UNEMPLOYMENT AND HEALTH IN CONTEXT AND COMPARISON: A STUDY OF CANADA, GERMANY, AND THE UNITED STATES OF AMERICA

by

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Abstract

This thesis explores how societal-level factors influence the relationship between unemployment and health. Using the Varieties of Capitalism (VOC) framework, hypotheses are developed that specify how this relationship may vary across high-income countries. Economies of high-income countries are grouped into coordinated market (CMEs) and liberal market (LMEs) economies that have different production specializations, but similar economic growth and aggregate levels of wealth and which are supported by different economic and labour market institutions. I hypothesize that these institutional differences give rise to different risks, types and durations of unemployment. After controlling for these differences, it is hypothesized that the higher levels of unemployment protection in CMEs will mediate the effect of unemployment on health compared to LMEs and that there will also be an interaction between skill level and unemployment and health. Two empirical studies are conducted to test these hypotheses using longitudinal micro-data from representative LME (Canada and the United States) and CME (Germany) countries. The first study examines the relationship between unemployment and mortality for Germany and the United States. The risk of death for the unemployed is higher in the United States compared to Germany, especially for the minimum- and medium-skilled unemployed. In Germany the risk of death for the unemployed is concentrated among East Germans. The second study examines the relationship between unemployment and self-reported health status for Canada, Germany and the United States. Across all countries unemployment is associated with poorer self-reported health status, but there is marked effect modification by educational status and by receipt of unemployment compensation. In particular, there is no association for the high-skilled unemployed in the United States, but for minimum- and medium-skilled unemployed those not receiving unemployment compensation have the highest risk of poorer self-reported health status. Policy makers should consider the effect on the health of the unemployed when designing programmes for the unemployed. Future research needs to examine the role that social programmes and in particular public transfers have in reducing health inequalities, not only among the unemployed, but also among workers in other work arrangements that may be harmful to their health.

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List of Symbols and Abbreviations

AIC – Akaike Information Criterion

BIC – Bayesian Information Criterion

BHPS – British Household Panel Survey

CASMIN – Comparative Analysis of Social Mobility in Industrial Nations

CME – Coordinated Market Economy

CNEF – Cross National Equivalent File

GSOEP – German Socioeconomic Panel

HR – Hazard Ratio

ILO – International Labour Office

ISCO88 – International Standard Classifications of Occupations (1988)

LFS – Labour Force Survey (Canada)

LME – Liberal Market Economy

OECD – Organisation for Economic Co-operation and Development

OPCS – Office of the Population Censuses and Surveys

OR – Odds Ratio

PSID – Panel Study of Income Dynamics

PY – Person Years

RE – Random Effect

RR – Relative Risk

SES – Socio-economic Status

SLID – Survey of Labour Income Dynamics

SRHS – Self-reported Health Status

VOC – Varieties of Capitalism

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Dedication

For my parents, Gary and Elaine McLeod.

This has been a long journey, but you have travelled it with me.

Chapter 1: Introduction and Scope of Dissertation

1.1: Motivation

Comparative health research is playing an increasing role in understanding the distribution of health inequalities within and between societies. Much of this research has looked at the relationship between the institutional and political organisation of societies and the corresponding average level of population health (Borrell et al. 2007; Espelt et al. 2008) and has attempted to characterize the structural or contextual features of a society that would lead to the best health outcomes within a society (Chung and Muntaner 2007; Navarro and Shi 2001). This research has emphasized the importance of welfare-regime type as the principal independent variable in explaining variation in health inequalities among countries. Welfare-regime typologies classify countries on the basis on which the state provides social and economic protection to its citizens. While there are many welfare-regime typologies (Bambra 2007), Esping-Andersen's (1990) typology that classifies countries into social democratic (universal provision), corporatist (class-based provision) and liberal or residual (mean-tested provision) regime clusters is the most common. Yet research using this typology has yielded mixed results in explaining the differences in health inequalities among high-income countries. Others have advocated that rather than focusing on broad based classifications of politics and institutions, comparative health research should focus on the role that society plays in providing resources to people and the effect that these resources, whether through public programmes or through cash transfers, have on reducing health inequality (Fritzell and Lundberg 2007; Lundberg 2008).

The main goal of this inquiry is to explore how societal-level factors can influence the relationship between unemployment and health. In particular, this research has three main objectives:

(1) to develop a set of hypotheses, based principally on the Varieties of Capitalism (VOC) framework (Hall and Soskice 2001), on how macroeconomic and institutional factors could affect the individual-level relationship between unemployment and health;

(2) to conduct a comparative study of the relationship between unemployment and mortality in Germany and the United States; and

(3) to conduct a comparative study of the relationship between unemployment and

self-reported health status in Canada, Germany, and the United States.

The determinants of population health have both contextual and compositional aspects in which the distribution of individual vulnerabilities and health inequalities are determined by and mediated through social, economic and physical environments (Dunn et al. 2006). While there is a long tradition of study into the relationship between unemployment and health, unemployment has almost always been conceptualized as an individual-level risk factor. Where context has been considered it has been to investigate whether the effect of unemployment on health is different during times or places with high unemployment compared with low unemployment (Beland, Birch, and Stoddart 2002; Martikainen, Maki, and Jantti 2007; Novo, Hammarstrom, and Janlert 2000). The unemployment rate has been viewed as a social mediator in which the experience of unemployment is different when large groups of individuals are unemployed and as a test of health selection in which the least healthy workers are more at risk of unemployment in times of low unemployment, while in times of high unemployment the risk of unemployment is generalized to healthy workers.

The role of context in the unemployment and health relationship goes far beyond the business cycle. Unemployment may influence health through material (e.g., loss of income) and psychosocial (e.g., loss of individual and social identity) pathways. These pathways are embedded in and influenced by societal context at every point, from determining who is unemployed (and who are labour market participants), the meaning of unemployment, the material effect of unemployment, and the future employment consequences of unemployment. Unemployment is not just an individual-level experience, but at its core a socially mediated one. In order to create a coherent framework that integrates both the contextual and- individual-level factors in understanding how unemployment affects health Hall and Sockice's (2001) Varieties of Capitalism (VOC) framework is used. This framework groups the economies of high-income countries into two variants of capitalism – coordinated market economies (CMEs) and liberal market economies (LMEs) – which have different economic and labour market institutions. Accordingly, the focus of this thesis is principally on how the contextual and institutional environment mediates the unemployment and health relationship through the material pathway.

1.2: Method of Inquiry

This research adopts a comparative study design and uses longitudinal individual-level data from three high-income countries – Germany, Canada, and the United States – that are representative of both CME and LME countries. The surveys used in this study are designed to study labour market, income, family and educational dynamics across the lifecourse and have produced a rich body of research relating these factors to health. In the United States, the Panel Study of Income Dynamics (PSID) has been used to examine the association between working conditions, marital transitions and income dynamics, on the one hand, and both mortality (Amick et al. 2002; Lillard and Waite 1995; McDonough et al. 1997; McDonough et al. 1999) and self-reported health outcomes (Haas 2006; Smith 2005), on the other. The German Socio-economic Panel (GSOEP) has been used to study the effect of unemployment on health impairments (Elkeles and Seifert 1993), the effect of income on health satisfaction and life expectancy (Frijters, Haisken-DeNew, and Shields 2005a; Frijters, Haisken-DeNew, and Shields 2005b) and differences in health inequalities between East and West Germans (Nolte and McKee 2004). The Survey of Labour and Income Dynamics (SLID) has been used to study health transitions in older Canadians (Buckley et al. 2006; Buckley et al. 2004) and the effect of contingent work on health (Tompa, Scott-Marshall, and Fang 2008).

German and American data have also provided a rich resource for comparative research on earnings and income dynamics (Burkhauser and Poupore 1997; DiPrete and McManus 1996; McManus and DiPrete 2000), and educational attainment (Daly, Buchel, and Duncan 2000; Szydlik 2002). There is little comparative research, however, that incorporates the Canadian data (Valleta 2005). Only a few studies have used these data to conduct comparative research into health inequalities (Burkhauser and Daly 1998; Rodriguez 2001; Sacker et al. 2007).

A challenge of conducting comparative longitudinal research is developing an analytic approach that is valid within and across study countries. There are more potential biases to consider in multi-country studies using cross national data than in single country studies. Indeed, the comparability of the study cohorts and the unemployment measures and the specification of the institutional environments across these countries lie at the crux of this research. Accordingly, developing the comparative study design and assessing the comparability of the study cohorts and measures warrants special attention.

The strength of comparative health research is that it allows examination of contextual-level and institutional-level determinants of health that do not (and in some cases cannot) vary within populations. It is only through comparative research that it can be determined how the distribution of health inequalities varies across populations.

This thesis is one of the first studies into unemployment and health that uses both a comparative and longitindinal approach. It adopts a longitudinal cohort design that can account for temporality in the unemployment and health relationship, consider exposure to unemployment throughout the lifecourse, and distinguish between the reciprocal effects of health on unemployment (health selection) and unemployment on health (social causation).

1.3: Plan of Thesis

Chapter 2 develops the conceptual framework and study hypotheses and places the relationship between unemployment and health into a comparative perspective. It begins by providing an overview of the emerging body of comparative health research that has sought to establish a link between societal and macroeconomic factors in explaining the variation in health inequalities among societies. The organizing typology – the VOC framework – that explains why institutional variation persists in the labour market among capitalist societies is introduced and extended to describe how variation in economic and social institutions among Canada, Germany and the United States may mediate the unemployment and health relationship. The pathways through which unemployment could influence health are explored and the methodological issues key to modelling this relationship are summarized. Applying the VOC lens to the unemployment and health relationship, the existing research on unemployment and mortality is reviewed to determine if this relationship is different by CME and LME. Finally, integrating the above sections, a set of hypotheses that specify how the differences in institutional factors among Canada, Germany and the United States could affect the unemployment and health relationship is developed. It is hypothesized that the effect of unemployment on health is mediated in CMEs compared to LMEs and that there will be differences in this relationship by educational status across CMEs and LMEs due to the greater degree of economic and social stratification by educational attainment in liberal market economies. The receipt of unemployment insurance, however, will mediate the relationship between unemployment and health. Unemployment insurance will be a stronger mediator in LMEs as the receipt of unemployment

insurance is a marker for strong labour force attachment and lowers the opportunity cost of waiting for a suitable job; the effect of unemployment compensation on the health of the unemployed in CMEs will be muted as unemployment benefits are also designed as income support for the long-term unemployed.

Chapter 3 describes the development of the data and study cohorts across the three study countries. The primary purpose of this chapter is to show that the cross-national survey data can be used to conduct comparative individual-level studies and that the cohort and variables developed will lead to valid inferences both within and across study countries. This chapter provides the justification that the data can support the analytic studies that follow in later chapters. It also describes the development of and key decisions in creating the cohorts and of the principal study variables, and concludes with an assessment of overall comparability and strengths and limitations of the data.

Chapter 4 presents a comparative study of unemployment and mortality between Germany and the United States for the period of 1984 to 2005. Using a discrete failure time model and controlling for a range of demographic, socioeconomic and health variables, the relationship between three measures of unemployment – current unemployment, months unemployed, and cumulative lifetime unemployment – and mortality is tested within each country. This chapter also explores if the relationship varies by educational status and gender and a series of baseline exclusions are applied that account for health selection into unemployment. The results of models across country cohorts are then interpreted in light of the hypotheses developed in Chapter 2 which specify how the relationship between unemployment and mortality could vary by institutional context.

Chapter 5 presents a comparative study of unemployment and self-reported health status among Canada, Germany and the United States. It covers the time periods of 1996 to 2005 for Canada, 1994 to 2005 for Germany, and 1984 to 1997 for the United States. The period covered varies among cohorts due to the differences in the years surveyed and the availability of the self-reported health status measure. This study is similar in conceptualization to the unemployment and mortality study, but with the greater statistical power of the self-reported health status variable it is possible to examine if the receipt of unemployment compensation modifies the relationship between unemployment and health. Random-effects logistic estimation is used to

examine the relationship between unemployment and self-reported health status. Both static and dynamic health models are tested with the inclusion of the same covariates and with the same education and gender stratifications and baseline exclusions as in the unemployment and mortality analysis. The results across the three countries are interpreted in light of the contextual-level hypotheses.

Chapter 6 concludes by synthesising and integrating the findings from the two empirical studies. The overall strengths and limitations of the study findings with respect to the robustness of the unemployment and health relationship are discussed. Whether the findings support the hypotheses that the unemployment and health relationship will be mediated in CMEs compared to LMEs and whether this mediation occurs through higher levels of unemployment protection and closer skill-occupation coordination in CMEs is assessed. The relevance of the findings to policy makers is also discussed and the potential of an ongoing research agenda in comparative health inequalities using cross-national survey data is presented.

Chapter 2: Unemployment and Health in a Comparative Perspective

2.1: Introduction

This chapter is about integrating two perspectives, that of unemployment as a risk factor for poor health and that of a comparative perspective, in describing how societal-level factors can influence the relationship between unemployment and health. This is accomplished by integrating the Varieties of Capitalism (VOC) framework that explains the persistence of different ways of coordinating the economies of high-income capitalist societies with research that examines the individual-level relationship between unemployment and health. From this, two related sets of hypotheses that are tested in the analytic chapters are developed: a set of compositional hypotheses focused on the individual-level relationship between unemployment and health; and a set of contextual hypotheses focused on how this relationship may vary across VOC economies.

2.2: Comparative Health Research

2.2.1: Comparative Health Research and Welfare Regime Typologies

This chapter starts with a review of the *Three Worlds of Capitalism* typology developed by Esping-Anderson (1990). This starting point is chosen because this is the typology most often used in international comparative studies interested in contextual influences on health. A grounding in this approach and the empirical literature behind it helps to highlight differences with the Varieties of Capitalism framework and the reasons the latter was chosen as the main theoretical framework for this research.

Esping-Andersen's classic welfare state typology groups high-income countries into three welfare regime clusters along the dimensions of decommodification (i.e., the degree to which individuals must rely on labour income for their own welfare) and social stratification (i.e., the extent to which this is based on class or gender (Esping-Andersen 1990; Esping-Andersen 1999)).

Means-tested assistance, modest universal transfers, or modest social-insurance plans dominate in countries labelled "liberal welfare states". Benefits are targeted to those at the bottom of the income and class spectrum. The consequence is that this type of welfare regime has minimal decommodification (i.e., people must work to rise above a minimal subsistence level). Canada, the United States, the United Kingdom, and Ireland are examples of countries that fall within this cluster.

In "conservative welfare states", benefit entitlements are more generous but are organized around the preservation of status differentials and the role of the family as the primary provider. Benefit entitlement is different for different occupational classes (e.g., manual workers versus civil servants). Social insurance typically excludes non-working wives, and family benefits encourage traditional family roles. France, Germany, and Austria are examples of countries that fall within this cluster.

The principles of universalism and decommodification of social rights are extended beyond the marginal worker to the middle and upper class in "social democratic welfare states". Benefit entitlement is not contingent on labour-market participation and is distributed equally among occupational classes. Manual workers tend to enjoy rights similar to those of white-collar workers, with benefit levels tied to earning levels. Denmark, Sweden and to a lesser extent the Netherlands are examples of countries that fall within this cluster.

Other authors have advanced typologies that revise the criteria on which welfare state regimes are defined to include measures of social inclusion, benefit replacement and poverty rates, political tradition and the expenditure on services and social transfers (Bambra 2007). These typologies have also been expanded to include the former communist eastern and the ex-fascist southern European countries and high-income countries in Asia.

Irrespective of the typology used, the essential argument is that regimes that provide greater access to decommodifying social benefits and services and have lower social and economic stratification will have better overall health outcomes and shallower health gradients (social democratic and to a lesser extent conservative or corporatist welfare regimes[1]), while regimes characterized by residual or means-tested welfare benefits and high levels of economic or social

[1] There is a profusion of terms used to describe welfare states. Throughout the chapter I use the terminology adopted by Esping-Andersen, but denote the alternative terminology in brackets where it applies to other research.

stratification will have poorer overall health outcomes and steeper health gradients (liberal welfare and southern and eastern European regimes) (Dahl et al. 2006; Fritzell and Lundberg 2007).

While ecological comparative studies have supported this ranking especially for child health outcomes (Chung and Muntaner 2006; Chung and Muntaner 2007; Navarro and Shi 2001; Navarro et al. 2006; Wennemo 1993), the findings from cross-sectional studies are mixed. Bambra, Eikemo and colleagues in a group of analyses using the cross-sectional European Social Survey (ESS) found no consistent pattern in health inequalities among conservative (or Bismarckian), social democratic and liberal welfare regimes, although southern and eastern regimes tended to have the greatest health inequalities. Income-related (Eikemo et al. 2008a) and education-related (Eikemo et al. 2008b) health inequalities were smallest in conservative regimes, but social democratic regimes had greater education-related health inequalities than liberal regimes, with the ranking reversed for income-related health inequalities; unemployment-related health inequalities were greatest in liberal regimes (Bambra and Eikemo 2009)[2], and no difference was observed among these three regimes in the likelihood of reporting poor self-reported health status (Eikemo et al. 2008c), or when self-reported health status was stratified by gender (Bambra et al. 2009).

Olsen and Dahl (2007) found that liberal (Anglo-Saxon), conservative (continental), and southern European regimes were not associated with lower levels of self-reported health, when compared to social democratic (Nordic) regimes, but that Eastern European regimes did have lower levels. Espelt and colleagues (2008) found no systematic differences in inequalities in self-reported health by social class across the same cluster of regime types, except for women in late democracies. Health inequalities by socio-economic status defined by overall family consumption, however, were higher for adolescents in liberal and Mediterranean welfare state countries, but not in conservative welfare state countries compared to social democratic countries (Zambon et al. 2006).

There are no longitudinal cohort studies examining health variations among high-income countries that have explicitly used a welfare regime typology. A number of studies have conducted longitudinal analyses of heath inequalities among European countries using the European Community Household Panel (Hernandez-Quevedo et al. 2006) including

unemployment-related health inequality (Cooper, McCausland, and Theodossiou 2006; Cooper, McCausland, and Theodossiou 2008).[2] But among these studies, no consistent pattern in income, education- or unemployment-related health inequalities by welfare regime type is found.

Dahl and colleagues (2006) provide some insight into why the observed ranking of health inequalities by welfare regime or country may diverge from the hypothesized ranking:

- social democratic countries have higher quality data, which could lead to a more precise ascertainment of the health inequalities;[3]
- socioeconomic constructs may have different meanings and also represent different social stratifications across countries (e.g. a lower skilled manual labourer in Sweden and in Portugal);
- lower absolute risks in health outcomes will necessarily lead to higher relative risks given comparable risk differences;[4]
- the welfare regime typology applied at a given point in time does not take into account the timing and historical development of a country's welfare state; and
- the greater of degree of decommodification is still not enough to counteract the negative health effects of relative deprivation due to psychosocial forces (i.e., relative deprivation gives rise to negative health outcomes through stress and dissatisfaction of being lower down in the social hierarchy).

Others have questioned the utility of broad-based regime clusters to explain variations in health inequalities among countries (Bambra 2007; Lundberg 2008). Lundberg states:

> So while the country clusters may be helpful for descriptive purposes, they are much less useful if we really want to open the black box and analyse what aspects of the welfare states that are of importance. Especially, if we are interested in linking welfare state characteristics to public health outcomes it will be much more fruitful to study aspects of like coverage and generosity in specific programmes and how these co-vary with public health outcomes rather than to merely relate country-cluster averages to each other (Lundberg 2008 p.2).

[2] These studies are reviewed in more detail in Section 2.4.4.
[3] This point falls under the general rubric of surveillance bias.
[4] The point is of particular relevance in that relative measures within a country may obscure large variations and differences in underlying health risks within groups across countries.

Lundberg outlines four features – coverage and generosity of cash transfer programmes (e.g., unemployment benefits, pensions) and the availability and quality of services (e.g., health care, education) provided – that may matter in reducing health inequalities. He argues that good cash programmes are not necessarily coordinated with good services programmes.

Building on Sen's capability theory of inequality (Sen 1999; Sen 1992), the role of the state is to provide control over resources (Fritzell and Lundberg 2007) and act as an enabler in providing equality of opportunity (Siddiqi et al. 2007). Moreover, for comparative health research to be policy relevant the specific mechanisms or pathways through which these factors can influence the health of populations and individuals must be identified.

2.2.2: Health Differences between Canada and the United States

The institutional variation between Canada and the United States is often lost in the larger cross-country comparisons of health outcomes that use established welfare typologies. Canada and the United States are grouped together as liberal welfare states,[5] but there are large differences in aggregate levels of health status and in health inequalities between these two countries.

A large body of research has made direct comparisons between the health of populations within the United States and the health of the populations within other countries. Many of these studies, motivated, in part by the more than two-year longer life expectancy in Canada (United Nations 2008), are comparative studies between Canada and the United States (Devereaux et al. 2002; Guyatt et al. 2007; Huguet, Kaplan, and Feeny 2008; Kunitz and Pesis-Katz 2005; Lasser, Himmelstein, and Woolhandler 2006; Manuel and Mao 2002; McGrail et al. 2009; Siddiqi and Hertzman 2007; Willson 2009). Most of these studies have focused on the differences in the organisation, financing, coverage, and provision of health care in the two countries as potential explanations.

Kunitz and Pesis-Katz (2005) conducted a review of studies that examined differences in mortality rates between Canada and the United States for those health conditions that can be

[5] Some typologies place Canada in a different welfare regime cluster than the United States based on a consideration of the provision of universal health care coverage (Bambra 2005). Scruggs, in a recent reanalysis of Esping-Andersen's decommodification index argues that Canada was basically misclassified (Scruggs and Allan 2006). In their analysis, Canada's decommodification score lies close to the mean and according to Esping-Andersen's criteria would have been classified as conservative regime rather than a liberal regime. These scores, however, are based on benefit levels in 1980 and so would not necessarily be reflective of the present.

attributed to the receipt of, or quality of, health care. With a few exceptions mortality outcomes were found to be better in Canada compared to the United States. This study also shows that the difference in life expectancy between Canada and the United States cannot be attributed to the lower life expectancy of African Americans compared to white Americans, and that for mortality from causes amenable to health care a persistent and growing gap emerged between white Americans and all Canadians in the early 1970s concurrent with the introduction of universal health insurance in Canada. Research using cross-sectional data from the Joint Canada/United States Survey of Health found that income-related inequalities were greater in the United Sates compared to Canada and that much of the difference can also be explained by differential access to health insurance by income in the United States (Huguet, Kaplan, and Feeny 2008; McGrail, van Doorslaer, Ross, and Sanmartin 2009).

Other authors (Siddiqi and Hertzman 2007) have argued that it is the overall differences in the nature and degree of each countries' social safety net (the health care system being but one aspect) that matter. In their analysis, the divergence of health outcomes in Canada and the United States over the last half century can be attributed to the slow and, at times, invisible development of institutional and societal factors that have led to a more equitable distribution of health-related resources within Canada compared to the United States.[6] This idea is further supported by a recent cross-sectional study using the Canadian National Population Health Survey and the American Panel Study of Income Dynamics that found that low levels of income and education were more predictive of a highly preventable disease (cardiovascular disease) compared to a less preventable disease (cancer) in the United States, but not in Canada (Willson 2009).

Income inequality may be a marker for the societal-level resources that affect population health status. Ecological studies of the effect of income inequality on population-level health have found a consistent relationship between income inequality and mortality in the United States, but not in Canada (Ross et al. 2005; Ross et al. 2000; Sanmartin et al. 2003); while cross-sectional and cohort studies have found mixed results for the effect of income inequality on individual-level health in Canada (Hou and Myles 2005; McLeod et al. 2003; Xi et al. 2005) and a consistent relationship in the United States (Lynch et al. 2004).

[6] They reference Pierson's idea that institutional change is big, slow-moving and invisible and can only be seen looking backward over a long period of time (Pierson 2003).

A comparison between cash transfers received by Canadians and Americans found that the expansion of social transfers and specifically the introduction of the social retirement benefit (the Guaranteed Income Supplement) explained most of the divergence of poverty rates between Canada and United States during the period 1974 to 1994 (Zuberi 2004). Differences in the unemployment insurance system also contributed to the reduction of poverty rates in Canada, but not in the United States.[7] A qualitative study of low income hotel workers in Vancouver, British Columbia and Seattle, Washington found that greater access to health care was only one of many differences associated with better health outcomes (Zuberi 2006). Low income hotel workers in Vancouver had more secure and better paying jobs, stable housing, access to more extensive publicly provided services, as well as cash transfers including transit and recreational opportunities, unemployment benefits, workers compensation, and child benefits.

These studies suggest that the differences in the provision of a broad range of public programmes and cash transfers between Canada the United States matter in explaining the difference in health status between Americans and Canadians. Nonetheless research establishing a definitive link between the availability of social programmes or the receipt of cash benefits in explaining health differences across these two countries has yet to be conducted using individual- and contextual-level data.

2.3: The Varieties of Capitalism Framework

The Varieties of Capitalism framework characterizes the different labour market institutions among high-income countries. This theorectical framework can be used to specify how the consequences of unemployment can vary by skill-profile, labour market attachment and other measures of socio-economic status across institutional settings.

Hall and Soskice (2001) assert that the economies of developed countries can be grouped into two distinct types of equilibria – liberal market economies and coordinated market economies – which reflect allocatively efficient production processes and have led to similar levels of economic growth and aggregate wealth among high-income capitalist societies. In other words, based on historical and institutional considerations, convergence to an *Anglo-American* style of organisation of production is neither inevitable nor optimal. Their approach is predicated on the

[7] Due to the reforms to the unemployment insurance system in Canada (see Figure 2.1) between 1990 and 1996 that reduced entitlements this may no longer be the case.

ideas of path dependency[8] and comparative economic advantage,[9] that together lead to a theory of comparative institutional advantage in which it is not only factor endowments, but also historically-dependent institutions that create comparative advantage.

Ebbinghaus and Manow (2001) outline the three central characteristics of this approach:

> (1) it is a systematic account of the functioning of the institutional components of economic systems,
> (2) it distinguishes *national models* of production and maps their comparative advantage, and
> (3) it seeks a micro-foundation of how institutions shape actors' behaviour and reinforce existing institutional structures (p.3).

In this approach the firm and production processes are placed at the centre of the model, and firms respond to the historical, social and institutional structures within which they operate in order to maximize the allocative efficiency of their production processes. This in turn creates a virtuous cycle as the firm now relies on these social institutions, including the type and quality of worker produced, in order to maintain its comparative advantage. The convergence on multiple equilibria has led to two distinct types of capitalist economies, liberal market economies in which production is coordinated through market mechanisms, and coordinated market economies in which production is organized through coordinating mechanisms like trade organisations and quasi-governmental bodies. Liberal market economies (LMEs) are characterized by flexibility and innovation in both production processes and the labour market; employees who have general and transferable skills are most highly valued. Coordinated market economies (CMEs) are characterized by stable but more complex production processes; workers who have skills specialized to specific areas of production are highly valued. The United States and Germany are considered the archetypical liberal market economy and coordinated market economy, respectively.[10] Canada is considered to be a variant of a liberal market economy, although it has higher levels of both employment and unemployment protection (see section 2.3.2) than the United States.

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[8] In other words, history matters not only to the development of institutions but also to the scope in which they are allowed to change when faced with similar fiscal and policy pressures (Pierson 2000).

[9] Comparative advantage refers to the gains in trade that can be made through product specialization due to the lower marginal cost of producing some goods compared to others (Krugman and Obstfeld 2003).

[10] Of high-income OECD countries, Hall and Sockice classify the United States, the United Kingdom, Australia, Canada, New Zealand, and Ireland as LMEs and Germany, Japan, Switzerland, the Netherlands, Belgium, Sweden, Norway, Demark, Finland and Austria as CMEs. France, Italy, Spain, Portugal, Greece, and Turkey represent an indeterminate case with some coordinating institutional features, but a deregulated labour market.

Estevez-Abe and colleagues (2001) show that in CMEs firms will be better able to induce employees to specialize in firm- or industry-specific skills when there is a high degree of both employment and unemployment protection as unemployment poses a greater danger (in terms of future losses) to workers that have skills that are not readily transferable to other production processes. This implies that in CMEs there is a higher liklihood of structural unemployment.[11] Conversely, for firms in LMEs, low levels of employment and unemployment protection will be optimal as firms require the flexibility to hire and lay-off employees according to the dictates of the market. Employees, too, will place less value on robust employment and unemployment protection as their skills are more readily transferable among firms. Unemployment is more likely to be short in duration and frictional or cyclical in nature.

2.3.1: Social Protection and Skill Profiles

There are four different types of skill-production profiles based on the degree of employment and unemployment protection, each with attendant reinforcing institutional arrangements (Figure 2.2) (Estevez-Abe, Iversen, and Soskice 2001). Employment protection (i.e, restrictions on terminating workers, even in the face of an economic downturn) encourages and protects firm-specific skill investments, while unemployment protection (i.e., measures that provide adequate earnings replacement until a suitable job within the same industry is found) encourages and protects industry-specific skill investment. In the absence of both high levels of employment and unemployment protection the optimal investment in training is in general skills that are readily transferable across firms and industries.

In the VOC framework high levels of employment and unemployment protection enhance a firm's ability to maintain its comparative advtantage in CMEs but not LMEs. This is in contrast to the neo-classical macoeconomic critique of high levels of employment and unemployment protection in which high levels of employment protection retards job creation by reducing the willingness of employers to hire workers as those workers will be difficult to terminate (OECD 2006), while high levels of unemployment protection raise workers' reservation wage (i.e., the lowest wage for which workers would be willing to offer their services) and increase the length of unemployment (Atkinson and Micklewright 1991).

[11] Structural unemployment is defined as unemployment that occurs because workers do not have the skills that are in demand; frictional unemployment occurs when a job exists for a worker but the worker cannot access the job due to geographic or other constraints; cyclical unemployment occurs when there is an excess supply of labour due to a downturn in the economy.

The clustering of skill and institutional arrangements around production processes leads to two distributional outcomes, one relating to wage inequality and the other to industry and occupational gender segregation. In CMEs the returns to vocational training (a principal form of firm and industry-specific skills) are greater than in LMEs. In LMEs there is a greater return to a high level of a general skilled education (i.e, college or a professional degree), while those without these qualifications tend to be relegated to lower wage service sector jobs. Thus in CMEs wage inequality across occupations and skill profiles will be less than in LMEs. Conversely, occupational gender segregation will be greater in CMEs compared to LMEs given the lower return on investment to both female workers and firms of firm- and industry-specific skills compared to male workers, given the likelihood of a career interruption related to raising a family. As a result in CMEs females are more likely to invest in general skills compared to males (Estevez-Abe 2005).

Szydlik (2002) provides a complementary perspective underscoring how the demand for different modal skill types in CMEs and LMEs creates an additional mechanism for economic and social stratification. He argues that in coordinated market economies[12] there will be a better educational-occupation match compared to liberal market economies due to the higher degree of coordination between vocational education and employment. There is a greater degree of labour market segmentation by income and job requirements in LMEs with a primary labour market characterized by a high general skill requirement (i.e., a university degree) and well paying jobs, and a larger secondary labour market characterized by low skill requirements and low paying jobs. The economic returns to education are greater in a LME, but there is also a greater risk of not achieving those returns through relegation to the secondary labour market.

In CMEs, the primary labour market centres on the need for firm- and industry-specific vocational skills with smaller secondary and tertiary labour markets for the low skilled and the high general skilled. The return to high general skills will be smaller in CMEs compared to LME, but wage inequality will be less given the larger demand for medium- (but specific-) skilled workers. Szydlik's research on returns to education and skill-occupation mismatch using the GSOEP and PSID provides support for these hypotheses, finding that there is a higher level of skill-occupational fit in Germany compared to the United States and that there is a greater earnings penalty for both the overqualified (i.e. high skilled but in a low skilled job) and those

[12] Szydilk makes the distinction between flexibility coordinated economies, deregulated economies and planned economies. For consistency I continue use the coordinated market and liberal market nomenclature.

with low skills in a low skill job compared with the medium and high skilled with an suitable skill-occupation fit in the United States (Szydlik 2002).

2.3.2: Unemployment and Employment Protection in Germany, Canada and the United States

Unemployment and employment protection are the central institutional mechanisms that may mediate the unemployment and health relationship. This may occur through influencing who is exposed to unemployment (i.e., who is in the labour market and their risk of unemployment) and through mediating the direct effects of unemployment on health (i.e., the material and career consequences of unemployment). Across high-income countries, there is large variation in the levels of unemployment and employment protection; in this section they are reviewed in detail for the three study countries.

2.3.2.1: Unemployment Protection

Unemployment protection relates to coverage of the unemployed (i.e., the proportion of the unemployed who receive unemployment compensation), the generosity of unemployment benefits in terms of net replacement rates of pre-unemployment income and in the duration of benefits, and whether the unemployed are required to take any job available or can wait until a 'suitable' job can be found (Estevez-Abe, Iversen, and Soskice 2001). More broadly, other state support and public transfers can also be viewed as unemployment protection, since income replacement for the unemployed can depend on other public transfers including social assistance, benefits for children including maternity or paternity benefits, and one-time payments for extraordinary expenses. Favourable tax treatment while unemployed, other public transfers and other forms of tax entitlements (e.g., refundable tax credits) can also increase the incomes of the unemployed.

In Germany there are two forms of unemployment benefits, namely unemployment insurance benefits and means-tested unemployment assistance that is now coupled with social assistance (Schneider 2004). Workers must be registered at the local unemployment office and actively engage in a job search in order to receive benefits. They can work up to 15 hours a week and earn a nominal sum without losing their benefit entitlement. Unemployment insurance benefits are available to workers with at least 360 days of insured employment in the previous three years and are payable for a maximum of 360 days for workers under 45 years of age,

increasing by step-wise age increments to 960 days for workers over 57 years of age. Benefit replacement is 67% of net income for workers with children and 60% for workers without children to a maximum of 94% and 84% of the average wage in 2001. Unemployment assistance is a means-tested benefit for workers with at least 150 days of unemployment in the past year, but without enough employment to qualify for unemployment insurance benefits or who have exhausted their unemployment insurance benefits. Benefits levels are 57% and 53% of net pre-unemployment earnings for workers with or without children, respectively. Prior to 2005 individuals not eligible for unemployment benefits or who have a household income below a minimum threshold could also receive social assistance. After 2005 unemployment assistance and social assistance were merged into one benefit and are no longer contingent on employment income (OECD 2006). Unemployment and social assistance benefits are not subject to income tax or social security contributions. Low-income unemployed in Germany are also eligible for a variety of other public transfers including a means-tested housing benefit and a universal child benefit (Adema, Gray, and Kahl 2003).

In Canada unemployment benefits are available through the federal Employment Insurance programme that provides benefits to eligible unemployed workers, parents on maternity or paternity leave and to some seasonal workers such as those who work in the fishing industry.[13] While the programme is federal in nature, eligibility requirements and maximum benefit durations vary by the regional unemployment rate with fewer qualifying hours required for eligibility and maximum benefit durations longer in high unemployment regions. In 2001, the replacement rate was 55% of the average weekly wage in the preceding 26-week period to a ceiling of $418 a week; benefits could be received for a maximum of 45 weeks depending on the local unemployment rate, number of qualifying hours worked and previous receipt of unemployment benefits. The maximum replacement rate in 2001 was 58% of the average wage and unemployment benefits were considered taxable income. There is also a small child supplement for low income families with children. Low-income unemployed may also be

[13] Between 1990 and 1996 a number of changes to Canada's unemployment insurance system took place that restricted benefit entitlement. These included increasing the number of weeks an individual had to work in low regions of unemployment in order to qualify for benefits, making workers who quit or were fired from their job ineligible for benefits, reducing the replacement rate to 50% for some users, and a 100% claw back of benefits for high-income repeat users. The system also changed from Unemployment Insurance to Employment Insurance as it also included maternity and paternity benefits. For consistency with Germany and the United States, I continue to use the term unemployment insurance.

eligible for means-tested tax credits and cash transfers for families with children, provincial social assistance benefits and federal and provincial sales tax refunds (OECD 1999).

In the United States unemployment benefits are jointly administered and funded at the federal and state level. Subject to federal guidelines, states set their own eligibility requirements and benefit levels and durations. States require a minimum level of earnings or number of weeks worked in the qualifying period. In general, benefit levels are around 50% of the workers' qualifying earnings to a maximum of 50% of the State's average wage; maximum benefit duration is usually 26 weeks but can be as long as 39 weeks in high unemployment areas (ORDP 1997). In Michigan, the state the OECD uses in international comparisons, the maximum replacement rate in 2001 was 46% of the average wage. Like Canada, unemployment benefits are considered taxable income. Low income unemployed may also be eligible for social assistance, cash transfers and tax credits for children, and food stamps, but may lose the earned income refundable tax credit[14] for low wage earners.

Taken together, the net income replacement rates for the unemployed from total public household transfers vary substantially across the three study countries (Table 2.1) (OECD 2009). Replacement rates are lower in the United States across all income and family types, especially for families with children due to both Canada and Germany having more generous programmes that provide tax credits and cash transfers to families with children. For example, a single person with no children earning 50% of the average wage prior to unemployment would have a net income replacement rate[15] of around two-thirds across the three countries (71% in Germany, 66% in Canada, and 64% in the United States). The net replacement rate rises to 95% in Germany and to 79% in Canada for a similarly-waged single person with two children, but falls to 61% in the United States due to the loss of the earned income tax credit. Germany's replacement rates are higher at lower levels of income than Canada's due to a low income housing subsidy and more generous welfare rates, while they are similar at average levels of income across all family types ranging from 60% to 91% for Germany and 64% to 85% for Canada. At 150% the average wage Germany maintains a replacement rate ranging from 60% to

[14] A refundable tax credit is credit that is paid to individuals even if they owe no income tax, and acts like a direct cash transfer.
[15] Net income replacement rate is the ratio of pre-unemployment post tax and transfer household income to post tax and transfer income in the first month in receipt of unemployment benefits. These scenarios assume a single earner in the household.

87%, while Canada's and the United States' replacement rates falls to between 46% to 70% and to 37% to 60%, respectively

The above paragraphs describe the maximum benefits levels that are available to the unemployed should they be eligible for unemployment insurance, but these scenarios may not reflect the experience of the typical unemployed who may not be eligible for unemployment benefits or who may receive less than the maximum entitlement. Individuals with weak labour force attachment – those working part-time or with short-term contracts – may be more likely to become unemployed, but less likely to receive unemployment compensation. Figure 2.1 depicts unemployed insurance beneficiaries as a percentage of the total unemployed drawn from the three study countries' labour force surveys. About 70% to 80% of the German unemployed received benefits during 1976 to 2000, while in the United States 30% to 40% of the unemployed received benefits. Canada presents a contrast; prior to the reforms to the unemployment insurance programme benefit levels were similar to those in Germany at around 70%, but after the reforms coverage levels are similar to those in the United States.[16] For the decade of the 1990s, Vroman and Brusentsev (2005) report that the coverage of unemployed was 76% for Germany, 60% for Canada, and 34% for the United States and that the average replacement rate was 48% for Germany, 45% percent for Canada, and 34% percent for the United States.

2.3.2.2: Employment Protection

Employment protection relates to how difficult it is to dismiss a worker. Employment protection is defined by the OECD as regulatory and legislative requirements pertaining to job separations for regular workers, the use of fixed-term contracts or temporary workers, and collective dismissals (OECD 2004b). The number of regulations is diverse spanning over 18 measures, which are summarized in Table 2.2. For regular employees (i.e., those not on a fixed-term or temporary contract), Germany has higher levels of employment protection than Canada and the United States (OECD 2004a). There are stricter standards for notification including the need to notify the local work council which can contest the dismissal in court, longer required notice periods, and the requirement to retrain or reassign employees. Workers unfairly dismissed may also be eligible for compensation or reinstatement. Germany has limitations on length of and type of work that can be covered under fixed-term or temporary contracts, while there are no

[16] Unfortunately Canadian surveys that include both unemployment and health measures are only available from 1994 (NPHS) and SLID (1996), so I am not able to examine whether the change in unemployment benefit coverage had an effect on the health of the unemployed within Canada.

limitations in Canada and the United States. All three countries have requirements to notify employee organisations and governmental authorities in the case of collective dismissal, but the threshold for dismissals to be considered a collective dismissal is lower in Germany and the local work council has the right to contest the dismissal. Notably, Canada has more generous severance requirements than Germany. The difference between Canada and the United States is more modest, but Canada has slightly stricter notice and severance pay requirements compared to the United States, which has none. Unfair dismissal in both countries, in general refers to dismissal due to discrimination, but there is greater recourse to compensation and the possibility of reinstatement in Canada.[17]

2.3.3: Post-unemployment Trajectories in CME and LME Countries

Post-unemployment labour market trajectories may also be a key pathway through which unemployment can affect health. The literature that has examined post-unemployment career and earning trajectories is collectively known as the labour market scarring literature (Jacobson, Lalonde, and Sullivan 1993; Kuhn 2002; Ruhm 1991; Topel 1990). Unemployment can lead not only to the loss of immediate employment income but also may harm a worker's future career and earning prospects though reemployment in a job that pays less or is less desirable (Brand 2006) and through the increased likelihood of future unemployment (Eliason and Storrie 2006). Long periods of unemployment may also lead to skill deterioration and the loss of productivity. Post-unemployment career trajectories may also differ by institutional environment and by the strength of employment and unemployment protection (DiPrete and McManus 1996; Gangl 2006; Gangl 2004).

The theoretical underpinnings of how unemployment and employment protection could affect post-unemployment labour market trajectories lead to mixed predictions on whether these protections protect future career and earning losses. High unemployment protection reduces the immediate income effects of unemployment and enables the unemployed to wait for a 'suitable' job (i.e., a job with an acceptable occupational-skill match and of comparable pay to the pre-unemployment job). Conversely, high unemployment protection may reduce the search intensity for a new job increasing the time unemployed, thereby leading to skill deterioration and loss of worker productivity. High levels of employment protection may mean that in order to downsize

[17] Based on the 18 employment indicators the OCED constructs a weight scale from 0 (lowest) to 6 (highest) reflecting the strength of employment protection. On this scale the United States scores 0.8, Canada 1.1 and Germany 2.5. No country scores higher than 3.5 (Portugal) (OECD 2004c).

or close a plant, employers may be required to partner with local authorities, unions and workers to facilitate or mitigate the consequences of the plant closure and this may lead to a smoother transition for the terminated workers (Kuhn 2002). But high levels of employment protection may reduce the outflows from unemployment as employers will be less likely to expand employment given the potential for future dismissal costs (OECD 2004b). High levels of employment protection may also increase the likelihood that when an employer terminates a worker, it is permanent.

Post-unemployment earning deficits have been found in economies of all high-income countries (Eliason and Storrie 2006; Gangl 2006; Gangl 2004; Jacobson, Lalonde, and Sullivan 1993; Kuhn 2002). No countries have adopted strategies or developed institutional arrangements that entirely mitigate the negative effects of post-unemployment earning trajectories. There is, however, a growing body of evidence that shows that labour market scarring is worse in LME countries, and in particular the United States, compared to CME countries. In a series of studies that examined post-unemployment trajectories across ten high-income countries, including Germany, Canada and the United States, Kuhn (2002) reports that the likelihood of unemployment after job displacement was lower in countries with high levels of employment protection compared to the United States, while earning losses were greater in Canada, the United States and the United Kingdom (LME countries, but also countries with high wage inequality) for workers with long-standing tenure.[18] Gangl (2004), in a comparative analysis of Germany and the United States, finds that the receipt of unemployment benefits significantly improves post-unemployment earnings in both the Germany and the United States. Overall, the greater coverage and benefit generosity of unemployment compensation explains the lower levels of labour market scarring in Germany compared to in the United States, but the unemployed in the United States who receive benefits (albeit a minority) have better post-unemployment outcomes that their German counterparts. In a second analysis Gangl (2006), drawing on data from 12 European countries and the United States, finds that once the temporarily laid-off (e.g. short-term plant closures) are removed from the data, the unemployed

[18] In contrast to standard the macroeconomic critique of strict labour market regulation (e.g., (OECD 2004b) (OECD 2006)), Kuhn and colleagues conclude that strong employment protection laws appear to reduce the incidence of an unemployment spell for those who lose their job involuntarily. However, they caution that high levels of protection may only protect those who already have a job and may retard the earnings and employment prospects of new workers or those with weak labour force attachment (e.g., younger workers and women).

in LME countries have similar durations of unemployment as those in CME countries, but poorer employment and earning outcomes.

2.3.4: Critiques and Alternatives

The Varieties of Capitalism (VOC) approach is not the only framework that seeks to explain the persistence of institutional variation among developed economies. Indeed, this approach, situated at the nexus of economic theory on the nature of economic growth and production arrangements and political science theory on development and persistence of institutions, has been critiqued by both economists and social theorists. Neo-classical (Watson 2003) and transaction cost (Allen 2004) perspectives take issue with the development and persistence of multiple allocatively efficient equilibria[19] among high-income countries, while the structuralist critique focuses on the lack of emphasis on class relations and power structures in explaining institutional variation (Coates 2005).

It is worthwhile to contrast Esping-Andersen's (1990) *Three Worlds* and VOC typologies as it is Esping-Andersen's typology that has been used most often to examine labour market structures and attendant government- and firm-level supports (Berthoud and Iacvou 2002; Gallie and Paugam 2000; Muffels and Fouarge 2002). While both are grounded in a historical institutional approach, in the *Three Worlds* typology it is the legacy of a historical class-based struggle in establishing various degrees of social protection that explains different societal trajectories. In the case of the VOC typology it is the complementarities and reinforcing comparative advantages that arise among different ways of organizing the production process and the social welfare state that explain the different trajectories.

There are distinct ontological differences between the two approaches. VOC is a rational choice-based approach which places firms and individuals at the centre of the model and the distribution of skill and wage inequality across CMEs and LMEs is largely an epiphenomenon that results from the two different equilibria. In contrast, inequality, class differences, and the state's response are at the core of the *Three Worlds* approach. Accordingly, the application of the VOC

[19] Rather the argument is that the imposition of state-mandated institutions on the market introduces a set of distortionary effects that lead to sub-optimal economic outcomes and that in the absence of state interference in the market these institutions would cease to exist and the convergence to a liberal-market economy equilibrium would occur.

framework may lead to a different understanding and interpretation of how social and economic processes affect health inequalities.

The VOC approach has been chosen to be the principle organizing framework for two reasons. There is increasing empirical support for its principal conclusion relating to the existence and persistence of two equilibria (Allen, Funk, and Tuselmann 2006; Hall and Gingerich 2004). In addition, it is one of the more tractable frameworks for developing a set of testable hypotheses on how context might influence the relationship between the labour market and health.

2.4: Unemployment as a Social Determinant of Health

2.4.1: Linking Unemployment to Health

Building on Evans' and Stoddart's (2003) health production framework, Figure 2.4 motivates how institutional context could affect the individual-level relationship between unemployment and health. At the individual level, unemployment may affect health through three individual-level pathways or dimensions:[20] material, in which the loss of income reduces the ability to invest in health (e.g., access to health care, housing, education, nutrition, physical activity); psychosocial, in which the loss of status and identity, increased feelings of insecurity, and family or role conflict lead to increased psychological stress which in turn affects health largely through the activation of physiological and nervous system responses (Mustard, Lavis, and Ostry 2006); and, indirectly through the diminishment of future economic or labour market success (i.e., a spell of unemployment leading to an increased likelihood of taking a job that has worse income or working conditions or a job that introduces or magnifies a skill-occupation mismatch). Additionally different types of unemployment may have a differential impact on the other components of the model. Specifically it is expected that cyclical unemployment (i.e. related to the macroeconomic cycle) would have less effect on health than structural unemployment (i.e., related to the mismatch between skills demanded by firms and skills that unemployed workers are able to supply). Indeed in the case of industries characterized by periods of regular and anticipated cyclical unemployment it may be that unemployment would not, at least for those working voluntarily in these arrangements, have any negative effect on health.

[20] I use the term dimension to connote that these pathways do not operate in isolation with another, but rather in concert or in interaction on health. Further, these dimensions operate within a temporal one which enables us to consider how unemployment influences health over the life course, either at a point in time (at a specific age) or through cumulative exposure.

This individual-level model is embedded in a societal (i.e., economic, institutional and cultural) context which has the potential to mediate (either mitigate or magnify) any of the individual-level pathways. For example, the provision of universal health care insurance in Canada and Germany could, at least partially, mitigate the material pathway between unemployment and health, while the largely firm-contingent provision of health insurance in the United States for those covered neither by Medicaid (the poor), nor Medicare (the elderly) could magnify the material pathway between unemployment and health through the direct loss of health insurance and access to health care or through the loss of additional income resulting from the need to purchase health insurance or health care.

2.4.2: Varieties of Capitalism and Unemployment-related Health Inequalities

Building on Figure 2.4 the Varieties of Capitalism framework enables us to specify how the institutional environment can affect the unemployment and health relationship. Hall and Soskice concisely summarize the features of CME and LME that could give rise to differences in health inequalities.

> In liberal market economies, the adult population tends to be engaged more extensively in paid employment and levels of income inequality are high. In coordinated market economies, working hours tend to be shorter for more of the population and incomes more equal. With regard to the distributions of well-being, of course, these differences are important (Hall and Soskice 2001 p.21).

The compression of wage-inequality and the skill-occupational equilibrium that targets the modal medium-skilled worker implies that overall socio-economic gradients will be shallower in CME countries, while the skill-occupation equilibrium that reinforces economic inequality and social stratification may lead to the steepening of these gradients in LME countries.[21] Moreover, the institutional supports in CMEs for the unemployed and the low-waged may further attenuate the socio-economic gradients in health.

Taken together, these insights lead to two main hypotheses of how the institutional environments across CME and LME may mediate or magnify the effect of unemployment on health:

- Higher levels of employment and unemployment protection will mitigate the effect of unemployment on health in CMEs compared to LMEs. These institutional supports in CMEs provide direct material support to the unemployed and reduce the negative long-term effects of unemployment on career earnings. This also leads to the supplementary

[21] In that the potential for gains are greater, but then so is the potential for loss.

hypothesis that the receipt of unemployment benefits will also mediate the effect of unemployment on health within countries.

- The different occupational-skill equilibria will lead to effect modification in the unemployment and health relationship by skill level. There will be a steeper education-health gradient in LMEs compared to CMEs and the health-risks of unemployment will also be greater for those of lower skill. Further once the CME differences in compositional (individual-level) characteristics are accounted for, the effects of unemployment on health will be lowest in the medium skilled in CMEs as the institutional environment is targeted towards these workers.

In CMEs, it is unclear how effective the institutional environment will be in mediating the unemployment and health relationship in the long-term unemployed. While there are institutional supports for the long-term unemployed that mitigate some of the material effects of unemployment, long-term unemployment has the potential for permanent exclusion from the active labour market. Accordingly, the psychosocial effects of unemployment on health may dominate. In LMEs, on the other hand, there would be both material and psychosocial effects on the health of the long-term unemployed, but fewer long-term unemployed given the incentive for the long-term unemployed to return to employment or exit out of the labour force.

2.4.3: Health Selection versus Social Causation

The framework also clearly indicates the dual relationship between health and unemployment; unemployment may determine health, but health is also a determinant of labour market success. The debate around health selection into unemployment is not new (Bartley 1988), but it is only recently, using longitudinal study designs and appropriate statistical methodology, that the causal arrows between unemployment and health have begun to be disentangled (Burgard, Brand, and House 2007; Elkeles and Seifert 1993; Gerdtham and Johannesson 2003; Korpi 2001; Leigh 1987). There are sound theoretical reasons and empirical evidence to support the contention that health selection into unemployment will account for some of the association between unemployment and health. Poor initial health or the experience of a negative health shock is strongly associated with unemployment or labour force exit (Arrow 1996; Riphahn 1999). The healthy worker effect (e.g. health selection *into* employment) is a also a well established phenomenon in occupational health research in that workers report better health outcomes when compared to general populace (Dahl 1993). Good health (or at least some minimal level

of health) is a requirement for productive employment.

Health selection into unemployment occurs because firms base layoff decisions, in part, on marginal productivity in which the least productive and the least healthy workers (in so far as productivity is related to health) are the first terminated with firms progressively laying off more productive and more healthy workers as demand for labour contracts. Comparisons of the unemployment and health relationship during times of high unemployment and low unemployment (Iversen et al. 1987; Martikainen and Valkonen 1996; Martikainen, Maki, and Jantti 2007; Novo, Hammarstrom, and Janlert 2000) or across areas of high and low unemployment (Beland, Birch, and Stoddart 2002; Lavis 1998) and natural experiments such as plant closure studies (Eliason and Storrie 2006; Hamilton et al. 1993; Keefe et al. 2002; Sullivan and Wachter 2007) are an attempt to account for this form of health selection.

Mass unemployment and plant closures may have different effects on health than singular or small scale job loss. Plant closures and mass layoffs require a longer period of notice in most jurisdictions and there are often additional measures to mitigate the effect of job loss including extra severance and buyout provisions, retraining and labour activation measures. Governments may also step in with additional measures to create jobs or otherwise mitigate the impact of job loss. Mass unemployment may create solidarity among those losing a job and reduce the stigma of job loss. Mass unemployment can also have contextual effects at the community level rather than at the individual level as it can represent the loss of financial and other resources in the community (e.g. a major employer closing down in a one-industry town) which leads to lower aggregate community income through the loss of the working-age population (the workers downsized, but also the associated services to support them) as they leave to search for other economic opportunities. Plant closure studies and studies comparing the effect of unemployment on health between places or times of high of unemployment compared to those of low unemployment may not be an accurate test of the health selection hypothesis across all types of unemployment.

At the same time there is also health selection out of unemployment. The relationship between unemployment and poor health status at a given point in time can be partially explained in that poorer health is related to a longer duration of unemployment (Korpi 2001; Stewart 2001). Research that has looked at the effect of unemployment on health while controlling for health

selection has yielded mixed results with some studies finding that the effect of unemployment on health is robust to controls for health selection (Eliason and Storrie 2007; Gerdtham and Johannesson 2003; Kerkhofs and Lindeboom 1997; Kiuila and Mieszkowski 2007; Korpi 2001; Leigh 1987; Rodriguez 2001) and others finding that the relationship is attenuated and no longer statistically significant (Ahs and Westerling 2006; Elkeles and Seifert 1993; Frijters, Haisken-DeNew, and Shields 2005a; Martikainen, Maki, and Jantti 2007).

Both health selection into unemployment and health selection out of unemployment may be modified by institutional arrangements. High levels of unemployment protection creates an incentive for individuals in ill health to remain unemployed rather than exiting the labour force or returning to employment, while in LMEs lower levels of unemployment protection means that the ability for individuals in ill health to remain unemployed is circumscribed and they may be more likely to exit the labour force or (if able) return to work.[22]

An argument can be made that higher employment protection will also have an effect on health selection into and out of unemployment. Health selection into unemployment may be less likely in countries with high levels of employment protection as firms are constrained in their ability to lay off the least productive workers. This constraint will also reduce the firm's willingness to re-employ or hire new workers. As such the standard theory of labour demand would lead to the conclusion that the effects of high employment protection would be ambiguous on health selection into or out of unemployment.

The application of the VOC framework provides a different interpretation given that in CMEs labour demand and labour supply are coordinated through non-market mechanisms. Because firms require specific skills from labour to engage in the specialized production processes characterized by CMEs the difference in productivity between the penultimate and last (marginal) worker will be small. When firms dismiss workers they are choosing between similarly skilled workers for whom there will be small differences in productivity. And as such the effect of high employment protection on productivity-related health selection into and out of unemployment will be less.

[22] The same incentive effects of high unemployment protection also exists for the unemployed who are healthy, but I contend that the ill unemployed are more likely to take advantage of the decommodification effects of high unemployment protection than the healthy unemployed. Moreover, even if the ill unemployed are unable to work they may still be able to meet the job search and activation requirements in order to continue to receive unemployment benefits. In LMEs, this incentive is much smaller, and so the unemployed unable to work due to ill health would be more likely to exit the labour force.

Thus in CME countries there will be less health selection into unemployment given high levels of employment protection, but there may be greater health selection out of unemployment given the high levels of unemployment protection. Moreover, if the institutional environment in CMEs is effective in mitigating the effect of unemployment on health (i.e., the social causation hypothesis), the residual association between unemployment and health will be due to selection.

2.5: Unemployment and Health in Context

The above sections have articulated the ways in which institutional context could affect the individual-level relationship between unemployment and health. This section reviews the comparative studies that have examined differences in unemployment-related health inequalities by welfare-regime type or CME and LME countries. It also categorizes by CME and LME all cohort studies that have examined the relationship between unemployment and mortality to test whether the relationship is mediated by institutional setting.

2.5.1: Comparative Studies of Unemployment and Health

Bambra in a cross-sectional analysis (Bambra and Eikemo 2009) applied Ferrera's (1996) welfare regime typology to examine whether the relationship between self-reported health status and limiting longstanding illness and unemployment varies by welfare regime cluster using the European Social Survey. In age-standardised models they report that the unemployed in liberal (Anglo-Saxon) welfare regimes tended to have the highest odds ratio of poor or fair self-reported health for men (OR 3.0 95% CI: 1.9-4.6) and for women (OR 2.8 95% CI: 1.6-4.7), but that men (OR 2.7 95% CI: 2.2-3.4) in conservative (Bismarckian) regimes and women (OR 3.0 95% CI: 2.3-4.0) in social democratic (Scandinavian) regimes also had high risks. The risks in the Southern and Eastern welfare regimes were the lowest for both men and women and across health outcomes.

Two other studies using longitudinal data have also examined how the relationship between unemployment and health varies across European countries (Cooper, McCausland, and Theodossiou 2006; Cooper, McCausland, and Theodossiou 2008). Cooper and colleagues conducted two related studies examining the relationship between current unemployment and duration of good health (defined as not reporting any physical or mental health problems or illness or disability) among 14 European countries using the European Community Household

Panel (ECHP)[23]. Using an accelerated-failure time (AFT) model and a discrete-failure time (DFT) model they find a statistically significant risk of exiting good health due to unemployment for most countries and marked variation across countries in the magnitude of the risk estimates. There is no discernable pattern to their results when a welfare regime or political economy lens is applied to their results and there is considerable variation in the risk estimates and ranking of study countries across statistical methodologies. In the AFT analysis Denmark (HRR 4.1) and the Netherlands (3.6) – CME or social democratic – countries have the highest hazard ratio of the unemployed exiting good health, while France (1.1) , Belgium (1.2), Italy (1.2) and UK (1.5) – a mixture of LME, CME or conservative and liberal welfare state regimes – have the lowest or not statistically significant hazard ratios. In contrast in the DFT model Greece (2.0) and Austria (2.1) have the highest odds ratio of the unemployed exiting good health, while Netherlands (0.92), Denmark (0.97), and Belgium (1.1) and Finland (1.1) have the lowest risk. Germany in both models tends to represent a middle case with a hazard ratio of 1.5 and odds ratio of 1.2.[24]

It is difficult to draw comparisons across the Bambra and Cooper studies given that they have different study designs and health measures. Cooper's health measure is constructed to account for health selection into unemployment and they account for a broad range of confounders, while Bambra's study is cross-sectional and standardized for age. Given the heterogeneity of design, method and results across the three studies the evidence for variation in the relationship between unemployment and health across European welfare regimes is inconclusive.

2.5.2: Studies of Unemployment, Unemployment Compensation and Health

Only a few studies have examined whether the direct receipt of unemployment benefits and public transfers (such as welfare or social assistance) ameliorate the effect of unemployment on health in single country and cross country studies (Bolton and Rodriguez 2009; Rodriguez 2001; Rodriguez, Frongillo, and Chandra 2001; Rodriguez, Lasch, and Mead 1997; Strandh 2001). Rodriguez and colleagues have conducted a number of studies using American health and household surveys including the PSID to examine whether the receipt of unemployment benefits moderates the effect of unemployment on self-reported health status, depression, BMI and

[23] The ECHP is a longitudinal household panel survey covering 14 West European countries spanning 1994 to 2001. Germany's contribution to this survey was taken from the GSOEP.

[24] A case could be made based on the DFT results that social democratic countries collectively have lower odds ratio, but this is not supported in the AFT analysis. While the authors do not reconcile the results across the two analyses, the DFT model adjusts for group-specific unobserved heterogeneity and the AFT model does not.

health-related behaviours. In a cross-sectional analysis using the 1987 wave of National Survey of Families and Households, they found that those currently unemployed and in receipt of welfare benefits reported higher levels of depression and more days depressed in the week compared to employed controls. Those unemployed and not receiving any welfare or unemployment benefits reported a smaller, but still statistically significant increase in the depression measures, while those unemployed and in receipt of unemployment benefits did not report different levels of depression compared to the employed (Rodriguez, Lasch, and Mead 1997). In a second longitudinal analysis, women in receipt of unemployment benefits in 1987 reported lower levels of depression compared to the employed in 1992, but no other significant differences in depression were observed among the unemployment and benefit groups compared to the employed (Rodriguez, Frongillo, and Chandra 2001). More recently Bolton and Rodriguez used the 1999 and 2001 waves of the PSID to study whether the receipt of unemployment benefits moderated the effect of prior unemployment on changes in BMI and smoking and drinking in a group of re-employed individuals compared to a continuously employed control group (Bolton and Rodriguez 2009). They found that the unemployed who did not receive unemployment benefits were 1.8 times more likely to report an increase in alcohol consumption and 1.7 times more like to report a decline in BMI, but that no associations were observed for the unemployed who received unemployment benefits.

Using an early version of the cross-national equivalent file[25] (CNEF), Rodriguez (2001) also examined whether the receipt of means-tested (i.e., welfare or social assistance) and unemployment benefits mediated the relationship between unemployment and self-assessed health[26] in Germany, United Kingdom and the United States over a three year period (1985-1987 for the PSID and 1991-1993 for Germany and the United Kingdom). Regular unemployment benefits moderated the relationship between unemployment and health in the United Kingdom (OR 1.3; 95% CI: 0.8-2.1), Germany (OR: 1.1 95% CI: 0.9-1.4), and the United States (OR 1.7 95% CI: 1.0-2.9) compared to the unemployed in receipt of means-tested benefit (UK OR 1.6 95%CI:1.1-2.4; GER OR 2.2 95% CI: 1.1-4.4; USA OR 2.4 95% CI: 1.4-4.1). An association

[25] The CNEF is a set of harmonized files spanning the PSID, GSOEP, SLID and other surveys. See section 3.2.4 for more detail.

[26] The self-assessed health outcome was defined as fair or poor self-reported health status in BHPS and the PSID States, and with a similar variable derived from the health satisfaction variable in the GSOEP as self-reported health status was not asked until 1994 in the GSOEP.

was also observed between the unemployed not in receipt of any benefits in the United States (OR 1.6 95% CI: 1.0-2.4), but not in the United Kingdom and Germany.

The studies conducted by Rodriguez and colleagues have a number of strengths in that almost all were longitudinal cohorts, enabling the appropriate temporal sequencing from exposure to unemployment to health outcomes, as well as consideration of baseline or prior health status. The studies also controlled for a range of other variables that may confound the relationship between unemployment and health including age sex, marital status, socio-economic status and prior employment history. However the longitudinal studies had only one period of follow-up which meant that unmeasured individual-level effects could not be modelled and as such residual or unmeasured confounding cannot be ruled out. Further the different groups of unemployed tended to be small in size, ranging from between 35 to 400, implying that formal statistical testing differences among unemployed groups would not likely yield statistically significant differences.[27]

Sweden,[28] like Germany, has two forms of unemployment compensation: a more generous benefit for individuals who have paid into an unemployment insurance fund and have worked five of the prior twelve months that pays up to 75% pre-unemployment earnings and a secondary, less generous, fixed cash benefit of about one-third the maximum payout of the more generous benefit. Strandh (2001) studied the effect of the two benefit systems and participation in labour market activation programmes on the mental health of unemployed in Sweden using a longitudinal survey of a national random sample of unemployed individuals. He found that in both cross-sectional and longitudinal analyses the receipt of the more generous unemployment benefit led to higher levels of mental health (defined by the 12-item version of the General Health Questionnaire)[29] compared to the receipt of no unemployment benefits, but the receipt of

[27] The argument here is that for effect of unemployment benefits on the unemployed to be definitive it is the contrast between the two unemployed groups that matters and not just significance of the difference between unemployed groups and the employed control group. Otherwise the interpretation of results can be driven by small differences in similar effect sizes and confounded by differences in sample size among the exposed groups. In the case of the United States, the unemployed group not in receipt of unemployment benefits is always larger than the unemployed group in receipt of unemployment benefits and thus given a similar effect size the results on the former group is more likely to be statistically significant.

[28] In Sweden unemployment and income protection is greater than in Germany particularly at the lower end of the income distribution. For example a couple with two children earning 50 of the average wage pre-unemployment would experience no difference in their household income while unemployed as both the low waged and the unemployed are provided income subsidies to reach a minimum income (OECD 2009).

the less generous cash benefit did not confer any advantage. Moreover, labour market activation related to workplace participation (volunteer work experience at a regular workplace) also conferred an advantage, but other types of volunteer work experience and vocational training did not. Strandh's study supports the hypothesis that unemployment affects health through both the material and psychosocial pathways, both of which may be amenable to intervention.

2.5.3: Unemployment and Mortality in CME and LME Countries

Population-based cohort studies that examined the relationship between unemployment and mortality in coordinated and liberal market economies were reviewed to investigate if the extant literature supported a difference in the relationship between unemployment and mortality by CME and LME. Studies were identified through a search strategy that built on a systematic review of published studies to 1998 (Lavis et al. 2001) and supplemented by a review of known study references, Web of Science citations,[30] Medline and Google Scholar searches. Studies were included if they were a population-based cohort study or a plant closure study that looked at the individual-level relationship between unemployment and mortality and were published in a peer-reviewed format (journal or book), or were a research report or working paper from a university or research institution (e.g., National Bureau of Economic Research). Studies that looked at aggregate-level relationships (i.e., the relationship between the unemployment rate and mortality) or those of clinical or patient populations were not included. Studies that grouped other labour force statuses with the unemployed were also not included (e.g. studies that included those on disability pensions in the unemployed (Johansson and Sundquist 1997) or those otherwise not working (Franks, Clancy, and Gold 1993)). Studies were classified into CME and LME clusters and were reviewed for study methodology and statistical method, cohort construction, time period and follow-up, measurement of unemployment, adjustment for confounders or covariates and study results.

Tables 2.3 and 2.3 provide a high-level summary of the study results. Results are summarized for the entire cohort (men and women together) and for men and women and younger and older workers separately. The unemployment measures used in the studies were grouped five ways:

- Current unemployment (CU) defined as being unemployed on the day of survey or census;

[30] I used the Web of Science function that links a paper to all articles that cite that paper.

- Short-term unemployed (STU) defined as being unemployed one to three months at or previous to baseline;
- Long-term unemployed (LTU) defined as being unemployed longer than four months at or prior to baseline or over more than one measurement period;
- Plant closure unemployment defined as unemployment due to plant closure or mass downsizing; and,
- Ever unemployed (EU) defined as any unemployment not otherwise specified.

Risk ratios or effect sizes are summarized as 'none' (no statistically significant relationship between unemployment and mortality), 'low' (a statistically significant relationship between 1.0 to 1.5), 'medium' (a statistically significant relationship between 1.5 and 2.0) and 'high' (a statistically significant relationship greater than 2.0). Terminology and classification cut-points were chosen to reflect the prospect that statistically significant risk ratios close to one may be due to unmeasured confounding (Fewell, Davey Smith, and Sterne 2007). This is particularly the case for some studies in this review as they did not control for variables that are likely confounders in the unemployment-mortality association such as socioeconomic status or prior health status. Full results, including detailed information on cohort, data and follow-up period, analytic approach, measure of unemployment, covariate adjustment, and study results are found in appendix tables B1 for CME countries and table B2 for LME countries.

The focus here is on all cause mortality, but the review includes two American studies that examined all injury-related mortality are also included (Cubbin, LeClere, and Smith 2000; Kiuila and Mieszkowski 2007); studies that examined detailed cause-specific analysis are not included in the synthesis (e.g., studies that examine the relationship between unemployment and suicide (Kposowa 2001; Lewis and Sloggett 1998; Norstrom 1988)), although these results are still included in the appendix tables. Another study from Italy (Costa and Segnan 1987) is also not included in the synthesis as Italy is not considered either a CME or LME country.

Overall 36 studies were included in the synthesis, 19 from CME countries and 17 from LME countries. Twenty-nine of the 36 studies were conducted in four countries (LME: 9 USA, 6 UK; CME: 8 Sweden, 6 Finland). Two studies were conducted in New Zealand (LME) and two in Denmark (CME). The remaining three studies were conducted in three CME countries – Germany, The Netherlands, and Switzerland.

Studies largely used population-representative survey data, census data, or linked administrative data. In the USA, four of the studies used data from the National Health Interview Survey, two used data from the Current Population Survey, two used other survey sources (the PSID and the National Longitudinal Survey of Older Men) and one was a plant closure study that used firm administrative data and unemployment records. In the UK, four of the six studies were conducted using the Office of the Population Censuses and Survey (OPCS) longitudinal study and two studies were drawn from other survey data (the British Panel Household Panel Study and the British Regional Heart Study). In Sweden, five of the nine studies were conducted using the Swedish Survey of Living conditions, two used a twin-cohort drawn from all twins born between 1928 and 1958, and the final study was a firm-closure study that linked firm administrative data to mortality records. In Finland, two studies used census data linked to mortality records, while four used census data and administrative employment records linked to mortality records. Of the five studies from the four other countries, one was conducted with census records and four used survey data. Cox proportional hazards estimation (16 studies) was the most common estimation approach.

A relationship between unemployment and mortality was found in both CME and LME countries. This relationship remained for both county clusters after controlling for health selection. Across country clusters, the pattern within groups is similar with there being a consistent relationship between unemployment and mortality for men and younger workers and less so for women and older workers. For CME countries and based on the results from the fully-adjusted models, five of the ten studies (50%) found an association in the full (non-stratified) cohort, for men all eleven studies (100%) found an association, for women six of nine studies (67%) found an association, and for younger workers all three studies reported an association (100%), while for older workers only one of three studies (33%) found an association. Across LME countries two of the four studies (50%) found an association in the full (non-stratified) cohort, for men all eight studies (100%) found an association, for women one of four studies (25%) found an association, for younger workers all five studies reported an association (100%), while for older workers five of seven studies (71%) found an association.

There are two critical points of divergence that make it difficult to draw conclusions about the strength of the unemployment-mortality relationship across the country clusters. First, in studies from LME countries, unemployment is almost always measured as current

unemployment (14 studies), while in CME countries, unemployment is measured in some studies as current unemployment (7 studies) and in others as long-term unemployment (7 studies). In CME countries, fewer studies that use current unemployment find an association with mortality (2 of 6 studies that use a full cohort) compared to studies that use long-term unemployment (3 of 4 that use a full cohort). While long-term unemployment appears to a risk factor for mortality in CME countries, no conclusions on the effect of long-term unemployment on mortality can be drawn from studies of LME countries as this construct is not measured in studies conducted in these countries.

How unemployment is measured may reflect important institutional differences that introduce surveillance and ascertainment biases in the measurement of unemployment between CME and LME countries. In section 2.3 it was argued that long-term unemployment is more likely in CME countries and long-term unemployment and its health effects may be of more concern to researchers and policy makers in these countries. Moreover, countries like Sweden and Finland have detailed administrative employment registries that facilitate the tracking of workers' unemployment history. The longer duration of unemployment benefits in CMEs also creates both reporting (i.e. individuals are more likely recall being unemployed) and inertial (i.e., individuals are more likely to remain unemployed rather than take a different job or exit the labour force) incentives. In contrast, in LME countries unemployment is seen as more short-term and of a frictional nature and there are fewer incentives for the long-term unemployed to remain unemployed.

The second point of divergence between studies conducted in CME and LME countries relates to study design and quality. Most of the LME studies from the United Kingdom (four of the seven) compared standardized mortality rates between unemployed and unemployed controls (Bethune 1996; Moser, Fox, and Jones 1984), but all the CME studies used multivariate estimation techniques making it difficult to compare effect sizes across these studies. Indeed it is challenging to find groups of studies that would be directly comparable. For instance, while the three plant closure studies have similar study designs they implement different statistical methods to create comparable employed controls (Eliason and Storrie 2007; Keefe, Reid, Ormsby, Robson, Purdie, and Baxter 2002; Sullivan and Wachter 2007). And among cohorts drawn from population-representative surveys there is also considerable variation in follow-up period (from one year to 24 years), confounder control (from age-only to a full range of

covariates including health status and behaviours), and estimation approach (from logistic regression to parametric duration models).

This review of cohort studies from CME and LME countries has found a relationship between unemployment and mortality across both country clusters, but differences in study design, measures and statistical methods prevent the drawing of definitive conclusions about whether this relationship varies by country cluster. Moreover, this literature review did not use a rigorous systematic review methodology including applying consistent search terms across multiple literature databases, exhaustively searching the grey literature and scoring studies using quality criteria. As such, the review may have missed some eligible studies or have drawn different conclusions about the research evidence if quality criteria were applied. Nevertheless, the findings from this review provide some guidance to forming the hypotheses and empirical studies of studies described in Chapters 4 and 5. These findings underscore the need to develop comparable cohorts and measures across studies. They also show that there may be age and gender modification in the relationship between unemployment and mortality particularly in CME countries. The evidence of effect modification is less clear in LME countries as a relationship was found for older workers, while there were too few studies of women to draw conclusions. Further, in CMEs, duration of unemployment appears to matter. There is mixed evidence for an association between current unemployment and mortality, and a more robust association for long-term unemployment. Given the higher likelihood of structural unemployment in CMEs and the potential for permanent exclusion from employment, long-term unemployment may represent a risk to health that is magnified by the CME institutional environment rather than mediated by it.

2.6: Hypotheses for Empirical Studies

The purpose of this chapter has been to specify how the institutional environment can affect the health of the unemployed. Using the Varieties of Capitalism framework I have explored how differences in employment and unemployment protection, skill-occupational fit, and health selection out of unemployment may mediate the unemployment and health relationship across CME and LME countries. This leads to the following hypotheses for the empirical studies that are described in Chapters 4 and 5:

1. The association between unemployment and health will be smaller in Germany

compared to United States given the higher levels of unemployment and employment protection; Canada will emerge as a middle case. The receipt of unemployment compensation will mediate the effect of unemployment on health within countries. The higher prevalence of the long term unemployed in Germany compared to the LME countries, however, may confound this comparison.

2. There will also be a distinct pattern of effect modification by educational status. The relationship between unemployment and health will be smaller for the minimum skilled and medium skilled in Germany compared to the LME countries, with the minimum skilled in the United States being especially disadvantaged. The effect of unemployment for the high general skilled in the United States and Canada will be smaller compared to those in lower skill categories, but there is no *a priori* expectation that higher skilled workers in Germany should have a different unemployment-health relationship than those with lower skills.
3. Controlling for health selection will account for some but not all of the relationship between unemployment and health. Further, more of the relationship in Germany will be accounted for by health-selection into unemployment compared to Canada and the United States.
4. The direction of effect modification for men and women is indeterminate, but the ranking across countries will be consistent by gender with the higher associations being in the United States compared to Canada and Germany.

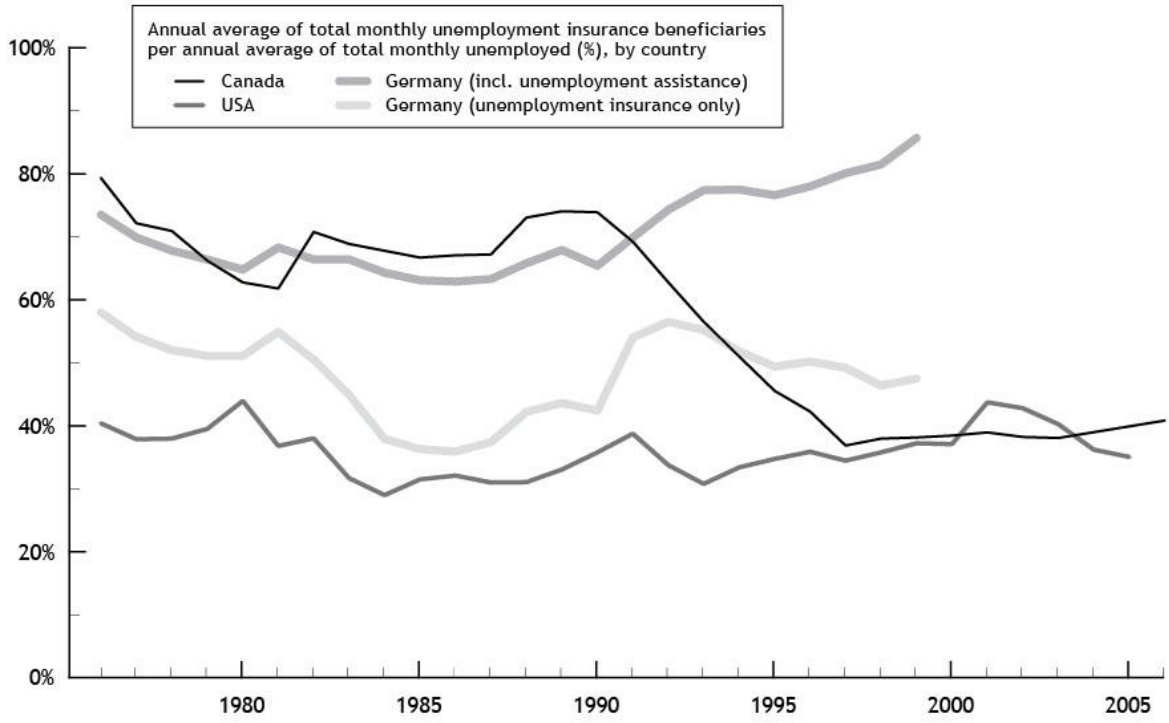
2.7: Concluding Remarks

The analytical studies in Chapter 4 and 5 compare unemployment-related health inequalities in Canada and the United States to Germany. The introduction of Canada as a study county offers a contrast to both the Germany and the United States as it represents a middle case between them. Germany and the United States represent 'pure' or archetypical types of institutional and structural variation whether one uses a welfare-regime or varieties of capitalism typology. Canada, on the other hand, while generally included with the United States in these typologies, shares some programme features more commonly associated with European welfare states (e.g., higher levels of employment and unemployment protection, universal access to health care). This enables the comparison of unemployment-related health inequalities in two distinct institutional and cultural contexts and labour markets that have very different approaches to unemployment protection (Germany and the United States), but also within similar institutional contexts where unemployment protection differs (Canada and the United States) and across different

institutional contexts with some similarities in unemployment protection (Canada and Germany).

Figures and Tables

Figure 2.1: Percentage of unemployment insurance beneficiaries to total unemployed for Canada, Germany and the United States, 1976-2006



Sources: Canadian Data: Statistics Canada Cansim II Series V384606, V385120; American Data: US Department of Labor and Bureau of Labor Statistics; German Data: Schneider 2004 Table 5, p 113

Figure 2.2: Social protection and predicted skill profiles

Unemployment Protection	Employment Protection: Low	Employment Protection: High
High	Industry-specific skills Example: Denmark	Industry-specific, firm-specific skill mix Example: Germany
Low	General skills Example: United States	Firm-specific skills Example: Japan

(Reproduced from Estevez-Abe, Iversen, and Soskice, 2001 p. 154, Figure 4.1)

Figure 2.3: Pathways through which unemployment could influence health

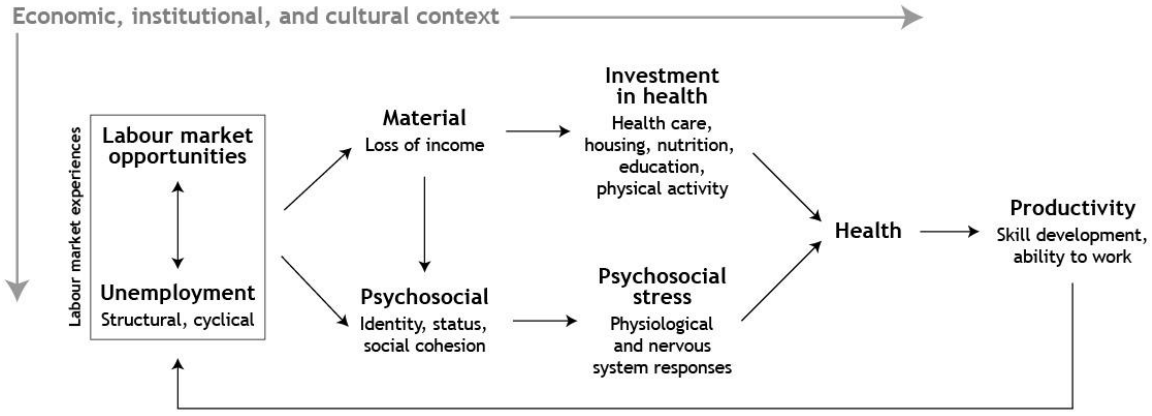


Table 2.1: Household income replacement rate scenarios for the unemployed by selected family type for Canada, Germany and the United States

	Germany		Canada		United States	
	No children	Two children	No children	Two children	No children	Two children
Single						
- 50% AW	71%	95%	66%	79%	64%	61%
- 100% AW	60%	71%	64%	75%	54%	53%
- 150% AW	61%	66%	46%	59%	39%	37%
Couple, single earner						
- 50% AW	85%	91%	81%	85%	72%	66%
- 100% AW	60%	75%	66%	77%	55%	55%
- 150% AW	60%	70%	48%	60%	38%	39%
Couple, dual earner						
- 50% AW, 67% AW	92%	95%	84%	96%	84%	87%
- 100% AW, 67% AW	86%	91%	78%	85%	72%	74%
- 150% AW, 67% AW	83%	87%	63%	70%	58%	60%

Source: OECD Online Benefit and Wage: Tax-Benefit Calculator (OECD 2009)

Notes:

1. Average wages in 2001 for Germany, Canada and the United States were $37,232 CAD, $38,204 EUR and 33,998 USD, respectively.
2. Net replacement rates are derived by dividing net household income in the month after becoming unemployed including unemployment benefits and all other social transfers by net household income in the month prior to becoming unemployment.
3. Germany has a unified tax and benefit structure and the replacement rates are representative across all regions. In Canada and the United States tax rates and benefits vary by province or state and it is not possible to calculate country-wide average rates. The OECD use rates from the province of Ontario and the state of Michigan to be representative of Canada and the United States.

Table 2.2: Scope of employment protection regulation

Regular contracts	Temporary contracts	Collective dismissal
1. Degree in flexibility in providing notice to dismiss a worker including the need to notify or seek permission from governmental authorities.	1. Degree of flexibility in a firm's use of fixed-term contracts.	1. Number of workers that can be dismissed before collective dismissal required come into effect.
2. Amount of time until notice period starts.	2. Permitted maximum number of fixed-term contracts.	2. Degree to which additional notification (e.g., to union or government authorities) is required for collective dismissals.
3.Required length of notice before a worker can be dismissed, based on number of years of tenure.	3. Permitted cumulative duration of fixed-term contracts.	3. Degree to which there are additional notice before for collective dismissal.
4. Amount of required severance pay, based on number of years of tenure.	4. Type of work for which temporary contracts are legal.	4. Other costs to employers including additional training or severance requirements.
5. Definition of justified or unfair dismissal and the degree to which employers must take steps to mitigate the dismissal through training or reassignment.	5. Permitted maximum number of renewals for temporary work arrangements.	
6. Length of trial period during which an employee can be dismissed without cause.	6. Permitted cumulative duration of temporary work arrangements.	
7. Degree of compensation for unfair dismissal.		
8. Right of reinstatement after unfair dismissal.		

(Revised from OECD, 2004a p.106, Table 2.A1.2.)

Table 2.3: Summary the relationship between unemployment and all cause mortality for cohort studies conducted in Coordinated Market Economies

	Unemploy-ment definition	Summary of effect size (None, Low, Medium, High)					Adjustments for confounders
		Full cohort	Men	Women	Younger workers	Older workers	
Sweden (8 studies)							
Ahs 2006	CU	Medium-LUR None-HUR None-HS					DEM, SES, HS, UR
Gerdtham 2003	CU	Medium					DEM, SES, HS,
Gerdtham 2004	CU	None					DEM, SES, HS,CON
Eliason 2007	PCU		Low	None	High	None	DEM,SES,HS, CON
Nylen 2001	CU, EU		High-CU Low-EU	Medium-CU Medium-EU			DEM, HB, HS,
Stefansson 1991	LTU	Low	High	None	High	Low	Age-only
Sundquist 1997	LTU		Medium	None			DEM, SES, HS
Voss 2004	EU		Low	Low			DEM, SES, HB, HS
Finland (6 studies)							
Blomgren 2007	LTU		Medium Medium-HUR Medium-LUR	Medium Medium-HUR High-LUR			DEM, SES, UR, CON
Martikainen 1990	STU, LTU		Medium-STU High-LTU				DEM, SES, HS
Martikainen 1996	LTU		High Low-LUR Medium-HUR	Medium Medium-LUR None-HUR			DEM, SES, HS, UR
Martikainen 2007	STU	High –LUR Low-HUR None – HS					DEM, UR
Pensola 2004	STU, LTU	High-LTU Medium-STU					DEM, SES
Saarela 2005	EU		High	Medium			DEM, UR
Denmark (2 studies)							
Iversen 1987	CU	Medium	Medium	Medium			DEM,SES
Osler 2003	STU, LTU	Low-STU High-LTU			Medium-STU	None-STU	SEM, HB, CON
The Netherlands							
Schrijvers 1999	CU	None					DEM, SES, CON, HS
Germany							
Frijiters 2005	CU	None					DEM, SES, HS, CON
Switzerland							
Gognalons-Nicolet 1999	EU		High				DEM, SES, HS

1. 'CU' refers to current unemployment; 'LTU' refers to long-term unemployment; 'STU' refers to short-term unemployment; 'EU' refers to ever unemployed; and 'PCU' refers to unemployment due to a plant closure.
2. 'None' means that there is no statistically significant relationship between unemployment and mortality; 'Low' refers to a statistically significant risk ratio between 1.00 and 1.49; 'Medium' a statistically significant between 1.50 and 1.99; and, 'High' a statistically significant risk ratio greater than 2.0.
3. The adjustments refer to the following sets of covariates: 'DEM' – demographic measures; 'SES' – socioeconomic status measures; 'HB' – health behaviours; 'HS' – health status measures; 'UR – unemployment rate with 'HUR' and 'LUR' referring to results for high and low unemployment rate time periods or areas; and, 'CON' – contextual measures.
4. A detailed summary, including measures of effect size, can be found in appendix table B1.

Table 2.4: Summary the relationship between unemployment and all cause mortality for cohort studies conducted in Liberal Market Economies

	Unemploy-ment definition	Summary of effect size (None, Low, Medium, High)					Adjustments for confounders
		Full cohort	Men only	Women only	Younger workers only	Older workers only	
United States (9 studies)							
Cubbin 2000	CU	High					DEM, SES
Hayward 1989	CU					None	DEM, SES, HS
Kiuila 2007	CU				Medium Medium-HS	Low None –HS	DEM, SES, HB, HS
Lavis 1998b	CU		High-CU None-LUR None-HUR				DEM, SES, UR
Rogers 2000 – Chapter 7	CU	None					DEM, SES, HS
Rogers 2000 – Chapter 10	CU	Medium					DEM, SES, HB, HS
Sorlie 1990	CU		Medium – Whites High– Blacks	None			DEM, SES
Sorlie 1995	CU			None	Medium	Low	DEM,SES
Sullivan 2007	PCU		Low, Medium		High	Low-Men None-Women	Age, SES,
United Kingdom (6 studies)							
Bethune 1996	CU		Low	Low	Medium	Low-Men None-Women	Age, SES
Gardner 2004	CU, LTU					Low	DEM, SES, HB, HS
Morris 1994	EU		Low				DEM, SES, HB, HS
Moser 1984	CU		Low				Age, SES
Moser 1986	CU		Low				Age, Region
Moser 1987	CU				Medium	None	Age
New Zealand (2 studies)							
Blakely 2002	CU		Low	None			DEM
Keefe	PCU	None					DEM

1. 'CU' refers to current unemployment; 'LTU' refers to long-term unemployment; 'STU' refers to short-term unemployment; 'EU' refers to ever unemployed; and 'PCU' refers to unemployment due to a plant closure.
2. 'None' means that there is no statistically significant relationship between unemployment and mortality; 'Low' refers to a statistically significant risk ratio between 1.00 and 1.49; 'Medium' a statistically significant between 1.50 and 1.99; and, 'High' a statistically significant risk ratio greater than 2.0.
3. The adjustments refer to the following sets of covariates: 'DEM' – demographic measures; 'SES' – socioeconomic status measures; 'HB' –health behaviours; 'HS' – health status measures; 'UR – unemployment rate with 'HUR' and 'LUR' referring to results for high and low unemployment rate time periods or areas; and, 'CON' – contextual measures,
4. A detailed summary, including measures of effect size, can be found in appendix table B2.

Chapter 3: Description of Survey Data, Cohort and Variable Development

3.1: Introduction

This chapter describes how the cohorts were developed for both analytic studies. An overview of the four data sources (the German Socio Economic Panel, the American Panel Study of Income Dynamics, the Canadian Survey of Income Dynamics, and the Cross National Equivalent File) used in the thesis is first provided, then the development of the German and American cohorts for the unemployment and mortality study, and the German, American and Canadian cohorts for the unemployment and self-reported health study is described. The development of the variables used in both analysis is discussed with a particular focus on the comparability (or lack thereof) of the variables. The chapter concludes with an overall assessment of the comparability of data and variables.

One of the challenges in conducting comparative research, particularly individual-level research, is balancing using the best data available within a single data source with conducting analyses that maximize comparability across countries and datasets. This challenge increases with the number of countries, datasets and years used in the research. While there is a rich literature looking at unemployment and health, the heterogeneous nature of this literature makes it difficult to make comparisons across this literature. The review of studies described in Chapter 2 that looked at unemployment and mortality was limited in drawing conclusions about the effect of the relationship across CME and LME countries because of the differences in the study design, definition of unemployment, analytic methods, and inclusion of covariates.

This thesis uses three longitudinal household panel surveys from Canada, Germany and the United States as well as a derived cross-national equivalent file based on these and other surveys. These surveys, described in more detail below, are all based on the concept of following households across time and focus on measuring income and labour force dynamics. But there are differences, some by design and some by circumstance that make it challenging to conduct comparative research with these surveys. The American survey, owing to a lack of funding, moved from yearly data collection in 1997 to biennial data collection thereafter. The Canadian

survey follows individuals for a maximum of six years, while the German and American surveys follow individuals until death or loss to follow-up. The German survey has higher rates of attrition than both the American and Canadian surveys.

Decisions were made with the intent of creating comparable cohorts and variables and in choosing analytic methods that would be appropriate for all three surveys. Creating comparable variables, both in the principal labour force measures and in the covariates, was viewed as most important. Indeed, the comparability of the labour force status measures lies at the crux of this thesis. Where possible the same time period has been used, but this was not always possible because of the change in the PSID to a biennial survey after 1997. Similar models and functional forms of variables were adopted across the surveys, although with the occasional sacrifice of maximizing model fit within a cohort.[31] There were some unique country differences that required the inclusion of specific measures. The reunification of Germany in 1991 and differences in income and labour market outcomes for citizens of the former Democratic Republic of Germany (East Germany) (Nolte, Shkolnikov, and McKee 2000; Nolte and McKee 2004) meant that it was necessary to control for whether a study member was originally from East Germany. Similarly, the established differences in labour market, income and health outcomes between black and white Americans in the United States (Adler and Rehkopf 2008; Kunitz and Pesis-Katz 2005) led to race being an essential demographic covariate in the American cohort, but not for the German or Canadian cohorts.[32]

3.2: Description of the Survey Data

3.2.1: The Panel Study of Income Dynamics (PSID)[33]

The Panel Study of Income Dynamics (Hill 1992) is a longitudinal survey of individuals and families that started in 1968. The PSID was started with the goal of understanding income and labour income dynamics, particularly among low-income families. It started with a population-

[31] For example, in the mortality models (Chapter 4) a quadratic specification for age was slightly preferred based on the Akaike Information Criterion (AIC) in the PSID, but a linear specification for age was preferred in the GSOEP. Neither specification affected the coefficients of the labour force status variables so I choose the more parsimonious linear specification.
[32] The GSOEP and SLID do not collect information on race/ethnicity in the same way as the PSID. The GSOEP collects information on country of birth, while SLID collects information on ethnicity and language group.
[33] Detailed information on the PSID, including downloadable public-use data files, is found at http://psidonline.isr.umich.edu/.

representative sample and an additional low income sample. Between 1990 and 1995 a sample of Latino or Hispanic households was also collected. The PSID principally collects information on heads and spouses, but all family members in the original sample of households are followed and new sample households are created when children in the original households become adults and form their own household or when two households are created due to marital dissolution.[34] The survey measures are based on self reports from the principal respondent in the household (usually the head) and proxy interviews for the rest of the household. The survey has grown in size over time from 4,800 families in 1968 to 8,500 families in 1996. In 1997, because of funding constraints, the number of families followed was reduced by about 30% and the survey went from yearly to biennial follow-up, although efforts were made to collect income and labour market information on the non-survey years (PSID 2009). The survey focuses on income and labour force status questions including calendar and retrospective measures, and also includes detailed information on education and training, household assets, and health and activity limitations. Mortality has been ascertained from the beginning of the survey. Self-reported health status was asked of head starting in 1984 and of spouses in 1985. More recently, from 1999 onwards, questions on chronic health conditions have been asked.

3.2.2: The German Socio-economic Panel (GSOEP)[35]

The German Socio-economic Panel (Haisken-DeNew and Frick 2005), like the PSID, is a longitudinal study that follows households over time with the aim of collecting information on a broad range of economic and social conditions. Measures in the survey are based on self report for all adults in a household or proxy interviews if the respondent is a child. The survey originally was a representative sample of the population of the Federal Republic of Germany (West Germany) starting in 1984 and with the reunification of Germany in 1990 the survey was expanded to include residents of the former Democratic Republic of Germany (East Germany).

[34] Men are heads in the PSID for the purposes of following households across time (i.e., households are tracked though headship); women are the heads if single or a lone parent, but become spouses if they marry or live common law. These household following conventions reflect the times when the PSID was created, but are maintained to ensure consistency of follow-up. In contrast, the GSOEP lets respondents self-identify who is the head and spouse for the purposes of follow-up, while in the SLID the head is deemed the individual with the largest labour income or in the case of individuals with equal income, the eldest. .

[35] Detailed information on the GSOEP is found at http://www.diw.de/english/sop/. Access to the GSOEP English scientific-use data file is arranged through a research contract with the German Institute for Economic Research (DIW Berlin). The English scientific use data file is a 95% sample designed to perverse confidentiality according to German data protection laws.

The GSOEP contains a number of other samples that target specific populations, including a sample of households with heads of Turkish, Greek, Yugoslavian, Spanish or Italian citizenship (Sample B – Foreigners in the FRG) that also started in 1984 and a broader immigrant sample that started in 1994 and 1995 (Sample D – Immigrants). In 1998 the SOEP was supplemented with a refreshment sample (Sample E) in order to maintain the representativeness of the SOEP to the German population. More recently a larger refreshment sample was conducted (Sample F – Innovation) in 2000, and in 2002 a sample of high-income households was conducted (Sample G – High income oversample).

3.2.3: The Survey of Labour and Income Dynamics (SLID)[36]

The Survey of Labour and Income Dynamics (Statistics Canada 1997) is a longitudinal survey of Canadian households that started in 1994 with the objective of supporting research on family, education, labour and income dynamics in relation to economic well being. Questions on self-reported health status and disability and activity restrictions have been asked since 1996. The SLID is comprised of overlapping longitudinal panels of six years in duration. Unlike the PSID and GSOEP, which follow individuals until death or loss to follow-up the maximum length of follow-up in the SLID is six years. To date, there have been five SLID panels, with panels starting in 1994, 1996, 1999, 2002, and 2005, and each consisting of about 15,000 households and 30,000 individuals.

The SLID consists of two interviews every year; a general interview in January covers labour market, personal characteristics and education, and an income-specific interview that occurs in May of every year. Respondents have the option of foregoing the income questionnaire if they provide permission for a linkage to their tax return. Between 50% and 90% of individuals consent to a tax-file linkage (the consent rate increases the longer the person stays in the survey).

3.2.4: The Cross-National Equivalent File (CNEF)

The Cross-national Equivalent File (Burkhauser et al. 2000; Burkhauser and Lillard 2005) is a set of data files containing harmonized and equivalent variables derived from contributing country-specific household panel data sets. The GSOEP, the PSID and the SLID, along with the

[36] Information on how to access the SLID can be found at http://data.library.ubc.ca/rdc/.

British Household Panel Survey (BHPS) are the principal surveys contributing to the CNEF.[37] The CNEF is a collective effort. It is primarily researcher driven and the harmonized variables reflect the research interests of those participating in the project and particular attention has been given to the development of comparable income measures, including pre- and post-tax and transfer household income, individual labour market income and household public transfers.[38]

Each country's CNEF data files can be merged with the underlying household survey to create a blended data file. Where possible the CNEF variables are used, alhough some harmonized variables specific to this analysis are also derived, as described in section 3.4.

3.3: Derivation of the Study Cohorts

This research conducts two sets of analyses, for which two distinct sets of cohorts are derived across the three surveys. The first analysis uses the PSID and GSOEP to examine the relationship between unemployment and mortality for the years 1984 to 2005, while the second uses the PSID, GSOEP and SLID to examine the relationship between unemployment and self-reported health status. In the second analysis, the PSID cohort is followed from 1984 to 1997, the GSOEP cohort from 1994 to 2005, and the SLID cohort from 1996 to 2005.

3.3.1: Mortality Cohorts

The mortality cohorts were designed to be as comparable as possible, both in terms of follow-up and in terms of composition across the two surveys. Table 3.1 illustrates the derivation of the German mortality cohort, and Table 3.2 illustrates the derivation of the American mortality cohort. The initial cohort inclusion criteria was defined as heads or spouses aged 18 to 64 (working-aged) at baseline who had at least three years of data prior to death, loss to follow-up or the study end in 2005. Cohort members were required to have at least three years of data so that baseline health and working histories could be established. A direct result of this is that in the first three years of the study there are no deaths and accordingly the first two years of the

[37] In the past few years the CNEF datasets have also been developed for the Swiss Household Panel (SHP) and the Household, Income and Labour Dynamics in Australia (HILDA).

[38] For some surveys the CNEF variables represent a significant value-added (and time saving) improvement over the measures available in the underlying datasets. For example in the PSID, yearly post-tax and transfer household income is derived by summing of broad range of household income sources, some of which need to be aggregated from monthly reports to the level of the year; state, federal and payroll taxes are estimated by using the NBER Taxsim model (Butricia and Burkhauser 1997).

time an individual was in the study was derfined as a baseline period with the third year as the first year of follow-up after which a person is at risk of dying. Entrance into the cohort was dynamic, to reflect the fact that individuals entered the underlying surveys at different times (e.g., the East German cohort) or met the cohort eligibility requirements after the initial baseline year 1984 (e.g., became a head or spouse after 1984) or both. The 'Latino or Hispanic' sample in the PSID was dropped as it was only followed for five years, and thereafter mortality was no longer ascertained. Similarly the 'Foreigner' sample in the GSOEP was also dropped; while this sample had been followed since 1984 there is an unusually low number of deaths compared to the 'West German' sample that started at the same time (3.3% versus 8.5%). For the 'Foreigner' sample it appears that deaths were incompletely ascertained as a higher proportion of individuals were lost to follow-up. This is likely because of repatriation back to their country of origin (see table C1 in the appendices for a description of the number of deaths by the different sample is the GSOEP).

The biennial nature of the PSID after 1997 meant that it was not possible to collect complete labour market and health histories after 1997. While some information was available for the non-survey 'off-years' these variables were not always collected;[39] more vexing is that there is no information on current unemployment (the most reliable measure of unemployment) for the years 1998, 2000, 2002, and 2004. Accordingly, the baseline years were restricted to 1984 to 1995 (1995 was chosen so that a cohort member would have a minimum of three contiguous years at baseline), with years 1996 to 2005 contributing to follow-up and mortality where years and measures were available. While it is possible to follow individuals in the GSOEP cohort on a yearly basis after 1997, the same cohort restriction was applied to enforce comparability with the PSID cohort. Excluding individuals who would have otherwise met the cohort definition after 1995 led to only a small reduction in the number of deaths (25 deaths in the GSOEP and six in the PSID).

The GSOEP 1984-2005 individual file contains 53,918 individuals, of whom 3,088 (5.7%) died. After excluding non-sample individuals and individuals who were never a head or spouse, the

[39] For example, unemployment benefit payments are available for 1997 and 1998 from the 1999 survey and for 1999 and 2000 from the 2001, but in the 2003 and 2005 years unemployment insurance payments are aggregated with other public transfer payments for the off years.

potentially eligible cohort consisted of 35,050 individuals and 2,688 deaths. Excluding those aged 65 years or over at the first year of baseline decreased the cohort to 30,966 but halved the number of deaths to 1,357 (4.4%). Dropping the foreigner sample (Sample B) and samples with an intake after the last baseline year (Samples E, F and G) and excluding those without three or more years of complete data led to a final cohort of 10,866 heads or spouses and 879 (8.1%) deaths.

The PSID 1968-2005 individual file contains 67,271 individuals, of whom 4,917 (7.3%) died. After excluding non sample individuals, the 'Latino or Hispanic' sample, individuals no longer in the survey by 1984 and individuals who were never a head or spouse, the potentially eligible cohort was 14,874 individuals with 1,907 deaths (12.8%). Excluding those aged 65 years or over at the first year of baseline decreased the cohort to 13,605, but almost halved the number of deaths to 977 (7.2%). The additional cohort restrictions led to a final cohort of 9,786 and 876 (9.0%) deaths.[40]

Two sub cohorts were also defined in order to account for the effects of health selection. The first sub cohort was restricted to individuals who were employed (defined as employed on the day of the survey) at both years before basline (t-1, and t-2). Individuals who were not working or unemployed in either year were excluded. This exclusion led to a sub cohort of 7,059 individuals and 395 deaths (5.6%) in the German cohort and 6,107 individual and 392 deaths (6.4%) in the American cohort. The second sub cohort was restricted to individuals who reported good or better health status at both baseline years.[41] Individuals who had poor or fair health in either year were excluded. The health exclusion led to a sub cohort of 8,797 individuals and 548 deaths (6.2%) in the German cohort and 7,724 individuals and 445 deaths (5.8%) in the American cohort.

[40] The reason the final two cohort restriction led so many fewer individuals and deaths being dropped from the PSID compared to the GSOEP is in part attributable the PSID sample being cut after 1997, while the GSOEP added samples.

[41] Heath is defined using heath satisfaction for the German cohort and self-reported health status for the American cohort. See section 3.4 for a description of these measures.

3.3.2: Self-reported Health Status Cohorts

Many of the decisions around creating the self-reported health status cohorts mirrored the mortality cohorts. Cohort members were required to be heads or spouses aged 18 to 64 at baseline and had to contribute at least three consecutive years of follow-up to be included in the cohort. It was not possible to create cohorts across the three surveys that covered the same years or had a similar number of years of follow-up due to the changes in PSID data collection from annual to biennial in 1997 and the fact that the SLID followed up individuals for a maximum of six years.

The change in the PSID data collection from annual to biennial is problematic for the three-country study in that the biennial period of data collection almost completely overlaps with SLID (cohort 1: 1996-2001 and cohort 2: 1999-2004). Furthermore, unlike the mortality analysis in which there is complete information on death across the entire study period, information on self-reported health status in the off-survey years is missing. The short panel time frame of the SLID and the biennial nature of the PSID for overlapping years makes it difficult to study concurrent unemployment and health dynamics across all three study countries. Sacker and colleagues' (2007) study of self-rated health trajectories in the United Kingdom and the United States using the PSID and BHPS is one of the few published studies that use longitudinal PSID data after 1997. Their study covers the time period of 1990 to 2001 or eight waves of the PSID. Sacker and colleagues pre-empt the missing years in their analysis by examining eight transitions in the PSID and nine in the BHPS. In this study, however, the missing data are more problematic as the main focus is on how two time-varying variables (unemployment and health status) are related to one another, rather than describing trajectories across time. This required creating study cohorts that span different time periods,[42] but allows the examination of the same dynamics or temporal relationship across years. Accordingly, the American cohort spans the years 1984-1997, the German cohort 1994-2005, and the Canadian cohort 1996-2005. Another difference between the three surveys is that the Canadian cohort only follows individuals for a maximum of six years although new cohorts are brought into the SLID every three years, while the Americans and

[42] The Rodriguez (2001) study that used three-years panels of the BHPS, GSOEP and PSID to look at the relationship between unemployment and SRHS also used different study years.

Germans cohorts follow individuals until loss to follow-up or to the end of the study period.[43] This means that the Canadian cohort has more individuals than the American and German cohorts but fewer years of observations on those individuals.

The GSOEP self-reported health status (SRHS) cohort starts in 1994, the first year of consistent SRHS data. Accordingly, the SRHS cohort is drawn from the later years of the survey (those with start dates after 1995) that were excluded in the mortality cohort. Sample B – the 'Foreigner' sample that started in 1984 is also included, although sensitivity testing excluding the Sample B is also conducted to determine if the inclusion of this sample changes the results. The GSOEP 1984-2006 individual file[44] contains 57,758 individuals and 693,096 person years. Dropping individuals not in the sample or never a head or spouse between 1994 and 2004 decreased the cohort to 29,138 and 188,142 person years. Additional age, follow-up, and missing data exclusions lead to a final cohort of 19,029 individuals and 103,484 person years.

The SLID cohort draws on panel one (1996-1998), panel two (1996-2001), panel three (1996-2004) and panel four (2004-2005); panel five is not included as it starts in 2005 and only contributes one year of data. The SLID CNEF cohort contains 223,809 individuals and 760,396 person years. Dropping individuals from panel five, non sample cohabitants,[45] individuals not meeting the age restrictions and those who were never a head or spouse reduces the cohort by almost two thirds to 77,763 individuals and 334,609 person years. Restricting the cohort to individuals with three or more years of follow-up and those without missing data leads to a final cohort of 65,168 individuals and 217,530 person years of data.

The PSID SRHS cohort is almost identical to the PSID mortality cohort in that the years for cohort eligibly overlap. The main difference between the two cohorts is that the person years after 1997 are not included in the SRHS analysis. The PSID SRHS cohort contains 67,271 individuals and 1,278,149 person years. Excluding the 'Latino or Hispanic' sample, non-sample individuals, individuals lost to follow-up, individuals who enter the study after 1997 and those

[43] As mentioned in section 3.2.1, the PSID stopped following a portion of the sample because of budgetary restrictions.
[44] I used the more recent data release of the SRHS analysis, but as unemployment benefits variables changed in 2006 I still restrict the sample to data from 2005 or earlier.
[45] Non-sample individuals are individuals in the household but not part of the sample frame; their information contributes to household and family measures, but otherwise they are not followed they leave the household.

never a head or spouse decreases the cohort to 12,779 individuals and 135,388 person years. Further restrictions on age, individuals with fewer than three years of follow-up and individuals with missing data leads to a final cohort of 9,545 individuals and 78,951 person years.

Additional baseline restrictions on employment status and health status at baseline yielded an 'employed only' at baseline cohort of 13,958, 46,507 and 6,857 respectively for the German, Canadian and American surveys, and a 'good health' at baseline cohort of 16,603, 57,971, and 8,305 for the German, Canadian and American surveys, respectively.

3.4: Development of the Variables Used in the Studies

This section develops the variables used in the following two chapters. The variables come from the CNEF file where there are existing comparable variables, although in a few cases (e.g., education) comparable variables specific to this study that more closely align with the study hypotheses are developed. Where comparable measures have not yet been developed (i.e., the labour force status variables) new cross-national equivalent variabled are created. The study variables are grouped into six categories – health (including dependent and control variables), labour forces status measures, education status, occupation, income measures, and demographic variables.

3.4.1: Health Variables

There are four health variables used across the three studies. Death and self-reported health status are the respective dependent variables. Lagged self-reported health status, health satisfaction (GSOEP only) and disability status are used as control variables.

3.4.1.1: Death (G,P)

Death is defined as all-cause mortality in any year between the last year of follow-up for an individual and the last-year of follow-up of the study. There were 879 and 876 deaths in the GSOEP and PSID cohorts, respectively (See Tables 3.1 and 3.2 for details). Most deaths occur in the year immediately following an individual's last year of follow-up (i.e., an individual can no longer be followed due to death), but some deaths occur after an individual has dropped out of the survey (157 or 17.8% of deaths in the GSOEP and 139 or 15.8 % of deaths in the PSID). All deaths are used to maximize the number of death events.

Mortality is ascertained at the time of survey for both the PSID and GSOEP and through re-contact efforts for those who have dropped out of the survey. Deaths in the PSID are periodically validated through the National Death Index and for most deaths, month and cause of death (ICD-9) are also available in addition to year. For comparability with the GSOEP mortality is restricted to the year of death and all-cause mortality.

3.4.1.2: Self-reported Health Status (G, S, P)

A five-category self-reported health status is available from 1984 onwards in the PSID, in 1992 and then 1994 onwards in the GSOEP, and from 1996 onwards in the SLID. This variable spans the categories 'excellent', 'very good', 'good', 'fair' and 'poor' for the PSID and SLID and 'excellent', 'good', 'satisfactory', 'poor', and' bad' for the GSOEP. Five indicator variables corresponding to the five categories were created and used as a control for pre-existing health status in the mortality study for the PSID cohort. Excellent SRHS is the reference category in the analytic models. Depending on the model and labour forces status measure being examined, SRHS health status is lagged one year (t-1) or two years (t-2).

In the self-reported health status study, SRHS is dichotomised as poor or fair versus good, very good or excellent (PF/GVGE) and poor, fair, or good versus very good or excellent (PFG/VGE) and the corresponding lagged version is used as a control. The rationale for this treatment of the SRHS is developed in detail in Chapter 5.

3.4.1.3: Satisfaction with Health (G)

Self-reported health status is not available for the period of 1984 to 1991 or in 1993 in the GSOEP and an alternative measure of health – satisfaction with health – is used as the principal control for health status for the German cohort in the mortality study.

Satisfaction with health is an 11-category variable derived from a question that asks individuals to rank how satisfied they are with their health. This variable ranges from 'not satisfied at all' (0) to 'completely satisfied' (10). For the years both variables are present the correlation between satisfaction with health and self-reported health status is high ($\rho = 0.77$); collapsing satisfaction with health into a five-category variable (see Table 3.6) led to a very small decline in the correlation ($\rho = 0.74$). Using health satisfaction as an 11-category variable compared to a five-

category variable does increase model fit, based on the AIC and BIC criterion in preliminary regression models on mortality. Differences in using a 5- or 11-category variable on the estimates of the labour force status variable are negligible and do not change the statistical significance or the interpretation of the results (i.e., the risk ratio of the unemployment variables differ by no more than 3% and there is no consistent pattern in the direction of the change in the risk ratio). For comparability purposes across surveys and to reduce the number of parameters in the statistical models the five-category variable is used.

3.4.1.4: Disability Status (CNEF – G,P,S)

GSOEP

In the GSOEP disability status is based on two questions that ask whether a person has a legally recognized disability and the degree of disability. The CNEF definition based on these questions is used thatdefines the disabled category as having a legally recognized disability of 30% or more. In sensitivity analysis, individuals with a disability of less than 30% had an odds ratio of close to one compared to no disability in a regression on mortality.

PSID

The PSID disability status measure is based on a question that asks whether a person has any physical or nervous condition that limits the type or amount of work they can do.

SLID

The SLID disability status measure is based on a series of questions that ask if the person has any difficulty doing any of the activities of daily living (e.g., hearing, seeing, walking communicating) or if the person has a physical or mental health condition that restricts their activities.[46]

In the GSOEP, disability status is not asked in all years. Accordingly, for all three surveys, prior disability status is brought forward from previous years if the question was not asked in that year or if the question was not answered.

[46] There are also differences in the derivation of this question prior to 1999 affecting the 1996 to 1998 measures in my cohort. The main difference is that after 1998 more questions were used to measure the activity limitations and disability construct. This tended to increases the number of individuals classified as disabled after 1998.

3.4.1.5: In Good Health at Baseline

'Good health' at baseline was defined as reporting good or better self-reported health status in both baseline years for the PSID or a health satisfaction level of five or higher for both years for the GSOEP for the mortality analysis. For the SRHS analysis, in 'good health' at baseline was defined only in the first year of baseline due to the shorter number of years of follow-up in the SLID. These variables were used to exclude individuals in poor health at baseline in some of the models.

3.4.2: Labour Force Status Variables

3.4.2.1: Deriving a Comparable Measure of Unemployment.

Deriving a comparable definition of labour force status between these three countries is challenging as unemployment is defined differently within Germany compared to Canada and the United States. The standard definition of unemployment in North America and that used by the International Labor Office (ILO) is that an individual be without a job, looking for work and available to work.[47] While this also applies to Germany, the unemployed must also be registered with the local employment agency and meet certain job search and labour market activation measures. They may work up to 15 hours a week and earn a nominal sum per month (€165 in 2005) without any reduction in benefits; individuals who work a main job eligible for unemployment benefits and a secondary job may also keep earnings of up to €400 from the secondary job (what might be considered underemployment in Canada and the United States) once unemployed. Individuals on maternity or child rearing leave and those performing compulsory military or community service may also be classified as registered unemployed. In contrast, in Canada and the United States any paid work, irrespective of the number of hours or amount earned, leads to a classification of employed. Thus using the native definition of German unemployment would lead to a classification of unemployment for some individuals who would otherwise be classified as employed or out of the labour force in Canada and the United States.

[47] There are also minor differences between the ILO, Canadian and American definition of who is considered unemployed. For example, full-time students seeking full-time work and available for work would be considered unemployed in the United States, but are not considered a part of the labour force in Canada. Conversely, a job search consisting only of reading newspaper advertisements would lead to a assignment of not in the labour force in the United States, but unemployed in Canada. When the Canadian unemployment rate is adjusted to the American definition the Canadian unemployment rate decreases by between a half and one percent during the period of 1976 and 1998 (Sorrentino 2000).

Moreover, some of the underemployed in Germany receive unemployment benefits and access to labour market activation programmes, which is a key institutional difference between Germany versus Canada and the United States and one that may modify the relationship between these types of working arrangements and health status. Accordingly, a measure of unemployment is developed that corresponds to the ILO and North American concept.

The GSOEP has a rich set of questions relating to labour market and other activities, both at the time of the survey and retrospectively. Using these questions and applying a set of decision rules that give precedence to any paid work irrespective of registered unemployment status, and secondly to removing individuals not available for work (e.g., those in community service or on child rearing leave), a set of labour force status measures was derived that is comparable to the labour force status definition in the PSID and the SLID. The PSID has fewer measures on labour market and other activities so the converse – a PSID measure of labour force status that was comparable to the German definition – was not possible.

Three comparable labour force status measures – current labour force status, labour force status in the year prior to the survey, and cumulative labour force status – were derived creating three mutually exclusive categories spanning employed, unemployed, and not working (out of the labour force). Current unemployment was also dichotomised into those who reported receiving any unemployment compensation benefits in the survey year and those who did not report receiving any unemployment compensation benefits in the survey year.[48]

3.4.2.2: Current Labour Force Status

Current labour force status is defined by three variables indicating being employed, unemployed (and laid off in the PSID) and not working at the time of the survey.

GSOEP[49]

Current labour status in the GSOEP is based on an amalgam of questions that cover employment status (working versus not working), registered unemployment, maternity leave or child rearing

[48] Any unemployment compensation is also included with these variables in its own right.
[49] The GSOEP provides a derived labour force status measure, but there is a coding error that classifies individuals who are registered unemployed but in marginal unemployment as out of the labour force. This variable was discarded and alternative labour force status measure was derived consistent with the decision rules outlined in the text.

leave, military or community service, and other secondary employment (odd job, second job or family job). An individual could report multiple affirmative answers (e.g., they could report 'yes' to working, being registered unemployed, on maternity leave, and having a second job). Individuals were assigned to one of four mutually exclusive labour force categories – working full time, working part-time, unemployed, and not working – using the following hierarchy:

- employed full-time which includes full-time employment and on the job vocational training and those on maternity leave or child rearing leave who indicate they are working full-time;
- employed part-time which includes part-time employment, second, odd jobs or work in a family business and those on maternity leave or child rearing leave who indicate they are working part-time;
- not working which includes those not working, the registered unemployed who are in training or on maternity or child-rearing, those in compulsory military or civilian service, those on maternity or child rearing leave and not working; and,
- unemployed which includes the registered unemployed with no indication of any paid work, not on maternity leave, and not in military or community service.

A Germany-specific definition of labour force status was also derived that gave precedence to registered unemployment in order to conduct sensitivity analysis on the labour force status definition. Full-time and part-time employment were collapsed for comparability with the PSID and SLID.

PSID

In the PSID current labour force status is based on one question indicating labour force status at the time of the survey. This question spans: working now, temporarily laid off, looking for work or unemployed, retired, permanently disabled, keeping house, student, other, and don't know. Those working are defined as employed and those laid off, looking for work or unemployed are defined as unemployed. All other responses are classified as not working. This question is asked up to four times in a survey year and respondents do not always give consistent answers. For the years 1984-1993 and 2003 onwards a derived variable is provided that resolves these discrepancies across the underlying questions. For the years 1994-2001 (the 'early release' files), no derived employment status variables are provided. To enforce consistency across years the following hierarchy used for the PSID derived variables was also applied to the 'early release'

variables: temporarily laid off, working now, looking for work/unemployed, retired, permanently disabled, keeping house, student, other, don't know.

SLID

In the SLID current labour status is based on a question indicating labour force status at the end of the reference year during the January interview (e.g., the respondent's labour force status on December 31st, 2001 would be asked during the January 2002 interview). This question was not asked in 1999 for individuals aged 70 or older and for the years 1996 to 1998 this question referred to the entire year and not just the end of the year. Similar to the PSID, the question spans: working at a job or business or self employed, looking for work, going to school, keeping house, caring for other family members, retired, long-term illness or disability, doing volunteer work, no main activity and other. Those working at a job or business or self-employed are classified as employed. Those looking for work are classified as unemployed, and all others are classified as not working.

3.4.2.3: Labour Force Status in the Year Prior to the Survey

Monthly labour force status was derived for each month of follow-up based on labour force status and activity questions pertaining to the year prior to the survey. These variables were then summed for each year and three variables indicating the number of months a person was employed, unemployed, or not working was created for each year. The number of months employed is the omitted reference category and the number of months unemployed and number of months not working are used as continuous variables ranging from zero to twelve. The parameter estimate of the months unemployment variable represents the effect of an additional month of unemployment on the risk of mortality or being in a worse SRHS state, controlling for the number of months of not working.

GSOEP

In the GSOEP monthly labour force status is based on a series of dichotomous but not mutually exclusive employment and activity questions similar to the current labour force status questions. These questions also changed and generally expanded across study years, necessitating modifications to the ranking over the years. A similar set of decision rules was applied to define

a mutually exclusive monthly labour force status for each month. Appendix table C2 outlines this hierarchy as it evolved across the survey years.

PSID

In the PSID the algorithm to assign monthly labour force status varies across years due to changes in the survey design and availability of variables. All questions are asked separately of heads and spouses.

1984-1992 Survey Years

For the years 1984 to 1992 the derivation of monthly labour force status spanning employed, unemployed and not working is outlined in Table 3.7. 'Missing' is assigned as not working for the consistency of generating a complete year history. While this may categorize very few working and unemployed persons as not working it will not have an effect on the working versus unemployed comparison.

1993-2001 Survey Years

For the 1993 through 2001interview years, monthly labour force status is defined through a series of underlying questions that change depending on whether a person is currently employed or not working at the time of the survey. Individuals currently employed are asked two sets of questions on whether they were unemployed or out of the labour force for at least one week in a given month. Using these two questions a hierarchy similar to the one outlined in Table 3.8 is then applied. For individuals who are not currently working the derivation is more complex. Monthly labour force status for these individuals is based on a nested series of five questions. Individuals are first asked if they ever worked and when they last worked. Individuals reporting never working or last working prior to the previous year (e.g., before 1992 if the survey year is 1993) are then asked in which months did they look for work in the previous year. These individuals are considered to be out of the labour force except for the months they reported looking for work, which leads to a classification of unemployment for these months. Current non-working individuals who report working in the previous year are asked which months they were unemployed, working or out of the labour force. A hierarchy similar to the one outlined in Table 3.8 is then applied. Unemployment status is missing for unemployed spouses for February 1994 and 1995. For these two months their labour force status for January is carried over.

1998, 2000 between Survey Years

The years 1998 and 2000 are off wave years and limited information is available. In 1999 and 2001, a series of questions on monthly unemployment and receipt of earning is asked for 1997 and 1999 (t-2), respectively. For these years a modified hierarchy is applied: individuals who report being 'unemployed' are considered unemployed, then individuals who report earnings are considered working, and the rest are considered out of the labour force. There is an error in the unemployment variable for January 1997; for this month unemployment is reported at seven times the rate of adjacent months. Accordingly, this variable is not used and February 1997 labour force values are assigned to January 1997.

Monthly labour force status for the t-2 years of 1997 and 1999 are only used in the cumulative labour forces status variable (see below). Monthly labour force status for the t-2 years of 2002 and 2004 is not available.

SLID

Monthly labour force status is a derived variable based on a series of activity questions by time period that determines whether an individual experienced a jobless spell, was available for work and looked for work at any time in a given month. Individuals in full-time studies are not considered unemployed even if they report being jobless and looking for work (Noreau, Hale, and Giles 1997). If an individual meets the definition of being unemployed in a given month they are considered unemployed for that month, even if they report working or being out of the labour force. If an individual reports no unemployment and worked at least some of the month, they are considered employed for that month; otherwise they are considered not working for that month.

3.4.2.4: Cumulative Labour Force Status (G,P)[50]

Cumulative labour force status is a variable that represents the percentage of time spent in a given labour force status accumulated across the period an individual is in the study. This

[50] The cumulative labour force status measure was only used in the mortality study. Given that the SLID only followed individuals for a maximum of six years, while the GSOEP and SLID maximum follow-up was more than double that for the SRHS study, it was deemed that there was insufficient comparability for the cumulative labour status variable across the three surveys to proceed with the analysis.

measure is motivated by a study of the relationship between cumulative psychosocial and job characteristics and mortality in the PSID (Amick, McDonough, Chang, Roger, Pieper, and Duncan 2002), in which the psychosocial and physical aspects of job characteristics were attributed to a specific occupation through a job-exposure matrix and accumulated yearly. For this derivation, labour force status is accumulated monthly. Number of months in a labour force status is accumulated across years and then divided by the total number of months followed to get the proportion of observed time spent in each labour force status. For individuals with missing variables or years (e.g., 2002 and 2004 for the PSID), the proportion of time spent in each labour force status is adjusted so that it always sums to 100 percent. Table 3.8 provides a stylized example of the dynamics of the cumulative labour force status variable.

Labour force status accumulates from baseline year t-2 onwards meaning that every individual has accumulated three years of labour force status prior to becoming at risk of dying. This measure is more sensitive to large changes in labour force dynamics earlier in follow-up compared to later in follow-up (e.g., 12 months of unemployment in years three of follow-up counts as 33% of lifetime spent in unemployment while 12 months of unemployment in year 10 would count as 10% of lifetime spent in unemployment). Because individuals are not observed for their entire adult life and only up to 22 years this has the potential to introduce bias in that there is the potential for more variation or change earlier in the follow-up period even though the individual may have already been in the labour force for some time. Most individuals who die, do not die in the early years of follow-up. The median number of years followed for those who die is 11 years in the GSOEP and 12 years in the PSID; the likelihood of dying also increases with years followed so large variations in percent of time unemployed in the early years would likely introduce a conservative bias (a bias toward the null) rather than magnify a relationship between percent of observed lifetime unemployed and mortality.

Cumulative percent of lifetime employed is the omitted reference category and the percent of lifetime unemployed and percent of lifetime not working are used as continuous variables, ranging from zero to one hundred.

3.4.2.5: Current Unemployment and Unemployment Compensation

An interaction variable between current unemployment and receipt of any unemployment compensation (see section 3.4.5.3 below) was also created. Current unemployment was dichotomized into the unemployed who reported receiving unemployment benefits and the unemployed who did not report receiving unemployment benefits. In sensitivity testing an unemployed variable that indicates whether a person had reported any months of unemployment in the year prior to survey was also created. This variable was then dichotomised by whether an individual had reported receiving unemployment benefits or whether they had not. Current labour force status and the receipt of unemployment benefits were harmonized so the variables referred to the same calendar year.[51]

3.4.2.6: Working at Baseline

Individuals had to report a current labour force status of employed for both years to be considered working at baseline, other labour force status combinations over the two years at baseline were assigned a value of not working at baseline. This variable is primarily used to exclude individuals who were not employed in both baseline years in some of the models.

3.4.3: Educational Status

Variables on education status are derived based on a modified version of the Comparative Analysis of Social Mobility in Industrial Nations (CASMIN) classification of education.[52] The CASMIN educational classification distinguishes two different education dimensions, one based on hierarchy (length, quality and value of education) and the other based on skill orientation (vocational versus general) (Brauns, Scherer, and Steinmann 2003). The application of the CASMIN educational classification to the educational variables across these three surveys allows the creation of comparable education variables that distinguish between skill type and level of education within and between study countries. The GSOEP has a derived CASMIN educational variable, while a CASMIN equivalent variable can be derived in the PSID based on years of

[51] In the GSOEP and PSID the income variables refer to the previous calendar year and not the year corresponding to the current survey year. Accordingly, income variables from the following survey year are brought back a year.
[52] Initially an educational classification system based on the International Standard Classification of Education (ISCED) was considered. The CASMIN classification is preferred to the ISCED classification as the CASMIN classification makes the distinction between vocational and general training whereas the ISCED classification does not.

education and degree type and in the SLID based on terminal degree type and whether the terminal degree would be considered primarily a general-skilled degree (e.g., high school completion) or a specific-skilled degree (e.g., business or trade school diploma or certificate). The modified CASMIN classification developed by Kerckhoff and colleagues (2002) refines the original CASMIN classification as applied to the United States and from this a skill level (minimal, medium and high) and skill type (specific or general) classification is developed (Table 3.9) and applied across all three study cohorts.[53]

There are marked differences in educational classification by study country. For Germany 66% of the cohort have specific-skilled qualifications compared to only 18% of the American cohort. Conversely 60% of the American cohort has a general skilled qualification compared to only 21.1% of the German cohort. The American and Canadian cohorts have a higher proportion of both the minimum skilled (or the inadequately educated) and of those with high general skill qualifications (university degrees). The Canadian cohort is similar to the American cohort except that there are a greater number of individuals with intermediate specific-skilled qualifications, although this may be due to differences in the questionnaire.[54] American and Canadian cohort members that have specific-skilled qualifications typically also have a general-skilled degree (high school or GED equivalency), while skill type for German cohort members tend to be either a general-skilled or specific-skilled degree.

Due to the low number of individuals who have specific skill classifications (United States and Canada) or intermediate level general skilled qualification (Germany), education is instead classified by CASMIN level (minimal, medium, or high) in most of the comparative and education-stratified analyses[55]. In sensitivity analyses the skill categorization (minimal, specific, or general) is used for the German cohort, while for the Canadian cohort there are sufficient numbers to distinguish between the medium general skilled and the medium specific skilled.

[53] The detailed application of the CASMIN classification as applied to the mortality study cohorts can be found in Appendix Table C3.
[54] The SLID asks educational attainment every year, whereas the PSID only asks educational status periodically.
[55] Table 3.9 and Appendix Table C3 denote how the cohort was classified into specific or general skills and by minimal, medium, or high educational level using the CASMIN rubric for the SRHS and mortality studies, respectively.

3.4.4: Occupation (G,P,S)

It was challenging to create a comparable construct for occupation across the three surveys because of the heterogeneity in classification standards. Each of the three surveys uses different occupational classification schemes with the GSOEP using the International Standard Classification of Occupations 1988 (ISCO88), the PSID using the United States 1970 Census occupational classification system until 2001 and the 2000 Census classification thereafter, and the SLID using the Canadian 2000 National Occupational Classification system (NOCS). While occupational classification cross-walks have been developed between United Kingdom's Standard Occupational Classification system and an early version of United States' Standard Occupational Classification system,[56] there are no validated cross-walks between Statistics Canada's NOCS, the American Census classification systems and the ISCO88. Moreover, the lag in time between the American 1970 and 2000 Census classification systems presents challenges in harmonizing occupation across these years in the PSID. While the CNEF has a cross-national equivalent variable on occupational for the PSID and GSOEP, there is no cross-national equivalent variable for the SLID. Rather than attempt to code the SLID to a *post hoc* occupational classification, all three surveys were coded to the ISCO88 standard for the SRHS analysis. This was because the ISCO88 groups occupation is based on skill level and skill specialisation (Hoffman 1999), which is consistent with the conceptualization of skill level being a central moderating variable between unemployment and health.

While it was perferable to code the mortality analysis to the ISCO88 standard, coding the PSID occupational categories across both the 1970 and 2000 Census standards proved prohibitive, so the CNEF equivalent variable was used for this analysis. The CNEF occupational variable codes the country-specific occupational classification (the 1988 – International Standard Classification of Occupations for the GSOEP and the 1970 United States Census classification for the PSID) into 100 occupational categories (e.g., chemist, office manager, janitor, farm hand, painter, machine fitter). From these a set of six occupational variables were created: no occupation (applied if an individual was out of the labour force at baseline); professional and technical

[56] An extensive set of occupational cross-walks have been developed through Cambridge Social Interaction and Stratification initiative (see http://www.camsis.stir.ac.uk/index.html) that has sought to harmonize country-specific occupational scales to provide comparable occupational scales based on social stratification. At the time of this writing, cross-walks for the Canadian NOCS and US 1970 Census occupational classification system have not been included.

occupations; business and sales occupations; service occupations; agriculture and forestry and mining occupations; and, manufacturing occupations.

The CNEF-based classification, however, is more akin to an industry classification with the grouping based upon production of goods or services rather than skills and tasks performed.[57]

The ISCO88 is a high-level occupational classification spanning ten categories (Table 3.10, column 2), and from these a set of nine occupational categories were created: no occupation; managers; professionals and technicians; clerical, sales and services; skilled trades, plant and equipment machinery operators; agriculture, forestry and fishing; and, labourers (Table 3.10). Professionals and technicians and associate professionals were grouped together as it was not possible to distinguish between these categories across the three surveys (i.e., the high-level SLID and PSID occupational categories did not map well to professionals or technicians separately). Armed forces (a very small group in the PSID and GSOEP, and none in the SLID) were put in the same category as other security and protective services. Individuals not working at baseline do not have an occupation, but individuals with a pre-existing occupation who are out the labour force after baseline have their occupation carried forward. Professional and technical occupations is the reference category for the empirical models.

3.4.5: Income and Transfers[58]

Most income variables for the GSOEP, PSID and SLID are taken from the CNEF, but the PSID and SLID unemployment compensation are derived directly from the underlying surveys. All income variables across years are adjusted to current 2005 Euros (GSOEP), United States Dollars (PSID) or Canadian Dollars (SLID) using respective consumer price indices.

3.4.5.1: Post Tax and Transfer Household Income (CNEF – G,P,S)

Post tax and transfer household income represents the sum of all income sources (labour, asset income, private and public transfers) minus reported taxes paid for all individuals in a household.

[57] I attempted to create occupational cross-walks between both PSID occupational classification systems and the ISCO-88 standard using the finest grained level occupation available in the PSID (the third digit of the Census Occupational Classification system) but obtained different cross-tabulation across the two classifications when mapping them to the ISCO-88. In order to successfully code to the ISCO-88 across survey years I would need to code directly from the underlying occupational titles.

[58] Most income and transfer variables are not used in the analytic models, but are used to describe income dynamics by labour and educational status in the descriptive tables.

In the GSOEP and SLID this is derived directly from the sum of the income and tax questions. The PSID variable is derived similarly except taxes paid is estimated using the National Bureau of Economic Research (NBER) TAXSIM algorithm that estimates the tax burden for each member in the household (Butricia and Burkhauser 1997).

In the GSOEP all income variables are restricted to a positive range, while in the PSID and SLID negative values (corresponding to business or investment losses) are allowed. For comparability and estimation purposes all negative income values in the PSID and SLID are recoded to zero. To capture the non-linear effect of income on health the log of income is used in the analytic models.

3.4.5.2: Individual Labour Income (CNEF – G,P,S)

Individual labour income represents the pre-tax wage and salary from all employment, including self-employment.

3.4.5.3: Unemployment Compensation (G,P,S)

GSOEP

Unemployment compensation is a derived variable taken from the GSOEP-CNEF file and is the sum of all unemployment-related transfers including unemployment assistance, unemployment benefits and subsistence allowance. These variables are collected at the monthly level and then summed to create a yearly total.

PSID

Unemployment compensation is not available in the PSID-CNEF file and was derived directly from the underlying yearly family files. Unemployment compensation is calculated based on 14 variables comprising the amount of unemployment benefits received, a time unit variable (bi-weekly, month, or year), and 12 single-month variables indicating whether unemployment benefits were received in a given month. The month variables are summed across the calendar year to give the number of months that unemployment benefits were received. Annual totals are derived by applying the following algorithm:

- if time unit equals year, then unemployment compensation equals the reported amount;

- if time unit equals month, then unemployment compensation equals the reported amount times the number of months unemployed;
- if time unit equals biweekly, then unemployment compensation equals the reported amount times 2.167 times the number of months unemployed; or,
- if time unit equals weekly, then unemployment compensation equals the reported amount times 4.333 times the number of months unemployed.[59]

For the years 1984 to 1993 and 2005, a derived variable based on the above algorithm has been provided in the respective family data files for heads and wives (this variable is only available from 1985 onwards for wives) corresponding to the tax years 1983 to 1991 and 2004 (Survey Research Centre 1998). For the years 1984 to 1992 these variables went through extensive consistency checks; implausible and missing values were corrected or assigned using hand coding procedures (Hill 1992), while for years 1993 and 2005 the variable was cleaned and missing values were assigned using computer coding and statistical imputation.

For the years 1994 to 2003 derived and imputed variables are not available in the family data files. For these years a comparable unemployment benefit variable is created based on the underlying 28 variables corresponding to head's and spouse's unemployment experience. For the years 1984 to 1992 only the derived variables are available in the family data file, however for 1993 and 2005, both the derived variable and the underlying component variables are provided. For these two years the unemployment benefit variable was recalulated from the underlying 14 variables and compared this with the derived variable in the family data files to ensure that the calculation was done consistently across years.

SLID

Unemployment compensation in the SLID is taken directly from Line 119 (Employment Insurance and Other Benefits) of the respondent's income tax return for the previous year for those respondents who provided permission for a tax-filer linkage. For those individuals who did not provide permission, the amount of unemployment compensation received in the previous year is asked in the May income interview. Employment benefits can also refer to maternity

[59] The biweekly and weekly multipliers of 2.167 and 4.333 are scaled up to the biweekly and weekly amounts to reflect the duration of an average month.

leave and seasonal benefits for workers in the fishing industry that would not be included as unemployment benefits in the GSOEP or PSID.

3.4.5.4: All Public Transfers (CNEF – G,P,S)

All public transfers represent the sum all of public transfers including welfare, social assistance, unemployment compensation , workers compensation, food stamps (PSID only), child benefits, and maternity leave (GSOEP only).

3.4.6: Demographics

3.4.6.1: Gender (CNEF – G,P,S)

Gender is a dichotomous variable with women as the reference category as men are hypothesized to have a higher risk of mortality.

3.4.6.2: Age (G,P,S)

Age is derived by subtracting year of the survey from the year of birth. Age at survey is not used as the timing of the survey varies each year for the GSOEP and PSID and so an individual does not necessarily age one full calendar year between each survey. Age is the principal measure of time in the mortality analysis (see the methods section in Chapter 4 for more detail) so it was imperative that individuals age in discrete and uniform increments, even if a full calendar year does not elapse between each survey wave. Age is defined as a continuous variable and polynomials of age were also considered to capture any non-linear relationship between age and the health dependent variables.

3.4.6.3: Relationship to Head (CNEF – G,P,S)

All cohort members in the three surveys are either a head or spouse. In the GSOEP, a head is self-identified and can be either a man or a woman irrespective of the gender of the other partner. In the PSID the head is always a man unless it a women-only household. Accordingly the relationship-to-head variable is not included in the the men-only models for the PSID cohort. In the SLID, the household head is defined as the individual with the highest greatest individual income but for comparability purposes with the PSID this has been revised to correspond to the PSID definition of head. Head is the reference category.

3.4.6.4: Martial Status (CNEF- G,P,S)

Marital Status is a set of four variables indicating whether a person was married or living with a partner, single, divorced or separated, or widowed. Married is the reference category.

3.4.6.5: Household size (CNEF - G,P,S)

Household size is a continuous variable indicating the number of people in the household.

3.4.6.6: Number of Children (CNEF - G,P,S)

Number of children is a continuous variable indicating the number of individuals under the age of 18 in the household.

3.4.6.7: East German (G)

East German is a variable indicating whether an individual was drawn from the 1991 sample (sample C) covering individuals from the former German Democratic Republic (GDR).

3.4.6.8: Immigrant (G)

Immigrant is a variable indicating if an individual immigrated to Germany after 1948. In general immigrants tend to be from Eastern Europe (e.g., Poland, Romania, Russia), the countries comprising the former Republic of Yugoslavia and Turkey. Immigrant is included as a control variable in the German cohort as previous research has indicated that immigrants to Germany tend to have different labour market experiences and health dynamics than German-born individuals (Elkeles and Seifert 1996).

3.4.6.9: Race (P)

Race is a set of three variables indicating whether an individual is white, black or of other ethnicity. Race is used to capture the health and labour market effects of discrimination and segregation in the United States. Race is not conceptualized as a biological construct, but rather as a marker of shared experiences and identities related to the social construction of historic racialized categories. Accordingly, race can be viewed as marker for radicalized identity (Veenstra, 2009). Race other than white or black are not distinguished due small sample sizes. All individuals are assigned a consistent racial indicator across time using the following ranking: black and African American, other (Asian, Pacific Islander, American Indian), or white. Race is

generally asked only of new heads (a former spouse can be a new head) and of new spouses and periodically of the whole sample. For new heads and spouses, ethnicity is asked up to four times in the survey. Any answer of 'Black' or 'African American' leads to an assignment of black or African American over other or white. Similarly any answer of 'Other' leads to an assignment of other over white. For a small number of respondents race does change across years although this is usually from 'White' to 'Other', as the PSID expanded the number of race categories in the latter years of the survey. The same ranking algorithm is applied across years to create a consistent, time invariant race variable.

In the SLID, there are a series of questions that asks about mother tongue, country of origin and visible minority status. Deriving a similar variable to the PSID leads to only a small number of individuals (less than 5%) being assigned an race other than white. Accordingly, race variables are not included in the SLID models.

3.4.6.10: Oversample Indicator (P)

Oversample is a variable indicating if an individual was drawn from the survey of economic opportunity (SEO) sample of the PSID. The SEO sample is a sample of low-income, predominately black families. While income, race and other variables that would characterize this sample are included as covariates in the models, the oversample indicator is included to capture any residual fixed effects between the two samples not accounted for by other demographic and income variables.

3.4.6.11: Geography (CNEF – G,S,P)

Geography was defined as residence in a state (Germany), census-division (United States) or province (Canada) in a given year.

GSOEP

Geography is defined as the level of the 16 Länder (States): eleven states from West Germany (Baden-Württenberg, Bayern, Berlin, Bremen, Hamburg, Hessen, Niedersachsen, Nordrhein-Westfalen, Rheinland-Saarland, Schleswig-Holstein) and five states from the East Germany (Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt, Thuringen).

PSID

In the PSID, states are not uniformly represented in the sample with some small states (e.g., Delaware, North Dakota, Montana, and Vermont) having very few study subjects. Inclusion of state as the geography indicator variable led to estimation problems in some model specifications given the small number of observations for some states.[60] Accordingly, states are grouped into nine census divisions (New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain and Pacific) and a residual category indicating state unknown.

The census division – state correspondence is:

- New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont;
- Middle Atlantic: New Jersey, New York and Pennsylvania;
- East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin;
- West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota;
- South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia;
- East South Central: Alabama, Kentucky, Mississippi, Tennessee;
- West South Central: Arkansas, Louisiana, Oklahoma, Texas;
- Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming; and,
- Pacific: California, Oregon, Washington, Alaska, Hawaii.

SLID

Geography is defined as the ten Canadian provinces (Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick, Québec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia).

[60] Including a set of 51 state indicator variables (the 50 states plus District of Columbia and state unknown minus California as a reference state) led to some observations being dropped as the state indicator variables predicted the outcome perfectly especially in the stratified models. For example, in the state of Hawaii there were no high-skilled individuals who reported being in poor or fair self-reported health status.

3.4.6.12: Year

Survey year (e.g., 1984 though 2005) was included as an indicator variable to control for time effects in the SRHS analysis. Survey year was not included in the mortality analysis as the inclusion of age, year and the exposure offset variable (see section 4.3.2 for a discussion of the offset variables) led to collinearity.

3.5: Assessment of Data Quality and Comparability of Study Cohorts

This chapter has described the survey data sets, the development of the study cohorts and derivation of the study variables. To the extent possible comparable cohorts and harmonized variables have been developed drawing on the existing comparable variables in the cross-national equivalent file and derivations specific to this study. However there are differences in the cohorts and variables both within and across surveys that may affect the comparability, reliability and validity of the survey measures or otherwise introduce bias into this study.

Some of the differences are intentional. The inclusion of race as a confounder and stratification variable in the PSID is imperative not only because of the longstanding health and social stratification by race in the United States, but also because the PSID deliberately oversampled blacks. Not accounting for race in the PSID would reduce the comparability of the results to countries where there is a different legacy of racial and ethnic segregation. A similar argument can also be made for including an East German variable in the GSOEP analysis.

Some of the differences are unavoidable. The PSID SRHS cohort spans the decade prior to the GSOEP and SLID SRHS cohorts because of changes in the PSID survey data collection. Unless the relationship between unemployment and health changed within the United States from the 1980s to the 1990s using an earlier American sample should not weaken the comparisons with Germany and Canada. The review of unemployment and mortality from Chapter 2 would suggest that the relationship between unemployment and health has remained consistent across the 1980s and 1990s. Moreover, the institutional arrangements pertaining to unemployment and employment protection did not change in the United States across these decades (unlike Canada, which saw significant retrenchment in the benefit available to the unemployed).

The shorter follow-up period of the SLID also presents challenges to the comparability of the study cohorts. The differences in follow-up across the three cohorts has the potential to affect the health dynamics in the models in that the longer a person is the study the more likely a change in health status will be observed. Further a shorter follow-up places more importance on baseline and initial conditions compared to events that occur during follow-up. Thus the SLID cohort is inherently a less dynamic cohort than the longer GSOEP and PSID cohorts. Accordingly, in the analytic chapters an exposure offset of the number of years in the study to account for difference in follow-up is included.

As with any longitudinal survey attrition, differential loss to follow-up, and ongoing representativeness are main concerns. Hill (1992) summarizes a number of assessments of representativeness and validity of the PSID during its early years and concludes that the PSID contains valid survey measures and does not have substantial non-response biases. The effect of attrition on the representativeness of the PSID has been well studied (Fitzgerald, Gottschalk, and Moffitt 1998; Lillard and Panis 1998; Zabel 1998). Fitzgerald, for example, reports 50% attrition in the original households from 1968 to 1989 and that attrition is more likely to occur among respondents of lower socio-economic status and those with unstable earnings and labour market histories. He finds that this does not significantly affect regression results for earnings, marital status, and welfare participation when compared with United States Current Population Survey. Poor health status was found to be a predictor of non-response in the BHPS and the ECHP, but health non-response did not substantively affect regression estimates of lagged health, income and education on self-reported health status across balanced or unbalanced models and a model corrected for non-response using inverse probability weights (Jones, Koolman, and Rice 2006).[61]

Section 3.4.2 detailed the development of comparable labour force status variables, and while care was taken define a similar measure of unemployment across the three surveys there are undoubtedly still differences in who is considered unemployed and who is not across the three surveys. Even within a single country, how labour forces status was measured changed across years (e.g., appendix table C3 illustrates how the number of possible labour force statuses grew over time in the German cohort).

[61] Inverse probability weighting corrects for non-response bias by weighting respondents by the inverse of the likelihood remaining a respondent such that individuals likely to drop but remain in the sample are given a higher weight to account for similar individuals who dropped out (Jones et al. 2007).

Retrospective measures of income and labour market activity have been found to be less accurate than current measures (Bound, Brown, and Mathiowetz 2000; Mathiowetz and Duncan 1988; Poterba and Summers 1995). A comparison of the SLID estimates of unemployment to estimates derived from Canada Labour Force Survey found that the SLID underreported the unemployment possibily due to the errors in recalling short spells of unemployment (Noreau, Hale, and Giles 1997). Jurges (2007) found in the GSOEP that 20% of current unemployment was not reflected in the retrospective unemployment measure collected the year following and that errors were more likely for individuals with weak labour force attachment and specifically women with children from West Germany, but not women from East Germany. Similarly, Jacobs (2002) studied the concordance between current and retrospective unemployment measures in the BHPS and found errors in retrospective recall rates in both men and women, with women being two to three more likely to not recall retrospective episodes of unemployment compared to men. Instead women tended to attribute the previous unemployment episode as being involved in family care.

The agreement between current and retrospective unemployment within the three surveys using the SRHS cohorts was investigated to acertain whether there were difference in the recall errors across the three surveys. In the GSOEP, about 11% of current episodes of unemployment are not captured in next year's retrospective monthly measure of unemployment (10% for males and 12% for females), while in the PSID almost 50% of current unemployment episodes were not captured in the following retrospective monthly measure of unemployment (56% for women and 42%). In both surveys the lack of concordance is largely explained by whether an individual also reported receiving unemployment compensation. In the GSOEP the lack of concordance for those not receiving unemployment compensation was 42% and for those receiving unemployment compensation it was 2%. Similarly in the PSID, the lack of concordance for those not receiving unemployment compensation was 56% and for those receiving compensation it was 19%.

There is more consistency among these measures in the SLID. About 23% of current episodes of unemployment in the SLID are not captured in the retrospective monthly measure of unemployment and there was no gender difference in the agreement rate. Concordance between current and retrospective measures of unemployment also did not vary by receipt of

unemployment (21% for those receiving unemployment compensation and 24% for those not receiving unemployment compensation). There was also a higher portion of individuals in the SLID who reported receiving unemployment benefits, but did not report ever being unemployed in the same survey year compared to the other surveys. This can be explained, in part, by the provision of employment benefits (i.e., maternity or paternity benefits and seasonal payments to fishers) through the same federal benefit system as unemployment benefits.

The greater disagreement between current and retrospective unemployment measures in the PSID compared to the GSOEP may be explained by the higher overall level of unemployment compensation in Germany as invididuals who receive unemployed compensation are more likely to recall a previous episode of unemployment. Further, to be considered unemployed in Germany a worker is also required to register at the municipal employment office, which may also decrease recall bias. That the same recall pattern is not found in the SLID may be due to the SLID collecting labour market information in January for the prior year, while the receipt of unemployment compensation comes directly from tax filer records for many respondents.

3.6: Concluding Remarks

The creation of comparable constructs and data lies at the heart of comparative research. This chapter has outlined the strengths of the constituent panel surveys used in this study, namely the ability to follow similar working-age cohorts with a consistent set of health and labour market variables over time. This represents a step forward from previous comparative health research which has relied on ecological or cross-sectional study designs. There are, however, limitations to the data and study design. The study cohorts were not designed to be comparable, *ex ante*, leading to some irresolvable differences in cohort design and study variables. Differences in survey design, variable construction and measurement error may also be reflective of institutional differences in their own right. While the data, cohort and measures used in this study allow for powerful analyses of how contextual and institutional factors can influence the unemployment and health relationship, care must also be taken to account for differences across the three studies that could bias the comparability of the results.

Tables

Table 3.1: Derivation of GSOEP mortality cohort (1984-2005)

	Individuals (Person Years)	Deaths (%)
SOEP Cohort 1984-2005 (95% GSOEP public use sample)	**53,918**	**3,088 (5.7%)[1]**
- Drop individuals not eligible for an interview or who never had a successful interview	-11,904	- 99 (0.8%)
- Drop individuals who were never Head or Partner between 1984-2005[2]	- 6,964	- 303 (4.3%)
Individuals with at least one year of complete data as Head or Spouse (1984-2005)	**35,050 (304,804 PY)**	**2,686 (7.7%)**
-Drop individuals who were 65 or older at baseline (t-2)	-4,084 (23,118 PY)	- 1,329 (32.4%)
-Drop person years in which individuals are not yet sample Heads or Spouses or are sample Heads or Spouses but are in an institution or otherwise not followable[3]	- 0 (19,492 PY)	- 0 (NA)
Heads and Spouses with at least one year of complete data (1984-2005) and between the ages of 18 and 64 at baseline	**30,966 (248,675 PY)**	**1,357 (4.4%)**
- Drop Samples B, F & G[4] (see Table C1 in appendices)	- 14,066 (76,841 PY)	214 (1.5%)
- Drop 1990 data from Sample C[5] (East German cohort)	- 153 (3,192 PY)	26 (17%)
Heads and Spouses with at least one year of complete data (1984-2005) and between the ages of 18 and 64 at baseline (t-2) in retained sample cohorts	**16,747 (168,642 PY)**	**1,117 (6.8%)**
- Drop individuals with less than three waves of follow-up	-2,901 (4,101 PY)	-213 (7.3%)
Heads and Spouses with three or more years of complete data (1984-2005) and between the ages of 18 and 64 at baseline (t-2) in retained sample cohorts	**13,846 (164,541 PY)**	**904 (6.5%)**
- Drop individuals whose baseline year (t-2) is after 1995 (this drops Sample E as well as later entrants from other retained samples)	-2,980 (18,809 PY)	-25 (0.8%)
Heads and Spouses with three or more years of complete data (1984-1997) and between the ages of 18 and 64 at baseline (t-2) in retained sample cohorts	**10,866 (145,732 PY)**	**879 (8.1%)**
Subsamples derived from baseline characteristics (these are not mutually exclusive)		
- Drop individuals who were not employed at baseline (t-1 **or** t-2)	- 3,807 (50,555 PY)	-484 (12.7%)
Cohort members employed for both years at baseline (t-1 and t-2)	**7,059 (95,177 PY)**	**395 (5.6%)**
- Drop individual who report poor or bad health satisfaction at baseline (t-1 **or** t-2)	-2,069 (27,015 PY)	-331 (16.0%)
Cohort members with satisfactory health satisfaction or better for both years at baseline (t-1 and t-2)	**8,797 (118,717 PY)**	**548 (6.2%)**

Notes:
[1] The percentages in the Deaths column represent the percentage of deaths of the total number of individuals in a given row.
[2] These individuals are mostly children.
[3] In contrast to the PSID complete information is collected on all adult household members. The majority of these individuals are adult children who have yet to form their own households. This group is dropped for comparability with the PSID cohort on the basis that adults who never been a head or spouse likely have different employment experiences than adults who have been a head or spouse.
[4] Sample B is dropped as deaths are incompletely ascertained in the foreigner sample due to individuals leaving Germany and returning to their country of origin once leaving the workforce. Samples E, F & G are dropped due to the short follow-up period. See Table C1 in the appendices for a more detailed breakdown.
[5] The 1990 data from the East German cohort was dropped as prior year income and work history data was not collected.

Table 3.2: Derivation of American mortality cohort (1984-2005)

	Individuals (Person Years)	Deaths (%)
PSID Cohort 1968-2005	**67,271**	**4,917 (7.3%)[1]**
- Drop Latino/Hispanic sample (1990-1995)[2]	-10,607	- 189 (1.8%)
- Drop non-sample individuals[3]	-20,725	- 817 (3.9%)
- Drop individuals lost to follow-up prior to 1984[4]	- 7,470	-1,743 (23.3%)
- Drop individuals who were never Head or Spouse between 1984-2005[5]	-13,595	- 261 (1.9%)
Individuals with at least one year of complete data as Head or Spouse (1984-2005)	**14,874 (191,931 PY)**	**1907 (12.8%)**
-Drop individuals who were 65 or older at baseline	-1,269 (11,577 PY)	- 930 (73.3%)
-Drop person years in which individuals are not yet sample Heads or Spouses or are sample Heads or Spouses but are in an institution or otherwise not followable[6]	- 0 (45,384 PY)	- 0 (NA)
Heads and Spouses with at least one year of complete data (1984-2005) and between the ages of 18 and 64 at baseline	**13,605 (134,970 PY)**	**977 (7.2%)**
Drop individuals with less than three waves of follow-up	-1,963 (2,868 PY)	-95 (4.8%)
Heads and Spouses with three or more years of complete data (1984-2005) and between the ages of 18 and 64 at baseline	**11,642 (132,102 PY)**	**882 (7.6%)**
- Drop individuals whose baseline year (t-2) is after 1995	-1,856 (7,760)	-6 (0.3%)
Heads and Spouses with three or more years of complete data (1984-1997) and between the ages of 18 and 64 at baseline (t-2) in retained sample cohorts	**9786 (124,342 PY)**	**876 (9.0%)**
Subsamples derived from baseline characteristics (these are not mutually exclusive)		
- Drop individuals who were not employed at baseline (t-1 or t-2)	- 3,679 (45,080 PY)	-484 (13.2%)
Cohort members employed for both years at baseline (t-1 and t-2)	**6,107 (77,262 PY)**	**392 (6.4%)**
- Drop individual who report fair or poor health self-reported health status at baseline (t-1 or t-2)	- 2,062 (29,945 PY)	-431 (20.9%)
Cohort members with good self-reported health status or better for both years at baseline (t-1 and t-2)	**7724 (99466 PY)**	**445 (5.8%)**

Notes:

[1] The percentages in the Deaths column represent the percentage of deaths of the total number of individuals in a give row.

[2] Between the years of 1990 and 1995 the PSID was supplemented by a Latino/Hispanic cohort. Due to budgetary restrictions the follow-up of this cohort was discontinued after 1995 and deaths were not ascertained.

[3] Non-sample individuals are individuals who moved into a sample household (usually through marriage). Non-sample individuals usually are the partner of a sample Head or Spouse, but could also be the parent of a followable sample child. These individuals are followed and complete information is collected on them while they are part of a sample household, but sampling weights are not calculated for them. They are not followed once they leave a sample household.

[4] These are sample individuals who have been lost to follow-up or who have died prior to 1984.

[5] This group is comprised almost entirely of children or child-age dependants of sample heads or spouses. A small number of individuals (940) are adult sample household member who were never a head or spouse between 1984 or 2005 (e.g., brother, sister, mother or father of Head or Spouse); these individuals account for most of the deaths in this group.

[6] Typically these would be years prior to a sample child creating a split-off sample household and becoming a head or spouse. A small number of original sample Heads or Spouses have person years dropped due to being in an institution (prison or hospitals etc) for a given survey year.

Table 3.3: Derivation of the German SRHS cohort (1994-2005)

	Individuals (Person years)
GSOEP Cohort 1984-2006 (95% GSOEP W public use sample)[1]	**57,758 (693,096)**
- Drop individuals not in sample during 1994 to 2005	-23,434 (485,178)
- Drop individuals who were never Head or Partner between 1994-2005	-5,186 (19,776)
Individuals with at least one year of complete data as Head or Spouse (1994-2005)	**29,138 (188,142)**
-Drop individuals who were 65 or older at baseline	-3,978 (27,169)
Drop individual never older than age 17	-25 (672)
-Drop person years in which individuals are not yet sample Heads or Spouses or are sample Heads or Spouses but are in an institution or otherwise not followable	-0 (2,960)
Heads and Spouses with at least one year of complete data (1984-2005) and between the ages of 18 and 64 at baseline in retained sample cohorts	**25,135 (157,341)**
- Drop individuals with less than three waves of follow-up	-5,322 (7,251)
Heads and Spouses with three or more years of complete data (1994-2005) and between the ages of 18 and 64 at baseline	**19,813 (150,090)**
- Drop baseline and final year person years	-0 (39,626)
- Drop individuals and person years with missing data on covariates for the fully specified analytic models	-738 (6,980)
Analytic sample (1995-2004)	**19,029 (103,484)**
Subsamples derived from baseline characteristics (these are not mutually exclusive)	
- Drop individuals who were not employed at baseline	-5,071 (27,991)
Cohort members employed at baseline	**13,958 (75,493)**
- Drop individual who report poor or bad health status at baseline	-2,426 (13,806)
Cohort members with good self-reported health status or better at baseline	**16,603 (89,678)**

1. The GSOEP SRHS cohort is dawn from the 95% GSOEP public use sample including 2006 data; however as the 2006 data includes different unemployment compensation measures relating to policy changes in the unemployment insurance system in 2005, and data from this year is not used.

Table 3.4: Derivation of the Canadian SRHS cohort (1996-2005)

	Individuals (Person years)
SLID Cohort 1996-2005 (CNEF cohort)1	**223,890 (760,396)**
- Drop individuals from panel 5 (2005)	- 34,895 (34,895)
- Drop non-sample cohabitants	- 41,049 (92,841)
- Drop children (less than 18 yrs of age), adults aged 65 or older at baseline and those who were never a head or spouse	-70,210 (299,309)
Individuals with at least one year of complete data as Head or Spouse (1994-2005) and between the ages of 18 and 64 at baseline	**77,763 (335,609)**
- Drop individuals with less than three waves of follow-up	-7,768 (12,316)
Heads and Spouses with three or more years of complete data (1984-2005) and between the ages of 18 and 64 at baseline	**69,995 (323,293)**
- Drop baseline year observations	- 0 (69,995)
- Drop individuals with missing data on covariates for the fully specified analytic models3	- 4,827 (35,767)
Analytic sample (1995-2005)	**65,168 (217,530)**
Subsamples derived from baseline characteristics (these are not mutually exclusive)	
- Drop individuals who were not employed at baseline	- 18,661 (61,206)
Cohort members employed at baseline	**46,507 (156,324)**
- Drop individual who report poor or fair health self-reported health status at baseline	- 7,197 (22,565)
Cohort members with good self-reported health status or better	**57,971 (194,965)**

1. The cross national equivalent SLID cohort is dawn from the underlying SLID panels which follow individuals for a maximum of 6 years. This study draws from panel one (1996-1998), panel two (1996-2001), panel three (1999-2004) and panel four (2002-2005).
2. Baseline year observations are dropped as there is no lagged health measure for the first year of observation.
3. This includes individuals who do not have complete data in any year, as well has individuals who are missing data in only some years.

Table 3.5: Derivation of the American SRHS cohort (1984-1997)

	Individuals (Person years)
PSID Cohort 1968-2005	**67,271 (1,278,149)**
- Drop Latino/Hispanic sample (1990-1995)[2]	-10,607 (201,533)
- Drop non-sample individuals[3]	-20,725 (393,775)
- Drop individuals lost to follow-up prior to 1984[4]	- 7,470 (142,172)
-Drop individuals and person years after 1997	- 3,341 (311,795)
- Drop individuals who were never Head or Spouse between 1984-1997[5]	-12,349 (93,728)
Individuals with at least one year of complete data as Head or Spouse (1984-1997)	**12,779 (135,388)**
-Drop individuals who were 65 or older at baseline	- 1,263 (10,662)
-Drop person years in which individuals are not yet sample Heads or Spouses or are sample Heads or Spouses but are in an institution or otherwise not followable[6]	- 5 (19,548)
Heads and Spouses with at least one year of complete data (1984-1997) and between the ages of 18 and 64 at baseline	**11,511 (105,178)**
Drop individuals with less than three waves of follow-up	- 1,754 (2,256)
Heads and Spouses with three or more years of complete data (1984-1997) and between the ages of 18 and 64 at baseline	**9,757 (102,922)**
- Drop baseline and final year person years	- 0 (19,514)
- Drop individuals with missing data on covariates for the fully specified analytic models3	- 212 (4,457)
Analytic sample (1985-1996)	**9,545 (78,951)**
Subsamples derived from baseline characteristics (these are not mutually exclusive)	
- Drop individuals who were not employed at baseline	- 2,688 (19,797)
Cohort members employed at baseline	**6,857 (59,154)**
- Drop individual who report fair or poor health self-reported health status at baseline	- 1,414 (12,041)
Cohort members with good self-reported health status or better at baseline	**8,305 (71,189)**

Table 3.6: Cross-tabulation between self-rated health status and health satisfaction for the years 1992, 1994-2005 for the German cohort

Health Satisfaction (on a scale of 1 to 10)	Current Self-Rated Health Status					
	Excellent	Good	Satisfactory	Poor	Bad	Total
Excellent 9/10	4666	7562	722	59	40	13049
Good 8/7	1286	23874	12325	838	63	38386
Satisfactory 5/6	97	4477	16730	4285	155	25744
Poor 3/4	17	579	4135	6122	12	11465
Bad 0/1/2	19	143	309	2170	2276	4917
Total	6085	36635	34221	13474	3146	93561

Table 3.7: Assignment of monthly labour force status based on the monthly labour force status question for 1984-1992[62]

Code	Meaning	LFS Status
1	Unemployed or temporarily laid off	Unemployed
2	Out of the labour force, but not unemployed or temporarily laid off	Not Working
3	Both unemployed and out of the labour force in the month	Unemployed
7	Either unemployed or out of the labour force, but not clear which	Not Working
9	Missing	Not working
0	Neither unemployed, temporarily laid off or out of the labour force	Employed

Table 3.8. Stylized cumulative labour force status example depicting the transition from employed to not working in the mortality cohort.

	Years Followed	Months Working	Months Unemployed	Months Not Working	Cum. % Working	Cum. % Unemployed	Cum. % Not Working
Baseline: T-2, T-1, T0	1	12	0	0	100%	0%	0%
	2	12	0	0	100%	0%	0%
	3	8	4	0	89%	11%	0%
T+1	4	6	6	0	79%	21%	0%
T+2	5	4	4	4	70%	23%	7%
T+3	6	0	3	9	58%	24%	18%
T+4	7	0	0	12	50%	20%	30%

[62] Unemployment dominates working, as working is implied through the union of the null answer to both the unemployment and out of the labour force. This is different than the labour force hierarchy developed for the GSOEP data in which working dominates registered unemployment. It is necessary to have a different ranking algorithm for GSOEP due to different meaning of registered unemployment (i.e. individual can work while registered unemployed) compared to unemployment in the PSID.

Table 3.9: Highest degree of education based on a modified CASMIN classification at baseline for the SRHS cohort

Skill Classification	Germany		United States and Canada	United States	Canada
Neither – minimal	Compulsory general elementary certificate (1a, 1b)	2,528 (12.9%)	Less than high school (1a, 1b)	2,179 (22.5%)	15,413 (22.33%)
Specific – medium	Basic vocational qualification (1c)	5,785(29.6%)	These educational qualifications do not exist in the United States or Canada	NA	NA
Specific– medium	Intermediate vocational qualification (2a)	5,016 (25.7%)			
Specific – medium	Vocational Maturity Certificate (2c_voc)	1,195 (6.1%)	Vocational degree or certificate (2c_voc, 3a_voc)	1,737 (17.9%)	19, 612 (30.7%)
Specific -high	Tertiary Education (3a_voc)	891 (4.6%)	(Not able to distinguish between 2c_voc and 3a_voc in the PSID or the SLID)		
General – medium	Intermediate general qualification or maturity certificate (2b, 2c_gen)	1,162 (5.9%)	High school or GED - includes some college including CEGEP in Canada (2b, 2c_gen)	3,905 (40.3%)	19,893 (30.1%)
General – high	Tertiary Education – (3b, 3c)	2,965 (15.2%)	Associate, bachelor, professional or graduate degree (3a_gen, 3b, 3c)	1,867 (19.3%)	11,157 (17.9%)
		19,552		9,688	66,075

Notes: While classifications 1c and 2a do not exist in the United States (Kerckhoff, Ezell, and Brown 2002), it is likely that some the vocational training received in the United States would more comparable to basic vocational qualification (1c) and not at a higher level (2c_voc, 3a_voc). Most holders of vocational certificates in the PSID also have high school or GED completion. There may also be some additional technical school degrees in the PSID classified as 3a_gen or 3b.

Table 3.10: Creation of the occupational variable used in the SRHS study across the three surveys

Occupational classification used in analysis	ISCO-88 (GSOEP)	2000 NOC (SLID)	US 1970 Census occupational classification (PSID)
Managers	Legislators, senior officials, managers (1)	Senior managers (1), Other managers (2)	Managers and administrators, except farm (201-245)
Professionals and Technicians	Professionals (2), Technicians and associate professionals (3)	Professionals in business and finance (3), Natural and applied science (6), Professionals in health (7), Technicians in health (8), Social science, government service and religion (9), Teachers and professors (10), Art culture, recreation, and sport (11)	Professional, technical and kindred workers (1-195)
Clerical	Clerks (4)	Financial, secretarial and administrative (4), clerical workers (5)	Clerical and kindred workers (301-395)
Sales and Services	Service workers and shop and market sales workers (5), Military (0)	Wholesale, technical, insurance, real estate sales (12), Retail sales (13), Good and beverage sales (14), Protective services (15), Childcare and home support (16), Travel and accommodation (17)	Sales workers (260-280), Service workers (901-984), Current and former members of the armed forces (580,600)
Skilled Trades	Craft and related workers (7)	Contractors (18), Construction trades (19), Other trades (20)	Craftsmen and kindred trades (401-575)
Plant, equipment and machinery operators	Plant and machine operators and assemblers (8)	Transport and equipment operators (21), Machine operators and assemblers in manufacturing (24)	Operatives except transport (601-695), Transport equipment operatives (701-715)
Agriculture, forestry and fishing	Skilled agricultural and fishery workers (6),	Occupations unique to primary industry (23)	Farmers and farm mangers (24, 801, 802), Farm foremen (821) and forestry worker (25, 605), fisher/hunter (752) logger (761), Drillers (614), Blasters (603)
Labourers	Elementary occupations (9)	Trades helpers, construction and transportation labourers (22), Labourers in processing manufacturing and utilities (25)	Labourers, (740-785), Farm labourers (822-824)

Chapter 4: Unemployment and Mortality: A Study of Germany and the United States

4.1: Introduction

The relationship between unemployment and mortality has been well studied in single country studies. Unemployment has been found to be associated with all cause mortality (Costa and Segnan 1987; Cubbin, LeClere, and Smith 2000; Iversen, Andersen, Andersen, Christoffersen, and Keiding 1987; Norstrom 1988), for both men (Bethune 1996; Lavis 1998; Nylen, Voss, and Floderus 2001) and women (Blomgren and Valkonen 2007; Saarela and Finnas 2005), for cause-specific outcomes (Johansson and Sundquist 1997; Kposowa 2001), and after controls for health selection into unemployment (Gerdtham and Johannesson 2003; Gognalons-Nicolet et al. 1999; Kiuila and Mieszkowski 2007; Rogers, Hummer, and Nam 2000). Unemployment is weakly associated with mortality in older workers (Hayward et al. 1989; Moser et al. 1987; Osler et al. 2003; Sorlie, Backlund, and Keller 1995; Stefansson 1991). Some studies have found that the relationship between unemployment and mortality is smaller during times of high unemployment and not in times of low unemployment (Martikainen and Valkonen 1996; Martikainen, Maki, and Jantti 2007); studies of plant closure, however, have found a consistent relationship (Eliason and Storrie 2007; Sullivan and Wachter 2007).

While a relationship between unemployment and mortality has been found in both CME and LME countries (see section 2.5), differences in study and cohort design, measurement of unemployment, control of covariates, and model specification make it difficult to draw conclusions about whether the relationship between unemployment and health varies by country cluster.

This chapter presents a comparative longitudinal cohort study of unemployment and mortality in Germany and the United States to determine whether this relationship varies between coordinated market and liberal market economies. In order to maximize comparability, comparable cohorts, measures, and statistical methodology have been used.

4.2: Research Objectives

The hypotheses articulated in Chapter 2 lead to the following objectives:

- to examine the relationship between unemployment and mortality in working-age cohorts of Germans and Americans to determine whether and how this relationship differs by study country;
- to examine how the relationship between unemployment and mortality changes after controlling for health selection and measure of unemployment; and,
- to examine if the unemployment-mortality relationship is modified by educational status or gender and whether this also varies by study country.

The specific hypotheses developed in Chapter 2 for the unemployment and mortality study are:

1. The association between unemployment and mortality will be weaker in Germany compared to the United States.
2. There will also be effect modification by educational status that will vary by study country. The relationship between unemployment and mortality will be weaker for the minimally skilled and medium skilled in Germany compared to their counterparts in the United States, with the minimally skilled in the United States being especially disadvantaged. The effect of unemployment for the high-general skilled in the United States will be weaker compared those in lower skill categories in the United States. There is no *a priori* expectation, however, that high-skilled workers in Germany will have a different unemployment-health relationship than those with lower skills.
3. Controlling for health selection will account for some but not all of the association between unemployment and health and a larger proportion of the association will be accounted by health selection into unemployment in Germany.
4. The direction of effect modification across genders is indeterminate, but the ranking across countries will be consistent by gender with the stronger associations being in the United States.

4.3: Methods

4.3.1: Study Cohort and Variables

The derivation of the mortality cohort and variables were described in detail in Chapter 3. In brief, two dynamic cohorts were developed; eligible individuals were required to be between 18 and 64 at baseline and have a minimum of three waves of data. Baseline was defined as the first two waves of data, with the first year of follow-up being the third year, after which

individuals were at risk of dying. Individuals were followed until death or loss to follow-up or were censored in 2005. The German cohort included 10,886 individuals and 145,732 person years, yielding an average follow-up of 13.4 years. Listwise deletion of individuals with observations with missing information on variables led to a final cohort of 10,754 individuals and 117,123 person years that was used in the statistical models. The American cohort included 9,786 individuals followed for 124,342 person years, yielding an average follow-up of 12.7 yrs. Some individuals (2,108 or 22.5% of the sample) in the American cohort were censored in 1997 because of the reduction in the study sample. Listwise deletion of individuals with observations with missing information on variables led to a final cohort of 9,523 individuals and 98,721 person years.[63]

Three sets of labour force status variables were examined: current unemployment, months unemployed in the year previous to the survey, and cumulative lifetime unemployment. The interaction between current unemployment and receipt of unemployment insurance could not be examined in the mortality models as individuals had to survive until the following year for their income variables to be observed.[64]

Six groups of covariates were defined and sequentially placed in the model: age and gender; other demographics; household income; education status; occupation; and health status in the previous year.

4.3.2: Health Selection into Unemployment

Three approaches were implemented to control for health selection into unemployment. Health selection is directly controlled for by including health status in the year prior to unemployment measures in all final models. Lagged health status, however, may be correlated with both prior and current unemployment and may not be a sufficient control for health selection. This is a form of the 'initial conditions' problem in longitudinal study designs in which it is not possible to directly account for the effects of and temporal sequencing of prior unobservable life events on those observable during the study period (Jones, Rice, Basho d'Uva, and Balia 2007). To account for the challenge of 'initial conditions', two sub cohorts were created that attempted to control

[63] The large reduction in person-years for eligible cohort members with complete data was due to excluding the first two years of their study data in the statistical models.

[64] Most German unemployed receive unemployment benefits, while most American unemployed do not (see Section 4.4.1.2) and one interpretation of the mortality analysis is that is a comparison between a cohort of unemployed that receive unemployment benefits and a cohort that does not.

for health selection prior to the study period through cohort construction rather than through statistical methods. The first sub cohort only includes individuals who are in good or better health at both baseline years and who are therefore unlikely to experience unemployment due to prior poor health. The second sub cohort only includes individuals currently employed at both baseline years and controls for health selection by removing those who have already experienced poor labour market outcomes that may be associated with poor health prior to the start of the study.

4.3.3: Statistical Model

While many studies of unemployment and mortality have adopted a Cox proportional hazard approach (16 of the 40 studies reviewed in Chapter 2), this study uses a discrete-time survival approach (Rabe-Hesketh and Skrondal 2008; Singer and Willett 1993; Singer and Willett 2004). In the GSOEP, only the year of death is collected (i.e., the year a person died after the last year of follow-up); while in the PSID the day and month of death are collected on most deaths in addition to year. The metric for death in the GSOEP is discrete time while for the PSID it approaches continuous time. For comparability purposes deaths are coded in both surveys at the level of the year. This leads to interval censoring in which an event that occurs in continuous time (death) is captured in discrete-time intervals (Rabe-Hesketh and Skrondal 2008) and survival analysis techniques that assume continuous time, such as Cox proportional hazards, may not be appropriate (Singer and Willett 2004).[65]

The discrete-time survival model can be formulated as:

$$(1)\quad h(t_{ij}) \equiv \Pr\left[T_i = j \middle| T_i \geq j, D_{ij}, X_i, Z_{ij}\right]$$

Where $h(t_{ij})$ is the hazard or probability of dying at time T_i that is conditional on having survived to T_i, the baseline hazard parameterization D_{ij}, a set of fixed covariates X_i, and a set of time varying covariates Z_{ij}. While the hazard can be estimated using any binomial link (e.g. logit, probit or complementary log-log link), this study uses the complementary log-log (clog-log) link

[65] The main reason Cox proportional hazard (PH) model is not acceptable is the abundance of failures (deaths) with the same date. In the case at hand there are multiple deaths (or ties) in every year. The PH model works on the rank ordering of failures and in its basic formulation failures with the same date or identical ranking create analytic difficulties. While there are methods to account for tied rankings in the PH model (e.g. the Breslow or Effron approximation), the abundance of ties in the survey data would lead to a less efficient (i.e., larger variance) modeling compared to the discrete time formulation.

that is the discrete-time equivalent of the Cox proportional hazard model. This leads to the convenient property that relative risks from these models can be directly compared to relative risks from other studies that use Cox proportional hazards (e.g., Lavis 1998; Ahs and Westerling 2006). The clog-log model, like the Cox model, also assumes a proportional hazard (i.e., a one unit change in a covariate in the model causes a proportional shift in the hazard across all values of the covariate).

The clog-log model for a given individual *i* can be expressed as:

$$(2)\quad \text{cloglog}(h_{it}) \equiv \ln\left\{-\ln(1-h_{it})\right\} = X_{it}\text{B}$$

Where h_{it} is the hazard from Equation 1 and $X_{it}B$ is the matrix product of the data matrix of the *ith* person at time *t* and the parameter vector. The hazard can be directly obtained by taking the inverse of the clog-log link.

$$(3)\quad h_{it} = 1-\exp(-\exp(X_{it}B)$$

The transformation of which:

$$(4)\quad \frac{h_{ijt}}{h_{it}} = \frac{\ln(1-\exp(-\exp(X_{it}B)\exp(B_j)))}{\ln(1-\exp(-\exp(X_{it}B)))} = \exp(B_j)$$

provides the hazard ratio representing the relative risk of dying for a one unit change in x_{ij} that is independent of the values of all other covariates in the model.

The conditional hazard specification enables us to account for both left censoring and delayed entry (i.e., individuals are observed at age 18 or older and not when they first become at risk of dying) and right censoring (i.e., individuals are lost to follow-up before dying or do not die before the end of the study). Delayed entry is accounted for by conditioning on age (i.e., age is how time is parameterized in the model) and thus the hazard at T_i becomes the probability of dying at age_i conditional on having survived to that age (Rabe-Hesketh and Skrondal 2008). This enables the construction of a dynamic cohort in which cohort members are followed starting in different calendar years (e.g., 1984 for the West German cohort and 1991 for the East German cohort) and for different lengths of follow-up. One consequence of both delayed entry and right censoring is that cohort members are at risk of dying for different lengths of time. This may introduce bias into the model if time at risk is correlated with the variables in the model.[66] To

[66]For example, East Germans are followed for a maximum of 14 years and have seven fewer years at risk compared to West Germans who are followed for a maximum of 21 years. Holding everything else constant, there would be a lower overall risk of dying in the East German cohort compared to the West German cohort due to the difference in length of maximum follow-up. Introducing an exposure offset standardizes for this difference in time at risk. Indeed,

account for this potential bias the natural logarithm of time at risk (i.e., years followed) is introduced as an exposure offset to standardize the estimated hazard.

The clog-log model is estimated using standard maximum likelihood estimation and can be extended to account for frailty (i.e., unobserved heterogeneity) or non-independence of observations at other levels of clustering (e.g., by region or year) through the inclusion of an appropriate random effect using adaptive Gauss-Hermite quadrature (StataCorp 2007).

4.3.3.1: Assessing Model Fit

Model fit was assessed through the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) with smaller criterion statistics indicating a better fit to the data. The AIC and BIC are extensions to the log-likelihood statistic that penalize the log likelihood for the number of parameters in the model (AIC) and additionally the sample size (BIC). Unlike the likelihood ratio test or the deviance statistic, these fit criteria enable comparisons across non-nested models (e.g., different specifications on age, income or the labour force status variables) (Singer and Willett 2004). That said, these fit statistics were used as a guide only and in some cases models with higher (worse) fit statistics were preferred based on conceptual or comparability grounds. For example, including current self-reported health status in the model compared to lagged health status led to a better model fit (i.e., current health status was a much better predictor of mortality than was lagged health status). Health status measures that are contemporaneous with labour force status measures, however, are no longer controls for health selection into unemployment as current health status may be on the pathway between current labour force status and mortality. Accordingly the health status variables were always lagged one year prior to the labour force status variables.[67]

4.3.3.2: Model-based Versus Design-based Approach

The GSOEP and PSID have a non-random multi-stage stratified sampling frame with the PSID oversampling low-income and black households. Cross-sectional and longitudinal weights and information on the sampling frame (i.e., the strata and primary sampling unit of a respondent) have been created for both surveys in order to account for the survey design through design-

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the relative risk on the East German variable changes from being protective to representing an increased risk once the exposure offset is introduced.

[67] For models that used current labour status, health status in the year prior to the survey was used. While models that used retrospective measures of labour force status (e.g., the number of months unemployed in the year prior to the survey) health status two years prior to the survey was used.

based estimation. In this analysis, however, a model-based approach is used that specifies the structural relationship between the dependent and independent variables and which accounts for the non-independence of observations through direct estimation. Deaton (1997) provides a concise summary of the two approaches and why one would choose a model-based approach over a design-based approach. In a fully-specified model (i.e., a model that has correct functional form and no missing variables) the structural relationship should be invariant to the sampling frame. Indeed, the inclusion of survey weights may lead to less efficient estimation (Reiter, Zanutto, and Hunter 2005). In this study, two dynamic cohorts are defined with entry possible in any year between 1984 and 1995. These cohorts do not correspond to a specific reference population and, as such, none of the supplied survey weights are applicable.[68] A model-based approach also allows for the consideration of a more flexible range of statistical and estimation techniques (e.g., accounting for multiple levels of correlation) than a design-based approach. Nevertheless, if the objective is to make inferences to the general population about the prevalence of an outcome within that population or to estimate the association between an outcome and exposure a design-based approach should be used.

In sensitivity analysis the effect of the multi-stage stratified design of the surveys was accounted for with the inclusion of a random effect at the level of the primary sampling unit (PSU). These results are compared to the final models for the three labour status specifications in Tables D1 (GSOEP) and D2 (PSID) in Appendix D. There is some evidence of modest correlation at the level of the PSU in the German cohort, but not in the American cohort. For both cohorts and across all specifications there are no differences in the fixed-effect parameter estimates and the AIC and BIC statistics indicate that the models without the random effects are preferable. Accordingly results are presented only on the more parsimonious fixed-effect only models.

4.3.3.3: Alternative Specifications

A number of alternative specifications were implemented to account for other potential departures from the statistical assumptions of the model that were not related to the survey design. Specifically, in separate models random and fixed effects for region and year were included to examine if the observed relationship between unemployment and mortality could be

[68]Both cross-sectional and longitudinal survey weights are designed to make the sample representative of a population at a given point in time. For example using the 1984 cross-sectional weight would make the sample representative to the 1984 population, while using the 1984 longitudinal weights creates a representative fixed cohort of individuals in 1984 that is followable over time by adjusting the 1984 cross-sectional weights for differential loss to follow-up.

explained by regional or temporal factors. In other models an individual-level random effect (i.e., what would be considered a frailty parameter in the survival analysis literature) was included to account for residual confounding (i.e., unobserved heterogeneity). None of the alternative specifications improved model fit; nor were there any changes in the relative risk between any of the labour force status variables and mortality.

4.4: Results

4.4.1: Descriptive Statistics

4.4.1.1: Mortality

For the German cohort, 879 individuals or 8.1% of the cohort died and the average length of follow-up until death was 10.8 years. For the American cohort, 876 individuals or 9.0% of the cohort died and the average length of follow-up until death was 11.6 years. Figures 4.1 through 4.5 depict the survivor function for both cohorts and stratified by labour force status, gender, educational status, and baseline health status. The survivor functions for the both cohorts indicate an identical cumulative survival probability of about 86% (a risk of dying of 14%) by the end of follow-up.[69] Men have lower survival probabilities than women (83% versus 88%) across both cohorts. The survivor functions for the unemployed and employed at baseline are similar across cohorts (90%), while Germans who were not working have a survival probability of 83% versus 77% for non-working Americans. The high (92%) and medium skilled (89%) also have similar survival functions across cohorts, but there are differences among the minimum skilled (79% for the Germans and 74% for the Americans). Being in poor health at baseline leads to a survival probability of 70% for Americans and 85% for Germans by the end of follow-up.

4.4.1.2: Labour Market Status and Other Variables

At baseline there are marked differences in the distribution of covariates by labour force status and by study cohort. Table 4.1 describes the baseline statistics of the German and American cohorts by current labour force status. The German cohort is older than the American cohort, particularly for the unemployed, who are on average eight years older in the German cohort compared to the American. There is no difference in the age of unemployed and employed in the

[69] The reason that the probabilities from the survival function are greater than the simple probabilities is that the survivor function accounts for censoring.

German cohort, but the unemployed in the American cohort are younger than their employed counterparts.

East Germans make up a disproportionate proportion (41%) of the unemployed in the German cohort, as do blacks in the American cohort (64%), reflecting, in part, that these groups are over sampled. Overall Germans are more likely to be married, divorced or separated but less likely to be single or widowed. Unemployed Americans are less likely to be married and more likely to be single. Notably, similar gender distributions are found across both cohorts, with men less likely to be unemployed or not working. Of those not working, about 80% are women in both cohorts. Household size is similar across cohorts, but Americans report more children in the household across all three labour force states; non-working Americans, in particular, have more children.

A higher proportion the unemployed or those not working in the American cohort are minimum skilled, while a higher proportion of the unemployed or those not working in the German cohort are medium or high skilled. At baseline only individuals who are working have an occupation; working Germans are more likely to be in manufacturing occupations, while working Americans are more likely to be in professional and technical occupations or business and sales occupations.

Unemployed and employed Germans report similar levels of health satisfaction at baseline, but unemployed Americans report lower self-reported health status compared to employed Americans.[70] Non-working Americans and Germans both report lower levels of baseline health status, with poor health being particularly prevalent in non-working Americans.

The unemployed report two thirds of the household income of the employed in the German cohort, while the unemployed report half of the household income of the employed in the American cohort. This ratio is consistent the year previous and the year after the current unemployment episode. However, the fraction of current labour market income is higher (28%) for unemployed Americans compared to unemployed Germans (19%). In the year following average labour market income recovers, but is still only 28% for the German unemployed and 34% for the American unemployed. Unemployed Germans report higher relative levels of unemployment compensation and of total household public transfers compared to their employed

[70] Recall that baseline health status is health satisfaction, rather than self-reported health status and these health measures could have different distributions. In particular, health satisfaction appears to be less associated with labour force status than self-reported health status.

counterparts. Unemployment compensation also makes up a greater proportion of public transfers for unemployed Germans than for unemployed Americans.

Table 4.2 describes the relationship between months unemployed in the year previous to the survey by demographic measures, other unemployment measures and income and transfers across all survey years.[71] Overall, Americans report a slightly higher proportion of any months of unemployment (11%) compared to Germans (9%), but Americans were more likely to be unemployed for fewer months; 50% of unemployed Americans reported being unemployed for three or fewer months and 14% reported being unemployed for ten or more months. In contrast, 30% of unemployed Germans reported being unemployed for three or fewer months and 35% reported being unemployed for ten or more months.

Unemployed Americans were much less likely to report receiving unemployment compensation. The proportion receiving unemployment compensation was never more than 36%, peaking for those reporting three or four months of unemployment and falling thereafter to 12% for those reporting 12 months of unemployment. The proportion of Germans receiving unemployment compensation was 76% for those reporting one month of unemployment; rising to about 90% coverage at eight months and declining to 83% for those unemployed the entire year. Unemployed Germans also reported higher mean benefit levels across all month profiles. Unemployment and total public transfers represented a greater proportion of household income. There was a greater decline in household and individual labour income for Americans compared to their employed counterparts than for Germans.

4.4.2: Current Unemployment

Tables 4.3 and 4.4 show the full results for the German and American cohort respectively, with the cumulative addition of groups of covariates. The relative risk (RR) of dying for unemployed Germans compared to employed Germans is 2.1 (95% CI: 1.5-3.1) in the age and gender model. The progressive inclusion of other demographic variables attenuates the relative risk to 2.0 (95% CI: 1.4-2.9). With the inclusion of the socio-economic status variables (household income, education and occupation) the relative risk drops to 1.7 (95% CI: 1.2-2.4). Once health status in the previous year is added the relative risk (1.4 95% CI%: 1.0-2.0) is no longer statistically

[71] Measures have been harmonized across years to ensure that reflect the same calendar year.

significant at the 95% confidence level, although the unemployed still have a 40% increased chance of dying.

The relative risk of dying for unemployed Americans compared to employed Americans is 3.7 (95% CI: 2.6-5.2). In the age and gender model, the progressive inclusion of other demographic variables attenuates the relative risk to 2.9 (95% CI: 2.0-4.1). With the inclusion of the socio-economic status variables the relative risk drops to 2.5 (95% CI: 1.7-3.5). With the inclusion of lagged health status the relative risk is 2.4 (95%CI: 1.7-3.4). Unemployed Americans have a higher relative risk of dying compared to unemployed Germans (2.4 versus 1.4 in the final lagged health model) representing 1.5 times larger risk (Table 4.5). While the attenuation of the relative risk is similar with the inclusion of other covariates for unemployed Americans and Germans, the inclusion of lagged health status has a greater attenuating effect for the German unemployed.

4.4.2.1: Results for the Other Variables[72]

For the German cohort, each additional year of age increases the risk of dying by 5% (RR 1.05); men have a 2.5 relative risk compared to women; being East German is associated with a 1.3 relative risk compared to West Germans, but there is no increased risk for immigrants, or for being a spouse. Single people (RR 1.5) and those divorced or separated (RR 1.4) have increased risks compared to married individuals, but those widowed do not. Household size is associated with an increased relative risk of 1.2 for each additional person, but each additional child has a protective effect (RR 0.7). The log of household income is protective (RR 0.83). The minimum skilled have a relative risk of 1.4 compared to the high skilled, but there is no association for the medium skilled. Having no occupation is associated with a relative risk of 1.6 compared to management and professional occupations, but there are no associations for the other occupational categories. Lagged health satisfaction and disability exhibit strong associations with mortality. While there was no association for good health satisfaction compared to excellent health satisfaction, being of satisfactory, poor or bad health is associated with increasing relative risks of 1.5, 1.8, and 3.8; the relative risk for being disabled is 1.4.

For the American cohort, each additional year of age increases the risk of dying by 5% (RR 1.05); men have a relative risk of 1.7 compared to women; being black is associated with a

[72] I only report the results on the other covariates in the current labour force status model as the specification and the results of the other variables were the same across the three different labour force status models.

relative risk of 1.2 compared to being white, while there was no association for those of other ethnicities. There is no association for spouses compared to heads. Single people have a relative risk of 1.6 compared to those married, but there is no association for those divorced or separated or those widowed. Neither household size nor number of children yields an association. The log of household income is protective (RR 0.93), but there is no association by educational or occupational status. Lagged self-reported health status exhibits a strong and increasing negative gradient with very good, good, fair, and poor health being associated with 1.5, 2.0, 3.8 and 7.2 relative risks compared to excellent health, respectively, while there is no association for disability status.

4.4.3: Months Unemployed and Cumulative Unemployment

Tables 4.6 and 4.7 show the results for months unemployed and cumulative lifetime unemployment across both cohorts. Each additional month of unemployment for unemployed Germans is associated with an increased risk of dying of 1.07 (95% CI: 1.03-1.10) and 1.05 (95% CI: 1.01-1.09) for the full- and health- adjusted models. For unemployed Americans the risk of additional months of unemployment is identical (1.09 95% CI: 1.05-1.14) in both the full- and health-adjusted models. Evaluated at the average number of months unemployed (6.8 months for the German unemployed and 4.3 months for the American unemployed), yields an average relative risk of 1.4 for the German cohort and 1.5 for the American cohort. Each additional percent of follow-up spent unemployed (lifetime unemployment) yields a 1% increased risk of mortality (RR 1.007 95%: CI: 1.001-1.012) for the German cohort and a 2% increased risk of mortality (RR 1.016 95% CI: 1:008-1.024) for the Americans.

4.4.4: Gender Stratified Results

Tables 4.8 through 4.10 present the gender stratified results across both cohorts. In the German cohort there is effect modification by gender across all labour force status measures. Men have consistently higher and statistically significant associations between current unemployment and mortality (RR: 1.6 95% CI: 1.0-2.4) and for the other labour force status measures. No associations are found for women for current unemployment (RR: 1.0 95% CI: 0.5-2.1) or for the other labour status measures. In the American cohort, men and women have statistically significant risks for current unemployment, with women (RR: 2.6 95% CI: 1.5-4.5) having a slightly higher risk than men (2.4 95% CI: 1.4-3.5); however, for months unemployed (RR: 1.11

95% CI: 1.06-1.18) and for cumulative lifetime unemployment (RR: 1.023 95% CI: 1.016-1.03) men have higher and statistically significant associations, while there is no association with mortality for women.

4.4.5: Education Stratified Results

Tables 4.11 through 4.13 present the education stratified results across both cohorts. There is marked effect modification by educational status in both the German and American cohorts. The relative risk of dying is highest for unemployed high-skilled Germans and minimum-skilled Americans and lowest for unemployed medium-skilled Germans and high-skilled Americans. Compared to the full cohort, unemployed minimum-skilled Germans have a higher, but not statistically significant relative risk (1.6 95% CI: 0.7-3.7), while the relationship for the unemployed medium skilled is close to one and not statistically significant (RR: 1.1 95% CI: 0.7-1.7). In contrast, unemployed high-skilled Germans have a larger and statistically significant relative risk (RR: 3.0 95% CI: 1.3-7.0). For unemployed minimum-skilled (RR: 2.6 95% CI: 1.4-4.7) and medium-skilled (RR: 2.4 95% CI: 1.5-3.8) Americans the association is slightly higher than the relative risk in the full cohort for current unemployment, but there is no association for the unemployed high skilled (RR 1.0 95% CI: 0.2-4.3). For the other labour force status measures, unemployed high-skilled Germans continue to have a higher relative risk of mortality, while there are no associations for the minimum and medium skilled. The unemployed medium-skilled Americans have the highest relative risks for months unemployed and cumulative unemployment, while there are no associations for these measures for the unemployed minimum and high skilled.

4.4.6: Exclusions

Tables 4.14 through 4.16 present the results based on excluding those in poor health at baseline and those unemployed or not working at baseline across both cohorts. The relative risk for current unemployment was higher in both the good health sub cohort (G: 1.7 95% CI: 1.1-2.6; P: 3.0 95% CI: 2.0-4.4) and the working cohort (G: 1.7 95% CI: 1.1-2.7; P: 3.4 95% CI: 2.2-5.4) compared to the full cohort for both study countries (G: 1.4; P: 2.4).

No differences in the relative risk of months unemployed and cumulative lifetime unemployment were found in comparing the sub-cohort results with the full cohort results, except that mortality risk of cumulative lifetime unemployment was higher in the American working sub

cohort (RR 1.027 95% CI: 1.01-1.04) compared to the full cohort (RR 1.016).

4.4.7: Country-specific Analyses

The German-specific analysis that stratified the cohort by whether an individual was from East or West Germany found large effect modification (Table 4.17). The relative risk of mortality for unemployed East Germans was 2.1 (95% CI: 1.2-3.6) for current unemployment and 1.08 (95% CI: 1.02-1.16) for months unemployed compared to employed East Germans, while there was no association for unemployed West Germans who had a relative risk of 0.9 (95% CI: 0.5-1.6) for current unemployment and 1.03 (1.0-1.1) for months unemployed. No association was found in either group for cumulative unemployment.

In contrast, stratifying the analysis by black and white or other did not yield evidence of effect modification (Table 4.18). The relative risk of mortality for unemployed blacks and white or other was 2.5 (95% CI: 1.5-4.0) and 2.3 (95% CI: 1.3-2.9) for current unemployment; 1.09 (95% CI: 1.03-1.15) and 1.11 (95% CI: 1.04-1.18) for months unemployed; and for cumulative unemployment it was 1.01 (95% CI: 1.00-1.02) and 1.02 (95% CI: 1.01-1.03) compared to employed blacks and whites or other.

4.5: Discussion

4.5.1: Assessment of Chapter Hypotheses

This study found an increased risk of dying for current unemployment for both Germans and Americans, but in almost all cases the risk was much higher for the American unemployed compared to the German unemployed. There is a statistically significant and higher risk of dying for men, the high skilled and East Germans in Germany compared to other unemployed groups, while for the American unemployed there is a consistent relative risk of dying among all groups except for the high skilled (Figure 4.6). Men in both Germany and the United States have elevated risks of dying for months unemployed and cumulative unemployment, but the risk in the United States is about twice as high; there is no association for women for these measures in either cohort.

The higher risk of dying for the unemployed in the United States compared to Germany supports the hypothesis that the institutional environment, including higher levels of unemployment and

employment protection, mediates the unemployment-mortality relationship. This finding held across all labour force specifications and for the sub-cohort exclusions, suggesting that the ranking of unemployment-mortality risks by country are robust to different measures of unemployment, health selection into unemployment, and labour force composition.

Nonetheless, it is worthwhile to consider whether other within-country factors, including differences in the measurement of unemployment, cohort definition, survey design or other unmeasured country confounders, could explain the differences in the risk of dying for the German and American unemployed. In other words, are there factors that could to lead the findings in Germany being biased downward and the findings in the United States being biased upwards such that if these factors were controlled for results between these two countries could converge? This study used an internationally standardized measure of unemployment across the two surveys, but there are individuals in Germany who meet a German-specific definition of unemployment (described in Chapter 3) who were excluded from the unemployed in this study and it may be these individuals had poorer health outcomes than those who were considered unemployed according to the international definition. To test for this, the German-specific definition of unemployment rather than the international measure was used in secondary GSOEP-only models. The results from these models were similar to the results in the main models, indicating that the relationship in Germany is not dependent on how unemployment was defined.

Research has shown that individuals in poor health are more likely to remain unemployed (Stewart 2001).[73] In Germany these individuals have an incentive to remain unemployed due to the continued receipt of unemployment benefits, while in the United States these individuals are less likely to be eligible for benefits and thus do not have this incentive. Based on differences in incentives relating to health selection out of unemployment, the results in Germany are more likely to be biased upward and the results in the United States more likely to be to be biased downward, which would magnify the differences in risk between these two countries.

The results from this study are also consistent with the one other study using the GSOEP, which found no relationship between unemployment and mortality in Germany (Frijters, Haisken-DeNew, and Shields 2005a). Nine unemployment and mortality studies use American data (see

[73] This refers to health selection out of unemployment which was discussed in Chapter 2 section 2.4.3.

Section 2.5.3) and while it is challenging to draw direct comparisons across these studies to give a modal or median estimate of the risk of dying associated with unemployment due to differences in study design and methods, unemployment measures, and length of follow-up, the results on current unemployment fall within the range for risk ratios found in the American studies that use current unemployment as a measure. One other study found a higher risk ratio of over three (Lavis 1998), with most studies finding a risk ratio between 1.5 to 2.2 (Cubbin, LeClere, and Smith 2000) (Kiuila and Mieszkowski 2007; Sorlie, Backlund, and Keller 1995; Sorlie and Rogot 1990), and a few finding no association at all (Hayward, Grady, Hardy, and Sommers 1989; Rogers, Hummer, and Nam 2000).

While other factors that may introduced a differential bias into the unemployment-mortality relationship cannot be ruled out,[74] the consistency of the results in this study from those of other studies and the fact that known biases are likely to magnify the differences in the relative risk across countries support the claim that the differences in risks are not artifactual, but reflect real differences in the unemployment-mortality relationship across these two countries.

The education stratified results are also consistent with the hypotheses developed in Chapter 2, which specify that there should be a stronger unemployment-mortality gradient by skill level in the United States, but that the modal medium- (and vocationally-) skilled worker in Germany would be the most protected from the negative health consequences of unemployment. In the American cohort there is no relationship between unemployment and mortality for the high skilled across any measure of unemployment. It appears that individuals with a high level of education are best suited to take advantage of the flexible labour markets within LMEs.[75] The high skilled are more likely to receive unemployment benefits when unemployed than those of lower skill levels. Further these individuals may also have other resources (e.g., savings, familial resources, and social or business contacts from educational or professional organisations) to draw upon that would buffer the effect on unemployment on health. The drop in household income for the unemployed high skilled in America was smaller than for those of lower skill levels. The median household income for the unemployed high skilled was 64% of the employed high skilled, while for the unemployed medium and minimum skilled it was 48% and 45%.

[74] For example differences in attrition among the unemployed across the surveys could also introduce bias into the results. But for the bias to be differential and increase the relative risk in Germany and decrease the relative risk in the United States, the unhealthy unemployed would have to be more likely to drop out in Germany and the healthy unemployed would have drop out in the United States.

[75] Almost all the high skilled in the United States would have a general skilled education. See section 3.4.3.

Moreover, the household income of unemployed high skilled was similar to that of the employed medium skilled and higher than that of the employed minimum skilled.

Both the unemployed minimum and medium skilled have an elevated risk of dying and, across all three measures of unemployment, the medium skilled have the highest risks in the United States. In Germany, the medium skilled have the lowest risk of dying across all three unemployment measures. This is the strongest evidence that institutional environment can affect the relationship between unemployment and health as institutional protection is targeted towards medium- (and vocationally-) skilled worker in Germany. Both medium-skilled groups are the largest group of workers and also have the largest number of unemployed in both cohorts (although the unemployment rate is highest among the minimum skilled in both countries) and this comparison does not suffer from small sample size in the number of unemployed and the number of deaths. Further, the contrast between the two medium-skilled groups is striking with respect to receipt of unemployment compensation and household income that may be mediators of the unemployment-mortality relationship. The unemployed medium skilled in Germany have a median household income of 70% of their employed counterparts and 75% of them report receiving unemployment compensation, while the unemployed medium skilled in the United States have a median household income of 48% of their employed counterparts and only 19% report receiving unemployment compensation.[76]

The elevated relative risk for the unemployed high skilled in Germany requires some interpretation. While there was no prior expectation that the unemployed high skilled would fare better than the unemployed medium skilled in Germany, it was not hypothesized that they would fare worse. There are two possible explanations for this finding. First, the low number of unemployed and deaths among high-skilled Germans leads to results that may be sensitive to only a few events. There are 109 deaths for the high skilled overall (only 4% of the high skilled died compared to 9% of the minimum or medium skilled). Accordingly, this difference may be driven by a low baseline hazard for the employed high skilled, even if there are only a few deaths among the unemployed high skilled (only 7% or seven died). The wide confidence intervals for this relationship also support this interpretation. Secondly, the unemployed high skilled in Germany may be relatively worse off compared to employed high skilled as the institutional

[76] This is likely an understatement of the proportion who receive unemployment compensation due to the reporting errors in the unemployment compensation variable that was discussed in section 3.5.

supports are targeted towards medium-skilled workers. Inspection of the data, however, reveals that the unemployed high skilled who died are almost all (six of seven) from East Germany, with no elevated risk of mortality in the unemployed high skilled in West Germany. This is consistent with the country-specific results that indicated that the elevated mortality risk was only found in the East German cohort.

Overall, the gender differences between countries are also consistent with the study hypotheses. American women have higher risks of dying for current unemployment, while no relationship is found for any of the measures of unemployment for German women. German men have statistically significant risks of dying for all measures of unemployment, but this risk is about two thirds to one half the relative risks for American men, depending on the measure. There are differences between men and women for both cohorts. American men and women have similar risks for current unemployment, but these risks diverged for the other labour force status measures. For German men and women, the risks differed across all measures. For women, the weaker relationship between unemployment and mortality may be due socio-economic gradients being expressed more through morbidity than mortality (Wingard 1984). Support for this interpretation will be found in the SRHS study if a robust relationship for women is found. The divergence among the unemployment-mortality relationship across the three labour force status measures for American women suggest that some of the effect modification may be due to differences in recall bias and in interpretation of the unemployment construct for women compared to men (Jacobs 2002; Jurges 2007). This is also consistent with the gender differences in recall bias discussed in section 3.5 in which there was a higher lack of concordance between retrospective and current measure of unemployment for women. Accordingly, caution needs to be applied when interpreting the retrospective measures for women.

The strong and similar relative risk for current unemployment for American women suggests that unemployment is a health risk for both men and women in the United States. In Germany, the fact that no relationship was found for women for any of the labour force status measures may also be due to recall bias (Jurges 2007), but could also be related to the gender segmentation in institutional and social support arrangements in Germany (Estevez-Abe 2005). Indeed, in Esping-Andersen's *Three Worlds* typology one of the distinguishing features of the corporatist or Christian Democratic welfare regime is the emphasis in these regimes on social and state support

reinforcing traditional familial roles (Esping-Andersen 1999).

Health status prior to unemployment was found to explain more of the relationship in Germany compared to the United States. The inclusion of lagged or baseline health status in the PSID did not attenuate the risk of dying, indicating that prior health status is not a confounder in the unemployment-health relationship in the American cohort. In contrast, prior health status is a confounder for this association in the German cohort, attenuating the risk for all measures of unemployment, sometimes to statistical insignificance. This supports the hypothesis that health selection is more important in Germany because of the protective institutional effects, but that social causation explains more of the relationship in the United States.

The results are also robust to the control for health selection in that similar or higher risks are observed in the good health and working sub cohorts. Notably, the relative risks increased in the sub cohorts that excluded either those not employed or those in poor health at baseline rather than decreasing. Removing those in poor health at baseline from both the unemployed and employed controls may affect either groups' underlying hazard. If the baseline hazard for the employed controls drops but the risk difference between the two groups stays the same, then the relative risk will necessarily increase. As such, a direct comparison of the risks across the exclusion sub cohorts is not advisable as the composition of the control groups has changed. The result of a robust relationship between the employed and unemployed who are healthy at baseline, however, indicates that health selection into unemployed does account for the observed relationship between unemployment and mortality. That a strong relationship between unemployment and mortality is also found in the working-only cohort at baseline provides additional support for this interpretation. Further, this suggests that the association between unemployment and mortality is also present in individuals with strong labour force attachment.

This argument that health selection has been sufficiently accounted for hinges on the validity of our baseline health status measures. Two points support the argument that they are sufficient controls. First, the health status measures are the strongest predictors of mortality in the model – poor health predicts death well; second, baseline health and labour force exclusions were based on two years of data and as such those in good health were persistently in good health.[77]

[77] Results from SRHS analysis in Chapter 5 indicate that SRHS is highly correlated across years.

4.5.2: Within Country Differences

The American results are not sensitive to stratification by race; unemployed blacks and whites have similar relative risks compared to their employed counterparts. This is not to say that race does not play a role in the unemployment and health relationship as blacks are much more likely to experience unemployment than whites (e.g., the unemployment rate for blacks in 2005 was 9.5%, while it was 4.4% for whites).[78] Indeed the proportion of mortality attributable to unemployment (i.e., adjusted population attributable fraction (Rothman, Greenland, and Lash 2008) is higher for blacks than for whites given the higher prevalence of unemployment for blacks. Societal context – the institutional, economic, and socio-cultural environment – can matter in two ways; both in determining who is unemployed and in how unemployment affects health. In the United States, blacks are more likely to become unemployed than whites, but once unemployed both black and whites are at an increased relative risk of dying. This suggests that country and institutional patterns relating to unemployment may, in part, be codetermined by the legacy of racism and segregation in the United States as blacks are more likely to be unemployed.

In contrast, in Germany, East Germans have both an increased risk of being unemployed and an increased relative risk of dying compared to West Germans. It is also the high-skilled East Germans that drive the relationship between unemployment and health in the high-skilled stratification. The results from Germany suggest that for West German workers, who have spent their entire working life embedded within the CME institutional environment, the institutional supports are effective. For unemployed East Germans, who come from a different institutional environment (a planned economy), the institutional supports are not as effective.

4.5.3: Unemployment and the Accumulation of Disadvantage

While a strong and robust association between unemployment and mortality was found in the United States and for some groups in Germany, this study does not definitely establish whether this relationship is causal. Unemployment may also be a marker for other mechanisms and for the accumulation of socio-economic disadvantage that may affect health. For example, workers in hazardous jobs may be more likely to face involuntary job loss (Robinson 1986). Unemployed workers are also more likely to come from groups already vulnerable to negative health

[78] See ftp://ftp.bls.gov/pub/special.requests/lf/aa2005/pdf/cpsaat24.pdf.

outcomes (i.e., unemployment is concentrated among the low-waged, the minimally-skilled, East Germans in Germany and blacks in the United States). Disentangling the confluence of these determinants of health is challenging, but insight can be gained from the comparative study design by moving beyond the comparison of relative risks across countries and comparing the average predicted risk of dying for specific unemployed groups across countries. Table 4.19 and Figure 4.7 depict the predicted hazard of dying evaluated at the mean of other covariates across the three models and stratified by educational status.[79] Figure 4.7 shows that the average risk of dying across all ages is lowest for employed Germans, while unemployed and non-working Americans have the highest risk. When stratified by skill level (Table 4.19), the differences in risks are magnified; unemployed minimum-skilled American are about seven times more likely to die than employed high-skilled Germans and employed or unemployed high-skilled Americans. In contrast, the risk of dying for non-working Germans (the worst off German group) is four times than those with the lowest risk. There is also a doubling of risk between the unemployed medium-skilled Germans and Americans. Taken together, these results support the idea that distributional and institutional factors contribute to the flattening of the socioeconomic-health gradient (Hertzman 2001; Siddiqi and Hertzman 2007). Further unemployed minimum and medium skilled Americans may be less likely have had access to health care insurance while employed and be more likely to lose it once unemployed compared to the high skilled. Access to health insurance and health care may be a key institutional feature that explains steeper socio-economic gradients in mortality in the United States compared to Germany and other countries (Kunitz and Pesis-Katz 2005). While it may not be possible to distinguish between determinants that are truly upstream and those that lie along the pathway to health, what is clear is that among individuals with multiple health vulnerabilities or disadvantages (in this case low education status and unemployment) the effects of these risks on health are modifiable.

4.5.4: Strengths and Limitations

The strengths in this study are the focus on creating comparable cohorts across study countries and the emphasis on creating similar labour market and educational variables. This study used a full range of covariates spanning demographic, socioeconomic status, and health status variables to control for potential confounding. It also examined two alternative measures of unemployment

[79] The predicted probabilities also reflect the effect of the other covariates on the risk of death; they represent the clustering of risk among groups of which the effect of unemployment and education would be only part.

in addition to current unemployment and a number of approaches were also taken to control for health selection.

There are number of limitations to this study. First, in spite of the efforts to create comparable measures across the study, some measures across countries were different. In particular the health status controls were different across countries. In the German cohort, the health status controls were measured through health satisfaction and disability defined as having a registered disability, while in the American cohort, health controls were measured through self-reported health status and disability defined as self-reported activity restrictions. Second, differences in attrition and measurement error across the studies could have introduced differential bias into the study. Third, there may be other variables that might confound the relationship between unemployment and mortality that were not controlled for in the models (i.e. residual confounding). For example, it was not possible to control for health-related behaviours such as drinking, smoking or physical activity that may have differed across the unemployed groups. It was also difficult to make the distinction between voluntary and involuntary unemployment.

4.6: Conclusion

The findings from this study support the idea that context matters to the health of the unemployed. In Germany, a CME with high levels of employment and unemployment protection, the unemployment-mortality association is only found for East Germans. For West German workers, who have spent their entire career within the CME institutional environment, there is no association. In the United States there is no unemployment-mortality association for the high skilled who are best positioned to take advantage of the flexible labour market found in liberal market economies. But for the remainder of workers – the minimum and medium skilled – unemployment comes with an increased risk of death. In particular, those at the bottom of labour market and educational hierarchy – the minimum skilled – are much more likely to die, reflecting the accumulation of health disadvantage within this group in the Unites States. The VOC framework is predicated on the idea that there are two macroeconomic equilibria that lead to similar levels of aggregate national wealth and economic growth. This study provides evidence that these equilibria may also have profound distributional consequences when it comes to workers' health.

The findings from and questions raised in this study point towards a continued research

agenda. Does the mediating effect of the institutional environment hold in other countries that have strong social support for the unemployed? The literature review in Chapter 2 found that there was an unemployment-mortality relationship in other CME countries (Ahs and Westerling 2006; Gerdtham and Johannesson 2003) (Eliason and Storrie 2007) and it cannot be ruled out that the findings from this study are peculiar to Germany and the United States. Further exploration needs to focus on the specific mechanisms that may buffer the unemployment-mortality association. This study focused on overall difference in the levels of unemployment and employment protection, but future research should also focus on the role of other government cash transfers and on post-unemployment labour market trajectories.

Figures and Tables

Figure 4.1: Survivor function for the German and American cohorts by years followed

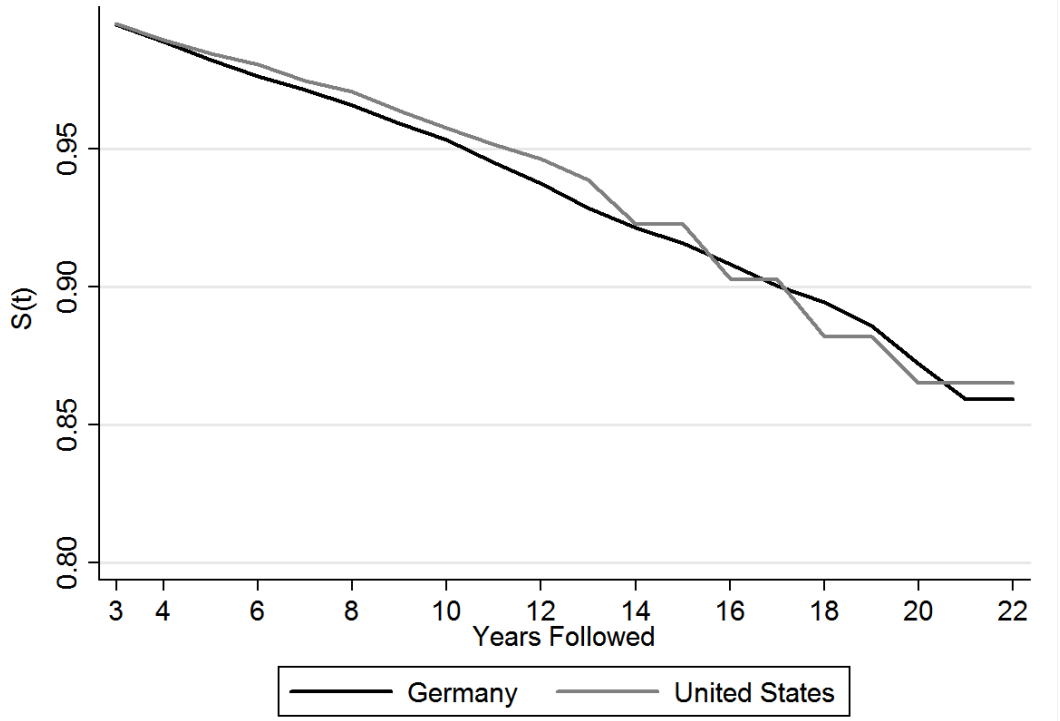


Figure 4.2: Survivor function for the German and American cohorts by years followed stratified by labour force status at baseline (t-2)

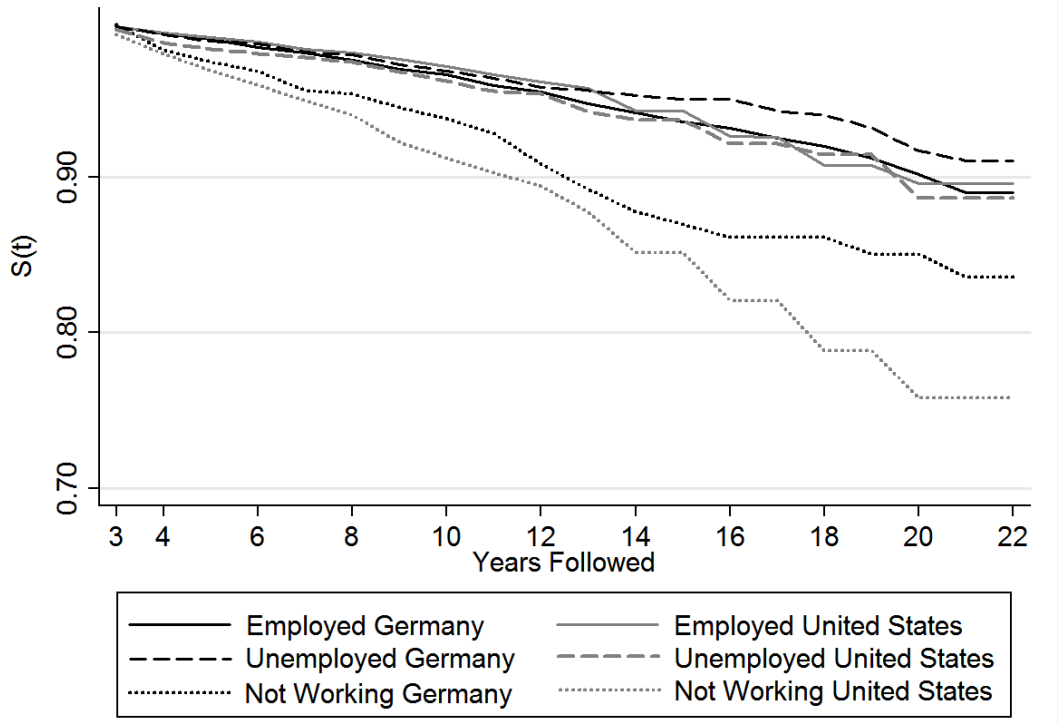


Figure 4.3: Survivor function for the German and American cohorts by years followed stratified by gender

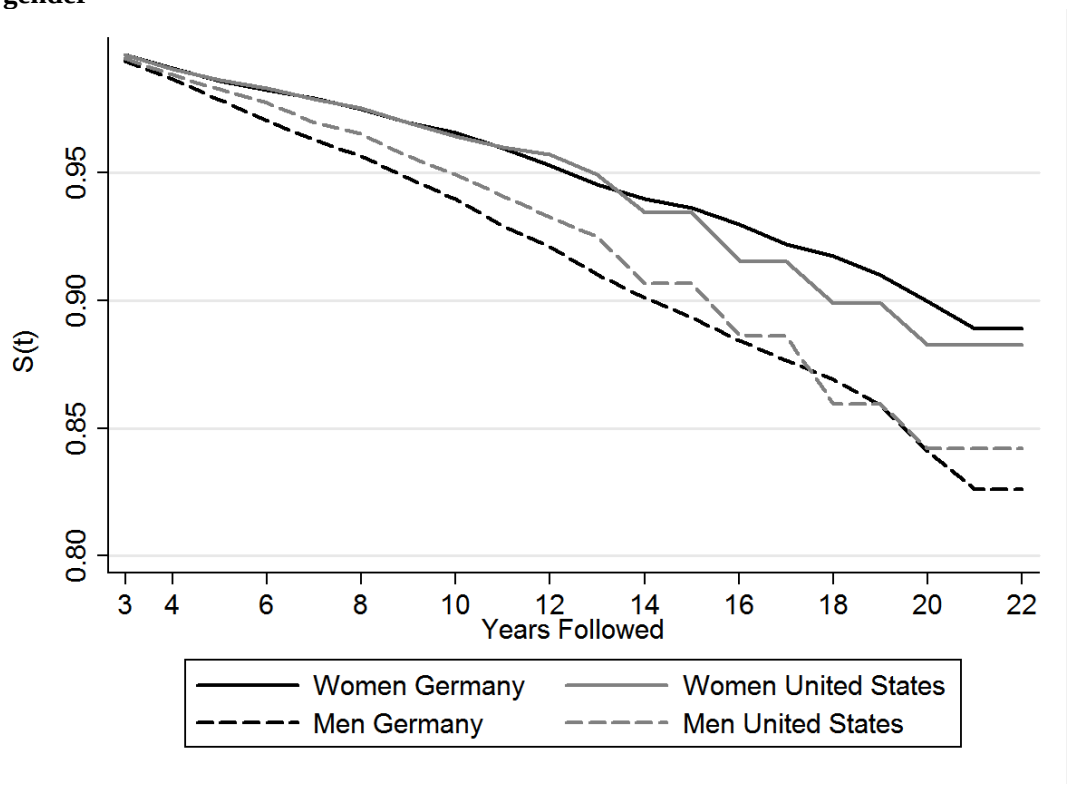


Figure 4.4: Survivor function for the German and American cohorts by years followed stratified by educational status

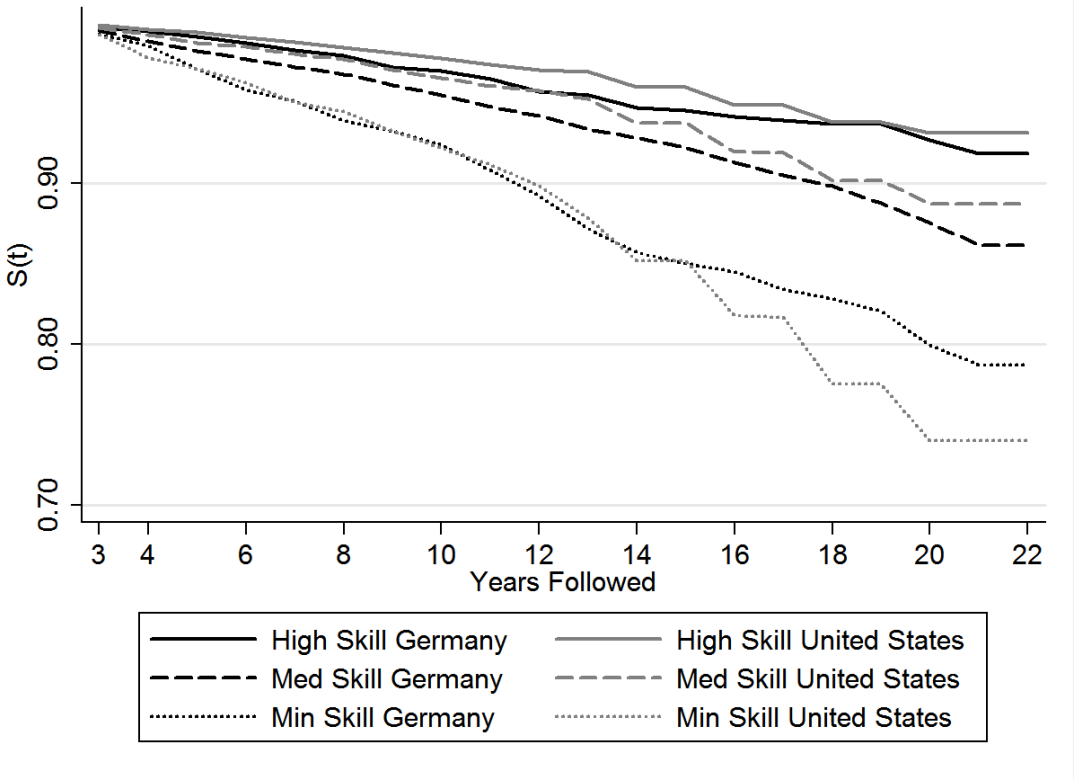


Figure 4.5: Survivor function for the German and American cohorts by years followed stratified by health status at baseline (t-1, t-2)

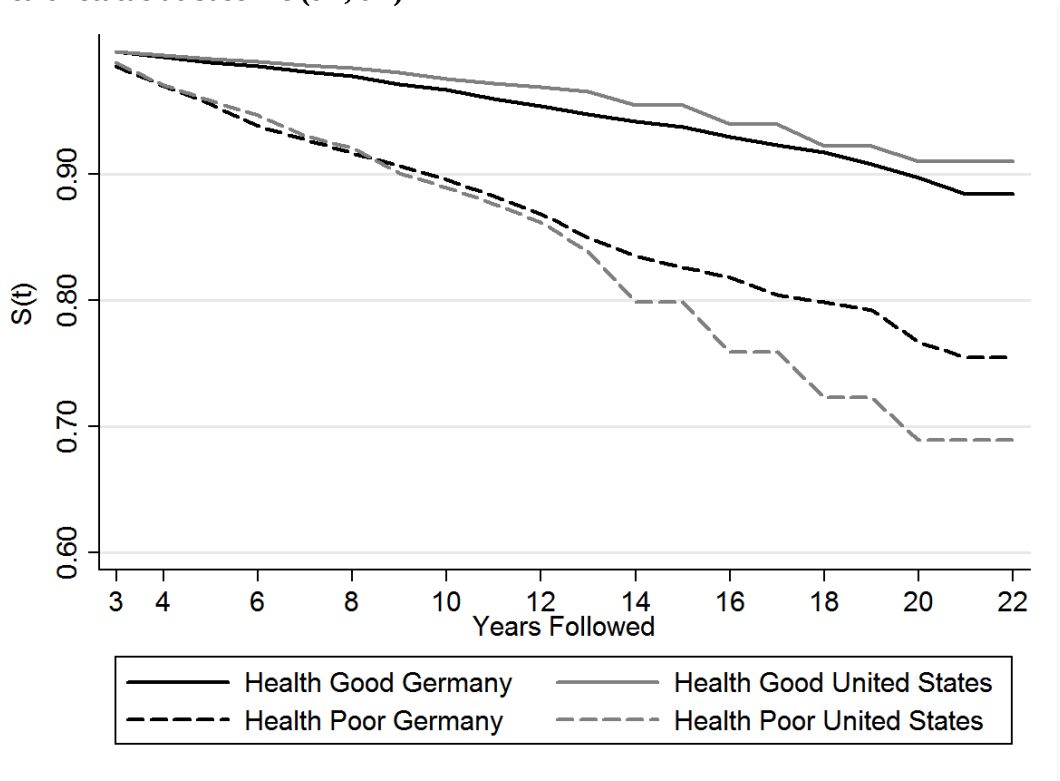


Figure 4.6: Summary of the relative risks of dying for current unemployed for the German and American cohorts

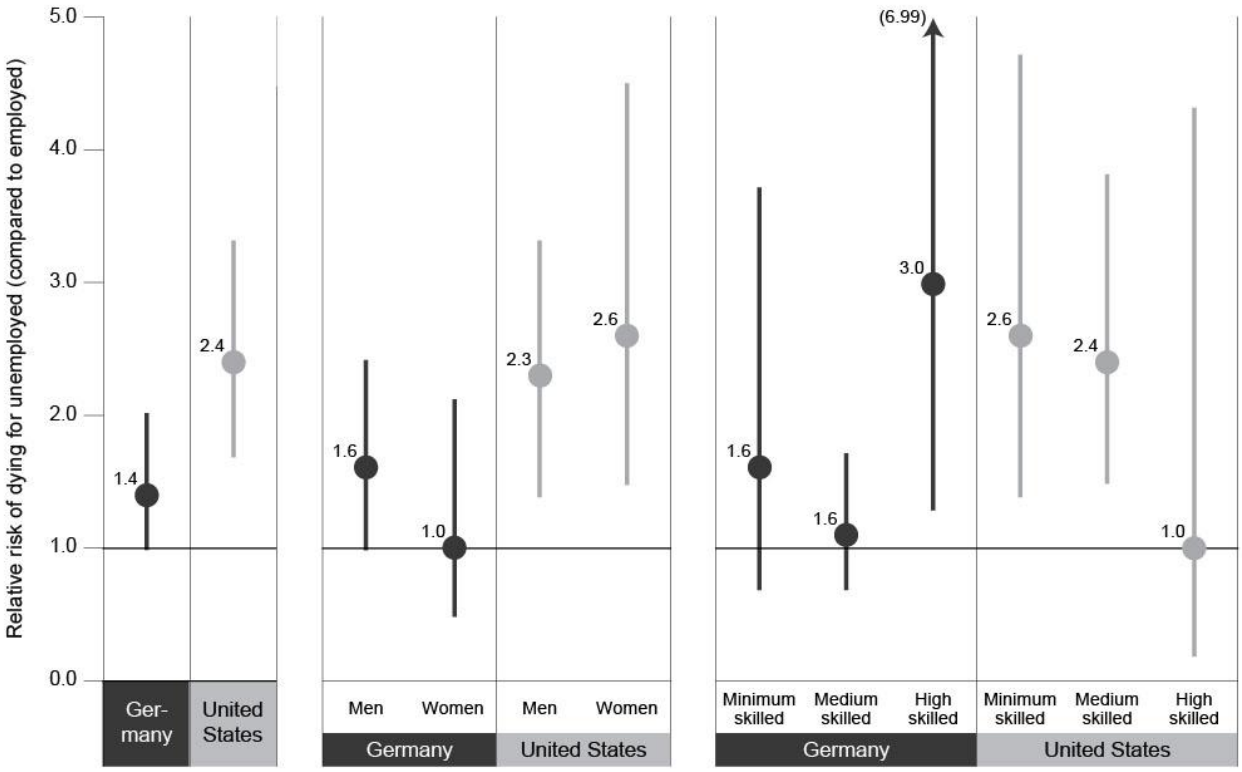


Figure 4.7: Predicted hazard of dying by current labour force status and age for the German and American cohorts (adjusted for all covariates including t-1 health status)

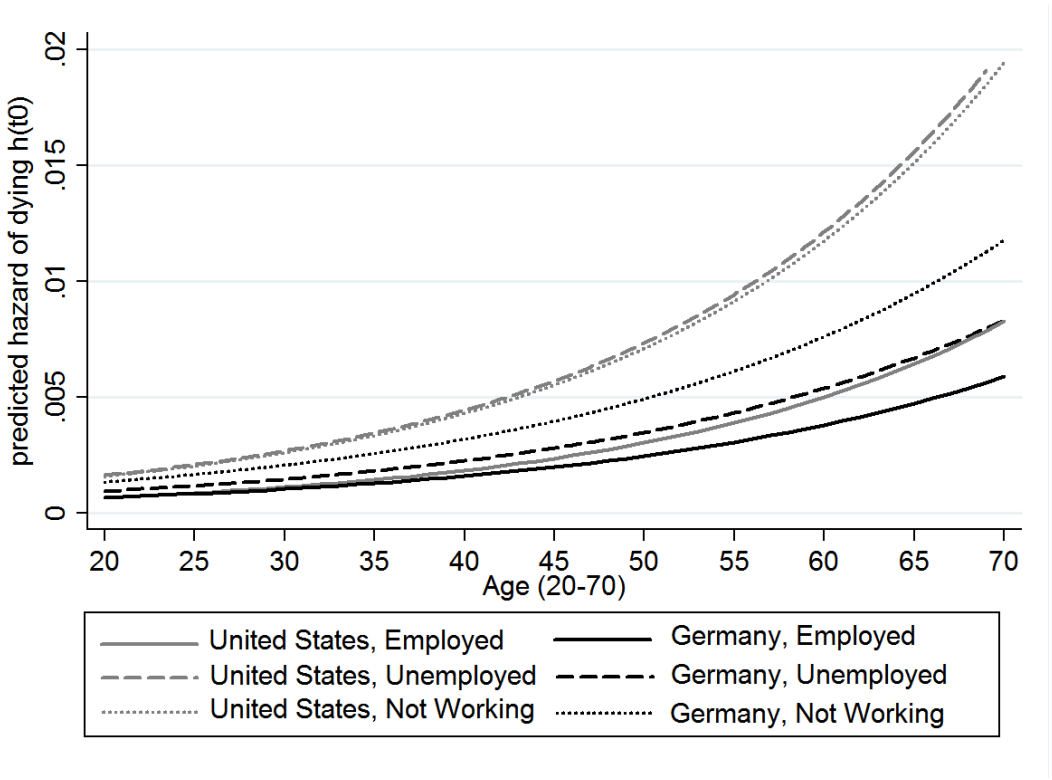


Table 4.1: Descriptive statistics at baseline stratified by current labour force status and study country

	GSOEP (N=10866)			PSID (N=9786)		
	Working (72.1%)	Unemployed (5.3%)	Not Working (22.5%))	Working (70.3%)	Unemployed (8.5%)	Not Working (21.4%)
Demographics						
Age	37.3 (37.0-37.6)	38.1 (37.1-39.1)	44.21 (43.7-44.7)	34.13 (33.8-	29.9 (29.1-30.8)	40.04 (39.5-40.6)
Male	.56 (.55-.58)	.43 (.4-.47)	.20 (.18-.22)	.52 (.51-.53)	.46 (.42-.49)	.19 (.16-
East German	.30 (.29-.31)	.41 (.37-.45)	.19 (.17-.20)			
Immigrant	.06 (.06-.07)	.18 (.16-.2)	.09 (.08-.10)			
White				.61 (.6-.62)	.32 (.28-.35)	.53 (.51-
Black				.34 (.33-.35)	.64 (.61-.67)	.41 (.39-
Other				.05 (.04-.06)	.04 (.03-.06)	.06 (.06-
Married	.70 (.69-.71)	.64 (.60-.67)	.77 (.76-.79)	.59 (.58-.6)	.32 (.29-.36)	.64 (.61-
Single	.22 (.21-.23)	.22 (.19-.25)	.12 (.10-.13)	.28 (.27-.29)	.48 (.45-.51)	.18 (.16-.2)
Div or Sep	.07 (.06-.07)	.13 (.11-.15)	.05 (.04-.06)	.02 (.01-.02)	.02 (.01-.03)	.06 (.05-
Widowed	.01 (.01-.02)	.02 (.01-.03)	.06 (.05-.07)	.08 (.08-.09)	.10 (.08-.12)	.07 (.06-
Household size(#)	2.87 (2.84-2.9)	2.75 (2.66-2.85)	2.91 (2.87-2.96)	2.73 (2.7-2.77)	2.66 (2.55-2.76)	3.18 (3.11-
Children(#)	.73 (.71-.75)	.71 (.63-.79)	.75 (.71-.78)	.83 (.80-.85)	.98 (.90-1.06)	1.12 (1.07-
Education						
Minimum skill	.10 (.09-.10)	.19 (.16-.21)	.28 (.26-.29)	.16 (.15-.17)	.36 (.33-.38)	.39 (.38-
Medium skill	.67 (.66-.68)	.67 (.63-.71)	.59 (.58-.61)	.60 (.59-.61)	.57 (.54-.6)	.51 (.49-
High skill	.22 (.21-.23)	.13 (.1-.17)	.12 (.11-.14)	.24 (.23-.24)	.07 (.04-.09)	.10 (.08-
Occupation						
No occupation	.05 (.05-.06)	1.00 (.98-1.02)	1.00 (.99-1.01)	.02 (.01-.02)	1.00 (.99-1.01)	1.00 (1.00-
Professional and Technical	.16 (.15-.17)	0.00 (-.03-.03)	0.00 (-.01-.01)	.19 (.18-.19)	0.00 (-.02-.02)	0.00 (-.01-.01)
Bus/Sales occ	.30 (.29-.31)	0.00 (-.03-.03)	0.00 (-.02-.02)	.34 (.33-.35)	0.00 (-.03-.03)	0.00 (-.02-.02)
Serives occ	.15 (.14-.16)	0.00 (-.02-.02)	0.00 (-.01-.01)	.14 (.14-.15)	0.00 (-.02-.02)	0.00 (-.01-.01)
Agr/For/Min occ	.03 (.03-.03)	0.00 (-.01-.01)	0 .00(-.01-.01)	.04 (.04-.05)	0.00 (-.01-.01)	0.00 (-.01-.01)
Manufacturing occ	.30 (.29-.31)	0.00 (-.03-.03)	0.00 (-.02-.02)	.26 (.25-.27)	0.00 (-.03-.03)	0.00 (-.02-.02)
Health						
Health excellent	.31 (.3-.32)	.28 (.24-.31)	.27 (.25-.28)	.29 (.28-.3)	.25 (.22-.28)	.19 (.17-
Health good	.38 (.37-.39)	.28 (.24-.32)	.3 (.28-.32)	.35 (.34-.36)	.28 (.25-.31)	.23 (.21-
Health satisfied	.21 (.2-.22)	.26 (.22-.29)	.25 (.24-.27)	.27 (.26-.28)	.29 (.26-.32)	.27 (.25-
Health fair	.07 (.06-.07)	.10 (.08-.12)	.09 (.08-.1)	.08 (.07-.09)	.14 (.12-.16)	.21 (.19-
Health poor	.03 (.03-.04)	.08 (.06-.1)	.09 (.08-.09)	.01 (.01-.02)	.04 (.02-.05)	.11 (.1-.12)
Disabled	.04 (.03-.04)	.03 (.02-.05)	.12 (.11-.13)	.08 (.07-.09)	.15 (.12-.17)	.33 (.32-

Table 4.1: Descriptive statistics at baseline stratified by current labour force status and study country (continued)

	GSOEP (N=10866)			PSID (N=9786)		
	Working	Unemployed	Not Working	Working	Unemployed	Not Working
			Income			
household income(t-1)	30655	20839	24855	38539	20116	31017
	(30238-31072)	(19243-22434)	(24159-25551)	(37898-39181)	(18262-21970)	(29847-32188)
household income(t0)	31614	21683	24852	40653	20281	31651
	(31255-31974)	(20349-23017)	(24209-25495)	(39892-41414)	(18079-22482)	(30260-33042)
household income(t+1)	32936	22830.	25820	41759	21284	31631
	(32566-33306)	(21471-24189)	(25159-26480)	(41094-42423)	(19357-23211)	(30418-32844)
individual labour income(t-1)	24924	7617	2018	29896	9372	2977
	(24473-25375)	(5893-9342)	(1266-2770)	(29248-30545)	(7498-11246)	(1794-4160)
individual labour income(t0)	24344	4555.	1283	32382.	8607.	2340
	(23949-24739)	(3089-6020)	(577-1989)	(31735-33029)	(6735-10478)	(1157-3522)
individual labour income(t+1)	24503.	7093	2433	32709	11125	3303
	(24159-24853)	(5809-8376)	(1809-3057)	(32046-33372)	(9202-13048)	(2093-4514)
			Transfers			
unemployment compensation (t-1)	207	2843	282	209	753	123
	(171-243)	(2705-2981)	(222-342)	(175-243)	(662-844)	(49-196)
unemployment compensation (t0)	206	3233.	379	116	649	47
	(173-239)	(3107-3359)	(309-430)	(96-137)	(591-708)	(10-84.38)
unemployment compensation (t+1)	470	2210	294.81	166.29	262.66	24.47
	(426-514)	(2048-2372)	(216.24-373.39)	(143-189)	(196-329)	(-18-67.)
household public transfers (t-1)	1199	5288	2026	737	3258	2851
	(1124-1273)	(5003-5573)	(1902-2150)	(659.75-814.1)	(3034-3481)	(2710-2991)
household public transfers (t0)	1544	5934	2301	561	3435	2920
	(1474-1615)	(5674-6195)	(2176-2427)	(486-632)	(3210-3651)	(2783-3056)
household public transfers (t+1)	2079	5188	2018	657	2684	2661
	(1996-2162)	(4886-5491)	(1871-2165)	(584-730)	(2473-2896)	(2528-2794)

Notes: Dollars $ and Euros € are in 2005 values.

Table 4.2: Unemployment, unemployment compensation, income and public transfers by number of months unemployed by study cohort

Months unemployed	zero	one	two	three	four	five	six	seven	eight	nine	ten	eleven	twelve
American cohort (PSID)													
Age	43.4	34.2	34.1	35.2	35.4	35.2	35.7	35.8	34.8	35.2	35.5	33.9	37.0
Male	42.7	49.5	48.3	47.2	48.0	50.7	47.2	40.9	42.3	39.7	40.4	39.1	43.4
Unemp at survey	3.6	13.3	18.1	23.0	27.7	32.9	41.1	45.8	49.0	54.2	51.1	48.5	56.0
Lifetime unemp	2.9	9.5	13.3	17.5	21.2	24.5	27.6	27.6	33.4	36.1	40.7	43.9	49.1
Unemp comp %	1.5	23.2	30.3	36.1	36.1	35.9	35.0	32.2	31.6	25.1	21.8	23.7	12.0
Unemp comp $	41.5	313.2	601.9	962.9	1263.4	1594.6	1707.5	1666.5	1669.7	1566.4	1315.5	1529.8	826.0
Public transfers $	914.3	1557.3	1852.6	2342.1	2752.8	3013.6	3594.5	3484.4	3895.8	4102.2	4208.4	4491.5	4918.0
Ind lbr inc (t-1) $	27464.5	21309.0	20510.0	18614.8	17086.9	17685.0	16218.9	14622.0	14328.7	12011.3	10293.4	11318.5	6531.0
Ind lbr inc (t0) $	28601.7	21957.2	20297.9	17786.3	15194.2	14191.2	13347.4	10074.8	8201.7	6315.0	4696.8	4232.0	1226.3
Hhld inc (t-1) $	44762.9	32302.5	30889.5	30613.5	27308.2	29094.7	28341.2	28260.2	28983.5	25082.5	23112.7	21415.6	18987.2
Hhld inc (t0) $	46472.9	32464.1	31168.0	29996.8	27715.5	26856.9	26569.0	27295.2	25175.9	22509.7	19379.1	18122.5	16064.5
Uecomp/Hhld inc	0.2	1.2	1.9	3.4	4.4	5.6	6.4	6.3	6.6	7.7	6.6	7.8	5.6
Pub Trans/Hhld inc	5.6	9.8	10.7	12.6	14.0	15.8	18.4	18.3	23.4	27.3	30.0	34.9	45.5
N (Person Years)	117757	3190	2491	1840	1238	933	905	670	575	506	381	294	1322
% (Person Years)	89.1	2.4	1.9	1.4	0.9	0.7	0.5	0.4	0.4	0.4	0.3	0.2	1.0
German cohort (GSOEP)													
Age	47.4	39.5	40.3	41.3	40.7	40.8	41.6	41.7	42.4	42.4	43.4	44.4	47.7
Male	46.9	53.9	51.5	50.9	47.1	43.7	47.2	41.1	40.5	42.8	41.1	41.3	42.9
Unemp at survey	0.8	18.8	34.4	37.9	43.6	43.8	39.0	48.5	48.2	49.6	56.3	57.9	86
Lifetime unemp	2.3	14.5	18.3	20.5	25.4	27.5	29.6	34.6	35.5	36.5	41.4	42.2	54.3
Unemp comp %	0.9	76.1	82.6	85.8	88.0	88.8	89.4	89.0	93.8	91.3	88.8	92.0	82.9
Unemp comp €	55.0	1652.3	2280.9	2687.4	3446	3950.7	4627.4	4654.3	5910.6	5927.3	6077.9	6650.8	6543.7
Public transfers €	1755.3	4212.1	4800.6	5140.6	6203.1	6684	7452.3	7658	8917.8	8741	8951.5	9871.4	9658.9
Ind lbr inc (t-1) €	19590.5	13986.6	12855.1	13632.3	11328.4	11159.8	12494.4	9623.4	10517.9	11302.8	9708.8	10200.6	4826.5
Ind lbr inc (t0) €	19910.7	15648	12790.5	12135.7	9349.2	8204.7	7635.4	5586.5	4412.1	3869.8	2727.4	2612.8	223.6
Hhld inc (t-1) €	33599.2	27859.2	27305.1	27752.5	27217.4	26808.8	27151	27039.2	26881.4	27717.6	26481.7	26795.8	23235.1
Hhld inc (t0) €	33723.6	28380.6	27326.4	27259.5	26914.8	26522.4	26240.6	27258.2	25836.8	25045.4	24943.8	25558	21567.5
Uecomp/Hhld inc	0.2	6.8	9.6	11.8	15.0	17.7	20.6	22.3	26.9	28.5	29.5	31.5	38.2
Pub Trans/Hhld inc	6.2	17.0	20.2	21.9	26.0	29.7	33.0	34.6	39.8	41.8	43.0	46.7	55.9
N (Person Years)	128696	1162	1217	1289	927	707	837	574	533	635	428	327	3425
% (Person Years)	94.1	0.8	0.9	0.9	0.7	0.5	0.6	0.4	0.4	0.5	0.3	0.2	2.4

Notes: Number of months unemployed is based on the number of months unemployed reported for the year prior to the survey year. Unemployment at survey has been brought forward so that is for the same year as the months unemployed measure.
Dollars $ and Euros € are in 2005 values.

Table 4.3: Relative risk of dying by labour force status at the time of the survey for the German cohort, 1986-2004

	Age & Sex	Demo-graphics	Household Income	Education	Occupation	Health
Unemployed	2.145*** [1.501,3.066]	2.002*** [1.395,2.871]	1.795** [1.248,2.580]	1.734** [1.205,2.495]	1.676** [1.163,2.413]	1.417 [0.984,2.042]
Not Working	3.007*** [2.443,3.703]	3.153*** [2.555,3.891]	2.894*** [2.341,3.579]	2.841*** [2.295,3.517]	2.452*** [1.964,3.062]	2.005*** [1.605,2.505]
Age	1.057*** [1.049,1.065]	1.051*** [1.042,1.060]	1.052*** [1.043,1.061]	1.051*** [1.042,1.060]	1.047*** [1.037,1.056]	1.045*** [1.035,1.054]
Male	2.121*** [1.843,2.441]	2.074*** [1.726,2.493]	2.182*** [1.812,2.627]	2.289*** [1.894,2.768]	2.599*** [2.124,3.181]	2.466*** [2.017,3.015]
East German		1.205* [1.017,1.428]	1.176 [0.992,1.395]	1.253* [1.053,1.492]	1.221* [1.026,1.454]	1.280** [1.071,1.529]
Immigrant		0.856 [0.624,1.173]	0.830 [0.606,1.138]	0.819 [0.597,1.123]	0.778 [0.566,1.068]	0.814 [0.593,1.117]
Spouse		0.906 [0.737,1.113]	0.950 [0.772,1.169]	0.919 [0.746,1.132]	0.887 [0.717,1.096]	0.941 [0.763,1.162]
Single		1.395 [0.985,1.975]	1.376 [0.971,1.949]	1.390 [0.982,1.969]	1.358 [0.956,1.928]	1.487* [1.045,2.115]
Div or Sep		1.500** [1.134,1.982]	1.408* [1.062,1.868]	1.411* [1.063,1.872]	1.425* [1.072,1.894]	1.359* [1.021,1.808]
Widowed		1.189 [0.927,1.525]	1.171 [0.911,1.505]	1.128 [0.876,1.452]	1.093 [0.847,1.410]	1.120 [0.867,1.445]
Household size(#)		1.103 [0.990,1.228]	1.195** [1.070,1.334]	1.180** [1.056,1.319]	1.171** [1.047,1.310]	1.171** [1.046,1.311]
Children(#)		0.725*** [0.601,0.874]	0.686*** [0.569,0.828]	0.695*** [0.576,0.839]	0.683*** [0.566,0.824]	0.715*** [0.593,0.863]
Hhld income (t-1,1og)			0.779*** [0.721,0.841]	0.794*** [0.730,0.864]	0.801*** [0.733,0.874]	0.825*** [0.752,0.906]
Min_skill				1.540*** [1.196,1.982]	1.464** [1.113,1.927]	1.365* [1.036,1.800]
Med_skill				1.257* [1.015,1.556]	1.230 [0.976,1.551]	1.186 [0.939,1.499]
No occupation					1.735*** [1.277,2.355]	1.582** [1.163,2.152]
Bus/sales occ					1.078 [0.793,1.466]	1.079 [0.793,1.469]
Services occ					1.025 [0.724,1.451]	0.991 [0.699,1.406]
Agr/For/Min occ					1.142 [0.694,1.881]	1.103 [0.669,1.819]
Manufacturing occ					1.027	0.995

					[0.748,1.409]	[0.724,1.367]
Hlth sat good (t-1)						0.919
						[0.676,1.251]
Hlth sat satisfied (t-1)						1.512**
						[1.123,2.035]
Hlth sat poor (t-1)						1.895***
						[1.381,2.601]
Hlth sat bad (t-1)						3.808***
						[2.772,5.231]
Disabled (t-1)						1.426***
						[1.217,1.671]
Observations	117123	117123	117123	117123	117123	117123
AIC	9956.3	9942.0	9917.1	9909.3	9882.2	9658.0
BIC	10004.7	10067.7	10052.5	10064.1	10085.3	9909.4

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Complementary log-log models.

2. Includes the log of years followed as an exposure offset.

3. Employed, Female, West German, German born, Head, Married, High skill, Professional/Management occupations, Excellent health satisfaction, and Not disabled are the respective reference categories for the categorical variables.

Table 4.4: Relative risk of dying by labour force status at the time of the survey for the American cohort, 1986-2004

	Age & Sex	Demo-graphics	Household Income	Education	Occupation	Health
Died after final yr						
Unemployed	3.661*** [2.599,5.158]	2.888*** [2.042,4.085]	2.636*** [1.859,3.739]	2.565*** [1.808,3.639]	2.454*** [1.727,3.486]	2.353*** [1.656,3.343]
Not Working	4.239*** [3.486,5.153]	4.086*** [3.353,4.978]	3.762*** [3.080,4.595]	3.618*** [2.959,4.425]	3.325*** [2.694,4.104]	2.428*** [1.956,3.014]
Age	1.054*** [1.048,1.061]	1.053*** [1.045,1.061]	1.054*** [1.046,1.062]	1.054*** [1.046,1.062]	1.054*** [1.046,1.062]	1.052*** [1.044,1.060]
Male	1.860*** [1.620,2.134]	1.782*** [1.450,2.189]	1.834*** [1.495,2.249]	1.839*** [1.499,2.257]	1.752*** [1.416,2.169]	1.722*** [1.397,2.125]
Black		1.695*** [1.457,1.970]	1.543*** [1.320,1.803]	1.448*** [1.229,1.705]	1.423*** [1.206,1.678]	1.203* [1.021,1.419]
Other		0.973 [0.693,1.367]	0.930 [0.662,1.308]	0.910 [0.646,1.281]	0.881 [0.625,1.241]	0.864 [0.613,1.218]
Spouse		0.971* [0.946,0.998]	0.976 [0.950,1.002]	0.975 [0.950,1.002]	0.973* [0.947,1.000]	0.981 [0.955,1.007]
Single		1.643*** [1.234,2.188]	1.531** [1.148,2.041]	1.568** [1.175,2.092]	1.563** [1.170,2.087]	1.596** [1.201,2.122]
Div or Sep		1.198 [0.935,1.537]	1.148 [0.896,1.470]	1.127 [0.880,1.444]	1.096 [0.855,1.406]	1.049 [0.819,1.343]
Widowed		1.401** [1.090,1.802]	1.323* [1.028,1.703]	1.325* [1.029,1.706]	1.348* [1.046,1.736]	1.239 [0.965,1.591]
Household size(#)		0.981 [0.893,1.078]	1.014 [0.923,1.115]	1.003 [0.912,1.103]	1.001 [0.910,1.101]	0.985 [0.895,1.084]
Children(#)		0.857* [0.741,0.991]	0.839* [0.726,0.970]	0.849* [0.734,0.982]	0.848* [0.733,0.981]	0.881 [0.762,1.019]
Hhld income (t-1,1og)			0.872*** [0.826,0.920]	0.886*** [0.837,0.938]	0.891*** [0.840,0.945]	0.925* [0.864,0.990]
Educ - Minimum skill				1.516*** [1.183,1.943]	1.314 [0.998,1.732]	0.916 [0.691,1.214]
Educ - Medium skill				1.406** [1.119,1.766]	1.283* [1.002,1.642]	1.109 [0.864,1.422]
No occupation					1.318 [0.995,1.745]	1.115 [0.840,1.479]
Bus/sales occ					0.895 [0.677,1.185]	0.924 [0.699,1.223]
Services occ					0.992 [0.725,1.357]	1.003 [0.733,1.372]
Agr/For/Min occ					1.096 [0.726,1.656]	1.177 [0.778,1.781]
Manufacturing occ					1.258	1.213

					[0.939,1.684]	[0.906,1.625]
Very good SRHS (t-1)						1.468* [1.034,2.084]
Good SRHS (t-1)						2.028*** [1.447,2.841]
Fair SRHS (t-1)						3.810*** [2.681,5.414]
Poor SRHS (t-1)						7.249*** [4.976,10.560]
Disabled (t-1)						1.103 [0.926,1.315]
Observations	99175	99175	99175	99175	99175	99175
AIC	9308.3	9193.1	9175.2	9167.2	9161.4	8907.9
BIC	9355.8	9316.6	9308.2	9319.3	9361.0	9155.0

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
1. Complementary log-log models.
2. Includes the log of years followed as an exposure offset.
3. Employed, Female, White/Other race, Head, Married, High skill, Professional/Management occupations, Excellent self-reported health status, and not disabled are the respective reference categories for the categorical variables.

Table 4.5: Relative risk of dying by labour force status at the time of the survey, adjusted for potential confounders, German and American cohorts, 1986-2004

	Demog GSOEP	Demog PSID	All GSOEP	All PSID	Health GSOEP	Health PSID
Unemployed	2.002***	2.888***	1.676**	2.454***	1.417	2.353***
	[1.395,2.871]	[2.042,4.085]	[1.163,2.413]	[1.727,3.486]	[0.984,2.042]	[1.656,3.343]
Not Working	3.153***	4.086***	2.452***	3.325***	2.005***	2.428***
	[2.555,3.891]	[3.353,4.978]	[1.964,3.062]	[2.694,4.104]	[1.605,2.505]	[1.956,3.014]
Observations	117123	99175	117123	99175	117123	99175
AIC	9942.0	9193.1	9882.2	9161.4	9658.0	8907.9
BIC	10067.7	9316.6	10085.3	9361.0	9909.4	9155.0

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The 'Demog' model includes all demographic variables (e.g., age, sex, race, marital status, household characteristics. The 'All' model includes all variables except for lagged health status and the 'Health' model adds lagged health status.

Table 4.6: Relative risk of dying by labour force status in the year prior to the survey, adjusted for potential confounders, German and American cohorts, 1986-2004

	Demog GSOEP	Demog PSID	All GSOEP	All PSID	Health GSOEP	Health PSID
Died after final yr						
Number of months unemployed	1.084***	1.113***	1.066***	1.094***	1.049**	1.090***
	[1.047,1.122]	[1.069,1.158]	[1.029,1.103]	[1.050,1.139]	[1.013,1.086]	[1.047,1.135]
Number of months not working	1.117***	1.104***	1.092***	1.084***	1.073***	1.061***
	[1.096,1.138]	[1.087,1.121]	[1.070,1.114]	[1.066,1.102]	[1.052,1.095]	[1.043,1.079]
Observations	115649	99129	115649	99129	115649	99129
AIC	9736.1	9222.3	9683.2	9187.6	9536.7	9020.2
BIC	9861.6	9345.9	9886.0	9387.2	9787.8	9267.3

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.7: Relative risk of dying by cumulative labour force status, adjusted for potential confounders, German and American cohorts, 1986-2004

	Demog GSOEP	Demog PSID	All GSOEP	All PSID	Health GSOEP	Health PSID
Died after final yr						
% of yrs followed unemployed	1.014***	1.020***	1.009***	1.016***	1.007*	1.016***
	[1.009,1.019]	[1.013,1.028]	[1.004,1.015]	[1.008,1.024]	[1.001,1.012]	[1.008,1.024]
% of yrs followed not working	1.014***	1.013***	1.010***	1.012***	1.007***	1.007***
	[1.011,1.016]	[1.011,1.015]	[1.007,1.013]	[1.009,1.015]	[1.004,1.011]	[1.004,1.010]
Observations	116877	99129	116877	99129	116877	99129
AIC	9902.1	9244.7	9877.3	9225.3	9717.2	9047.2
BIC	10027.8	9368.2	10080.3	9424.9	9968.6	9294.4

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.8: Relative risk of dying by labour force status at time of survey stratified by sex, adjusted for potential confounders, German and American cohorts, 1986-2004

	Males All GSOEP	Males Health GSOEP	Males All PSID	Males Health PSID	Females All GSOEP	Females Health GSOEP	Females All PSID	Females Health PSID
Unemployed	1.853** [1.208,2.843]	1.555* [1.013,2.387]	2.363*** [1.504,3.714]	2.248*** [1.429,3.536]	1.192 [0.581,2.446]	1.041 [0.507,2.137]	2.590*** [1.475,4.547]	2.570** [1.465,4.509]
Not Working	2.857*** [2.142,3.812]	2.220*** [1.662,2.965]	3.156*** [2.377,4.190]	2.280*** [1.704,3.050]	1.892*** [1.295,2.765]	1.668** [1.143,2.434]	3.599*** [2.583,5.015]	2.745*** [1.957,3.851]
Observations	54741	54741	42945	42945	62382	62382	56230	56230
AIC	5672.8	5569.8	4716.1	4588.7	4223.3	4108.0	4468.3	4347.1
BIC	5851.0	5792.6	4880.8	4796.7	4404.1	4334.0	4647.1	4570.5

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The 'All' model includes all variables except for lagged health status and the 'Health' model adds lagged health status.

Table 4.9: Relative risk of dying by labour force status in the year prior to the survey stratified by sex, adjusted for potential confounders, German and American cohorts, 1986-2004

	Males All GSOEP	Males Health GSOEP	Males All PSID	Males Health PSID	Females All GSOEP	Females Health GSOEP	Females All PSID	Females Health PSID
Months unemployed	1.078*** [1.034,1.123]	1.059** [1.015,1.104]	1.120*** [1.067,1.175]	1.108*** [1.056,1.163]	1.028 [0.962,1.098]	1.017 [0.952,1.086]	1.044 [0.967,1.128]	1.051 [0.974,1.135]
Month not working	1.114*** [1.085,1.144]	1.090*** [1.062,1.120]	1.080*** [1.056,1.104]	1.051*** [1.027,1.075]	1.057** [1.022,1.095]	1.046** [1.011,1.083]	1.087*** [1.059,1.114]	1.072*** [1.045,1.099]
Observations	54115	54115	42914	42914	61534	61534	56215	56215
AIC	5489.5	5420.5	4732.4	4642.4	4204.0	4134.1	4474.9	4403.3
BIC	5667.5	5643.0	4897.1	4850.4	4384.6	4359.8	4653.6	4626.8

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.10: Relative risk of dying by cumulative labour force status stratified by sex, adjusted for potential confounders, German and American cohorts, 1986-2004

	Males All GSOEP	Males Health GSOEP	Males All PSID	Males Health PSID	Females All GSOEP	Females Health GSOEP	Females All PSID	Females Health PSID
% of yrs followed unemployed	1.012*** [1.005,1.019]	1.009* [1.002,1.016]	1.024*** [1.015,1.033]	1.023*** [1.014,1.032]	1.000 [0.990,1.011]	0.998 [0.988,1.009]	0.998 [0.982,1.014]	1.001 [0.985,1.017]
% of yrs followed not working	1.013*** [1.009,1.017]	1.010*** [1.006,1.015]	1.012*** [1.007,1.016]	1.005* [1.001,1.010]	1.003 [0.997,1.009]	1.002 [0.996,1.008]	1.011*** [1.006,1.016]	1.008*** [1.004,1.013]
Observations	54606	54606	42914	42914	62271	62271	56215	56215
AIC	5625.5	5549.3	4743.2	4647.3	4260.4	4183.2	4496.1	4420.5
BIC	5803.7	5772.0	4907.9	4855.3	4441.2	4409.1	4674.9	4644.0

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The 'All' model includes all variables except for lagged health status and the 'Health' model adds lagged health status.

Table 4.11: Relative risk of dying, by labour force status at time of survey stratified by educational skill level, adjusted for potential confounders, German and American cohorts, 1986-2004, health (t-1) model

	Full GSOEP	Min skill GSOEP	Med Skill GSOEP	High Skill GSOEP	Full PSID	Min skill PSID	Med Skill PSID	High Skill PSID
Unemployed	1.417 [0.984,2.042]	1.629 [0.718,3.692]	1.086 [0.678,1.739]	2.983* [1.272,6.993]	2.353*** [1.656,3.343]	2.554** [1.395,4.677]	2.373*** [1.487,3.786]	1.014 [0.240,4.283]
Not Working	2.005*** [1.605,2.505]	2.354** [1.394,3.974]	1.691*** [1.282,2.229]	2.800*** [1.564,5.010]	2.428*** [1.956,3.014]	2.406*** [1.635,3.540]	2.494*** [1.850,3.363]	1.698 [0.949,3.039]
Observations	117123	17359	74928	24836	99175	20546	57291	21338
AIC	9658.0	2364.1	6000.8	1341.1	8907.9	3430.6	4350.4	1150.5
BIC	9909.4	2542.6	6213.0	1527.9	9155.0	3613.0	4556.4	1333.8

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The 'Full' model refers to the complete unstratified cohort and the 'Min Skill', 'Med Skill' and 'High Skill' models refer to the respective education stratified cohorts.

Table 4.12: Relative risk of dying by labour status in the year prior to the survey stratified by educational skill level, adjusted for potential confounders, German and American cohorts, 1986-2004, health (t-1) model

	Full GSOEP	Min skill GSOEP	Med Skill GSOEP	High Skill GSOEP	Full PSID	Min skill PSID	Med Skill PSID	High Skill PSID
Died after final yr								
Months unemployed	1.049**	1.014	1.034	1.152***	1.090***	1.047	1.121***	0.916
	[1.013,1.086]	[0.933,1.102]	[0.990,1.080]	[1.061,1.250]	[1.047,1.135]	[0.971,1.130]	[1.067,1.177]	[0.701,1.197]
Months not working	1.073***	1.056*	1.062***	1.140***	1.061***	1.058***	1.060***	1.042
	[1.052,1.095]	[1.009,1.106]	[1.036,1.089]	[1.080,1.203]	[1.043,1.079]	[1.029,1.088]	[1.035,1.085]	[0.993,1.094]
Observations	115649	17137	73980	24532	99129	20527	57263	21339
AIC	9536.7	2349.8	5932.9	1295.0	9020.2	3452.5	4413.5	1160.8
BIC	9787.8	2528.0	6144.8	1481.5	9267.3	3634.8	4619.5	1344.0

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The 'All' model includes all variables except for lagged health status and the 'Health' model adds lagged health status.
The 'Full' model refers to the complete unstratified cohort and the 'Min Skill', 'Med Skill' and 'High Skill' models refer to the respective education stratified cohorts.

Table 4.13: Relative risk of dying by cumulative labour force status stratified by educational skill level, adjusted for potential confounders, German and American cohorts, 1986-2004, health (t-1) model

	Full GSOEP	Min skill GSOEP	Med Skill GSOEP	High Skill GSOEP	Full PSID	Min skill PSID	Med Skill PSID	High Skill PSID
Died after final yr								
% of yrs followed unemployed	1.007*	1.006	1.004	1.014	1.016***	1.010	1.019***	1.012
	[1.001,1.012]	[0.996,1.016]	[0.996,1.011]	[0.998,1.031]	[1.008,1.024]	[0.998,1.022]	[1.008,1.030]	[0.976,1.049]
% of yrs followed not working	1.007***	1.002	1.009***	1.007	1.007***	1.007**	1.006*	1.005
	[1.004,1.011]	[0.995,1.009]	[1.005,1.013]	[0.999,1.016]	[1.004,1.010]	[1.002,1.012]	[1.001,1.011]	[0.995,1.015]
Observations	116877	17342	74749	24786	99129	20527	57263	21339
AIC	9717.2	2418.9	5993.2	1349.2	9047.2	3460.6	4432.3	1163.2
BIC	9968.6	2597.4	6205.3	1535.9	9294.4	3643.0	4638.3	1346.4

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.14: Relative risk of dying by labour force status at time of survey with exclusions for baseline health and labour force status, adjusted for potential confounders, German and American cohorts, 1986-2004, health (t-1) model

	Full GSOEP	Health Good GSOEP	Working GSOEP	Full PSID	Health Good PSID	Working PSID
Died after final yr						
Unemployed	1.417	1.658*	1.718*	2.353***	2.987***	3.414***
	[0.984,2.042]	[1.064,2.583]	[1.083,2.728]	[1.656,3.343]	[2.014,4.430]	[2.152,5.416]
Not Working	2.005***	2.406***	2.129***	2.428***	2.794***	3.557***
	[1.605,2.505]	[1.842,3.142]	[1.597,2.838]	[1.956,3.014]	[2.141,3.645]	[2.704,4.679]
Observations	117123	95618	76540	99175	79683	63669
AIC	9658.0	6463.8	4803.6	8907.9	5117.8	4367.3
BIC	9909.4	6662.6	4997.7	9155.0	5312.8	4548.6

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.15: Relative risk of dying by labour status in the year prior to the survey with exclusions for baseline health and labour force status, adjusted for potential confounders, German and American cohorts, 1986-2004, health (t-1) model

	Full GSOEP	Health Good GSOEP	Working GSOEP	Full PSID	Health Good PSID	Working PSID
Died after final yr						
Number of months unemployed	1.049**	1.055*	1.048*	1.090***	1.086**	1.099**
	[1.013,1.086]	[1.012,1.099]	[1.001,1.097]	[1.047,1.135]	[1.032,1.142]	[1.034,1.169]
Number of month not working	1.073***	1.069***	1.058***	1.061***	1.049***	1.058***
	[1.052,1.095]	[1.044,1.096]	[1.030,1.086]	[1.043,1.079]	[1.026,1.072]	[1.035,1.082]
Observations	115649	94413	75612	99129	79674	63667
AIC	9536.7	6243.6	4649.3	9020.2	5100.1	4339.1
BIC	9787.8	6489.5	4889.4	9267.3	5341.5	4565.7

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.16: Relative risk of dying by cumulative labour force status stratified with exclusions for baseline health and labour force status, adjusted for potential confounders, German and American cohorts, 1986-2004, health (t-1) model

	Full GSOEP	Health Good GSOEP	Working GSOEP	Full PSID	Health Good PSID	Working PSID
Died after final yr						
% of yrs followed unemployed	1.007*	1.006	1.007	1.016***	1.019***	1.027***
	[1.001,1.012]	[0.999,1.014]	[0.995,1.018]	[1.008,1.024]	[1.009,1.029]	[1.011,1.044]
% of yrs followed not working	1.007***	1.007**	1.009***	1.007***	1.006**	1.007**
	[1.004,1.011]	[1.003,1.011]	[1.004,1.014]	[1.004,1.010]	[1.002,1.011]	[1.002,1.012]
Observations	116877	95425	76377	99129	79674	63667
AIC	9717.2	6343.5	4722.8	9047.2	5105.5	4351.9
BIC	9968.6	6589.6	4963.2	9294.4	5346.9	4578.4

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.17: Relative risk of dying by all three labour force status variables stratified by East and West Germany, adjusted for potential confounders, German cohort, 1986-2004, health (t-1) model

	East German	West German	East German	West German	East German	West German
Died after final yr						
Unemployed	2.079** [1.209,3.574]	0.888 [0.500,1.576]				
Not Working	2.051** [1.217,3.457]	2.041*** [1.594,2.612]				
Months unemployed			1.082** [1.023,1.145]	1.027 [0.980,1.077]		
Months not working			1.104*** [1.053,1.157]	1.068*** [1.045,1.092]		
% of yrs followed unemployed					1.007 [0.998,1.017]	1.005 [0.998,1.013]
% of yrs followed not working					1.005 [0.998,1.012]	1.009*** [1.005,1.013]
Observations	27920	89412	27601	88252	27780	89306
AIC	2098.6	7692.0	2063.8	7599.8	2081.7	7763.5
BIC	2296.3	7917.6	2261.2	7825.1	2279.2	7989.1

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.18: Relative risk of dying by all three labour force status variables stratified by race, adjusted for potential confounders, American cohort, 1986-2004, health (t-1) model

	Black	White/Other	Black	White/Other	Black	White/Other
Unemployed	2.456*** [1.521,3.964]	2.261** [1.315,3.887]				
Not Working	3.084*** [2.152,4.422]	1.996*** [1.519,2.623]				
Months unemployed			1.085** [1.027,1.146]	1.108*** [1.043,1.178]		
Months not working			1.092*** [1.061,1.123]	1.038*** [1.016,1.060]		
% of yrs followed unemployed					1.013* [1.003,1.023]	1.019** [1.006,1.032]
% of yrs followed not working					1.009** [1.003,1.014]	1.005* [1.001,1.009]
Observations	34155	65020	34122	65007	34122	65007
AIC	3685.9	5208.8	3731.8	5266.2	3758.8	5273.4
BIC	3888.5	5426.8	3934.3	5484.2	3961.3	5491.4

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.19: Predicted hazard of dying in a given year by current labour force status, skill level and age, based on the skill stratified estimates

Country	Labour Force Status	Skill Level	Age 20	Age 30	Age 40	Age 50	Age 60	Age 70	Ratio at Age 40
Germany	Employed	High Skill	0.0005	0.0008	0.0012	0.0017	0.0026	0.0039	1.00
United States	Employed	High Skill	0.0004	0.0007	0.0012	0.0019	0.0031	0.0050	1.00
United States	Unemployed	High Skill	0.0004	0.0007	0.0012	0.0019	0.0031	0.0050	1.01
Germany	Employed	Medium Skill	0.0006	0.0010	0.0016	0.0026	0.0043	0.0069	1.38
United States	Employed	Medium Skill	0.0005	0.0009	0.0016	0.0029	0.0053	0.0097	1.39
Germany	Unemployed	Medium Skill	0.0007	0.0011	0.0018	0.0028	0.0046	0.0075	1.50
Germany	Employed	Minimum Skill	0.0008	0.0012	0.0020	0.0032	0.0052	0.0084	1.70
United States	Not Working	High Skill	0.0010	0.0014	0.0020	0.0029	0.0042	0.0060	1.71
Germany	Not Working	High Skill	0.0010	0.0017	0.0027	0.0044	0.0072	0.0117	2.34
United States	Employed	Minimum Skill	0.0013	0.0020	0.0032	0.0049	0.0075	0.0115	2.70
Germany	Unemployed	Minimum Skill	0.0016	0.0023	0.0033	0.0047	0.0068	0.0098	2.79
Germany	Not Working	High Skill	0.0014	0.0022	0.0033	0.0049	0.0073	0.0108	2.80
Germany	Unemployed	High Skill	0.0015	0.0023	0.0035	0.0052	0.0077	0.0115	2.98
United States	Unemployed	Medium Skill	0.0012	0.0021	0.0038	0.0070	0.0127	0.0231	3.29
United States	Not Working	Medium Skill	0.0012	0.0022	0.0040	0.0073	0.0133	0.0243	3.46
Germany	Not Working	Minimum Skill	0.0023	0.0033	0.0047	0.0068	0.0098	0.0141	4.03
United States	Not Working	Minimum Skill	0.0032	0.0049	0.0076	0.0117	0.0180	0.0278	6.50
United States	Unemployed	Minimum Skill	0.0034	0.0052	0.0081	0.0124	0.0191	0.0295	6.90

Notes: The hazard of dying is evaluated at the mean of the other covariates in each of the stratified models (e.g. the hazard of dying for the minimum skilled is based on the mean of the covariates of the minimum skilled in each survey and so forth).

Chapter 5: Unemployment and Self-rated Health: A Study of Canada, Germany and the United States

5.1: Introduction

This chapter builds on the mortality analysis presented in Chapter 4. Canada, an LME country with higher levels of unemployment and employment protection than the United States, is introduced as a middle case between Germany and Canada. Other research has established that socio-economic gradients are flatter in Canada compared to the United States (see section 2.2.2), although no research has conducted a direct comparison of unemployment-related health inequalities between these two countries. This study enables a more detailed exploration of whether the overall institutional context matters to the health of the unemployed, and whether within LMEs whether there can be effective mediation of the unemployment-health relationship.

Self-reported health status (SRHS) is the dependent variable in this study. While SRHS is strongly associated with mortality (see section 5.3.2), it enables the consideration of the effect of unemployment on morbidity. Self-reported health status is also a more 'powerful' variable as there is more variation in it across years compared to mortality. In the mortality study only about eight percent of the cohorts died. With the greater variation in SRHS it possible to directly examine whether there are differences in the health of the unemployed who receive unemployment compensation and those that do not. Self-reported health status may also be a better measure of the test of the psychosocial effects of unemployment on health because it may capture aspects of morbidity related to psychological and function.

5.2: Research Objectives

The hypotheses articulated in Chapter 2 lead to the following research objectives:

- To examine the relationship between unemployment and self-reported health status in three working-age cohorts of Germans, Canadian and Americans, and whether and how this relationship changes by study country;
- To examine if the receipt of unemployment benefits modifies the relationship between unemployment and self-reported health status; and,
- To examine if these relationships are modified by skill level or gender.

The specific hypothesis for the unemployment and self-reported health status study are similar to the mortality study, but include hypotheses related to the receipt of unemployment benefits:

1. The association between unemployment and SRHS will be weaker in Germany compared to the United States. It is unclear where the strength of the association in Canada will rank among the three countries, given that Canada has higher levels of unemployment and employment protection than the United States, but lower levels of long-term unemployed than Germany.
2. The receipt of unemployment compensation will mediate the effect of unemployment on health within countries. The higher prevalence of the long term unemployed in Germany compared to the LME countries, however, may confound this comparison.
3. There will continue to be effect modification by educational status that will vary by study country. The relationship between unemployment and SRHS will be weaker for the minimally skilled and medium skilled in Germany compared to their counterparts in the United States and Canada, with the minimally skilled in the United States being especially disadvantaged. Effect modification by skill level will be similar in Canada and the United States given the similarities in these countries educational systems.
4. The relationship between unemployment and SRHS will be stronger for women than the in unemployment and mortality study and there will continue to be stronger associations in Canada and the United States compared to Germany.

5.3: Methods

5.3.1: Self-reported Health Status

5.3.1.1: Validity of Self-reported Health Status

A number of reviews have found that SRHS is predictive of mortality and exhibits a robust gradient (i.e., poor health is more predictive than fair, and fair more than good) (Benyamini and Idler 1999; DeSalvo et al. 2006; Idler and Benyamini 1997). The reviews by Idler and Benyamini established a strong link between SRHS and mortality, while more recently, DeSalvo and colleagues conducted a systemic review of all published studies between 1996 and 2003 that examined the association between general self-rated status and mortality. Based on a pooled analysis from the 22 cohort studies that met their eligibility criteria, they report relative risks of 1.25 for good SRHS, 1.39 for fair SRHS, and 1.92 for poor SRHS when compared to excellent SRHS.

The relationship between SRHS and other health conditions is not as well established. Benjamins and colleagues (2004), report that SRHS is predictive of disease-specific mortality, but not for accidents, after linking the United States National Health Interview Survey to the National Death Registry, and Idler and colleagues (2004), drawing on the United States National Health and Nutrition Examination Survey (NHANES), report that poor SRHS is predictive of mortality in the presence of a previously diagnosed chronic condition, but not without. In contrast, Burstrom and Fredlund (2001), using the Swedish Survey of Living Conditions, report that SRHS was predictive of mortality regardless of the presence of a chronic condition.

Other research has shown that the relationship between self-reported health status and mortality and other measures of health may vary by socioeconomic status (Burstrom and Fredlund 2001; Dowd and Zajacova 2007; Quesnel-Vallee 2007; Singh-Manoux et al. 2007) or by employment status (Kerkhofs and Lindeboom 1995). Quesnel-Valle (2007) argues that the differences in this relationship by socio-economic may be due to the underlying social safety net in that the differences seem to show a steeper gradient in the relationship between SRHS and mortality in the United States compared to other countries in her review. Burstrom and Fredlund (2001) also report a stronger relationship between self-reported health and mortality in individuals of high occupational standing compared to those of lower occupational standing. They attribute the differences in the relationship between occupational groupings to differences in the baseline risk of death between the categories (i.e., the relative risk changes among SES categories due to changes in the baseline risk, even though the absolute risk difference is similar across SES categories).

The mortality analysis conducted in Chapter 4 can be expanded to directly address the robustness of SRHS as a measure of mortality and whether this relationship varies by socioeconomic status in the PSID. When current SRHS is used as a regressor, the relative risk of poor self-reported health status on mortality is 9.7, for fair it is 3.3, for good it is 1.7 and, for very good it is 1.0.[80] Consistent with Burstrom's findings when the SRHS-mortality relationship is stratified by educational status the strength of this relationship is strongest in the high skilled (the relative risk for poor is 13.9, for fair is 4.29, for good is 2.4 and for very good 1.5) and weakest in the minimally skilled (the relative risk for poor is 4.0, for fair is 2.7, for good is 1.7 and for very

[80] Recall that I do not use current self-reported health status as a control variable in Chapter 4 as I want to enforce the temporal ordering between health status and labour force status in those models, however in this case current self-reported health status is the best measure.

good 1.3). In addition to Burnstrom's interpretation of why these risks may vary, this may also be due to differences in how SRHS is perceived across the spectrum of socio-economic status (Kerkhofs and Lindeboom 1995). These findings indicate that some caution should be applied in interpreting the differences in odds ratios across SES strata.

5.3.1.2: Modelling Self-reported Health Status

Self-reported health status has most often been dichotomised as an outcome variable into poor or fair versus good, very good, or excellent (based upon a five category variable). The dichotomising of self-reported health status into a binary variable has the potential to ignore health dynamics within the collapsed categories (i.e., movement between excellent to very good or good and between fair and poor). Indeed when year-to-year transitions in SRHS are examined in the study cohorts, the transitions between excellent, very good and good are the most common.

The ordered logit model, an extension of the standard logit model, enables the estimation of the probability of an individual being in a particular self-reported health state conditional on a set of observed characteristics and an additional set of threshold parameters which demarcate the logit probability density function into the underlying ordinal categories. From this, the odds ratio for a one unit change in any variable can be obtained.

The proportional odds assumption of the logit model also extends to the ordered logit model in that the odds ratio is not dependent on threshold parameters or covariate values in the model. The ordered logit model assumes that the odds ratio will be invariant across the ordinal categories. In other words, the odds ratio of being in a worse SRHS category will be the same irrespective of how SRHS is dichotomised (e.g., the odds ratio of being in poor health versus fair, good, very good or excellent health will be the same as the odds ratio of being in poor or fair health versus good, very good or excellent health and so forth).

To test the proportional odds assumption, the ordered logit results for the dynamic health model was compared with four sets of logit models that dichotomised self-reported health status across the four possible dichotomisations for each of the study cohorts (See appendix tables E1 to E3 for the results of these models).

There was a declining gradient in the estimated odds ratio as the dichotomisation moves up the ordinal scale, with the odds ratio of current unemployment compared to current employment ranging from between 1.7 (SLID), 2.4 (GSOEP) and 2.8 (PSID) for the poor versus fair or higher categorization to an odds ratio of 1.0 (PSID), 1.1 (GSOEP) and 1.1 (SLID) for the very good and lower versus excellent categorization. Of the three surveys, the SLID has the most similar odds ratio for current unemployment across the four logit models, but it is clear that for current unemployment the proportional odds assumption does not hold. Indeed, the ordinal logit odds ratio on unemployment is most similar to the poor, fair or good versus very good or excellent dichotomisation for the GSOEP and PSID and to the poor, fair, good or very good versus excellent for the SLID, suggesting that the ordinal logit specification would underestimate the odds of falling into the worst self-reported health statuses. Not all covariates in the model violated the proportional odds assumption, in particular, the log of household income and skill level tended to exhibit proportionality across the ordinal logit and four logit specifications.

While there are a number of extensions of the ordinal logit model that allow for the relaxation of the proportional odds assumptions,[81] this study focuses on the two middle dichotomisations of poor or fair versus good, very good (PF/GVGE) or excellent and poor, fair or good versus very good and excellent (PFG/VGE) in logit models. This is done for two reasons. First, the PF/GVGE and PFG/VGE self-reported health status specifications span the part of the SRHS distribution where most of the health dynamics take place. Second, the logit estimation framework enables one to attend to other statistical issues in a comparable and parsimonious manner across the three surveys (e.g., an individual-level random effect to account for within subject correlation).

5.3.2: Statistical Methods

5.3.2.1: Description of Data and Study Cohort

This chapter examines three labour status specifications: current unemployment, number of months unemployed in the year prior to the survey, and the interaction between current

[81] For example, extensions have been developed that relax the proportional odds assumption by modeling the threshold parameters as a function of the covariates or additional variables (Jones, Rice, Basho d'Uva, and Balia 2007; Rabe-Hesketh and Skrondal 2008). Other possibilities include the generalized ordered model (Williams 2006) that is similar to performing multiple logit models as I did above, but with constraints to reduce the number of parameters estimated and the stereotype logistic model (Long and Freese 2006) that is related to the multinomial logit model. While all these models are feasible with my data, they introduce an additional set of constraints or parameterization that may vary across the three datasets. Accordingly to maximize comparability and parsimony across the three datasets, I adopt the two logit dichotomizations describe above of self-reported health status.

unemployment and the receipt of unemployment benefits.[82] As the Canadian data only has a maximum of six years a cumulative labour force status measure is not developed for the SLID and this measure is not used in the SRHS analysis. For the unemployment and unemployment benefit interaction models, the receipt of unemployment benefits was also included as a separate indicator variable as this variable represented the receipt of unemployment benefits at any time during the survey year. Accordingly, the reference group is those employed at the time of the survey and who reported no unemployment benefits in that year. To test for differences among the two groups of unemployed and the employed reference group three separate Wald tests were conducted:

1. Unemployed, no benefits = Employed, no benefits

$$H_1: \beta_{\text{unemployed, no benefits}} = 0$$

2. Unemployed, benefits+ unemployment benefits = Employed, benefits

$$H_2: \beta_{\text{unemployed, benefits}} + \beta_{\text{unemployment benefits}} = 0$$

3. Unemployed, benefits + unemployment benefits = Unemployment, no benefits.

$$H_3: \beta_{\text{unemployed, benefits}} + \beta_{\text{unemployment benefits}} = \beta_{\text{unemployed, no benefits}}$$

The third test is a direct test of whether the unemployed in receipt of benefit are more likely to report better self-reported health status than the unemployed not in receipt of benefits.

5.3.2.2: Balanced Versus Unbalanced Cohort

A balanced design means that individuals are present for every wave of follow-up, while an unbalanced design implies that individuals do not need to be present for every survey wave, can drop out of the study and can have gaps across survey waves. This study adopts an unbalanced design, which enables individuals to enter and leave the study cohort in different years, but with the restriction that individuals have a minimum of three contiguous years of survey data at baseline and for every subsequent year of follow-up two contiguous years of data. The restriction ensures that individuals have a minimum number of years to be present across all labour force status and model specifications (i.e., for individuals to be included in models that look at number of months unemployed in the dynamic health specification three years of data are required for the GSOEP and PSID – t-1 for lagged health status, t0 for covariates, and t+1 for number of months unemployed in the previous year).

[82] Current unemployment and unemployment benefits are harmonized so that they refer to the same survey year.

In practise, given the sample construction of the three cohorts, the SLID cohort is closer to a balanced design, while the PSID and the GSOEP are more unbalanced. The SLID cohort has an average of 4.6 years of follow-up and 42% of individuals are present for a maximum of 6 years; by construction no individuals are present for the entire study period. The PSID cohort has an average of 10.8 years of follow-up and 40% are present for the entire study period and the GSOEP cohort has an average of 7.7 years of follow-up and 28% are present or the entire study period. Listwise deletion was used in the statistical models to ensure that all models, irrespective of measures used, had the same individuals and person years within study cohorts. For the German cohort, 738 (3.7%) members of the eligible cohort were excluded due to missing data yielding an analytic cohort of 19,029 individuals and 103,484 person years. For the Canadian cohort, 4,827 (6.9%) members of the eligible cohort were excluded due to missing data yielding an analytic cohort of 65,168 individuals and 217,530 person years, For the American cohort, 212 (2.2%) %) members of the eligible cohort were excluded due to missing data yielding an analytic cohort of 9545 individuals and 78,951 person years.[83]

5.3.2.3: Estimation Strategy

This study adopts the methodology outlined by Jones and colleagues (2007) to examine the dynamics of health in a longitudinal and panel data context. Two model specifications are examined – a static health model and a dynamic health model[84] – and random effects logit estimation is used to estimate the odds of a transition into poor health, conditional on a set of fixed effects, lagged health status variables (the dynamic health model only). In sensitivity testing, the survey design is accounted for with the inclusion of a second random effect at the level of the primary sampling unit in the PSID and GSOEP (see appendix tables E4 and E5).[85]

The static health model can be expressed as:

$$(1)\quad y_{it} = x_{it}\beta + z_{it}\gamma + w_{it}\lambda + \mu_i + \epsilon_{it}$$

[83] See Tables 3.3 to 3.5 for a more detailed development of the three cohorts.
[84] I do not use a statistical specification to account for the problem of initial conditions (i.e., that exposures and heath prior to the observation period confound the observed relationship) (Wooldridge 2005), rather I argue that the exclusions of cohort members not working at baseline or not in good health at baseline is an acceptable test of whether prior health and working history confounds the observed relationship.
[85] These models are very computationally intense given the large sample size and number of parameters. I was able to estimate these models for the PSID and SLID using a multi-core processor and STATA 10 MP. Even so, it took between four days to a week to estimate each model. I was not able to estimate the model with two random effects for the SLID cohort, given the processing limitations of the computers that housed the SLID data at the UBC Research Data Centre.

The model examines the relationship between the level of self-reported health status (y_{it}) and labour force status (x_{it}) conditional on a set of individual-level covariates (z_{it}), and region and year fixed effects (w_{it}), a random effect (μ_i) to account for correlation within individuals across waves and an idiosyncratic error term (ϵ_{it}). The model can be extended to included lagged health status, which can account for state dependence between health at time t0 and lagged health at t-1.

$$(2)\quad y_{it} = \delta y_{it-1} + x_{it}\beta + z_{it}\gamma + w_{it}\lambda + \mu_i + \epsilon_{it}$$

Where δ is the lagged health (y_{it-1}) coefficient, which can be viewed as the persistence of being in a particular health state between years and the effect of the fixed effects can be viewed as the likelihood of transitioning into the lower health state. The final model accounts for health selection through lagged health status, and unobservable heterogeneity (unexplained variance at the individual level) is dealt with through the random effect specification. These models are further supplemented, as was done in the mortality analysis, by excluding individuals whose baseline characteristics may indicate health selection or poor labour market outcomes prior to the start of follow-up. Random effects for region and year could also be parameterized, but for computational simplicity and given the large sample size relative to the number of fixed effect parameters to be estimated, the fixed effect formulation for region and year was used rather than the random effect formulation.

5.4: Results

5.4.1: Descriptive Statistics

5.4.1.1: Self-reported Health Status

There are noticeable differences in the distribution of self-reported health status by labour force status and by country at baseline (Figure 5.1). Germans report the lowest levels of excellent self-reported health status and highest levels of fair or poor self-reported health status compared to Canadians or Americans across both the employed and unemployed categories. The unemployed report lower self-reported health status compared to the employed in all countries. The proportion of unemployed and employed reporting poor or fair health was 23% and 13% in Germany, 11% and 6% in Canada and 17% and 9% in the United States. While the risk

difference ranged from 5% in Canada to 10% in Germany, the relative risks were similar (1.8 for Germany and Canada and 1.9 for the United States).[86]

5.4.1.2: Independent Variables

There are significant differences in the distribution of covariates by labour force status and by study cohort that may confound the unemployment and health relationship. Table 5.1 describes the baseline descriptive statistics of the German, Canadian, and American cohorts by current labour force status. The German and Canadian cohorts are older than the American cohort, particularly for the unemployed who are on average 13 and 10 years older in the German and Canadian cohorts, respectively, compared to the American cohort. Men make up a greater proportion of the unemployed (58%) in Canada compared to Germany and the United States (45%), while the proportion of the employed who are men is similar. Unemployed Americans are more likely to be single than their counterparts in Germany or Canada, while the distribution of marital status is similar. Blacks are the majority of the unemployed in the American cohort (65%) and almost half of the unemployed are East Germans (45%) in the German cohort. Household size is similar across cohorts, but Canadians and Americans report more children than Germans.

A larger proportion of the unemployed and those not working in the American and Canadian cohorts are minimum skilled (35%) compared to the German cohort (19%). The high skilled comprise a larger proportion of the employed in Germany (29%) and the Unites States (24%) compared to Canada (19%), whereas they are equally represented in the unemployed in Germany (11%) and Canada (10%), and less so in the United States (7%). Employed Germans are more likely to be of the professional and technical occupations than Canadians and Americans, while services and sales occupations are more represented in Canada and the United States.[87]

The unemployed report about 60% of the household income of the employed in the German and Canadian cohorts, while the unemployed report half of the household income of the employed in the American cohort. The proportion of current unemployed who report receiving any

[86] The difference in the underlying distribution points to the inherent subjectivity of the SRHS measure which may vary by cultural context and implies that comparing average levels of SRHS across countries may not be appropriate.
[87] The occupational classification used here appears to more accurately capture the variation in the occupational structure among the three countries than in the mortality study.

unemployment compensation is 73% in Germany, 52% in Canada[88], and 17% in United States. Average public transfers as a proportion of total household income was similar for the unemployed in Canada (31%) and Germany (33%), but smaller in the United States (17%). Unemployment compensation was a larger component of public transfers in Germany compared to Canada.

Table 5.2 describes the relationship between months unemployed in the year previous to the survey and to demographic, other unemployment measures, and income and transfers across all survey years. The proportion of individuals with any unemployment is similar across cohorts, but slightly lower in Canada (9.3%), and Germany (10.3%) compared to the United States (12%).[89] The pattern of more months of unemployment in Germany, but a higher level of coverage and more generous public transfers compared to the United States was observed in the mortality study. Here Canada emerges as a middle case (Figures 5.2-5.5). The unemployed in Canada are less likely to report short term unemployment (zero to three months), but more likely to report being unemployed for the entire year than Americans, while the converse is true with Germans. In particular, the German unemployed (31%) are much more likely than the Canadian (15%) or American (9%) unemployed to be unemployed for the entire year (Figure 5.2). Overall the average number of months unemployed is 7.1, 5.2 and 4.5 months for the German, Canadian, and American cohorts, respectively.

Unemployed Canadians are more likely to report receiving unemployment compensation across all unemployment-month profiles than Americans, with the proportion receiving benefits peaking at over 60% between months three to eight. In contrast, unemployment benefit coverage averages over 80% across all months unemployed in the German cohort, and never reaches 40% in the American cohort. Notably, Canadians (20%) and Americans (13%) unemployed for the entire year both report low likelihoods of receiving benefits (Figure 5.3).[90] Canadians and Germans also report similar declines in average household income compared to the continuously employed with this proportion being between 70% and 80% for one to eleven months, but declining to 54% for Canadians unemployed the entire year (Figure 5.4). For Americans there is

[88] Canada's employment insurance system also provides maternity and seasonal fishers benefits, so this proportion is likely overstated.
[89] These percentages are higher for the American and German SRHS cohorts compared to the cohort from the mortality analysis. The SRHS German cohort spans the period when Germany had a level of higher level of unemployment and excludes the 1980s when it had a lower period. Similarly the American cohort excludes the late 1990s during which the United States had low levels of unemployment.
[90] These coverage rates are similar to those presented from population-based labour force surveys in Chapter 2 (see figure 2.1).

a larger immediate drop in household income and then a gradual decline such that the household income of those unemployed for the entire year is only 42% of the household income of the continuously employed.[91] As the duration of unemployment increases, unemployment benefits represent an increasing share of household income for the unemployed in Germany rising to 40% for those unemployed for 12 months. Unemployment benefits are never more than 20% or 10% household income in Canada and the United States.

5.4.2: Multivariate Results

Multivariate results were estimated for both the static and dynamic health models and across the two formulations of SRHS. Overall the results for the labour force status variables are similar for the static and dynamic health models within each country (Tables 5.3 and 5.4). [92] The goodness-of-fit statistics – the AIC and BIC – indicate that the dynamic health model is the superior specification and accounts for much of the unexplained variance at the individual level. Similarly, the goodness-of-fit statistics indicate that the empirical specification (i.e., the choice of independent variables and their functional form) better explains variation in the PF/GVGE dichotomization of SRHS compared to the PFG/VGE dichotomization. Accordingly, the results are presented for dynamic health models and the PF/GVGE dichotomization of SRHS. Results from the other specifications are only presented where they differ from the dynamic health or PF/GVGE dichotomization. Complete results on the PFG/VGE dichotomization, however, can be found in the appendix to this chapter (Tables E6 to E14).

5.4.3: Full Cohort

5.4.3.1: Current Labour Force Status

Current unemployment is associated with higher odds of fair or poor SRHS in all three cohorts in both the static and dynamic health models (Table 5.3). The odds ratio of fair or poor SRHS is 1.9 (95% CI: 1.7-2.1) for the static model and 1.7 (95% CI: 1.5-1.9) for the dynamic health model in the German cohort, 1.9 (95% CI: 1.7-2.2) and 1.5 (95% CI: 1.4-1.9) in the Canadian cohort, and 1.8 (95% CI: 1.6-2.0) and 1.7 (95% CI: 1.5-1.9) in the American cohort.

[91] The results are similar if median measures of household income are used.
[92] This is not the case for all the variables in the model. In particular there is large attenuation in the household income and education variables across the static and dynamic health specifications. Unlike the labour force status variables, these variables have a greater stability across years (education status can be considered a fixed effect even though I do not restrict it to be the same across waves) and are more highly correlated with prior health status than the labour force status variables.

When the good, fair or poor SRHS specification is examined there is also an association between unemployment and worse SRHS across both the static and dynamic health models in all three countries (Table 5.4). The odds ratio of good, fair or poor SRHS is 1.3 (95% CI: 1.3-1.4) for the static model and 1.2 (95% CI: 1.1-1.4) for the health dynamic model in the German cohort, 1.4 (95% CI:1.3-1.5) and 1.3 (95% CI:1.2-1.4) in the Canadian cohort, and 1.2 (95%CI:1.1-1.4) and 1.2 (95% CI:1.1-1.3) in the American cohort.

5.4.3.2: Results for the Other Variables

The results of the other covariates from the final dynamic health model are summarized for SRHS dichotomized as PF/GVGE (Table 5.3) as follows:

In all three countries age is negatively related to worse SRHS, while age squared is positively related, yielding a convex relationship in the odds by age. Being a man is protective (OR 0.87) in the German cohort, while there was no relationship by gender in the Canadian and American cohorts. Black (OR 2.9) and other (OR 1.8) ethnicities are associated with greater odds of reporting worse SRHS in the American cohort. Being single (OR 1.2) in the Canadian cohort or being divorced or separated in the Canadian (OR 1.2) or German (OR 1.3) cohorts is associated with a higher odds compared to being married. There is no association by marital status in the American cohort. Being a spouse is protective in the Canadian (OR 0.8) and American (OR 0.8) cohort, but not in the German cohort. Household size is negatively associated with poor SRHS (GSOEP (G): OR 1.03; SLID (S): OR 1.04; PSID (P): OR 1.05), while number of children is protective (G: OR 0.9; S: OR 0.8; P: OR 0.9).

The log of household income is associated with worse health status in all three countries (G: OR 0.8; S: OR 0.9; P: OR 0.8). There is a consistent gradient in the odds of reporting worse SRHS by educational status, with a steeper gradient in the American cohort. The odds ratio for the minimum skilled are 1.6, 2.1 and 7.2 for the German, Canadian and American cohorts, respectively, while for the medium skilled they are 1.2, 1.4 and 2.6 compared to the high skilled. The relationship by occupation varies across the three cohorts. Those with no occupation have higher odds (G: OR 1.5; S: OR 1.5; P: OR 2.4) in all three cohorts compared to managers. Sales and services (S: OR 1.3; P: OR 1.5), skilled trades (S: OR 1.2; P: OR 1.3), equipment operators (S: OR 1.2; P: OR 1.5), and labourers (S: OR 1.2; P: OR 1.4) have higher odds in the Canadian and American cohort, while higher odds are found for professionals (OR 1.1) in the Canadian cohort and clerks (OR 1.2) in the American cohort. Both disability status (G: OR 3.1; S: OR 3.7;

P: OR 2.7) and lagged fair or poor SRHS (G: OR 3.4; S: OR 7.5; P: OR 2.8) are associated with higher odds in all three countries.

5.4.3.3: Receipt of Unemployment Compensation

The unemployed not in receipt of unemployment benefits report a similar odds ratio for being in poor or fair SRHS across the three cohorts, but there are marked differences in the odds ratio for the unemployed who received unemployment benefits (Table 5.5). There is no statistically significant difference in the odds ratio in the German cohort (unemployed with benefits (UB): OR 1.7 95% CI: 1.4-2.1; unemployed without benefits (UNB): OR 1.9 95% CI: 1.7-2.1) or the Canadian cohort (UB: OR 1.7 95% CI: 1.5-1.9; UNB: OR 1.5 95% CI: 1.3-1.7) for the unemployed who received benefits and those who did not. In the American cohort the unemployed who did not receive benefits are more likely to report worse SRHS than both the unemployed who received benefits and the employed reference group (UB: OR 1.0 95% CI: 0.7-1.3; UNB: OR 1.9 95% CI: 1.7-2.2). This pattern is consistent in the PFG/VGE formulation of SRHS except that the difference between the unemployed who received benefits and those that did not approaches statistical significance (UB: OR 1.3 95% CI: 1.2-1.4; UNB: OR 1.4 95% CI: 1.3-1.6; χ^2 (1) test of UB vs. UNB: 3.10; *prob* > χ^2: 0.08) in the Canadian cohort (Table 5.6).

5.4.3.4: Months Unemployed

Each additional month of unemployment is associated with a 1.08 odds ratio of worse SRHS in the German cohort and a 1.04 odds ratio of worse SRHS in the Canadian and American cohorts (Table 5.5). Evaluated at the average months of unemployment (G: 7.1, S: 5.2, P: 4.5) these odds ratios reflect a 1.7 (95% CI: 1.6-1.8), 1.2 (95% CI: 1.2-1.3) and 1.2 (95% CI: 1.2-1.3) increased risk of being in worse SRHS for the German, Canadian and American cohorts respectively. The German and Canadian cohort had a similar risk of 1.03 in the PFG/VGE formulation, but there was no increased risk for the American cohort.

5.4.3.5: Exclusions

The results from the sub cohorts based on excluding either those in poor health at baseline or those not working (Tables 5.7 & 5.8) are consistent with and of similar magnitude to those from the full cohort, across all three labour status measures and county cohorts.

5.4.4: Gender-stratified Results

Unemployed men and women have similar odds ratio of being in worse SRHS in the German cohort (men (M): OR 1.6 95% CI: 1.3-1.9; women (W): OR 1.7 95% CI 1.5-1.9), but men have higher odds in the Canadian (M: OR 1.7 95% CI: 1.5-1.9; W: OR:1.3 95%C I 1.1-1.5) and American (M: OR 2.0 95% CI: 1.7-2.4; W: OR 1.5 95 %CI 1.3-1.7) cohorts (Tables 5.9 and 5.10). In the unemployment benefit interaction models, the interaction is significant for both men (UB: OR: 1.0 95% CI: 0.6-1.5; UNB OR: 1.4 95% CI: 1.9-2.9) and women (UB OR: 1.0 95% CI: 0.6-1.5; UNB OR: 1.6 95% CI: 1.4-1.9) in the American cohort. Notably, the unemployment benefit interaction reaches statistical significance in the PFG/VGE formulation for SRHS for both the German and Canadian men, but in different directions (appendix table E6). Unemployed men in receipt of benefits have a higher odds ratio compared to those without in the German cohort (UB: OR 1.4 95% CI: 1.2-1.6; UNB: OR 1.0 95% CI: 0.8-2.3), and unemployed men in receipt of benefits have a lower odds ratio compared to those without in the Canadian cohort (UB: OR: 1.3 95% CI: 1.2-1.5; UNB OR: 1.6 95% CI: 1.4-1.8). The odds of being in worse health of each additional month of unemployment are similar for men and women, with the odds being slightly smaller for women across all countries.

5.4.5: Education-stratified Results

Minimum- and medium-skilled unemployed individuals have increased odds of worse self-reported health status across all three countries, with the odds being similar in the German (minimum skilled (Min): OR 2.0 95%CI: 1.6-2.4; medium skilled (Med): OR 1.7 95 CI%: 1.5-1.9) and American (Min: OR 1.8 95% CI: 1.4-2.1; Med: OR 1.8 95 CI%: 1.5-2.1) cohorts and smaller in the Canadian cohort (Min: OR 1.6 95% CI: 1.3-2.8; Med: OR 1.4 95 CI% :1.2-1.6) (Tables 5.11, 5.12 and 5.13). There is no association between unemployment and worse SRHS for the high skilled in the German (OR 1.2 95% CI: 0.9-1.6) and American (OR 0.9 95% CI: 0.5-1.6) cohorts, but the odds ratio is larger for unemployed high-skilled Canadians (OR 1.8 95% CI: 1.3-2.6) compared to unemployed Canadians of lower skill levels.

The unemployment-benefit interaction is significant for unemployed minimum skilled (UB: OR 0.7 95% CI: 0.4-1.2; UNB: OR 2.0 95% CI: 1.6-2.4) and medium skilled (UB: OR 1.2 95% CI: 0.8-1.7; UNB: OR 2.0 95% CI: 1.6-2.4) Americans and not for the high skilled (UB: OR 0.6 95% CI: 0.2-1.9; UNB: OR 1.0 95% CI: 0.6-2.0). The interaction is not statistically significant at any skill level for the German and Canadian cohort, but the unemployed minimum-skilled (UB:

OR 2.4 95% CI: 1.9-3.1; UNB: OR 1.8 95% CI: 1.2-2.5) Germans and high-skilled (UB: OR 2.3 95% CI: 1.4-3.8; UNB: OR 1.6 95% CI: 1.0-2.6) Canadians in receipt of benefits had higher odds ratios than their counterparts who did not receive benefits. Conversely, unemployed minimum skilled (UB: OR 1.5 95% CI: 1.2-1.8; UNB: OR 1.8 95% CI: 1.4-2.2) and medium-skilled (UB: OR 1.3 95% CI: 1.1-2.6; UNB: OR 1.6 95% CI: 1.3-2.0) Canadians who did not receive benefits had higher odds ratios than those who received benefits.

The odds ratio for number of months unemployed was 1.08 for minimum- and medium-skilled Germans and 1.04 for high-skilled Germans, for minimum-, medium- and high-skilled Canadians, and minimum- and medium-skilled Americans. There was no association for high-skilled Americans.

5.4.6: Country-specific Analyses

In the East and West German stratified analysis, both East and West Germans have increased odds of worse SRHS for current unemployment (East German (EG): OR 1.5 95% CI: 1.3-1.8; West German (WG): OR 1.8 95CI: 1.6-2.1) and similar odds ratio for number of months unemployed (EG: OR 1.07 95%CI: 1.05-1.09;WG: OR 1.08 95% CI:1.07-1.10) (Table 5.14). The unemployment benefit interaction is statistically significant in the West German cohort only (UB: OR 2.1 95% CI: 1.8-2.4; UNB: OR 1.6 95% CI: 1.3-2.0). The ordering of the odds ratio is switched for the East German cohort (UB: OR 1.6 95% CI: 1.4-2.0; UNB: OR 1.8 95% CI: 1.3-2.5), but not statistically significant.

Black and whites or other ethnicities have identical odds ratios for current unemployment (blacks (B): OR 1.8 95% CI: 1.5-2.1; white or other (W/O): OR 1.8 95% CI: 1.4-2.2) in the American race stratified analysis (Table 5.15). The unemployment benefit interaction models for blacks (UB: OR 1.0 95% CI: 0.7-1.6; UNB: OR 1.9 95% CI: 1.6-2.2) is also similar in magnitude to white or other (UB: OR 1.0 95% CI: 0.7-1.5; UNB: OR 2.2 95% CI: 1.7-2.7). Number of months unemployed was statistically significant for blacks only (OR 1.05 95% CI: 1.03-1.07).

5.5: Discussion

Unemployment is associated with worse self-reported health status in all the study countries (Figure 5.6). This association is found for both men and women, although the strength of the association is higher in Canada and the United States for men. In Germany and the United States, the unemployed minimum and medium skilled have the highest odds, respectively, while in

Canada it is the high skilled. There is no association for the unemployed high skilled in the United States.

There is marked effect modification in the relationship between unemployment and self-reported health status by the receipt of unemployment benefits (Figure 5.7). In Germany, the unemployed in receipt of benefits have a higher odds of poor SRHS than those not in receipt of benefits, but this difference is not statistically significant. In Canada and the United States the ordering of the odds is reversed; the unemployed who received benefits have lower odds than those who do not receive benefits. This difference is large and statistically significant in the United States and more modest in Canada, where it is only approaches statistical significance in a few models. The relationship between months unemployed and SRHS is highest in Germany; the odds ratio is similar in Canada and the United States except for the high skilled for whom there is no relationship in the Unites States. Overall the results are robust to the alternative specification of SRHS, the exclusion of those in poor health or not working at baseline, and by country-specific stratifications.

5.5.1: Assessment of Study Hypotheses

The study provides mixed evidence, unlike the mortality study, for the hypothesis that the effect of unemployment on health is less in Germany compared to Canada and the United States. The odds ratio of worse SRHS is similar across all three countries for current unemployment and for months unemployed it is higher in Germany than in the two LME countries. The institutional environment in Germany and, in particular, the high levels of unemployment protection is focused on mitigating the material consequences of unemployment. This study found that the unemployed in Germany are more likely to be unemployed longer than the unemployed in the Canada and the United States (Figure 5.2), but that their household income declined less and that they received higher levels unemployment benefits and other public transfers (Figure 5.4 and Table 5.2).

Unemployment in Germany is more likely to be structural and the long-term unemployed face the risk of permanent exclusion from the labour market given that their skills may not be transferable to other firms or industries. Long-term unemployment may affect health through the psychosocial pathway (see Figure 2.2) in that it may represent the loss of personal and social identity and a decline in social status and the institutional environment may not be as effective in reducing the effects of this pathway on health. Support for this interpretation is found in other

studies that have examined the effect of unemployment on subjective measures of health or life-satisfaction in Germany. Clark (2001) found that both recent and persistent unemployment is associated with declines in overall life satisfaction for Germany, the United Kingdom and other European countries (Clark 2006).[93] Romeu Gordo (2006), using pooled GSOEP data from 1984 to 2001, also finds that long durations of unemployment have a greater negative effect on health satisfaction compared to short-term episodes of unemployment in Germany.

The expected effect modification by skill level is found in the United States. Germany has results that are consistent with the United States, while in Canada the unemployed high skilled have the highest risk of poor SRHS. The elevated risk for the high skilled in Canada may be due to a low baseline risk for the employed high skilled in Canada (the high skilled in Canada report much lower levels of fair and poor SRHS compared to the other skill groups), but it may also represent real differences across the countries in how unemployment affects health. In Canada, the high skilled do not have same relative income advantage, compared to the minimum and medium skilled as they have in the United States and Germany. Indeed, the difference in average labour income between the three skill groups is less in Canada compared to the other two countries.

The unemployed high skilled in Germany appear to be better off than their lower skilled counterparts. In the mortality analysis, once the East Germans were excluded there was no association between unemployment and mortality for any skill level, while in contrast the SRHS analysis found a strong association between unemployment and SRHS for the minimum and medium skilled. The SRHS cohort, however, draws upon later years of the GSOEP (the cohort intake was 1994 to 2003 in the SRHS study compared to 1984 to 1995 in the mortality study), and in the later years of the study a greater proportion of the German cohort had high-skill qualifications compared to medium-skilled qualifications. One explanation for the difference in the education-stratified findings across the two studies is that the returns to high-skilled education may have changed in Germany over the time periods of the two studies. Further, during the period of the 1990s the unemployment rate increased in Germany. In the SRHS cohort this increase was largely borne by the minimum and medium skilled, while the unemployment rate of the high skilled stayed constant. These descriptive findings indicate that the occupation-

[93] Life satisfaction, while not a direct measure of health, is correlated with measures of affect and mental well-being (Clark and Etile 2002).

skill nexus in Germany may be shifting over time, suggesting that effect modification of education on the health of the unemployed may also have changed.[94]

The receipt of unemployment compensation mediated the effect of unemployment on SRHS entirely in the United States and partially in Canada, while in Germany there is an elevated, but not statistically significant, difference for the unemployed who received compensation. The findings in the United States and Canada are consistent with the hypothesis that unemployment compensation will mediate the unemployment and health relationship, although the findings in Germany, again, diverge from this hypothesis. In understanding the effect of unemployment compensation on the health of the unemployed both within and across countries, consideration needs to be given to whether the receipt of unemployment is a marker for other health vulnerabilities, or whether it a mechanism through which the unemployment-health relationship is directly mediated.

In Germany, most of the unemployed receive unemployment compensation or unemployment - related social assistance, especially the long-term unemployed (Figure 5.3), while in the United States and Canada only those who meet hours or earnings requirements receive unemployment compensation. In these countries, unemployment benefits are for workers who have a strong and recent labour market attachment.[95]

The unemployed in the United States who receive unemployment insurance are different than those who do not. They are unemployed for fewer months, have higher current year labour and household income, are more likely to be of higher educational status, and are less likely to have been unemployed in the previous year compared to those who do not receive unemployment benefits. Canada is similar to the United States, except that the differences between the two groups of unemployed are smaller. In contrast, the main difference between these two groups in Germany is that the unemployed who receive benefits are more likely to be unemployed for more months. These material indicators are consistent with the findings that effect modification of the receipt of unemployment compensation is different for CME and LME countries.

[94] I also cannot rule out that how education is measured in the GSOEP has changed over time, which may mean that between the mortality and SRHS studies I have differential classification of education.
[95] Human Resources and Development Canada explicitly notes that Employment Insurance is not designed to provide income support for new labour force entrants or the long-term unemployed. HRDC's perspective can be found at http://www.hrsdc.gc.ca/eng/cs/sp/hrsd/prc/publications/research/1998-000128/page02.shtml.

Findings this thesis are not consistent with the one other study that has examined the effect of unemployment compensation on the health of the unemployed in Germany and the United States (Rodriguez 2001). She found smaller effect modification in the United States for the receipt of unemployment compensation and a different pattern of effect modification for Germany (the unemployed receiving unemployed insurance benefits had a lower risk of worse health satisfaction, while the unemployed receiving unemployment assistance or social assistance had higher risks). In sensitivity testing overall unemployment compensation was decomposed into its two component parts for the German cohort and separate interaction variables were created, one for the receipt of unemployment insurance compensation and the other for unemployment assistance. Models that included both interaction variables gave similar results for both interactions (i.e., there was no evidence that there was a difference in effect modification by type of unemployment benefit in Germany). These results may differ from the earlier German study as a different cohort specification, a different health measure (self-reported health status instead of health satisfaction) and a different statistical model (random effects logit) is used.

This study, while controlling for household income, labour force attachment (in the working at baseline exclusions) and stratifying by educational status, is not able to disentangle whether unemployment compensation in the United States and Canada is a marker for a composite set of characteristics that buffer the effect of unemployment on health, or whether unemployment compensation directly mediates this relationship. It is likely both. Unemployment compensation is provided to the unemployed who are already advantaged compared to those who do not receive it. In Canada and the United States, the current eligibility requirements for unemployment compensation may increase health disparities within the unemployed as the most vulnerable unemployed are the ones who do not receive it. This interpretation is consistent the study by Gangl (2004) on the effect of unemployment compensation on reducing labour market scarring in the United States (see section 2.3.3). He found that extending unemployment compensation in the United States to those currently not eligible would be more effective in reducing post-unemployment earnings losses than in Germany, where other forms of social assistance are available.

5.5.2: Is Canada a Middle Case?

Canada is a LME country with slightly higher levels of employment and unemployment protection than the United States. The social safety net in Canada is also more generous (see

section 2.2.2) and health care insurance is universally provided, while in the United States health care insurance is largely dependent on employment for workers. But are these differences enough to mediate the unemployment and health relationship in Canada, but not in the United States? Descriptively, the unemployed in Canada share characteristics with both the German and American unemployed. Canada has higher unemployment compensation coverage of the unemployed (Figure 5.3) and their household income does not decline as precipitously compared to those in the United States (Figure 5.4). Indeed, save for the long-term unemployed (those unemployed for the entire year), the unemployed in Canada do not appear that much worse off than their German counterparts on these material indicators. The long-term unemployed appear to be as disadvantaged as their American counterparts and the unemployed are more likely to be long-term unemployed in Canada (Figure 5.2). This suggests that the institutional environment in Canada may be more effective in mediating the material pathway for the short-term unemployed than in United States, but unlike Germany not for long-term unemployed.

The odds ratio of poor and fair SRHS for current unemployment is generally lower in Canada compared to both Germany and United States except for the high skilled. The receipt of unemployment compensation mediates the unemployment-health relationship in both Canada and the United States, but the effect modification is less in Canada. Notably, the difference in household income between the unemployed who receive unemployment compensation and those who do not is less in Canada than in the United States. Unemployed Canadians have lower odds ratio for months unemployed than the German unemployed, which suggests that long-term unemployment has a greater effect on the health of the unemployed in Germany.

5.5.3: Strengths and Limitations

The strengths and limitations outlined in the mortality study also apply here: the comparability of the measures and methods and the longitudinal nature of study and attention to health selection are strengths, while the potential for differences in measures, differential attrition, and residual or unmeasured confounding are also limitations of this study. There are a few additional limitations particular to this study. There are differences in sample period and follow-up (i.e., the American cohort was drawn from a time period just before that of the German and Canadian cohorts and the SLID follows individuals for only six years). There may also have been differential measurement error in the unemployment compensation variable across the three surveys. For example, the SLID had a more reliable measure of unemployment compensation compared to the

PSID and GSOEP as the amount of unemployment compensation came directly from tax records for most individuals. On the other hand, the SLID unemployment compensation measure may also have been a less valid measure as receipt of other employment benefits (e.g., maternity and seasonal benefits) were comingled with it.[96] SRHS is a subjective measure and there may be additional unaccounted societal and cultural factors that may also have affected the unemployment and health relationship within countries.

5.6: Conclusion

The principal finding from this study is that unemployment negatively affects the SRHS of the unemployed across all three countries and institutional environments, but the risk is concentrated among different groups of workers. In Canada and the United States, it is the unemployed who do not receive unemployment benefits, while in Germany it is the long-term unemployed that face the highest risk. This is consistent with the VOC framework that specifies that the risk of and type of unemployed differs across institutional environments. This finding indicates that the action needed to improve the health of unemployed in CMEs may be different than in LMEs. In LMEs, direct income and material support for the unemployed is required. This study, like the mortality study, also indicates a greater disadvantage for those at the bottom of socio-economic hierarchy, especially in the United States. In these countries the material pathway between unemployment and health appears to be most important. In CME countries, it is the potential for long-term or permanent exclusion from employment that presents the greatest challenge; in these countries it the psychosocial pathway that may dominate. Active labour market policies that encourage the successful reintegration of the long-term unemployed into employment may be effective in reducing the effect of health on unemployment.

[96] While I was able to distinguish between unemployment and being out of the labour force due to seasonal work stoppage or maternity leave, I was not able remove income that the unemployed may have received because of these other employment related benefits. This likely overstated the amount of unemployment compensation for some people.

Figures and Tables

Figure 5.1 Self-reported health status at baseline by labour force status for Germany, Canada and the United States

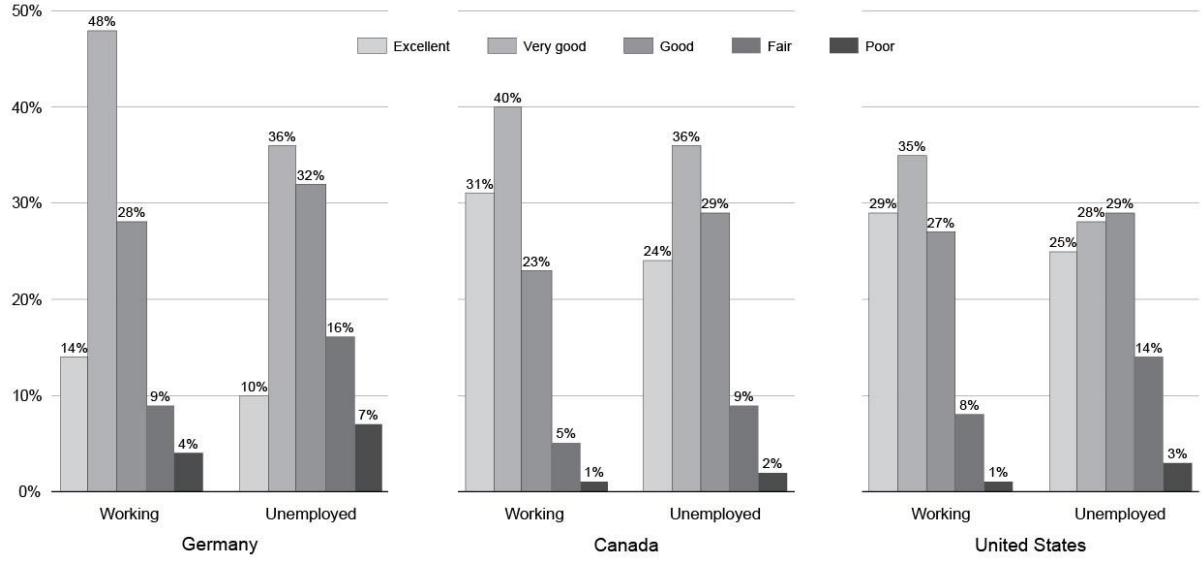


Figure 5.2: Proportion of unemployment by months unemployed for Germany (1994-2005), Canada (1996-2005) and the United States (1984-1997)

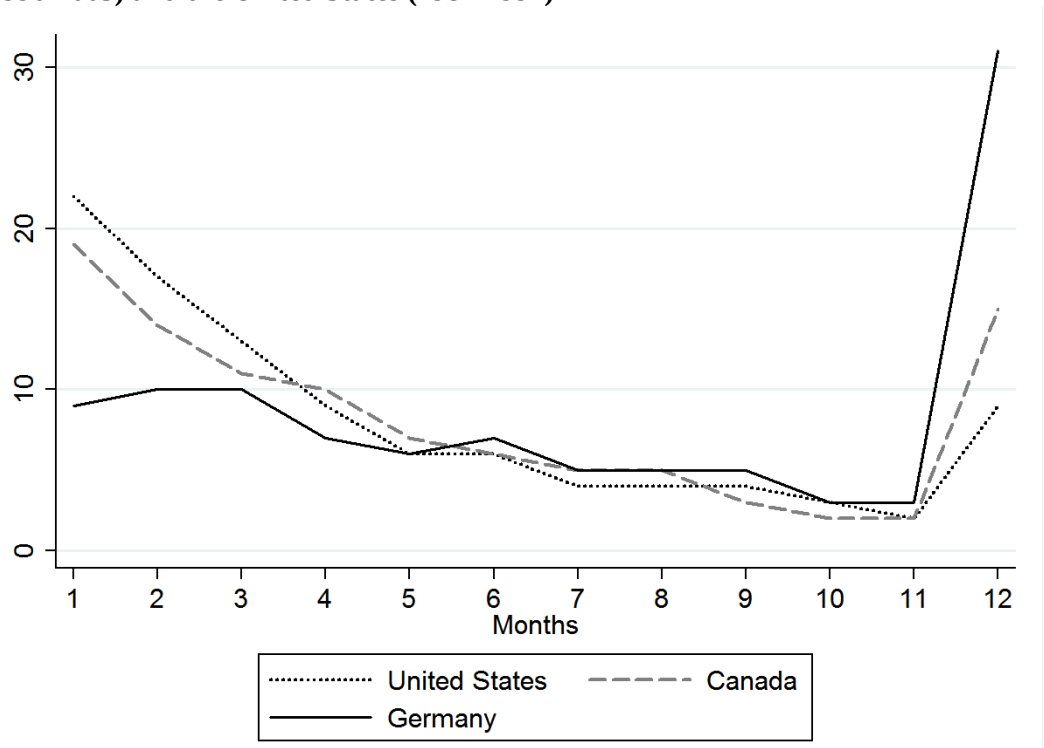


Figure 5.3: Percent of individuals in receipt of unemployment compensation by months unemployed for Germany (1994-2005), Canada (1996-2005) and the United States (1984-1997)

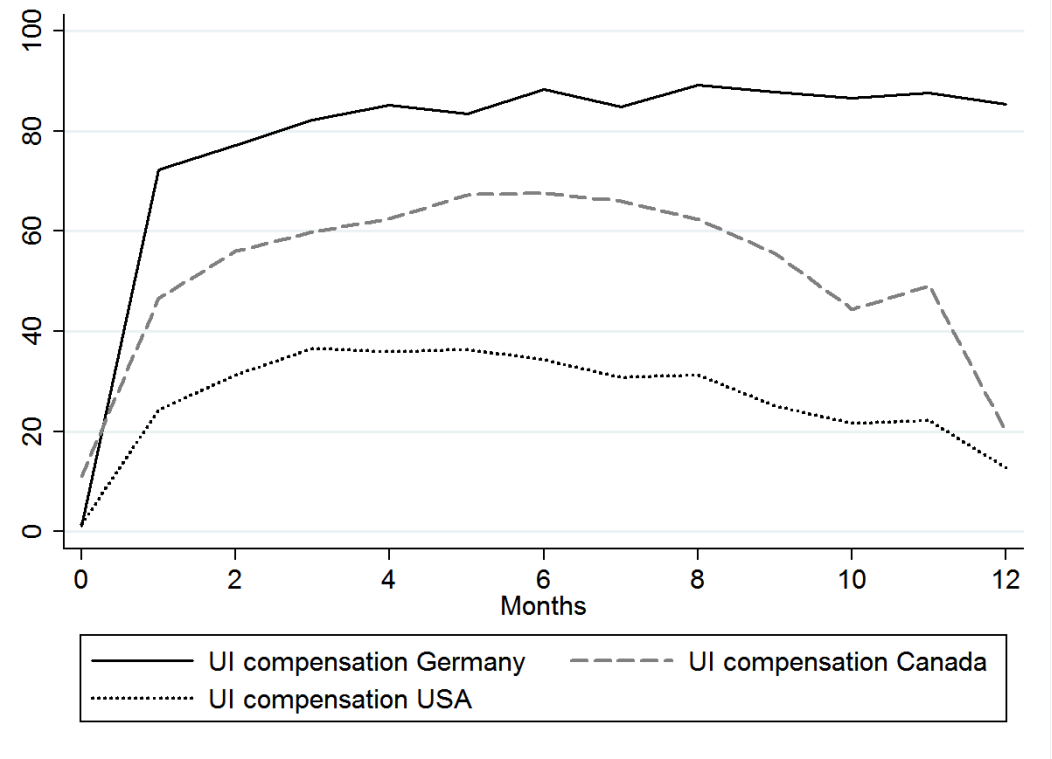


Figure 5.4: Ratio of household income of the unemployed to the continuously employed by months unemployed for Germany (1994-2005), Canada (1996-2005) and the United States (1984-1997)

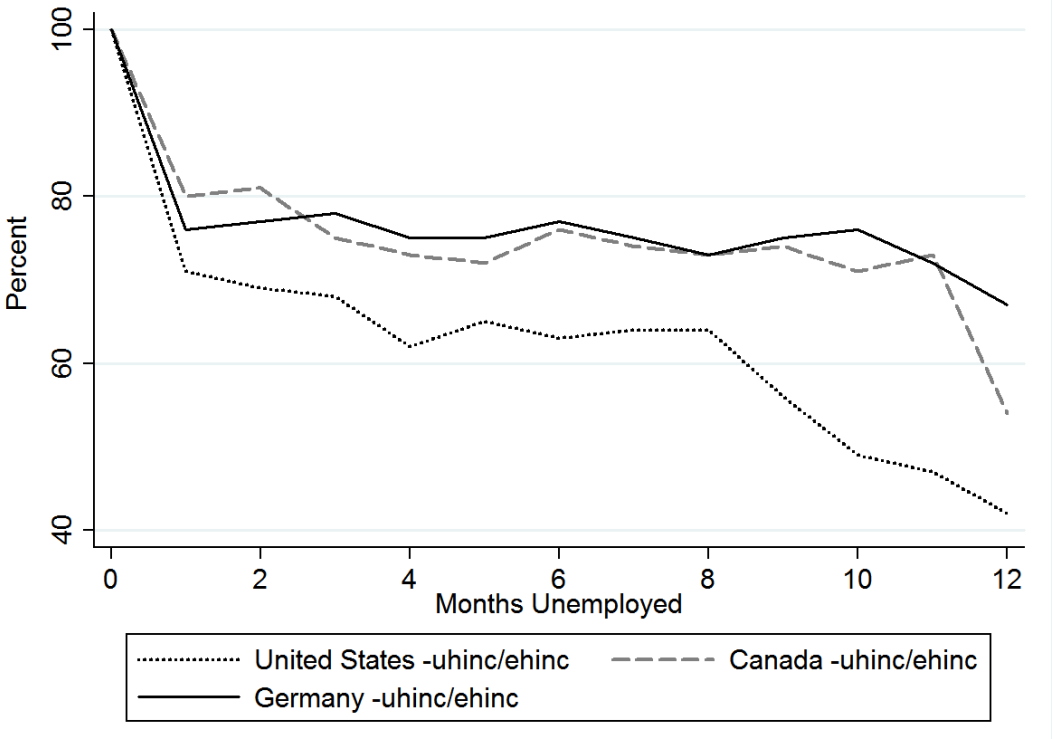
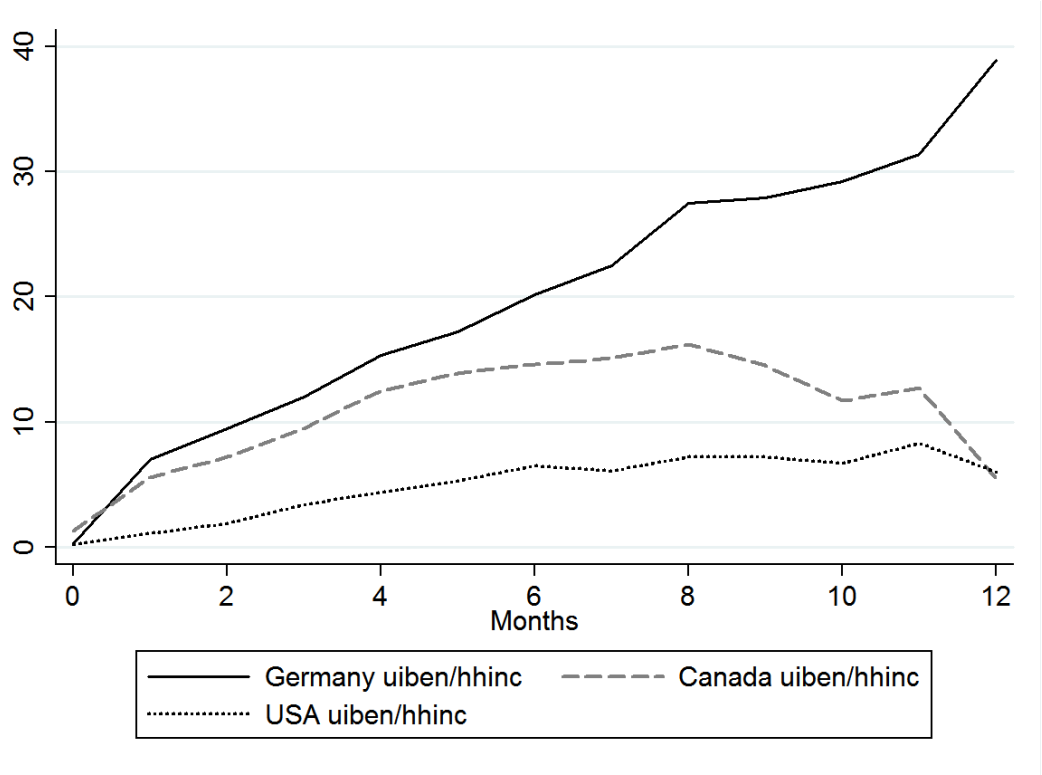


Figure 5.5: Ratio of unemployment compensation to unemployed household income by months unemployed for Germany (1994-2005), Canada (1996-2005) and the United States (1984-1997)



Uiben/hhinc refers proportion to household income of the unemployed that is derived from unemployment compensation.

Figure 5.6: Summary of the odds ratios of being in poor or fair health to those currently unemployed in Germany, Canada and the United States

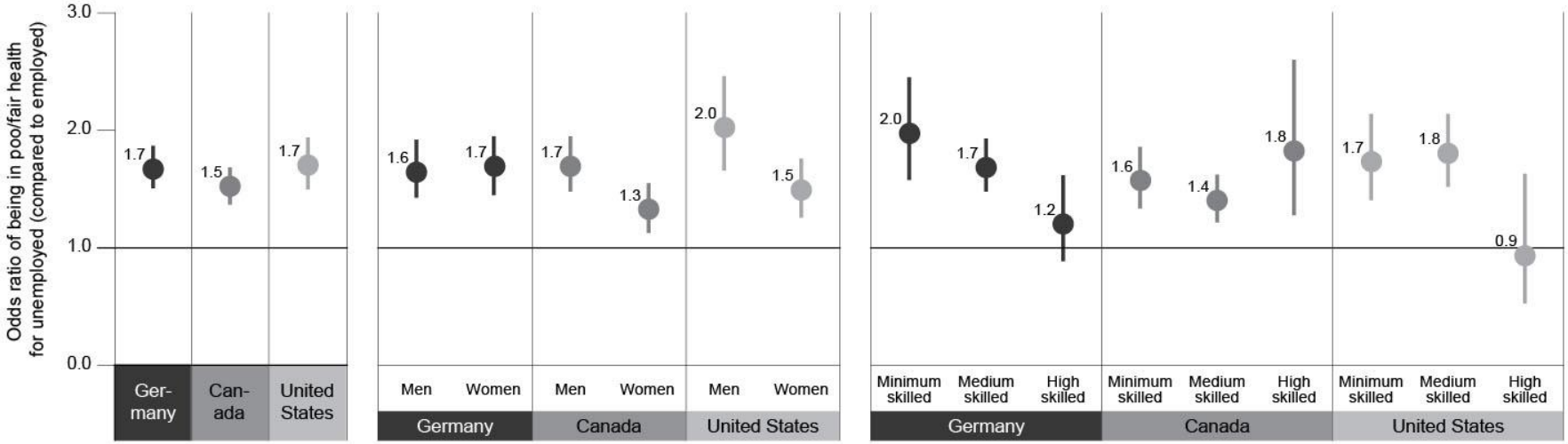


Figure 5.7: Summary of the odds ratios of being in poor or fair health for the currently unemployed, by receipt of unemployment benefits for Germany, Canada and the United States

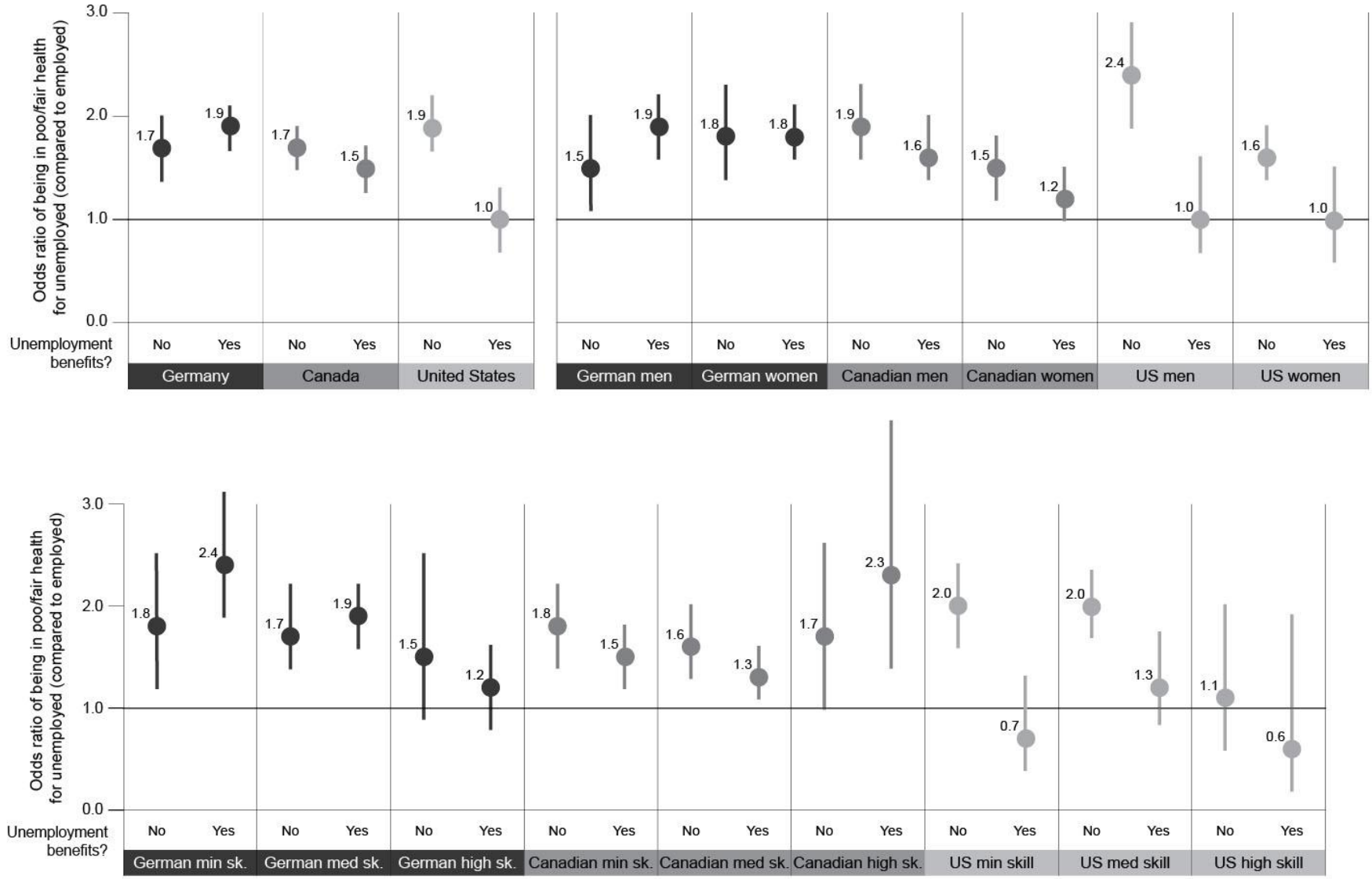


Table 5.1: Descriptive statistics, by study cohort and labour force status

	Germany (Baseline: 1994-2003)			Canada (Baseline: 1996-2003)			United States (Baseline: 1984-1995)		
	Working	Unemployed	Not Working	Working	Unemployed	Not Working	Working	Unemployed	Not Working
Sample Size (%)	13,965	1,258	3,811	48,727	2,120	16,394	6,726	796	2,020
	(73.4)	(6.7)	(20.0)	(72.5)	(3.2)	(24.4)	(70.5)	(7.0)	(21.5)
				Health status measures					
Excellent SRHS	0.14	0.10	0.10	0.31	0.24	0.21	0.29	0.25	0.18
Very Good SRHS	0.48	0.36	0.38	0.40	0.36	0.32	0.35	0.28	0.23
Good SRHS	0.28	0.32	0.32	0.23	0.29	0.25	0.27	0.29	0.27
Fair SRHS	0.09	0.16	0.15	0.05	0.09	0.14	0.08	0.14	0.21
Poor SRHS	0.01	0.05	0.05	0.01	0.02	0.09	0.01	0.03	0.11
Disabled	0.04	0.07	0.15	0.11	0.18	0.30	0.08	0.15	0.33
				Demographics					
Age	40.0	42.6	46.0	41.2	40.4	45.7	34.1	30.0	40.1
Male	0.55	0.45	0.24	0.55	0.58	0.24	0.52	0.45	0.18
White							0.61	0.31	0.53
Black							0.34	0.65	0.41
Other							0.05	0.04	0.07
East German	0.22	0.45	0.18						
Immigrant	0.14	0.23	0.21						
Married	0.68	0.65	0.79	0.79	0.66	0.77	0.59	0.32	0.64
Single	0.22	0.19	0.11	0.12	0.20	0.11	0.27	0.48	0.18
Divorced or Separated	0.09	0.13	0.06	0.08	0.13	0.08	0.01	0.02	0.06
Widowed	0.02	0.02	0.04	0.01	0.01	0.04	0.08	0.1	0.07
Spouse	0.40	0.43	0.60	0.35	0.27	0.61	0.25	0.14	0.52
Children(#)	0.72	0.68	0.75	0.94	0.83	0.85	0.83	0.99	1.13
Household size(#)	2.84	2.77	2.90	3.08	2.79	2.88	2.73	2.66	3.19

Table 5.1: Descriptive statistics, by study cohort and labour force status (continued)

	Germany (Baseline: 1994-2003)			Canada (Baseline: 1996-2003)			United States (Baseline: 1984-1995)		
	Working	Unemployed	Not Working	Working	Unemployed	Not Working	Working	Unemployed	Not Working
				Education					
Minimum Skill	0.10	0.19	0.23	0.19	0.34	0.36	0.16	0.36	0.40
Medium Skill	0.60	0.69	0.60	0.62	0.56	0.53	0.6	0.57	0.51
High Skill	0.29	0.11	0.16	0.19	0.10	0.11	0.24	0.07	0.10
				Occupation					
No occupation	0.10	1.00	1.00	0.02	0.35	0.71	0.00	0.12	0.87
Managers	0.06	0.00	0.00	0.10	0.02	0.01	0.12	0.03	0.01
Professionals and Technicians	0.34	0.00	0.00	0.22	0.08	0.06	0.17	0.04	0.01
Clerical and Admin	0.11	0.00	0.00	0.14	0.07	0.05	0.19	0.14	0.03
Services and Sales	0.10	0.00	0.00	0.21	0.16	0.10	0.20	0.27	0.05
Skilled Trades	0.15	0.00	0.00	0.11	0.09	0.01	0.11	0.10	0.01
Plant and Equipment operators	0.07	0.00	0.00	0.10	0.08	0.02	0.15	0.18	0.01
Agricultural, Forestry and Fishery	0.01	0.00	0.00	0.06	0.08	0.02	0.01	0.00	0.00
Labourers	0.07	0.00	0.00	0.03	0.06	0.01	0.05	0.12	0.01
				Income and Transfers					
Household post-government income	35565.23	21420.77	27474.10	47755.20	27749.44	33290.01	40687.33	20120.57	31849.31
Individual labour income	27636.09	3756.02	1436.13	31075.56	7997.97	3772.56	32399.58	8523.88	2332.06
Household public transfers	1973.06	6974.87	2756.64	2897.03	8473.03	5170.51	559.84	3521.49	2940.30
Unemployment compensation t0	183.11	4204.73	279.93	658.79	3166.66	559.49	116.25	658.98	37.73
Any unemployment compensation	0.05	0.73	0.05	0.16	0.52	0.11	0.06	0.17	0.01

All monetary measures are have been adjusted to 2005 units of each countries respective currency

Table 5.2: Unemployment, unemployment compensation, income and public transfers by number of months unemployed by study cohort

Months unemployed	0 months	1 months	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months
German cohort (GSOEP: 1994-2005)													
Age	45.2	39.1	40.4	41.3	40.8	40.6	41.5	41.7	42.4	43.4	43.2	44.7	48.4
Male (%)	47.4	55.8	51.8	52.5	48.5	47.3	48.3	45.8	45.1	48.3	44.4	44.8	47.8
Currently unemployed (%)	0.8	22.1	34.3	39.8	40.4	43.3	41.6	46.1	51.1	48	55.4	55.1	87.6
UI benefits any (%)	1.0	72.3	77.2	82.2	85.3	83.5	88.3	84.9	89.2	87.9	86.6	87.7	85.4
UI benefit amount $	57.4	1508.5	2122.3	2546.5	3176.8	3622.7	4265.1	4414.5	5313.8	5395.7	5565.5	5989.1	6343.8
Household public transfers $	2324.2	4143.9	4870.7	5421.6	6127.4	6465.3	7264.8	7575.4	8425.7	8461.4	8767.9	9241.5	9737.3
Individual labour income (t-1) $	20552.8	12756	11728.7	12090.4	10303.9	9874.6	11633.3	9455.7	8845.2	10030.2	8977.6	9139.8	4337.4
Individual labour income (t0) $	21267.7	14215.8	11735.2	11275.4	8455.5	7762.2	7093.4	5517.9	4047.8	3785.6	3104.7	2449.1	232.5
Household post government income (t-1) $	32980.3	25056.1	25380.7	25814.4	24684.6	24724.4	25256	24887.5	24121.4	24767.4	25001.9	23659.5	22076.9
Household post government income (t0) $	33729.5	25850.2	25739.6	25814.7	24717.1	24547.7	24514.2	24666.2	23105	22691.4	23485.3	22435.6	20698.3
Ratio of UI benefits to hhld income	0.3	7	9.5	12	15.3	17.2	20.2	22.5	27.5	27.9	29.2	31.4	38.9
Ratio of public transfers to hhld inc	8.5	18.4	21.4	24.2	28	31.1	34.9	36.8	42.6	43.7	45	49.5	58.7
Person years	116591	1236	1333	1357	1033	857	920	683	658	720	484	397	4320
Percentage of person years	89.28	0.95	1.02	1.04	0.79	0.66	0.70	0.52	0.50	0.55	0.37	0.30	3.31
Canadian Cohort (SLID: 1996-2005)													
Age	44.7	39.7	39.9	40.5	40.5	40.8	41.6	41.5	40.9	41.2	41.3	41.5	43.4
Male (%)	47.5	43	44.2	48.8	50.3	54.2	48.9	48.7	46.1	44.7	44.3	45.3	44.4
Currently unemployed (%)	0.7	9	13.4	16.2	19.2	22.9	27.2	32.2	31.8	35.7	37.1	43.6	48.5
UI benefits any (%)	11	46.6	56	59.9	62.5	67.3	67.6	66.1	62.4	55.6	44.4	49.1	19.8
UI benefit amount $	436.7	1674.7	2165	2821	3423.8	3941	4166.8	4316.9	4194.4	3735.9	3149	3313.8	1217.5
Household public transfers $	3270.9	5064.2	5787.2	6872.1	7629.6	8101.1	8455.1	8754.5	8919.5	8673.4	8332.3	8119.9	8383.5
Individual labour income (t-1) $	25499.5	14864.9	15059.3	14048	13147.7	13060.1	13357.1	12368.7	12331.5	12807.8	11564.1	13784	4268.8
Individual labour income (t0) $	25922.9	14716	14497.9	12972.8	11443.7	10963.8	9729.5	9211.5	7602.8	6395.4	5410	6713.4	1260.3
Household post government income (t-1) $	46838.7	37635.5	37881.7	35353.7	34392.8	33784.7	35524.3	34593.5	34170.4	34548.5	33393.9	34245.3	25095.4
Household post government income (t0) $	47514	38081.4	37463.5	35416.3	33945.3	33220	34023.7	33940.7	31289.7	31270.6	30511.1	31471.2	23193.7
Ratio of UI benefits to hhld income	1.3	5.6	7.2	9.5	12.5	13.9	14.6	15.1	16.2	14.5	11.7	12.7	5.5
Ratio of public transfers to hhld inc	12.9	19.9	22.9	27.8	31.4	31.8	32.7	34	38.3	38.5	38.9	39.1	55.1
Person years	275635	5557	4286	3338	2992	2202	1903	1494	1351	1025	684	477	4295
Percentage of person years	90.30	1.82	1.40	1.09	0.98	0.72	0.62	0.49	0.44	0.34	0.22	0.16	1.41

Table 5.2 Unemployment, unemployment compensation, income and public transfers by number of months unemployed by study cohort (cont'd)

Months unemployed	0 months	1 months	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months
American cohort (PSID: 1984-1996)													
Age	42.4	34	33.9	34.5	34.7	34.8	35.1	35.2	34.1	34.8	35	33.1	36
Male (%)	42.5	49.9	48.2	47.3	49.5	52	49.2	39.6	43.3	40.8	40.8	41.7	45.1
Currently unemployed (%)	3.7	13.7	18.3	22.3	27.9	33.4	40.7	45.6	49.9	53.7	51.9	49.5	56.7
UI benefits any (%)	1.4	24.3	31.3	36.6	35.9	36.4	34.3	30.8	31.3	25.1	21.6	22.2	12.7
UI benefit amount $	38.3	296.5	597.3	962.3	1265.7	1526.1	1681.8	1629.9	1778.5	1498.9	1305.3	1458.2	858.6
Household public transfers $	995.8	1533.2	1840.8	2283.9	2759.6	3042.7	3596.6	3413.7	3984.5	4048	4503.9	4549.2	5285.3
Individual labour income (t-1) $	27091.8	20540.8	20061	18232.6	17033.6	17296.6	15732.2	14114.6	13929.6	12083.8	9540.9	11233.3	6470.2
Individual labour income (t0) $	27433.7	20933.3	19283.9	16499	14714.6	14067.9	12159	9871.3	7763.9	5907.7	3647.3	3910	1168.4
Household post government income (t-1) $	44019.4	31173.5	30214.2	29997.8	27159.5	28574.8	27535.3	28171.6	28072.4	24534.8	21770.9	20580.3	18532.4
Household post government income (t0) $	44240.9	31218.7	29761.7	28456.6	26705.3	25999.7	25559.1	27766.8	23950.8	21748.9	18397	16484.1	15134.1
Ratio of UI benefits to hhld income	0.2	1.1	1.9	3.4	4.4	5.3	6.5	6.1	7.2	7.2	6.7	8.3	6
Ratio of public transfers to hhld income	6.2	10.1	10.9	12.8	15.1	16.2	18.7	18.6	25	28	32.2	37.1	49.7
Person Years	84571	2567	2003	1492	979	742	731	508	455	402	287	228	1063
Percentage of Person Years	88.07	2.67	2.09	1.55	1.02	0.77	0.76	0.53	0.47	0.42	0.30	0.24	1.11

Notes: Number of months unemployed is based on the number of months reported for the year prior to the survey year. Current unemployment has brought forward from the previous year brought forward so that it is for the same year as the months unemployed measure.

Dollars $ and Euros € are adjusted to 2005 values.

Ratio variable are calculated as 1/n Σxi/yi and so are not the same as the ratio of means in the respective variables.

Table 5.3: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for current labour force status, static and dynamic health models, German, Canadian and American cohorts

	Static health GSOEP	Dynamic health GSOEP	Static health SLID	Dynamic health SLID	Static health PSID	Dynamic health PSID
Unemployed	1.890*** [1.698,2.104]	1.678*** [1.518,1.854]	1.914*** [1.682,2.177]	1.515*** [1.375,1.671]	1.775*** [1.568,2.011]	1.702*** [1.506,1.922]
Not Working	1.350*** [1.228,1.483]	1.166*** [1.067,1.274]	4.336*** [4.021,4.675]	2.323*** [2.202,2.450]	2.707*** [2.444,2.998]	2.179*** [1.973,2.407]
Age	1.155*** [1.123,1.188]	1.125*** [1.099,1.152]	1.288*** [1.256,1.321]	1.144*** [1.128,1.161]	1.177*** [1.145,1.209]	1.131*** [1.104,1.159]
Age Squared	0.999*** [0.999,0.999]	0.999*** [0.999,0.999]	0.998*** [0.997,0.998]	0.999*** [0.999,0.999]	0.999*** [0.999,0.999]	0.999*** [0.999,0.999]
Male	0.859* [0.764,0.967]	0.873** [0.798,0.955]	1.010 [0.894,1.140]	0.975 [0.908,1.047]	0.950 [0.785,1.150]	0.986 [0.841,1.156]
Black					3.901*** [3.265,4.660]	2.865*** [2.487,3.302]
Other					2.041*** [1.450,2.872]	1.781*** [1.363,2.328]
Single	1.053 [0.896,1.237]	1.084 [0.949,1.238]	1.538*** [1.333,1.775]	1.183*** [1.089,1.286]	1.164 [0.964,1.407]	1.163 [0.983,1.376]
Div or Sep	1.093 [0.948,1.260]	1.134* [1.006,1.278]	1.617*** [1.427,1.832]	1.240*** [1.148,1.338]	1.166 [0.933,1.456]	1.168 [0.951,1.434]
Widowed	1.087 [0.876,1.348]	1.042 [0.871,1.246]	0.983 [0.797,1.211]	0.980 [0.869,1.105]	1.128 [0.961,1.324]	1.142 [0.982,1.327]
Spouse	0.998 [0.893,1.116]	1.038 [0.952,1.133]	0.658*** [0.581,0.745]	0.806*** [0.745,0.871]	0.734*** [0.620,0.868]	0.780** [0.668,0.911]
Children(#)	0.858*** [0.804,0.915]	0.889*** [0.839,0.941]	1.009 [0.967,1.052]	1.037** [1.010,1.066]	0.913** [0.852,0.977]	0.919* [0.861,0.981]
Household size(#)	1.031 [0.976,1.088]	1.034 [0.987,1.084]	0.838*** [0.795,0.883]	0.886*** [0.857,0.916]	1.050 [0.994,1.110]	1.055* [1.001,1.113]
Hhld income (t-1,1og)	0.735*** [0.686,0.786]	0.781*** [0.735,0.828]	0.795*** [0.771,0.819]	0.872*** [0.854,0.890]	0.799*** [0.760,0.841]	0.811*** [0.773,0.851]
Educ - Minimum skill	2.020*** [1.723,2.368]	1.615*** [1.419,1.838]	6.011*** [5.270,6.855]	2.114*** [1.965,2.275]	14.508*** [10.990,19.152]	7.248*** [5.777,9.094]
Educ - Medium skill	1.416*** [1.254,1.599]	1.213*** [1.101,1.337]	2.117*** [1.887,2.375]	1.365*** [1.280,1.455]	3.539*** [2.778,4.507]	2.597*** [2.138,3.155]
No occupation	1.657*** [1.347,2.038]	1.494*** [1.250,1.786]	4.659*** [3.973,5.464]	1.540*** [1.397,1.697]	2.973*** [2.339,3.779]	2.398*** [1.931,2.978]
Professionals/Technicians	0.915 [0.763,1.097]	0.922 [0.787,1.080]	1.290** [1.108,1.501]	1.102* [1.003,1.210]	1.057 [0.857,1.303]	1.023 [0.841,1.244]
Clerical	0.958 [0.778,1.180]	0.913 [0.761,1.095]	1.273** [1.087,1.491]	1.078 [0.977,1.189]	1.224* [1.013,1.479]	1.204* [1.007,1.439]
Services and Sales	1.043	1.068	1.738***	1.278***	1.534***	1.465***

	[0.842,1.292]	[0.887,1.286]	[1.504,2.009]	[1.168,1.399]	[1.278,1.841]	[1.234,1.739]
Skilled Trades	1.129	1.091	1.356***	1.189**	1.270*	1.317**
	[0.920,1.385]	[0.915,1.301]	[1.143,1.610]	[1.071,1.319]	[1.023,1.576]	[1.076,1.611]
Equipment operators	1.249*	1.159	1.386***	1.219***	1.577***	1.532***
	[1.001,1.558]	[0.957,1.402]	[1.172,1.640]	[1.100,1.350]	[1.293,1.922]	[1.273,1.842]
Agricultural	1.189	1.080	1.103	1.019	1.060	1.076
	[0.822,1.721]	[0.788,1.482]	[0.910,1.338]	[0.907,1.144]	[0.807,1.392]	[0.835,1.387]
Labourers	1.218	1.143	1.384**	1.215**	1.466**	1.416**
	[0.985,1.507]	[0.949,1.376]	[1.118,1.714]	[1.063,1.389]	[1.148,1.872]	[1.123,1.786]
Disabled (t-1)		3.091***		3.680***		2.739***
		[2.813,3.396]		[3.525,3.843]		[2.516,2.983]
Fair/poor srhs (t-1)		3.363***		7.487***		2.774***
		[3.147,3.594]		[7.070,7.930]		[2.564,3.002]
sigma_u	2.409	1.577	2.784	0.716	2.772	1.960
	[2.347,2.474]	[1.516,1.640]	[2.728,2.842]	[0.656,0.781]	[2.682,2.866]	[1.877,2.046]
rho	0.638	0.430	0.702	0.135	0.700	0.539
	[0.626,0.650]	[0.411,0.450]	[0.694,0.711]	[0.116,0.156]	[0.686,0.714]	[0.517,0.560]
Observations	103684	103684	217530	217530	79291	79319
AIC	67180.4	65463.9	109689.2	102530.8	42880.3	41534.6
BIC	67629.3	65931.8	110111.1	102973.2	43297.9	41970.8

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates for area and year fixed effects are not shown.

2. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

3. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

Table 5.4: Odds ratio of self-reported health status (poor/fair/very good vs. very good/excellent) for current labour force status, static and dynamic health model, German, Canadian and American cohorts

	Static health GSOEP	Dynamic health GSOEP	Static health SLID	Dynamic health SLID	Static health PSID	Dynamic health PSID
Unemployed	1.298*** [1.183,1.423]	1.238*** [1.135,1.350]	1.395*** [1.283,1.517]	1.293*** [1.206,1.386]	1.216*** [1.107,1.335]	1.189*** [1.085,1.303]
Not Working	1.012 [0.936,1.095]	0.951 [0.883,1.023]	1.751*** [1.667,1.839]	1.399*** [1.345,1.455]	1.450*** [1.342,1.566]	1.295*** [1.201,1.396]
Age	1.131*** [1.106,1.157]	1.098*** [1.077,1.119]	1.156*** [1.139,1.174]	1.095*** [1.084,1.107]	1.038*** [1.018,1.058]	1.016 [0.998,1.034]
Age Squared	1.000*** [0.999,1.000]	1.000*** [0.999,1.000]	0.999*** [0.999,0.999]	0.999*** [0.999,0.999]	1.000 [1.000,1.000]	1.000 [1.000,1.000]
Male	0.843*** [0.767,0.926]	0.874*** [0.812,0.941]	0.881** [0.814,0.952]	0.918** [0.869,0.970]	0.714*** [0.625,0.816]	0.762*** [0.680,0.854]
Black					3.014*** [2.665,3.407]	2.430*** [2.199,2.686]
Other					1.934*** [1.521,2.459]	1.723*** [1.422,2.088]
Single	1.013 [0.903,1.136]	1.026 [0.931,1.131]	1.301*** [1.192,1.420]	1.157*** [1.090,1.229]	1.127 [0.994,1.277]	1.140* [1.017,1.277]
Div or Sep	0.900 [0.805,1.007]	0.947 [0.859,1.043]	1.317*** [1.217,1.425]	1.177*** [1.112,1.245]	0.982 [0.812,1.186]	1.004 [0.843,1.197]
Widowed	0.766** [0.629,0.934]	0.808* [0.684,0.954]	1.035 [0.893,1.199]	1.030 [0.930,1.140]	1.201** [1.073,1.345]	1.161** [1.043,1.293]
Spouse	1.066 [0.976,1.164]	1.098** [1.024,1.178]	0.834*** [0.770,0.902]	0.903*** [0.853,0.957]	1.020 [0.907,1.147]	1.009 [0.904,1.126]
Children(#)	0.918*** [0.873,0.965]	0.926*** [0.886,0.968]	1.020 [0.994,1.046]	1.037*** [1.018,1.057]	0.934** [0.888,0.983]	0.924** [0.880,0.970]
Household size(#)	1.022 [0.978,1.067]	1.031 [0.992,1.071]	0.910*** [0.882,0.938]	0.925*** [0.905,0.946]	1.068** [1.023,1.114]	1.072*** [1.029,1.117]
Hhld income (t-1,1og)	0.751*** [0.708,0.796]	0.794*** [0.754,0.836]	0.845*** [0.827,0.863]	0.883*** [0.868,0.898]	0.853*** [0.820,0.888]	0.863*** [0.831,0.897]
Educ - Minimum skill	2.017*** [1.773,2.294]	1.647*** [1.479,1.834]	4.380*** [4.052,4.736]	2.237*** [2.124,2.356]	5.265*** [4.408,6.290]	3.432*** [2.958,3.982]
Educ - Medium skill	1.481*** [1.351,1.624]	1.270*** [1.178,1.368]	1.964*** [1.842,2.093]	1.438*** [1.379,1.499]	2.342*** [2.035,2.696]	1.943*** [1.729,2.183]
No occupation	1.746*** [1.491,2.045]	1.509*** [1.314,1.733]	2.581*** [2.344,2.843]	1.575*** [1.470,1.686]	1.911*** [1.604,2.277]	1.658*** [1.412,1.947]
Professionals/Technicians	0.941 [0.827,1.070]	0.923 [0.823,1.035]	1.149*** [1.059,1.247]	1.084** [1.023,1.148]	0.994 [0.883,1.118]	0.980 [0.876,1.095]
Clerical	1.089 [0.937,1.267]	1.028 [0.900,1.175]	1.197*** [1.098,1.305]	1.098** [1.033,1.168]	1.233*** [1.102,1.380]	1.219*** [1.095,1.357]
Services and Sales	1.267** [1.084,1.481]	1.208** [1.052,1.386]	1.412*** [1.303,1.530]	1.231*** [1.163,1.303]	1.331*** [1.186,1.492]	1.296*** [1.162,1.445]

Skilled Trades	1.350***	1.246**	1.325***	1.210***	1.252**	1.253***
	[1.162,1.568]	[1.093,1.420]	[1.202,1.459]	[1.131,1.294]	[1.092,1.435]	[1.101,1.426]
Equipment operators	1.330***	1.199*	1.512***	1.319***	1.460***	1.444***
	[1.128,1.569]	[1.037,1.386]	[1.374,1.663]	[1.234,1.410]	[1.286,1.657]	[1.282,1.627]
Agricultural	1.181	1.097	1.089	1.033	1.058	1.076
	[0.888,1.572]	[0.856,1.405]	[0.976,1.216]	[0.957,1.115]	[0.893,1.252]	[0.917,1.262]
Labourers	1.228*	1.116	1.530***	1.345***	1.413***	1.373***
	[1.047,1.440]	[0.969,1.286]	[1.351,1.733]	[1.229,1.472]	[1.198,1.666]	[1.173,1.607]
Disabled (t-1)		4.291***		2.798***		2.540***
		[3.834,4.802]		[2.703,2.896]		[2.352,2.743]
Good/Fair/poor srhs (t-1)		2.807***		3.582***		2.329***
		[2.678,2.942]		[3.457,3.711]		[2.213,2.451]
sigma_u	2.302	1.578	2.137	0.971	2.180	1.626
	[2.254,2.351]	[1.532,1.626]	[2.106,2.167]	[0.935,1.007]	[2.125,2.237]	[1.574,1.680]
rho	0.617	0.431	0.581	0.223	0.591	0.446
	[0.607,0.627]	[0.416,0.445]	[0.574,0.588]	[0.210,0.236]	[0.578,0.603]	[0.430,0.462]
Observations	103684	103684	217530	217530	79319	78944
AIC	106139.3	103695.4	235253.3	227731.2	76178.6	74089.8
BIC	106588.1	104163.3	235675.2	228173.7	76596.2	74525.8

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates for area and year fixed effects are not shown.

2. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

3. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

Table 5.5: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, dynamic health model, German, Canadian and American cohorts.

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.678***	1.515***	1.702***						
	[1.518,1.854]	[1.375,1.671]	[1.506,1.922]						
Not working	1.166***	2.323***	2.179***	1.169***	2.318***	2.215***			
	[1.067,1.274]	[2.202,2.450]	[1.973,2.407]	[1.070,1.277]	[2.197,2.445]	[2.005,2.448]			
Unemployed, no benefits				1.661***	1.695***	1.893***			
				[1.377,2.004]	[1.482,1.939]	[1.660,2.158]			
Unemployed, benefits				1.882***	1.459***	0.988			
				[1.683,2.105]	[1.272,1.674	[0.732,1.334]			
# of months unemployed							1.076***	1.040***	1.037***
							[1.065,1.086]	[1.031,1.049]	[1.020,1.054]
# of months not working							1.043***	1.070***	1.066***
							[1.035,1.051]	[1.064,1.076]	[1.057,1.075]
Unemployed, no benefits= Unemployed, benefits									
χ^2 (1) test:				1.47	2.46	16.02			
prob > χ^2:				0.226	0.117	0.000			
sigma_u	1.587	0.716	1.960	1.575	0.715	1.960	1.577	0.697	1.948
	[1.516,1.640]	[0.656,0.781]	[1.877,2.46]	[1.515,1.638]	[0.656,0.780]	[1.878,2.046]	[1.516,1.639]	[0.637,0.763]	[1.860,2.034]
rho	0.430	0.135	0.539	0.430	0.135	0.539	0.430	0.129	0.535
	[0.411,0.450]	[0.116,0.156]	[0.517,0.560]	[0.411,0.449]	[0.116,0.156]	[0.517.0.560]	[0.411,0.450]	[0.110,0.150]	[0.514,0.557]
Observations (person yrs)	103684	217530	79319	103684	217530	79315	103687	217362	79330
AIC	65463.9	102530.8	41534.6	65404.0	102486.5	41517.2	65318.9	102795.7	41568.2
BIC	65931.8	102973.2	41970.8	65891.0	102949.6	41972.0	65786.8	103238.1	42004.4

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.6: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.238***	1.293***	1.189***						
	[1.135,1.350]	[1.206,1.386]	[1.085,1.303]						
Not Working	0.951	1.399***	1.295***	0.947	1.393***	1.303***			
	[0.883,1.023]	[1.345,1.455]	[1.201,1.396]	[0.880,1.020]	[1.339,1.449]	[1.208,1.405]			
Unemployed, No Benefits				1.163	1.433***	1.251***			
				[0.984,1.373]	[1.291,1.591]	[1.130,1.384]			
Unemployed, Benefits				1.329***	1.268***	0.974			
				[1.205,1.465]	[1.156,1.390]	[0.802,1.183]			
# of months unemployed							1.031***	1.030***	1.004
							[1.023,1.040]	[1.023,1.037]	[0.992,1.016]
# of months not working							1.009**	1.030***	1.028***
							[1.002,1.016]	[1.025,1.034]	[1.021,1.035]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				2.09	3.10	5.27			
prob > χ^2:				0.148	0.078	0.027			
sigma_u	1.578	0.971	1.626	1.578	0.967	1.626	1.579	0.965	1.626
	[1.532,1.626]	[0.936,1.007]	[1.574,1.680]	[1.532,1.625]	[0.932,1.004]	[1.574,1.681]	[1.532,1.626]	[0.930,1.001]	[1.574,1.680]
rho	0.431	0.223	0.446	0.431	0.221	0.446	0.431	0.221	0.446
	[0.416,0.445]	[0.210,0.236]	[0.429,0.462]	[0.416,0.445]	[0.209,0.234]	[0.430,0.460]	[0.417,0.446]	[0.208,0.234]	[0.429,0.462]
Observations (person yrs)	103684	217530	78944	103684	217530	78940	103687	217362	78954
AIC	103695.4	227731.2	74089.8	103678.8	227678.6	74082.6	103678.5	227626.9	74081.5
BIC	104163.3	228173.7	74525.8	104165.8	228141.6	74537.1	104146.4	228069.3	74517.5

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.7: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *excluding those in poor or fair health at baseline*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.764***	1.621***	1.660***						
	[1.569,1.984]	[1.421,1.849]	[1.441,1.913]						
Not Working	1.105	2.591***	2.185***	1.104	2.566***	2.214***			
	[0.994,1.228]	[2.407,2.791]	[1.942,2.457]	[0.994,1.227]	[2.383,2.763]	[1.968,2.491]			
Unemployed, No Benefits				1.713***	1.919***	1.827***			
				[1.359,2.159]	[1.591,2.316]	[1.567,2.131]			
Unemployed, Benefits				2.041***	1.601***	1.061			
				[1.792,2.324]	[1.345,1.923]	[0.760,1.480]			
Months unemployed							1.084***	1.056***	1.032**
							[1.071,1.096]	[1.043,1.069]	[1.012,1.051]
Months not working							1.042***	1.076***	1.065***
							[1.032,1.052]	[1.067,1.084]	[1.054,1.076]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				1.92	1.89	8.96			
prob > χ^2:				0.166	0.169	0.003			
sigma_u	1.639	1.614	1.87	1.634	1.601	1.871	1.640	1.604	1.858
	[1.572,1.708]	[1.547,1.682]	[1.781,1.966]	[1.570,1.705]	[1.542,1.677]	[1.781,1.966]	[1.574,1.709]	[1.538,1.674]	[1.769,1.952]
rho	0.449	0.442	0.515	0.449	0.440	0.516	0.450	0.439	0.512
	[0.429,0.470]	[0.421,0.463]	[0.491,0.540]	[0.428,0.469]	[0.419,0.461]	[0.491,0.540]	[0.430,0.470]	[0.418,0.460]	[0.487,0.537]
Observations	89847	194965	67639	89847	194965	67637	89850	194828	67649
AIC	47915.1	74539.9	29019.1	47847.3	74481.9	29013.2	47801.4	74755.9	29055.7
BIC	48376.0	74977.6	29447.8	48327.0	74940.0	29460.2	48262.3	75193.7	29484.5

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.8: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *excluding those unemployed or not working at baseline*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.768***	1.565***	1.574***						
	[1.561,2.002]	[1.357,1.806]	[1.331,1.861]						
Not Working	1.192**	2.753***	2.337***	1.183**	2.698***	2.363***			
	[1.069,1.330]	[2.556,2.966]	[2.049,2.667]	[1.061,1.319]	[2.504,2.907]	[2.071,2.697]			
Unemployed, No Benefits				1.696***	1.861***	1.836***			
				[1.289,2.231]	[1.462,2.369]	[1.524,2.212]			
Unemployed, Benefits				1.989***	1.556***	0.955			
				[1.735,2.279]	[1.306,1,853]	[0.665,1.371]			
Months unemployed							1.080***	1.031***	1.024
							[1.067,1.093]	[1.015,1.046]	[1.000,1.048]
Months not working							1.049***	1.079***	1.069***
							[1.039,1.059]	[1.071,1.088]	[1.057,1.081]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				1.13	1.45	10.44			
prob > χ^2:				0.287	0.229	0.001			
sigma_u	1.593	1.093	1.988	1.592	1.091	1.986	1.592	1.077	1.969
	[1.520,1.670]	[1.018,1.173]	[1.884,2.097]	[1.519,1.668]	[1.017,1.171]	[1.882,2.095]	[1.520,1.669]	[1.000,1.157]	[1.866,2.078]
rho	0.436	0.266	0.545	0.435	0.266	0.545	0.435	0.260	0.541
	[0.412,0.459]	[0.239,0.295]	[0.520,0.572]	[0.412,0.458]	[0.239,0.294]	[0.519,0.572]	[0.412,0.458]	[0.233,0.289]	[0.514,0.567]
Observations	75594	156324	56298	75594	156324	56295	75597	156213	56305
AIC	44158.5	62200.4	25697.8	44109.1	62165.3	25686.5	44039.3	62486.0	25738.1
BIC	44610.9	62628.6	26117.9	44580.0	62613.5	26124.5	44491.7	62914.2	26158.2

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.9: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *men only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Fair/poor srhs									
Unemployed	1.646***	1.693***	2.017***						
	[1.425,1.903]	[1.485,1.929]	[1.665,2.443]						
Not Working	1.341***	2.923***	2.964***	1.343***	2.922***	3.013***			
	[1.159,1.552]	[2.672,3.197]	[2.474,3.550]	[1.161,1.553]	[2.672,3.196]	[2.514,3.612]			
Unemployed, No Benefits				1.492**	1.904***	2.378***			
				[1.102,2.018]	[1.580,2.293]	[1.927,2.936]			
Unemployed, Benefits				1.913***	1.642***	1.002			
				[1.634,2.240]	[1.374,1.961]	[0.649,1.546]			
# of months unemployed							1.084***	1.047***	1.044***
							[1.068,1.099]	[1.033,1.060]	[1.018,1.071]
# of months not working							1.064***	1.083***	1.088***
							[1.050,1.078]	[1.073,1.092]	[1.072,1.104]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				2.35	1.36	13.15			
prob > χ^2:				0.125	0.244	0.000			
sigma_u	1.556	0.862	2.00	1.553	0.859	2.002	1.549	0.832	1.976
	[1.466,1.652]	[0.779,0.954]	[1.970,2.142]	[1.463,1.649]	[0.776,0.951]	[1.870,1.523]	[1.459,1.644]	[0.749,0.924]	[1.846,2.116]
rho	0.424	0.184	0.549	0.423	0.183	0.549	0.422	0.174	0.543
	[0.395,0.453]	[0.156,0.216]	[0.515,0.582]	[0.394,0.453]	[0.155,0.216]	[0.515,0.582]	[0.393,0.451]	[0.145,0.206]	[0.509,0.576]
Observations	49171	102508	33979	49171	102508	33976	49173	102440	33982
AIC	29618.8	47157.1	16258.4	29576.8	47143.7	16244.9	29511.5	47358.6	16293.2
BIC	30041.3	47557.7	16637.9	30017.0	47563.3	16641.3	29934.0	47759.2	16672.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.10: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *women only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Fair/poor srhs									
Unemployed	1.683***	1.320***	1.489***						
	[1.463,1.936]	[1.137,1.533]	[1.271,1.744]						
Not Working	1.112	2.021***	1.854***	1.117	2.015***	1.881***			
	[0.993,1.244]	[1.889,2.163]	[1.644,2.091]	[0.997,1.250]	[1.883,2.156]	[1.667,2.122]			
Unemployed, No Benefits				1.777***	1.486***	1.607***			
				[1.397,2.258]	[1.219,1.812]	[1.359,1.901]			
Unemployed, Benefits				1.814***	1.233	0.967			
				[1.545,2.129]	[0.988,1.540]	[0.636,1.468]			
# of months unemployed							1.068***	1.031***	1.031**
							[1.053,1.083]	[1.019,1.044]	[1.010,1.053]
# of months not working							1.035***	1.061***	1.054***
							[1.024,1.045]	[1.054,1.069]	[1.043,1.065]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				0.02	1.57	5.16			
prob > χ^2:				0.877	0.211	0.023			
sigma_u	1.587	0.623	1.915	1.586	0.623	1.915	1.589	0.608	1.909
	[1.506,1.671]	[0.539,0.720]	[1.811,2.024]	[1.506,1.670]	[0.540,0.721]	[1.811,2.025]	[1.508,1.673]	[0.524,0.706]	[1.806,2.019]
rho	0.433	0.106	0.527	0.4332	0.106	0.527	0.434	0.101	0.526
	[0.408,0.459]	[0.081,0.136]	[0.499,0.555]	[0.408,0.459]	[0.081,0.136]	[0.499,0.555]	[0.409,0.460]	[0.077,0.132]	[0.480,0.553]
Observations	54513	115022	45340	54513	115022	45339	54514	114922	45348
AIC	35831.6	55275.5	25260.3	35815.4	55251.4	25256.3	35783.9	55359.1	25267.3
BIC	36259.1	55680.9	25661.5	36260.7	55676.1	25675.0	36211.4	55764.5	25668.5

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.11: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *minimum skilled only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.967***	1.574***	1.728***						
	[1.589,2.434]	[1.347,1.838]	[1.409,2.119]						
Not Working	1.378**	2.328***	2.315***	1.403***	2.345***	2.364***			
	[1.137,1.669]	[2.117,2.559]	[1.969,2.722]	[1.157,1.702]	[2.132,2.580]	[2.008,2.783]			
Unemployed, No Benefits				1.751**	1.753***	1.950***			
				[1.212,2.531]	[1.420,2.165]	[1.572,2.418]			
Unemployed, Benefits				2.433***	1.452***	0.696			
				[1.911,3.098]	[1.166,1.809]	[0.389,1.245]			
# of months unemployed							1.079***	1.041***	1.042**
							[1.057,1.101]	[1.027,1.056]	[1.015,1.071]
# of months not working							1.036***	1.072***	1.071***
							[1.018,1.054]	[1.062,1.082]	[1.057,1.086]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				2.66	1.59	11.15			
prob > χ^2:				0.102	0.208	0.000			
sigma_u	1.548	0.704	1.906	1.548	0.703	1.908	1.546	0.692	1.903
	[1.412,1686]	[0.608,0.816]	[1.769,2.053]	[1.412,1.696]	[0.606,0.816]	[1.771,2.055]	[1.411,1.694]	[0.594,0.805]	[1.767,2.049]
rho	0.421	0.131	0.524	0.421	0.131	0.525	0.421	0.127	0.524
	[0.377,0.467]	[0.101,0.168]	[0.488,0.562]	[0.377,0.467]	[0.101,0.168]	[0.488,0.562]	[0.377,0.466]	[0.097,0.165]	[0.487,0.561]
Observations	14935	48127	17848	14935	48127	17844	14936	48090	17849
AIC	12655.3	34520.2	14627.4	12631.7	34520.9	14615.5	12640.6	34579.4	14630.9
BIC	13013.1	34880.3	14977.9	13004.6	34898.5	14981.6	12998.3	34939.4	14981.4

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.12: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *medium skilled only***, dynamic health model, German, Canadian and American cohorts**

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.683***	1.403***	1.794***						
	[1.487,1.905]	[1.227,1.603]	[1.530,2.105]						
Not Working	1.130*	2.303***	2.129***	1.133*	2.288***	2.156***			
	[1.010,1.263]	[2.146,2.470]	[1.860,2.437]	[1.013,1.267]	[2.133,2.455]	[1.883,2.469]			
Unemployed, No Benefits				1.717***	1.613***	1.966***			
				[1.351,2.182]	[1.337,1.946]	[1.653,2.339]			
Unemployed, Benefits				1.884***	1.320**	1.207			
				[1.642,2.162]	[1.096,1.590]	[0.838.1.738]			
Months unemployed							1.079***	1.038***	1.035**
							[1.066,1.093]	[1.025,1.050]	[1.013,1.057]
Months not working							1.045***	1.071***	1.063***
							[1.035,1.056]	[1.063,1.079]	[1.051,1.076]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				0.51	2.30	5.98			
prob > χ^2:				0.476	0.129	0.015			
sigma_u	1.531	0.623	1.924	1.529	0.626	1.924	1.530	0.605	1.908
	[1.454,1.612]	[0.538,0.723]	[1.814,2.040]	[1.451,1.610]	[0.541,0.725]	[0.500,0.558]	[1.454,1.611]	[0.519,0.705]	[1.799,2.023]
rho	0.416	0.106	0.529	0.415	0.107	0.529	0.416	0.100	0.525
	[0.391,0.441]	[0.081,0.137]	[0.500,0.558]	[0.390,0.441]	[0.082,0.138]	[0.500,0.559]	[0.391,0.441]	[0.076,0.131]	[0.496,0.554]
Observations	63870	130189	45120	63870	130189	45120	63872	130090	45128
AIC	40528.9	56121.9	22604.5	40489.3	56092.9	22601.9	40423.0	56265.8	22639.0
BIC	40955.0	56522.8	22996.7	40933.5	56513.3	23011.6	40849.0	56666.6	23031.3

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.13: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, *high skilled only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.197	1.823***	0.930						
	[0.896,1.598]	[1.287,2.581]	[0.536,1.612]						
Not Working	1.136	2.268***	1.993***	1.137	2.208***	2.010***			
	[0.912,1.414]	[1.938,2.654]	[1.385,2.868]	[0.914,1.416]	[1.887,2.583]	[1.398,2.892]			
Unemployed, No Benefits				1.465	1.649*	1.073			
				[0.862,2.491]	[1.038,2.618]	[0.586,1.964]			
Unemployed, Benefits				1.167	2.312***	0.587			
				[0.838,1.626]	[1.394,3.833]	[0.178,1.932]			
Months unemployed							1.040**	1.043*	1.011
							[1.011,1.069]	[1.008,1.079]	[0.936,1.091]
Months not working							1.048***	1.053***	1.063***
							[1.028,1.069]	[1.035,1.071]	[1.029,1.098]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				0.56	0.97	0.83			
prob > χ^2:				0.456	0.324	0.365			
sigma_u	1.544	0.678	2.042	1.546	0.680	2.039	1.551	0.639	2.029
	[1.403,1.700]	[0.507,0.906]	[1.775,2.349]	[1.404,1.701]	[0.510,0.967]	[1.772,2.345]	[1.410,1.707]	[0.467,0.874]	[1.764,2.334]
rho	0.420	0.123	0.559	0.421	0.123	0.558	0.422	0.110	0.556
	[0.374,0.467]	[0.073,0.200]	[0.489,0.627]	[0.375,0.468]	[0.073,0.200]	[0.488,0.626]	[0.376,0.470]	[0.062,0.188]	[0.486,0.624]
Observations	24879	39214	16351	24879	39214	16351	24879	39182	16353
AIC	12547.1	11779.8	4359.2	12548.7	11759.8	4361.7	12525.0	11838.1	4360.1
BIC	12928.9	12131.5	4705.8	12946.6	12128.6	4723.6	12906.8	12189.7	4706.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.14: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, stratified by East and West German, dynamic health model, German cohort

	East German	West German	East German	West German	East German	West German
Fair/poor srhs						
Unemployed	1.497***	1.830***				
	[1.260,1.778]	[1.614,2.075]				
Not Working	1.361**	1.140**	1.387***	1.136*		
	[1.123,1.649]	[1.032,1.260]	[1.145,1.680]	[1.028,1.255]		
Unemployed, No Benefits			1.824***	1.613***		
			[1.311,2.536]	[1.282,2.029]		
Unemployed, Benefits			1.637***	2.09**		
			[1.353,1.979]	[1.82,2.41]		
# of months unemployed					1.071***	1.083***
					[1.053,1.090]	[1.070,1.096]
# of months not working					1.080***	1.035***
					[1.061,1.099]	[1.026,1.045]
Unemployed, no benefits= Unemployed, benefits						
χ^2 (1) test:			0.39	4.06		
prob > χ^2:			0.532	0.044		
sigma_u	1.708	1.517	1.705	1.517	1.686	1.519
	[1.580,1.846]	[1.449,1.589]	[1.577,1.843]	[1.45,1.59]	[1.56,1.823]	[1.450,1.590]
rho	0.470	0.412	0.469	0.411	0.464	0.412
	[0.432,0.509]	[0.390,0.434]	[0.430,0.508]	[0.389,0.434]	[0.425,0.503]	[0.390,0.435]
Observations	26141	77543	26141	77543	26142	77545
AIC	16126.5	49346.1	16113.6	49301.0	16053.1	49256.0
BIC	16445.1	49753.5	16448.6	49726.9	16371.8	49663.3

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table 5.15: Odds ratio of self-reported health status (poor/fair vs. good/very good/excellent) for all three labour force status measures, stratified by race (Black and White/Other), dynamic health model, American cohort

	Black	White/Other	Black	White/Other	Black	White/Other
Fair/poor srhs						
Unemployed	1.762***	1.758***				
	[1.509,2.056]	[1.437,2.152]				
Not Working	2.454***	1.986***	2.530***	2.106***		
	[2.131,2.826]	[1.727,2.284]	[2.194,2.918]	[1.828,2.427]		
Unemployed, No Benefits			1.878***	2.168***		
			[1.595,2.211]	[1.729,2.718]		
Unemployed, Benefits			1.034	0.960		
			[0.676,1.582]	[0.629,1.463]		
# of months unemployed					1.045***	1.019
					[1.025,1.066]	[0.990,1.049]
# of months not working					1.072***	1.065***
					[1.060,1.085]	[1.052,1.078]
Unemployed, no benefits= Unemployed, benefits						
χ^2 (1) test:			7.00	11.78		
prob > χ^2:			0.008	0.001		
sigma_u	1.914	2.048	1.912	2.034	1.905	2.028
	[1.816,2.08]	[1.941,2.161]	[1.820,2.021]	[1.929,2.148]	[1.803,2.013]	[1.922,2.140]
rho	0.528	0.560	0.526	0.557	0.525	0.556
	[0.501,0.556]	[0.534,0.587]	[0.499,0.534]	[0.531,0.584]	[0.470,0.552]	[0.529,0.582]
Observations	28068	50873	28066	50871	28071	50880
AIC	19799.7	21094.4	19784.1	21064.0	19820.9	21085.2
BIC	20121.1	21439.1	20171.5	21488.2	20191.8	21491.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Chapter 6: Synthesis & Conclusion

6.1: Introduction

The main goal of this thesis has been to explore how societal-level factors influence the relationship between unemployment and health, while attending to the methodological issues that have frustrated previous attempts to draw policy relevant conclusions from the body of unemployment and health research. In chapter 2, a set of hypotheses based on the Varieties of Capitalism framework was developed that specified how institutional arrangements could mediate the unemployment and health relationship. Based on the higher levels of unemployment and employment protection, a skill-occupational nexus with a higher proportion of medium, but vocationally, skilled workers, and less wage inequality in CME countries compared to LME countries, the following hypotheses were tested in the empirical chapters:

1. The association between unemployment and health will be smaller in Germany compared to the United States given the higher levels of unemployment and employment protection; Canada will emerge as a middle case. The receipt of unemployment compensation will mediate the effect of unemployment on health within countries. The higher prevalence of the long term unemployed in Germany compared to the LME countries, however, may confound this comparison.
2. There will also be a distinct pattern of effect modification by educational status. The relationship between unemployment and health will be smaller for the minimum skilled and medium skilled in Germany compared to the LME countries, with the minimum skilled in the United States being especially disadvantaged. The effect of unemployment for the high general skilled in the United States and Canada will be smaller compared to those in lower skill categories, but there is no *a priori* expectation that higher skilled workers in Germany should have a different unemployment-health relationship than those with lower skills.
3. Controlling for health selection will account for some but not all of the relationship between unemployment and health. Further, more of the relationship in Germany will

be accounted for by health-selection into unemployment compared to Canada and the United States.

4. The direction of effect modification for men and women is indeterminate, but the ranking across countries will be consistent by gender with the higher associations being in the United States compared to Canada and Germany.

6.2: Summary of Main Findings

In the United States, unemployment is negatively associated with both mortality and low self-rated health (SRHS) for everyone except for the high skilled. The minimum skilled and unemployed not in receipt of unemployment compensation have the highest risk of negative health outcomes, while receipt of unemployment compensation mitigates the unemployment-health relationship.

In Germany, unemployment is associated with mortality only for East Germans, but there is a strong and consistent relationship between unemployment and SRHS for everyone, except the high skilled. The receipt of unemployment insurance did not mediate the unemployment-health relationship; if anything, the unemployed in receipt of unemployment compensation have higher risks of worse SRHS than the unemployed not in receipt of compensation. Germans have the highest risk of worse SRHS for months unemployed, indicating that the unemployment-health relationship in Germany is largely driven by the long-term unemployed.

In Canada, unemployment is also associated with worse SRHS. The unemployed in receipt of unemployment compensation have consistently lower risks of poorer SRHS than the unemployed not in receipt of compensation, but this difference is only statistically significant in a few comparisons. In contrast to the American and German results, the unemployed high skilled have similar or higher risks compared the unemployed minimum and medium skilled.

Rigorous controls for health selection did not account for the relationship between unemployment in any of the countries, but health selection into unemployed appears to explain a greater proportion of the unemployment and health relationship in Germany and Canada. Men had a stronger and more consistent unemployment and mortality association

than women, but unemployment and SRHS association was equally as strong for both men and women.

6.3: Synthesis of Findings across Studies

The main results from the empirical studies and the degree to which the support the thesis hypotheses is summarized in table 6.1. Overall the results support the contention that institutional context matters to the health of the unemployed and that this varies by CME and LME. The mortality risk of unemployment was concentrated among the minimum and medium skilled in the United States and East Germans in Germany. The high skilled in the United States are more likely to have resources that will buffer the effect of unemployment on health (e.g., they are more likely to receive unemployment compensation), and they have the qualifications that enable them to take advantage of the flexible labour market (Szydlik 2002). In Germany, West German workers have spent their entire educational and working life embedded in the CME institutional environment, while East Germans' educational and working history are reflective of a different institutional environment. While there may be other factors also affecting the health of unemployed East Germans, the CME institutional environment has not been successful in mitigating their risk of mortality.

There is a divergence in findings between the mortality and SRHS studies for unemployed Germans, but there is consistency across both studies in the relationship between long-term unemployment and health. Long-term unemployment (months unemployed and cumulative unemployment) is associated with mortality and it is long-term unemployment that explains the unemployment-SRHS relationship and the elevated risk in the unemployed who receive of unemployment benefits. This is supported by findings from other unemployment-mortality studies conducted in CMEs countries that also found higher and more consistent associations for long-term unemployment than for current or short-term unemployment (Section 2.5.3). In Germany, it appears that the institutional environment has successfully mediated the relationship between current unemployment and health through addressing the material pathway between unemployment and health, but for long-term unemployed there appears to be a link between unemployment and health through the psychosocial pathway.

In the mortality study, there is effect modification by skill level that differed by institutional environment, with no relationship for the modal medium- (vocationally skilled) workers in Germany, but high risks for both minimum- and high-skilled workers. There was less support for the differences in effect modification by skill-level in the SRHS study. In this latter study, the association between unemployment and poor SRHS declined as educational status increased (i.e., it was smaller among the medium-skilled and smallest among the high-skilled) in Germany and the United States, but in Canada the unemployed high skilled had the highest risks of poor SRHS. It is unclear why the high skilled in Canada have higher risks. This may be due to a low baseline risk of poor health for the employed high skilled in Canada. The unemployed high skilled may also not have the same degree of advantage in Canada as they do in the United States given the universal provision of health care, more progressive tax system and higher levels of social transfers available to those with low incomes in Canada. Notwithstanding the puzzling results for the Canadian high skilled, unemployment is generally a greater contributor to worse health status in the medium and minimum skilled – especially in the United States – as the likelihood of unemployment and ensuing risk of poor health both increase among individuals of lower educational status. In Canada and the United States, however, unemployment and employment protection are more likely to be available to highly educated workers.

Unemployment compensation mitigated the unemployment-health relationship in Canada and the United States, but not in Germany. Unemployment compensation may buffer the effect of unemployment on health through the material pathway by providing more resources to the unemployed, but the observed effect modification could also be due to the fact that the unemployed eligible for compensation have stronger labour market attachment than those not in receipt of compensation. Unemployment compensation is highly correlated with long-term unemployed in Germany, but otherwise there was little difference between the unemployed who received compensation and those that did not, particularly on measures of household income. Nonetheless, the differences in the incomes of the unemployed who receive unemployment compensation and those that do not, strongly supports the hypothesis that unemployment affects health through material disadvantage.

There was effect modification by gender in the mortality study, but not in the SRHS study; unemployed women had lower risks of mortality compared to men, but a similar risk of worse self-reported health status. Some these differences may be due to differential interpretation of and recall bias in unemployment across genders (Jacobs 2002), but they are also consistent with research that suggests that socio-economic health gradients are expressed more in measures of morbidity than mortality for women.

6.4: Strengths and Limitations

The studies in the thesis are among the first comparative and longitudinal studies of unemployment and health that seek to understand how societal-level factors can influence this association. They are informed by a framework that integrates the empirical and theoretical literature on: comparative health inequalities; the development and persistence of macroeconomic institutions; and, the unemployment-health relationship. The empirical studies in this thesis are longitudinal and account for the temporal sequencing of unemployment and health and individual-level heterogeneity. Consideration has also been given to accounting for health selection and the duration of unemployment.

There are a number of limitations to these studies and caution needs to be exercised in concluding that the observed unemployment and health associations are causal. Unemployment may be a marker of prior exposures and other factors that are associated with health. Unemployment may also be on the pathway between health and other determinants further upstream. The concentration of unemployment among individuals who have multiple vulnerabilities (e.g., those with low education) also hinders disentangling the causal effect of unemployment on health.

This study focussed on unemployment and employment protection as the central institutional mediators between unemployment and health, but there are other institutional supports that may be important, including the role of active labour market policies in returning the unemployed to employment, as well as broader societal factors such as the culturally-dependent meaning of work. This study also used only three countries and the findings may be peculiar to these countries, rather than being generalizable to other high-income countries. Indeed, the complex nature of the results underscores the importance of studying additional

countries. Further research needs to examine the variation of institutional supports within CME and LME countries clusters in order to generalise these findings.

There are also limitations to the comparability of the cohorts, measures, and differential attrition both within and across the surveys. For example, the composition of the German cohorts changed across the two studies (the SRHS cohort is more educated than the mortality cohort), which may limit the comparability of the results within Germany. Of most concern is the potential for recall and measurement error in the retrospective measures of unemployment and unemployment compensation, particularly for women. Individuals who received unemployment benefits were more likely to consider themselves unemployed and to accurately recall prior episodes of employment. As such, measurement error of unemployment and unemployment compensation is a potential differential bias in international comparisons, given the higher levels of unemployment compensation in Germany. Future comparative research needs to validate the findings from this thesis using other measures of unemployment and data sources (perhaps linking detailed employment records to vital statistics or national death registries).

This study, given the data and measures, focused on the material pathway between unemployment and health and the effect of the psychosocial pathway was only indirectly assessed. Further a full range of health outcomes was not assessed, including the role of health-related behaviours (e.g., smoking, heavy alcohol consumption) or the effect of specific health outcomes (e.g., stress related diseases) that may be more strongly associated with unemployment than other health outcomes. The role of employment-contingent health insurance in the United States was also not examined in explaining the higher risks found the American unemployed and particularly those of lower educational status. In recent years the PSID has begun to collect these some of these measures, but there is need for high quality comparative longitudinal data that has both reliable and valid measures that span the range of labour market and health outcomes.

6.5: Implications for Policy

This research adds to the growing body of comparative health research that demonstrates that many social determinants of health are amenable to policy intervention. Unemployment

appears to have less of an effect on health in countries with stronger employment and unemployment protection, and providing unemployment benefits to the unemployed may be one of the key buffers. But policies like generous unemployment insurance are part of the broader institutional environment. According to the VOC framework there is a reason that LMEs have low unemployment protection; it supports a flexible labour market, which helps maintain these countries' comparative advantage, notwithstanding the effect on health inequalities. Expanding economic protection to workers will be difficult as these protections are endogenous to the system of production. If it is accepted that the institutional supports in LMEs are reflective of a macroeconomic equilibrium, then policies that move an economy away from this equilibrium will be difficult to sustain.

The American example suggests that there is a minimal level of social protection required to reduce health inequalities. Macroeconomic theory and the VOC framework is predicated on the idea of economies reaching or at least moving towards efficient production arrangements, but is largely silent on equity and distributional aspects.[97] Nevertheless, the reduction of health inequalities is a societal objective among all high-income countries (CSDH 2008), including the United States (U.S.Department of Health and Human Services 2000).[98] In CMEs, the distributional consequences of economic arrangements is more in concert with the reduction of health inequalities, while in LMEs there is an inherent tension. Reconciling these objectives presents a central challenge to policy makers and researchers focused on creating and sustaining economically vibrant and healthy societies.

The case of Canada provides insight. In comparison to the more expansive social protection of European nations, Canada's social safety net is minimal, however it is more expansive than the United States and it is these small differences that may explain the overall and consistent advantage that Canadians have in health status over Americans. (Siddiqi and

[97] Using the economic criterion of pareto optimality, an economic (or allocatively) efficient equilibrium can be derived from an economy where one person has all the resources and the rest have none (or for that matter any allocation of factor inputs among the population).

[98] Reducing health inequalities is an explicit goal of the US Department of Health and Human Services, which states in the 2000 report setting the goals for the health of Americans:

> "The second goal of Healthy People 2010 is to eliminate health disparities among segments of the population, including differences that occur by gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation." (US Department of Health Human Services 2000 p.11)

Hertzman 2007; Zuberi 2006). Moreover, Canadians also have comparable or better health outcomes than Germans (United Nations 2008) suggesting that large scale policy and institutional change may not be necessary to improve population health. But, Canada is a country where sustaining these protections may be difficult. Unemployment protection was dramatically scaled back between 1988 and 1996 in Canada, in part, in response to the federal fiscal crises of the 1980s and 1990s, but also because of the perception that Canada's unemployment insurance system was inhibiting economic growth and labour market flexibility (Betcherman 2000).[99] In contrast, during the same period, unemployment protection and other social protections were not scaled back in Scandinavian or Central European countries even though these countries also faced similar macroeconomic challenges (Nordlund 2000; Pierson 1996).

6.6: Towards an Ongoing Research Agenda

While this thesis was one of the first studies to take a comparative perspective on the relationship between labour market experiences and health, there was much that it did not explore or that pointed to a need for further research.

It did not take an explicit gender perspective, although it did uncover significant effect modification by gender, especially in the relationship between unemployment and mortality. Estevez-Abe (2005), has shown that CMEs and LMEs have different implications by gender in terms of labour market attachment and occupational segregation. Future research should explore whether these differences also lead to gender differences in the relationship between labour market experiences and health.

The role of active labour market policies as a potential mediator in the unemployment and health relationship should also be explored. Research from Sweden, for example, has found that active labour market policies such as opportunities to remain involved in a workplace also reduce the negative psychsocial consequences of unemployment (Strandh 2001).

[99] Betcherman (2000), in an econometric analysis of Canada's unemployment rate and institutional changes in labour market policy shows that Canada's high unemployment rate relative to the United States, during the 1998s and 1990 was not due to higher levels of unemployment protection.

This research did not examine the impact of other social transfers on health, nor did it look at the interplay between unemployment and marginal or insecure employment in predicting health outcomes. Recent research has shown that part-time, marginal work and underemployment may have as great an impact on health as unemployment (Grzywacz and Dooley 2003). More broadly, the emergence of cross-national micro data with robust measures of income, labour market experiences and health represents an unprecedented opportunity to understand whether and how measurable inputs by government and state institutions influence individual-level health, either through mediating the influence of other determinants of health or through the direct provision of health-enhancing resources.

Tables

Table 6.1: Summary of thesis hypotheses and results from the empirical studies

Thesis hypothesis	Results from mortality and SRHS studies
The association between unemployment and health will be smaller in Germany compared to the United States, with Canada as a middle case.	Unemployment was strongly associated with mortality in the United States, but not in Germany except for East Germans. The association between unemployment and poorer SRHS was similar in all three study countries.
The receipt of unemployment compensation will mediate the relationship between unemployment and SRHS in all three countries.	The receipt of unemployment compensation mediated the relationship between unemployment and lower SRHS in the United States and to a lesser extent in Canada. In Germany the unemployed in receipt of unemployment compensation had similar or higher ORs of lower SRHS compared to the unemployed who did not receive unemployment compensation. The unemployed in Germany in receipt of unemployment compensation, however, were more likely to be long-term unemployed.
There will be effect modification by educational status that will differ by CME and LME. In particular, the effect of unemployment on health will be greatest for the minimum skilled in Canada and the United States, while this relationship will be mediated in the medium (vocationally) skilled in Germany.	There was strong and consistent effect modification by educational status in the United States. In both the mortality and SRHS studies, the association between unemployment and mortality was stronger for the minimum and medium skilled, while there was no association for the high skilled. In Germany and Canada, the results are mixed. In the mortality study, the association between unemployment was smallest for the medium skilled in Germany, while in the SRHS the association was smallest for the high skilled. In the Canadian SRHS cohort, the association was greatest in the high skilled.
Health selection with explain some, but not all, of the relationship between unemployment and health. The role of health selection will be greater in Germany compared to Canada and the United States.	Controlling for health selection explained a greater proportion of the association between unemployment and mortality in Germany than in the United States, while in the SRHS study health selection explained a greater proportion of the association in Germany and Canada than in the United States.
While the role of gender as an effect modifier is not clear, the rankings of the association between unemployment and health across countries will be consistent by gender, with a higher association in the United States compared to Canada and Germany.	Women had a similar unemployment-mortality association for current unemployment in the United States compared to men, but no association was found for women for months unemployed or lifetime unemployment. In Germany, there was no association for women between any of the labour force status measures and mortality. In the SRHS study, unemployment was associated with a higher OR of poorer SRHS in Canada and the United States compared in men compared to women, while unemployed men and women in the Germany has similar associations. Unemployed women had similar or higher ORs of poorer SRHS in Germany compared to Canada and the United States, with the converse being the case for men.

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Appendix A: Ethics Certificate

The University of British Columbia
Office of Research Services
Behavioural Research Ethics Board
Suite 102, 6190 Agronomy Road, Vancouver, B.C. V6T 1Z3

CERTIFICATE OF APPROVAL - MINIMAL RISK

PRINCIPAL INVESTIGATOR:	INSTITUTION / DEPARTMENT:	UBC BREB NUMBER:
Clyde Hertzman	UBC/College for Interdisciplinary Studies	H06-04021

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:

Institution	Site
UBC	Point Grey Site

Other locations where the research will be conducted:
N/A

CO-INVESTIGATOR(S):

Robert G. Evans
Christopher McLeod
Ying C MacNab

SPONSORING AGENCIES:

N/A

PROJECT TITLE:
Health and labour market trajectories across macroeconomic and institutional contexts: A study of Canada, Germany, and the United States

CERTIFICATE EXPIRY DATE: May 17, 2008

DOCUMENTS INCLUDED IN THIS APPROVAL:		DATE APPROVED:
		May 17, 2007
Document Name	Version	Date
Protocol:		
Thesis Proposal	N/A	December 18, 2006

The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board and signed electronically by one of the following:

Dr. Peter Suedfeld, Chair
Dr. Jim Rupert, Associate Chair
Dr. Arminee Kazanjian, Associate Chair
Dr. M. Judith Lynam, Associate Chair
Dr. Laurie Ford, Associate Chair

Appendix B: Cohort Studies that Examine the Relationship between Unemployment and Mortality by LME and CME

Table B1: Detailed summary of cohort studies that examine the relationship between unemployment and mortality by country for Coordinated Market Economies (20 studies)

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
Sweden (9 studies)					
(Ahs and Westerling 2006)	Two working-age cohorts drawn from the Swedish Survey of Living Conditions. The first cohort was from a period of low unemployment (1984-89) and the second cohort was from a period of high unemployment (1992-1997). Mortality was ascertained for 8.5 years until 1992 and 2000 respectively.	Cox proportional hazards. The two cohorts are analyzed separately and in a pooled analysis. In the pooled analysis an interaction term is included as a test of whether the relationship between unemployment and mortality differs by time period.	Unemployed during the week of the survey.	Gender, age, country of birth, education, cohabitation status, region of residence, longstanding illness or handicap. Baseline self-rated health at baseline is also adjusted for in sensitivity analysis.	Unemployment was associated with a relative risk of dying of 1.63 (1.05-2.53) in the 1984-89 cohort and a relative risk of dying 1.25 (0.76-2.03) in the 1992-97 cohort. In the pooled analysis the difference in the association between unemployment and mortality was not significant between the low unemployment rate and high unemployment rate cohort (Pooled relative risk 1.43 95% CI 1.03-1.98). With the addition of baseline SRHS the relationship between unemployment and mortality is not significant in either cohort.
(Gerdtham and Johannesson 2003)	Representative working-age (24-64) sample drawn from the 1980-86 waves of the Swedish Survey of Living Conditions. All cause and cause-specific mortality was ascertained for 10-17 yrs of follow-up until 1996.	Probit and bivariate probit (two-equation SEM model with one equation account for health selection into unemployment) estimating the probability of being dead by end of follow-up.	Unemployed during the week of the survey. .	Gender, age, children, immigration status, marital status, education, annual income, SRHS, limitations in functional ability, high blood pressure, parents deceased, urbanization, region	Unemployment was associated with a 46% percent increase in mortality from 5.36% to 7.83% (probit coefficient 0.235 (t-stat of 3.06)). In the bivariate probit estimation unemployment was associated with 189% increase in mortality from 5.27% to 15.25 (probit coefficient 0.717 (t-stat 2.45), but the single equation probit model is the preferred model on statistical grounds. Suicide and was associated with an increased relative

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
				of residence, baseline year.	risk of 2.45 ($p<0.05$) and as were other diseases (RR 2.88 p,<0.01), but not mortality related to cancer, cardiovascular diseases or other external causes.
(Gerdtham and Johannesson 2004)	Representative working-age (24-84) sample drawn from the 1980-86 waves of the Swedish Survey of Living Conditions. All cause and cause-specific mortality was ascertained for 10-17 years of follow-up until 1996.	Cox proportional hazards adjusted for clustering at the level of region	Unemployed during the week of the survey.	Gender, age, children, immigration status, marital status, education, annual income, net wealth, disposable income, SRHS, limitations in functional ability, high blood pressure, parents deceased, region of residence, baseline year. Aggregate variables Mean income, income inequality (gini coef), urbanization	Unemployment was not associated with mortality. (HR 1.21, t-stat 1.67, p=0.095).
(Eliason and Storrie 2007)	Linked administrative data on all workers experiencing a plant closure in 1987 and 1988 and a representative employed control population. All cause and cause-specific mortality was ascertained for three follow-up periods: 0-4 years; 5-8 years, and 9-12 years until 1999.	Discrete-time logistic regression. The unemployed and employed controls were matched using propensity score weights.	Unemployment defined at job loss due to all plant closures in 1987 and 1988.	Individual age, marital status, children, region of origin, education, house owner, wealth, earnings, social benefits, disposable income, days of unemployment, industry, health status including diseases or injury derived from hospital registrar data, disability	Unemployment was associated with all-cause mortality for men at 4 years of follow-up (HR 1.44 (1.19-1.76) but not at 5-8 years (HR 0.98 (0.82-1.17) or at 9-12 years (HR (0.91 (0.77-1.07). Unemployment was not associated with all-cause mortality for women at either 4 years of follow-up (HR 1.01 (0.74-1.37), or at 5-8 years (HR 1.04 (0.79-1.37) or at 9-12 (HR (1.10 (0.88-1.38). Unemployment was associated with cause-specific mortality at 4 years of follow-up for men for external causes (including suicide) (HR 2.07 (1.42-3.02) and for alcohol-related disease (HR 2.21 (1.14-4.31), but not for any other cause. Unemployment was not associated with any cause-specific mortality for women.

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
				status, and number of insured sick-leave days. Aggregate average workplace education, region of residence, unemployment rate, average area income	In age stratified analysis unemployment was associated with mortality at 25-34 years of age at 4 years of follow-up (HR 2.20 (1.20-4.01), but not at longer periods of follow-up and not for men of older ages. Unemployed married (HR 1.50 (1.16-1.93) and divorced/widowed (HR 1.65 (1.1.12-2.43) males had a risk of mortality at 4 years, but not for longer periods of follow-up. Unemployment was not associated with mortality for single men. In health stratified analysis, unemployment was associated with mortality at 4 years of follow-up for both men in good health (HR (1.31 (1.01-1.70) and poor health (HR (1.71 (1.25-2.34) at baseline.
(Norstrom 1988)	Unemployed and employed drawn from the 1960 Swedish Census. Suicide-related mortality was ascertained for 10 years until 1970.	Relative risks derived from age-ajusted rate ratios	Unemployed at the time of the census for at least 4 months	Age	Unemployment was associated with a relative risk of dying of 3.04 (2.05-4.51) in the first five years of follow-up and of 2.41 (1.60-3.63) compared to those employed at the time of the 1960 census.
(Nylen, Voss, and Floderus 2001)	Working-age population drawn from a cohort of all twins born during 1926-58. Employment status and other characteristics were measured in 1973. Mortality was ascertained for 24 years until 1996.	Cox proportional hazards; analysis was not adjusted for clustering by twins.	Ever unemployed; Unemployed at baseline; Employed at baseline but	Age, marital status, smoking, drinking, sleeping pills (men only), tranquilizers (women only),instability (men only) extraversion (women only), serious prior illness	Being ever unemployed was associated with mortality for both men (HR 1.34 (1.03-1.73)) and women (HR 1.62 (1.11-2.35)) at 24 years of follow-up but not at 5 years of follow-up. Being unemployed at baseline (1973) was associated with mortality at 24 years for women (HR 1.98 (1.16-3.38)), but not for men (HR 1.43 (0.91-2.25)), while at 5 years of follow-up the association was significant for men (HR 3.29 (1.33-8.17)) but not for women (2.60 (0.33-20.55)). Being previously unemployed, but employed at

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
			previous unemployment		baseline was not associated with mortality for either men or women.
(Stefansson 1991)	Long-term unemployed in 1980-83 drawn from an administrative registry and an employed reference population from the Swedish Survey of Living Conditions in 1980-83. Mortality was ascertained for up to seven years until 1986.	Relative risks derived from age-ajusted rate ratios	Long-term unemployed (300 plus days if aged 25-54 or 450 plus days if aged 55-64) no longer entitled to unemployment benefits	Age	Unemployment was associated with mortality (1.37-RR 95% CI 1.42-1.84) overall and for men (1.61-RR 95% CI 1.42-1.84) but not for women (RR 1.14 95% CI 0.91-1.42). In age-stratified analysis unemployment was associated with a high statistically significant risk (RR between 3 and 7) of mortality at younger ages, but there was only a low or no relationship in older ages for men.
(Sundquist and Johansson 1997)	Representative working-age (24-64) sample drawn from the 1979-85 waves of the Swedish Survey of Living Conditions. All-cause mortality was ascertained for a maximum of 24 years of follow-up until 1993.	Cox proportional hazards	Long-term unemployed versus employed middle/upper level professionals. Duration of long-term unemployment is not defined.	Age, sex, marital status, SES based on occupation skill level and non-working categories, renter vs. house owner, education, country of birth, long-term limiting illness	Unemployment was associated with mortality for men 1.89 (1.11-3.20), but not for females 1.73 (0.85-3.55).
(Voss et al. 2004)	Working-age population drawn from a cohort of all twins born during 1926-58. Employment status and other characteristics were measured in 1973. All-cause and cause-specific mortality was ascertained for 24 years until 1996.	Cox proportional hazards; analysis adjusted for clustering by twins. Conditional logistic regression for twin-paired analysis.	Ever unemployed at or prior to baseline versus never unemployed	Age, marital status, education, children, smoking, drinking, use of sleeping pills and tranquilizers, life stress, shift work, SES based on occupation skill level, personality factors, serious prior illness	Unemployment was associated with mortality at 24 years of follow-up (RR 1.4 95% CI 1.0-1.9) but not at 10 years of follow-up (RR 1.4 95% CI 0.7-3.0) for women. For men unemployment was associated with mortality at both 24 (RR 1.3 95% CI 1.0-1.6) and 10 (RR 1.5 95% CI 1.0-2.2) years of follow-up. The association between unemployment and mortality related to injuries, poisonings and external causes was significant for both men and women. The results from the twin-paired conditional fixed-effects models were not significant for both men and women.

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
Finland (6 studies)					
(Blomgren and Valkonen 2007)	All labour-force participants aged 30-54 in urban for the years 1993-1994 drawn from employment administrative data. Mortality was ascertained for 6 years from 1995 to 2001.	Multi-level Poisson regression Random intercept model	Long-term unemployment – 12 or more months during baseline versus the employed or those who had experience short-term unemployment.	Age, Mother tongue, education, SES based on occupation skill level, family type (marital status and children), previous labour market experience 1989-1990. Unemployment rate, level of urbanization, voter turnout, level of family cohesion (one person households, single parent households, proportion divorced), region	Unemployment was associated with 1.8 increase in the risk of mortality for men and a 1.7 for women. In models exploring the interaction between area-level characteristics and unemployment the association between unemployment and mortality declined for women as the unemployment rate increased falling from a risk ratio of 2.01 to 1.53, but for men the difference was not statistically different falling from 1.96 to 1.71. Higher levels of urbanization increased the association between unemployment and mortality for both men and women, and increased area-level family cohesion led to a decrease in the association between unemployment and mortality. Increasing voter turnout did not modify the relationship between unemployment and mortality.
(Martikainen 1990)	All wage-earner men aged 30-54 drawn from the 1980 census and present at the 1970 and 1975 censuses. All cause and cause-specific mortality was ascertained from 1980 to 1985 for a maximum of 5/6 years.	Log-linear regression	Unemployed in the year prior to the census Duration of unemployment in the year prior to the census defined as 1-3 months, 4-6 months, 7-11 months and 12 months of unemployment.	Age, SES based on occupation skill level (1975), education, marital status (1975), reimbursable medicines, sick days	Unemployment in the year prior to the census was associated with mortality (RR 1.93 (1.82-2.05)). It was associated with a higher risk for external causes (RR 2.51 (2.28-2.76)) compared to diseases (RR 1.70 (1.58-1.83)). Among diseases, lung cancer, circulatory diseases, and respiratory diseases, alcohol-diseases, and other diseases were significantly associated with unemployment, while stomach cancer, cancer of the intestine and rectum and other cancers were not. Among external causes, alcohol poisonings, other accidents and violence, suicide and traffic accidents were all associated with mortality.

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
					Longer duration of unemployment was associated with a greater risk of mortality. The relative risk was ranged from 3 to 5 for the longest duration compared to a risk of about 1.5 for less than three months of unemployment (results presented graphically).
(Martikainen and Valkonen 1996)	All adults aged 25-59 from the 1990 census linked to administrative employment data from 1987 to 1992. All cause mortality is ascertained from 1991 to 1993 for a maximum of three years.	Poisson regression Unemployment is examined during a low unemployment period (1987-89) and during a period of increasing unemployment (1990-92) to examine the effect of health selection.	Unemployment in the 1987-89 period is defined as at least three months unemployment during this period. Unemployment in the 1990 to 1992 period is defined as at least one month unemployment during this period. Employment status is broken into three periods, employed/unemployed in 1987-89, employed/unemployed 1990, employed/unemployed 1991.	Age, gender, education, occupational class, marital status	Men unemployed in both 1990 and 1991 (RR 2.30 (1.98-2.68)) or in all three periods (RR 2.84 (2.62-3.08)) had a greater risk of mortality than men unemployed only between 1987 to 1989 (RR 1.45 (1.25-1.67)) or in 1991 (RR 1.66 (1.51-1.82)). Women unemployed in 1991 only (RR 1.60 (1.32-1.95)), in 1987 to 1989 only (RR 1.45 (1.16-1.80)) or in all three periods (RR 1.86 (1.53-2.29)) had a significant risk of mortality, but not women unemployed in both 1990 and 1991 (RR 1.14 (0.76-1.73)). Men employed in 1987-90, but unemployed in 1990 (RR 2.11 (1.76-2.53)) had a higher risk of mortality in the year following unemployment compared to men employed in 1987-91, but unemployed in 1991 (RR 1.72 (1.51-1.96)) or men employed in 1987-92 but unemployed in 1992 (RR 1.35 (1.16-1.56)). Women employed in 1987-90, but unemployed in 1990 (RR 1.61 (1.09-2.36)) and women employed in 1987-91, but unemployed in 1991 (RR 1.56 (1.17-2.08)) had a higher risk of mortality in the year following unemployment compared to women employed in 1987-91, but unemployed in 1992 (RR 1.30 (0.97-1.75)).
(Martikainen	Two cohorts of adults	Cox proportional	Unemployed is	Age, gender,	Unemployment was associated with a greater risk of

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
, Maki, and Jantti 2007)	aged 35-64 years, one from a period of low unemployment (1989) and the other from a period of high unemployment (1994) drawn from administrative employment data. All cause mortality us ascertained from 1990 to 1998 for the 1989 cohort and from 1995 to 2002 for the 1994 for a maximum if 8 years (7 years) of follow-up.	hazard Study examine speriods of low and high unemployment and degree of overall workplace downsizing to examine the effect of health selection.	defined a one or more months of unemployment in the baseline year versus employed throughout the baseline years or unemployed for less than one month	stratified by degree of downsizing at workplace: secure (less than 9% downsizing), moderate (10 to 29% downsizing), severe (30 to 49% downsizing), and workplace closure (50% or more downsizing).	mortality in the period of low unemployment (1989) (HR 2.38 (2.11-2.68)), compared to the period of high unemployment (1994) (HR (1.25 (1.12-1.40)). When stratified by degree of workplace closure unemployment was associated with a greater risk of mortality in secure (1989 cohort: HR 2.45 (2.12-2.83); 1994 cohort: HR 1.37 (1.17-1.61)) or moderately downsized (1989 cohort: HR 2.68 (2.04-3.53); 1994 cohort HR 1.56 (1.21-2.00)) establishments compared to those establishments severely downsized (1989 cohort: HR 1.51 (0.90-2.53); 1994 cohort: HR 1.10 (0.73- 1.66)) or undergoing workplace closure (1989 cohort: HR 1.47 (0.77-2.81); 1994 cohort HR 1.03 (0.78-1.37)).
(Pensola and Martikainen 2004)	All men aged 30-34 drawn from the 1990 Finnish Census. All cause mortality ascertained for 9 years until 1998.	Poisson regression	Short-term unemployment defined as less than 6 months unemployment during 1986-90 or one spell of unemployment at time of the 1975, 1980, 1985 or 1990 censuses. Long-term unemployment defined as more than six months unemployment during 1986-1990 or two or more spells	SES based on occupation skill level, education, marital status, children, mother tongue, number of siblings, family type (two parent or single parent home), parental class, region	Both short-term (RR 1.69 $p<0.05$) and long-term (RR 2.97 $p<0.05$) unemployment were associated with mortality.

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
			of unemployment at time of the 1975, 1980. 1985 or 1990 censuses.		
(Saarela and Finnas 2005)	Stratified random sample Swedish or Finnish speakers aged 40-67 comprising of 11 waves (1989-99) linked administrative data on labour market and socio-demographic factors. All-cause mortality is ascertained for 11 years until 1999.	Exponential transition rate hazard model.	Unemployed in any month in a 5-year window, and no receipt of a disability pension, versus employed for at least one month in a 5-year window and no receipt of a disability pension.	Age, Swedish or Finnish speaker, calendar time, education, marital status, birth region	Unemployment was significantly associated with mortality for both men (HR 2.38 (2.04-2.76)) and women (HR 1.74 (1.30-2.32)). In interaction models by language spoken and marital status (partnered, employed Swedish speaker is the reference category) unemployment is associated with a greater risk of mortality for both males (Swedish HR 5.15 (2.95-8.98) Finnish 5.39 (4.18-6.95)) and females (Swedish 7.93 (3.25-19.35) Finnish 4.07 (2.42-6.80)) living alone. Partnered males and male living with other family members have a small, but significant association between unemployment and mortality. Unemployment was not associated with mortality for partnered women and women living with other family members.
Denmark (2 studies)					
(Iversen, Andersen, Andersen, Christoffersen, and Keiding 1987)	Total Danish labour force aged 20-64 on the day of the 1970 Census. All cause and cause-specific mortality was ascertained for 10 years until 1980.	Poisson regression (multiplicative hazard regression) and in sensitivity analysis over-dispersed Poisson regression to account unobservable heterogeneity.	Unemployed on the day of the census.	Age, but stratified by gender, SES based on occupation skill level, housing, region, and marital status. Additional models looked at the interaction between mortality due to unemployment and the municipal	Unemployment was associated with mortality for both men (RR 1.58 (1.51-1.65)) and women (1.58 (1.40-1.78)). In the over-dispersed Poisson model the risk of mortality increased to 1.84 (1.62-2.09). For men working in a non-manual (RR 1.59 (1.40-1.82)) or skilled manual (RR 1.66 (1.50-1.83)) job, renting (RR 1.58 (1.43-1.74)) or living in Copenhagen (RR 1.59 (1.44-.174)), North East Sealand (RR 1.93 (1.69-2.21)), or an urban area (RR 1.61 (1.49-1.74)) was associated with an increase in mortality. There was no difference in the risk by marital status.

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
				unemployment rate (range <0.4%-2.0%).	For women working in a non-manual occupation (RR 1.75 (1.44-2.13)), renting (RR 1.62(1.34-1.97)), living in Copenhagen (RR 2.06 (1.72-2.48)) or North East Sealand (RR 1.92 (1.41-2.62)), and being widowed/divorced (RR 1.64 (1.37-1.97) was associated with an increased risk of mortality when unemployed, while being in unskilled manual job (RR 1.63 (0.81-3.29)), living an owner occupied house (RR 1.15 (0.84-1.55)), being married (RR 1.19 (0.95-1.49)), and living in an urban (RR 1.20 (0.96-1.50)) or rural area (RR 1.24 (0.91-1.70)) was not associated with a relationship between unemployment and mortality. For men, mortality due to cancer (RR 1.33 (1.21-1.47)), cardiovascular disease (RR 1.28 (1.18-1.39)), other diseases (RR 2.26 (2.04-2.51)), accidents (RR 2.55 (2.17-3.00)) or suicide (RR 2.51 (2.12-2.97)) were all associated with unemployment. While for women mortality due to cardiovascular disease (RR 1.41 (1.08-1.83)), other diseases 2.55 (1.98-3.27), accidents (RR 2.71 (1.83-4.00)) and suicides (RR 2.45 (1.72-3.49)) was associated with unemployment, while mortality due to cancer was not (RR 1.15 (0.94-1.40)). These relationships were consistent across the first five years of follow-up (1970-75) and the second five years of follow-up (1975-1980). For both men and women, a higher municipal unemployment rate was associated with reduction in the risk of mortality when unemployed. This decline was greater for women (β -0.3 (-0.588- -0.012)) than for men (β -0.118 (0.225- -0.012)).
(Osler, Christensen, Lund, Gamborg, Godtfredsen, and Prescott	Population based sample aged 20-67 and employed on Jan 1, 1980 drawn from the Copenhagen City Heart Study and the Glostrup	Cox proportional hazards; analysis adjusted for clustering by area. Age and area	Registered unemployment in 1980 Number of years registered	Age, gender, smoking, physical activity, drinking, marital status, education	Unemployment in 1980 was associated with mortality (HR 1.24 (1.11-.137)), and in the cumulative years of unemployment 2-6 years of unemployment was also associated with mortality (HR 1.45 (1.21-1.74) but not fewer years of unemployment.

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
2003)	Population and MONICA studies linked to administrative socio-economic data for the period of 1980-85. Mortality was ascertained for a maximum of 19 years to 1998.	unemployment rate are interacted with unemployed to account for potential differences in unemployment by age and by the unemployment rate.	unemployed (1980-85)	Area unemployment rate	Unemployment was significantly associated with mortality in the youngest age group 19-30 (HR 1.94 (1.06-3.53)), declining in the older age groups to no association in the eldest age group 60-67 (HR 0.96 (0.77-1.19)). There were no significant interactions in the association between unemployment and mortality by local unemployment rate.
The Netherlands					
(Schrijvers et al. 1999)	Population-based sample of adult Dutch (age 15-74) drawn from the 1991 Longitudinal Study on Socioeconomic Differences. All-cause mortality was ascertained for 5 years until 1996.	Cox proportional hazards Individuals with serious chronic disease at baseline were excluded.	Unemployed at the time of the survey.	Age, gender, marital status, religious affiliation, and degree of urbanization	Unemployment was not associated with mortality (HR: 1.10 (0.47-2.57)).
Germany					
(Frijters, Haisken-DeNew, and Shields 2005a)	All individuals aged fifteen or older from 19 waves (1984-2002) of the German Socio-economic panel. All-cause mortality is ascertained to a maximum of 19 years to 2002.	Cox proportional hazards and two extensions – Mixed PH model which allows for frailty (unobserved heterogeneity) and the increasing mixed PH model which allows for frailty to increase over time.	Unemployed at the time of the survey Unemployment is not a principal focus of this study. Unemployment is the omitted reference category, and results are presented for the employed.	Gender, age, marital status, children, foreign born, education, house owner, asset income, household income, % disabled, health satisfaction, invalid in household, live in West Germany, Average area income	Unemployment is not associated with mortality in any of the PH models. Employed vs unemployed, so a HR less than one indicated a positive association between unemployment and mortality. PH model: HR 0.94 (t-stat 0.65) MPH model HR 0.93 (t-stat 0.70) IMPH model HR 0.91 (t-stat 0.87)

Study	Cohort, data and follow-up period	Analytic approach	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
Switzerland					
(Gognalons-Nicolet, Derriennic, Monfort, and Cassou 1999)	Random sample of 820 older working- age adults (40-64) living in Geneva at baseline (1984). Mortality was ascertained for 12 years until 1996.	Cox proportional hazards There were too few deaths for women to conduct multivariable analysis	Ever unemployed defined as at least one period of unemployment during working life.	Age, occupational class, social activeness, past unemployment, model 1 (SRHS), or model 2 (serious illnesses)	Unemployment was associated with mortality for men when adjusting for SRHS (HR 2.8 (1.2-6.4) or Serious illnesses (HR 3.8 (1.6-9.2)) at baseline.
Italy (Not a CME, but is classified as a Mediterranean economy; it is included here for completeness)					
(Costa and Segnan 1987)	Sub sample of working-age males (15-59) from the 1976 and 1981 censuses. All cause and cause-specific mortality is ascertained from 1981 for 5 year until 1985.	Standardized mortality ratios (SMR) The reference population is the total male population from the census samples.	Unemployed at both censuses Unemployed at the 1976 census, employed at the 1981 census Employed at the 1976 census, unemployed at the at the 1981 census	Standardized for age, job tenure, education, region of birth, and marital status.	Men unemployed in 1981 (SMR 187 (159-222)) or unemployed at the time of both censuses (SMR 256 (209-308)) had significantly higher mortality than the referent working-age population or those employed at both censuses (SMR 81 (78-84)). Those mortality rate of those unemployed at the 1976 census, but employed at the 1981 census did not significantly differ from reference population. Men unemployed in 1981 also had significantly higher SMR for cancer, circulatory diseases, digestive diseases, external causes, and other causes, but not for digestive diseases.

Table B2: Summary of population-based cohort studies that examine the relationship between unemployment and mortality by country for Liberal Market Economies (19 studies)

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
United States (9 studies)					
(Cubbin, LeClere, and Smith 2000)	Nationally representative working-age (18-64) cohort drawn from the 1987-1994 cross-sectional waves of the National Health Interview Survey All mortality related to injury was ascertained for a maximum of 8 years from 1987 to 1995.	Cox proportional hazards	unemployed versus "white collar" employed workers	Age, gender, race/ethnicity, marital status, household income, education, occupation/employment status	Unemployment was associated with a higher mortality risk compared the "white collar" employed for all injuries (HR 2.26 p<0.01), homicide (HR 2.52 p<0.01), motor vehicle accidents (HR 1.83 p<0.01), and other external causes (HR 3.20 p<0.01), but not for suicide HR 1.70 p>0.05). The unemployed also had a higher risk of mortality compared to "blue collar" workers for all causes of injuries, but it is not clear if these differences are statistically significant.
(Hayward, Grady, Hardy, and Sommers 1989)	Nationally representative sample of older males (55 years +) drawn the 1966 to 1981 waves from National Longitudinal Survey of Older Men All-cause mortality was acertained for a maximum of 15 years from 1966 to 1981.	Wiebull parametric poportional hazards model	Unemployed during the week of the baseline survey	Age, marital status, education, hourly wage, pension coverage, job characteristics (substantive complexity, manipulative skill, physical demands, social skills), job tenure government employment, compulsory retirement, baseline health status	Unemployment was not associated with mortality (HR 0.26 (0.04-1.90)).
(Kiuila and Mieszkowski 2007)	Nationally representative adult cohort (25 years +) cohort drawn from the 1987-1994 cross-sectional waves of the National Health	Cox proportional hazards model	Unemployed in the two weeks prior to the survey	Age, gender, race, household income, education, marital status, family size, smoking, BMI, SRHS (model 2 only)	Unemployment is associated with mortality in young (HR 1.60, p<0.01) and older adults (HR 1.39, p<0.05), but not in middle-aged adults (HR 1.05 p>0.05). When baseline SRHS is added unemployment is

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	Interview Survey and stratified into young (25-44), middle (45-64) and older (65 +) adults. All mortality related to injury was ascertained for a maximum of 10 years from 1987 to 1997.			Health insurance is added in sensitivity analysis	associated with mortality in young adults (HR 1.50 $p<0.05$), but not in middle-aged (HR 1.02 $p>0.05$) or older adults (HR 1.29 $p>0.05$). When stratified by age and SRHS unemployment is associated with mortality in young adults (HR 1.82 $p<0.05$) in fair or poor health and in older adults (1.84 $p<0.01$) in good health, but not in any other age and SRHS combination. In an analysis of adults aged 25-64 covered by private health insurance unemployment was not associated with mortality (HR 0.95 $p>0.05$).
(Kposowa 2001)	Population-based adult cohort (15 years +) drawn from 5 cross-sectional waves of the Current Population Survey between 1979 and 1980. Cause-specific mortality related to suicide was ascertained for a maximum of 10 years from 1979 to 1989.	Cox proportional hazards model The cohort was restricted to non-Hispanic white, non-Hispanic blacks, and Hispanics due to the small number of suicides in other ethnicities.	Unemployed during the survey week and available for working and looking for work in 4 previous weeks prior to the survey, laid-off or waiting to start a new job within 30 days	Age, race/ethnicity, living arrangements, education, household income, urban/rural residence	Unemployment was associated with suicide in men at 2 years (HR 2.30 (1.16-4.54)) of follow-up, but not at 5 years (HR 1.16 (0.78-1.72)) or at 9 years (HR 1.14 (0.72-1.70)) of follow-up. Unemployment was associated with suicide in women at 2 years (25.19 (5.96-106.40)), 5 years (HR 3.85 (1.45-10.20)) and 9 years (HR 3.06 (1.42-6.60)) of follow-up.
(Lavis 1998)	Two cohorts of male heads drawn from the 1968 and 1977 waves of the Panel Study of Income Dynamics. Mortality was ascertained for 25 years for the 1968 cohort and 16 years for the 1977	Cox proportional hazards model. Yearly data on employment experience and time-varying covariates are included from each year of the PSID	1968 cohort Unemployed at time of survey (one or more years) 1977 cohort	Age, race/ethnicity, marital status, household income, family size, education, manual job, local (county) unemployment rate	For the 1968 cohort having been unemployed at least once on the day of the survey was associated with mortality (HR 3.23 (1.61-6.48)). The first instance of unemployment was more strongly associated with mortality (HR 3.50 (1.65-7.43)) compared to additional years of unemployment (2.20 (0.57,8.53)). Being unemployed in a county with a low unemployment rate was associated with higher risk of mortality (HR 3.50 (0.78-15.67) compared to

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	until 1992.	subsequent to baseline. Number of weeks unemployed in the year prior to the survey.	Unemployed any time in the years prior to the survey (versus employed or retired in the year previous) Men outside of the labour force are excluded.		unemployment in a county with a high unemployment rate (HR 1.42 (0.39-5.20)) although these difference were not statistically significant. For the 1977 cohort being unemployed at any time in the year prior to the survey was not associated with mortality (HR 1.56 (0.82-3.18)), but each additional week of unemployment in year prior to the survey was associated with mortality (HR 1.03 (1.00-1.05))
(Rogers, Hummer, and Nam 2000) Chapter 7 cohort	Nationally representative adult (18 years +) cohort drawn from the 1991 wave of the National Health Interview Survey. All cause and cause-specific mortality was ascertained for a maximum of 5 years until 1995.	Discrete-time (logistic) hazards model	Unemployed in the two weeks prior to the survey	Age, gender, race/ethnicity, marital status, household equivalent income (categorical), education, SRHS	Unemployment was not associated with mortality before (HR 0.96, $p>0.05$) or after adjusting (HR 0.88, $p>0.05$) for SRHS. Unemployment was not associated with any cause-specific mortality.
(Rogers, Hummer, and Nam 2000) Chapter 10 cohort	Nationally representative adult (18 years +) cohort drawn from the 1990 health promotion and disease prevention supplement of the National Health Interview Survey All cause and cause-specific mortality was ascertained for a maximum of 5 years until 1995.	Discrete-time (logistic) hazards model	Unemployed in the two weeks prior to the survey	Age, gender, race/ethnicity, marital status, household equivalent income (continuous), education, smoking, exercise, BMI, SRHS, activity limitations, bed sick days, hypertension, diabetes, heart condition, ever had stroke	Unemployment is associated with mortality before (HR 1.99 $p<0.05$) and after (HR 1.93 $p>05$) controlling for specific heath factors in adults aged 18-64. Unemployment is not associated with mortality in adult age 65 and older. Unemployment was not associated with any cause-specific mortality, but the hazard ratios are similar to the all cause mortality results.
(Sorlie and Rogot 1990)	Population-based adult cohort (25 years +)	Age standardized mortality ratios and	Unemployed during the survey	Age, gender, education, household	Unemployed white and black men had a SMR 1.6 and 2.2 times higher compared to employed white and

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	drawn from 7 cross-sectional waves of the Current Population Survey between 1979 and 1983. All cause and cause-specific mortality was ascertained for a maximum of 5 years until 1983.	logistic regression	week and available for working and looking for work in 4 previous weeks prior to the survey, laid-off or waiting to start a new job within 30 days	income (categorical)	black, men, respectively. Unemployment was not associated with mortality for women. In the logistic regression analysis unemployment was younger men (specific results not reported), but was not associated with mortality for older men (age 45-64 years) (OR: 1.07 p>0.05) or for older women (OR: 0.81 p>0.05). There was insufficient number of deaths of assess the association between unemployment and mortality in younger women.
(Sorlie, Backlund, and Keller 1995)	Population-based adult cohort (25 years +) drawn from 9 cross-sectional waves of the Current Population Survey between 1979 and 1989. All cause mortality was ascertained for a maximum of 10/11 years until 1989.	Cox proportional hazards model	Unemployed during the survey week and available for working and looking for work in 4 previous weeks prior to the survey, laid-off or waiting to start a new job within 30 days	Age, gender, race/ethnicity, marital status, education, household size, household income (categorical),	Unemployment associated with mortality for men aged 25-44 (HR 1.6 p<0.01) and 45-64 (1.16 p<0.01), but not for men aged 65 and over (HR 1.03 p>0.01). Unemployment was not associated with mortality in women aged 25-44 (HR 1.09 p>0.01), aged 44-64 (HR 0.85 p>0.01) and aged 65 and older (HR 0.90, p>0.01).
(Sullivan and Wachter 2007)	Linked administrative data from the state of Pennsylvania on all male workers experiencing mass layoffs during 1980-1987 compared to the entire male working population that did not experience unemployment due to do	Discrete-time (logitic) hazards model Two methods are used to account for potential health into unemployment. For the first, the mortality of all	Unemployment defined at workers who left their job at the same time their employers experienced 30% or greater decline in employment.	Age, year, prior career information on earnings and employment (1974-79), industry The relationship between post-layoff earnings and mortality is explored	Unemployment due to mass layoff is associated with mortality for workers aged 20-50 (OR 1.28 p>0.01) and aged 51-60 (OR 1.14 p>0.01) in 1980. These associations are robust to labour force attachment specification and interaction effects. The association between unemployment and mortally is highest the year of job loss (OR 2.67 p<0.01 workers aged 20-50 and OR 1.35 p<0.01 for all ages and declines thereafter.

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	mass layoffs. Sample refinements are conducted to explore the effect of labour force attachment (restricted to include only workers who remained in the labour forece between 1980-1986) and by birth cohort (aged 20-50 in 1980, and 51-60 in 1980). All-cause mortality is ascertained from 1980 or 1987 to 2002 for a maximum of 23 years of follow-up.	workers in the mass-layoff estabishments is comared to the mortality of workers in etablishments not experiencing mass layoffs. For the second the the size of mass-layoff as a porportion of total employment is used as an instrument for unemployment.		as a potential pathway between unemployment and mortality.	In age-stratified models the association between unemployment and mortality is greatest for workers aged 30-39 (OR 1.37 $p<0.01$), then workers aged 40-49 (OR 1.30 $p<0.01$), and workers aged 50-59 (1.24 $p<0.01$), but not workers aged 60-69 (OR 1.00 $p>0.05$). The authors estimate that about two-thirds of the effect of mass unemployment on mortality can be attributed to a decline in post-layoff career earnings. The relationship between mass unemployment and mortality is also related to an increase in the instability or variance of post-layoff earnings.
United Kingdom (7 studies)					
(Bethune 1996)	Women aged 15-59 and men aged 15-64 drawn from the OPSC longitudinal study (1% sample drawn from the 1971 British Census and followed in 1981 census). All cause and cause-specific mortality is ascertained from 1971 or 1981 to 1979 or 1989 respectively for a maximum of 9 years of follow-up. Women are only	Standardized mortality rates.	Unemployed and seeking work on the day of the census.	Stratified by age, gender, and social class. Age is based at age at death.	Unemployment was associated with mortality for both men (1971 SMR 135 (120-151); 1981 SMR 128 (118-138)) and women (1981 SMR 135 (107- 168). In age-stratified analysis the association between unemployment and mortality was higher in ages 16-44 in both men (1971 SMR 176 (135-226); 1981 SMR 153 (127-182)) and women (1981 SMR 162 (113-225)) compared to ages 45-64 in men (1971 SMR 127 (112-144); 1981 SMR 123 (112-134)) and ages 45-59 in women (1981 SMR 120 (87-160)). For men, unemployment in 1981 was also associated with higher SMR in lower social classes (SC IV SMR 136 (112-162); SC V SMR 172 (139-209)) compared to higher social class (SC 1 SMR 73 (29-15); SC 2 104 (77-138); SC 3 (non manual) SMR 110 (77-153); SC 3 (manual) SMR 114 (98-132)).

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	followed from the 1981 census.				Cause-specific SMRs are only graphically shown.
(Gardner and Oswald 2004)	Cohort of adults aged 40 years and older drawn from the 1991 wave of the British Household Panel Survey. Baseline variables are drawn from the 1991 and 1992 waves. Mortality is ascertained from 1992 to 2001 for a maximum of 10 years of follow-up.	Logistic regression approximating the log odd of dying at the end of follow-up. Marginal effect (percent change in the likelihood of dying).	Number of years unemployed (not otherwise specified but likely refers to unemployment at the time of the survey).	Age, gender, marital status, income quintile, log of household income, education, smoker, SRHS.	Each additional year of unemployment was associated with 1.4% increase ($p<0.01$ in the probability of dying for men (1.3% increase when controlling for SRHS). For women an additional year of unemployment was not associated with an increased risk of dying. (0.4 % $p>0.05$)
(Lewis and Sloggett 1998)	Adults aged 15-64 drawn from the OPSC longitudinal study (1% sample drawn from the 1971 British Census and followed in 1981 census). Suicide was ascertained from 1983 to 1992 for a maximum of 10 years.	Logistic regression Suicides in 1981 and 1982 are excluded to account for health selection.	Unemployed and seeking work on the day of the 1981 census. Unemployed in both the 1971 and 1981 censuses. Unemployed in 1971 and employed in 1981. Employed in 1971 and unemployed in 1981.	Age, gender, marital status, time period, social class, education, housing tenure, access to car	Unemployment was associated with suicide-related mortality adjusting for age and gender (OR 3.14 (2.44-4.02)) and with the inclusion of SES (OR 2.58 (1.97-3.38)) for unemployment in 1981. Unemployment in both 1971 and 1981 was associated with suicide (OR (3.30 (1.73-6.32)), but not for unemployment in 1971 and employment in 1981 (OR 1.48 (0.82-2.66)). Employment in 1971 and unemployment in 1981 was associated with suicide (OR 2.39 (1.79-3.19)).
(Morris, Cook, and Shaper	Men aged 40-59 at initial screening drawn from the British Regional	Cox proportional hazards	Unemployed not due to illness any time during the 5-	Age, social class (manual vs non-manual occupation),	Unemployment was associated with all-cause mortality before (HR 1.49 (1.12-1.98)) and after (HR 1.47 (1.10-1.96)) adjusting for pre-existing disease.

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
1994)	Heart Study. Men unemployed at initial screening or who report unemployment in the 5-years prior to screening were excluded from the study. All-cause and cause-specific mortality was ascertained after a five-year baseline period (1979-1983/5) to 1990 for a maximum of 7 years of follow-up.	Cohort is restricted to men employed at initial screening to account for health selection into unemployment.	years baseline period versus continuously employed during the baseline period. (Unemployment or retired due to illness is a separate category)	town, smoking, alcohol intake, and pre-existing disease.	Unemployment was associated with mortality related to cancer (HR 1.59 (1.00-2.51)) and circulatory disease (HR 1.64 (1.10-2.47)). The association between unemployment and all-cause mortality did not differ when stratified by manual and non-manual occupations.
(Moser, Fox, and Jones 1984)	Men aged 15-64 drawn from the OPSC longitudinal study (1% sample of the 1971 British Census). All-cause and cause-specific mortality was ascertained from 1971-1981 for a maximum of 10 years.	Standardized mortality rates. In sensitivity analysis the follow-up period is broken into the first five years (1971-75) and the second five years (1976-1981) to account for health selection into unemployment.	Unemployed and seeking work on the day of the 1971 census versus all men in the cohort.	Age and social class (occupation), Age and housing tenure (only all-cause)	Unemployment was associated with all-cause mortality when adjusting for age and social class and age (SMR 121 (108-135)) and housing tenure (SMR 127 (113-141)). Unemployment was associated with malignant neoplasms (SMR 128 (103-155)), lung cancer (SMR 154 (113-208)), and suicide (SMR 169 (102-254)), but not circulatory diseases (109 (90-129)), ischaemic heart disease (107 (86-130)), respiratory diseases (\132 (86-187), asthma and other bronchial disease (117 (59-193)) or other external causes (SMR 140 (90-200)). The association between unemployment and mortality did not differ by follow-up period (1st five years versus 2nd five years).
(Moser et al. 1986)	Men aged 15-64 drawn from the OPSC longitudinal study (1%	Standardized mortality rates.	Unemployed and seeking work on the day of the 1971	Age and stratified by a high- (North & West), mid-	The association between unemployment was higher in the high- (SMR 141 (118-167)) and mid- (SMR 143 (116-173)) unemployment regions compared to the

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	sample of the 1971 British Census). All-cause and cause-specific mortality was ascertained from 1971-1981 for a maximum of 10 years.		census versus all men in the cohort.	(Central), and low-(South & East) unemployment region.	low (SMR 118 (96-143)) unemployment region. For cause specific mortality the association between unemployment and suicide was twice as high in the high- (SMR 333 (148-593)) and mid- (SMR 286 (100-567), compared to the low (SMR 147 (45-308). The association between unemployment and other external cause mortality was higher in the low- (SMR 224 (110-380)), compared to the mid- (SMR 159 (62-302)) or high- (SMR 157 (66-287)). For other cause specific mortality the association are similar to what was reported in Moser 1984 with having a lower and non-significant SMR for the unemployed.
(Moser, Goldblatt, Fox, and Jones 1987)	Men aged 15-64 drawn from the OPSC longitudinal study (1% sample drawn from the 1971 British Census and followed in 1981 census). All cause and cause-specific mortality is ascertained from 1971 or 1981 to 1973 or 1983 respectively for a maximum of 3 years of follow-up.	Standardized mortality rates.	Unemployed and seeking work on the day of the census.	Stratified by age. Age is based at age at death.	Unemployment is significantly associated with mortality for men aged 15-44 in 1981 (SMR 160 (115-217)), but not in 1971(SMR 162 (95-248)) or for males aged 45-65 for 1971 (SMR (115 (91-142)) or 1981 (SMR (103 (87-121)). For cause specific mortality, unemployment in 1981 was associated with a higher SMR in 1983 for lung cancer (SMR 209 (112-336)), circulatory disease (SMR 159 (116-210)), including ischaemic heart disease (SMR 182 (129-245)) and all external causes (SMR 240 (121-399)), but not for malignant neoplasms (SMR 138 (88-199)), respiratory diseases (SMR 91 (16-226)) or suicide (241 SMR (93-458)).
New Zealand (2 studies)					
(Blakely et al. 2002)	Working-age adults aged 25-64 from the 1991 New Zealand Census. All cause and cause-specific mortality was	Logistic regression Individuals who died in the 6 months after the census were excluded to	Unemployed on the day of the census and available and looking for work	Age, ethnicity	Unemployment was associated with all-cause mortality for men (OR 1.40 (1.24-1.59)) but not for women (OR 1.15 (0.92-1.43)). In men unemployment was associated with cardiovascular disease mortality (OR 1.42 (1.15-

Study	Cohort, data and follow-up period	Estimation method	Unemployment measure(s)	Adjustments/ Pathways	Study results (results are reported only on fully adjusted models)
	ascertained from 1991 to 1994 for a maximum of 4 years	account for health selection.			1.74)) and suicide (OR 2.70 (1.84-3.95)), but not with mortality related to cancer (OR 1.24 (0.99-1.56)) or unintentional injuries (OR 1.25 (0.84-1.85)). In women unemployment was associated with suicide (OR 2.86 (1.19-6.85)), but not mortality related to cardiovascular disease (OR 1.16 (0.70-1.93)), cancer (OR 0.88 (0.63-1-22)), or unintentional injuries (OR 0.62 (0.19-2.00)).
(Keefe, Reid, Ormsby, Robson, Purdie, and Baxter 2002)	Meat-packing workers unemployed due to a plant closure in 1986 and employed controls from a plant that remained open through-out follow-up. All cause and cause-specific mortality was ascertained from 1986 to 1994 for a maximum of 8 years.	Cox proportional hazards Study has low power due to small number of deaths.	Unemployment due to plant closure.	Age, gender, ethnicity	Unemployment was not associated with all-cause mortality (HR 1.19 (0.87 (1.62)) or any cause-specific mortality, although there was a two-fold increase in risk for hazard ratios for suicide (HR 2.15 (0.56-8.36)) and other external injuries (HR 1.90 (0.66-5.47)).

Appendix C: Supplementary Tables for the Study Cohorts and Variable Development

Table C1: Mortality experience by sample population for individuals between the ages of 18 and 64 at baseline for the German cohort

	Sample A: West German Cohort (1984-2005)	Sample B: Foreigner Cohort (1984-2005)	Sample C: East German Cohort (1991-2005)	Sample D: Immigrant Cohort (1994/5-2005)	Sample E: Refreshment Cohort (1998-2005)	Sample F: Innovation Cohort (2000-2005)	Sample G: High Income Cohort (2002-2005)
SOEP Cohort 1984-2005 (95% GSOEP sample)							
Total sample size	16,222	6,905	7,727	2,002	2,602	14,647	3,449
Mean age at sample inception	44.1	36.4	42.6	37.8	47.6	47.2	46.6
Mean age at death	73.5	55.5	69.1	61.7	74.7	74.0	61.3
Deaths	1,881 (11.6)	146 (2.1)	555 (7.2%)	42 (2.1%)	100 (3.8%)	343 (2.3%)	21 (0.6%)
All Heads and Spouses with at least one year of complete data (1984-2005) and between the ages of 18 and 64 at baseline							
Sample size	9,557	3,783	4,713	1,105	1,525	8,208	2,075
Mean number of years followed	11.5	9.5	9.6	7.0	5.5	4.3	3.0
Mean age at baseline	37.3	35.3	36.9	36.0	42.9	42.9	47.9
Mean age at death	64.2	56.4	59.0	55.2	61.0	58.1	58.0
Deaths	821 (8.6%)	122 (3.2%)	265 (5.6%)	30 (2.7%)	27 (1.8%)	84 (1.0%)	8 (0.4%)
Heads and Spouses with three or more years of complete data (1984-2005) and between the ages of 18 and 64 at baseline							
Sample size	7,973	2,972	3,978	890	1,159	5,834	1,391
Mean number of years followed	13.5	11.7	11.3	8.4	6.8	5.4	3.8
Mean age at baseline	37.3	35.1	37.4	36.3	43.1	43.6	48.9
Mean age at death	65.1	58.2	59.6	58.4	62.3	60.0	64
Deaths	677 (8.5%)	97 (3.3%)	214 (5.4%)	19 (2.1%)	18 (1.6%)	46 (0.8%)	1 (0.1%)

Table C2: Hierarchy of monthly labour force status variables by study year

Rank	1984-1990	1991-1993	1994-1995	1996-1999	2000-2004	2005
1	FT employed	FT employed	FT employed	FT employed	FT employed	FT employed
2	Vocational training	Vocational training	Vocational training	Vocational training	First-time company training	First-time company training
3	PT or occasionally employed	PT or occasionally employed	Short-term contract	PT or occasionally employed	Continuing vocational training	Continuing vocational training
4	Military/ civilian service	Military/ civilian service	PT or occasionally employed	Military/ civilian service	PT or occasionally employed	PT or occasionally employed
5	**Registered unemployed**	Maternity/child leave	Military/ civilian service	Maternity/child leave	Military/ community service	Mini-job
6	Retired	**Registered unemployed**	Maternity/child leave	**Registered unemployed**	Maternity/child leave	Military/ community service
7	In school	Retired	**Registered unemployed**	Retired	**Registered unemployed**	Maternity/child leave
8	Keeping house	In school	Retired	In school	Retired	**Registered unemployed**
9	Other	Keeping house	In school	Keeping house	In school	Retired
10		Other	Keeping house	Other	Keeping House	In school
11			Other		Other	Keeping House
12						Other

Full time employed – FT working, vocational training
Part time employed – PT working, occasional, mini-job, short-term contract
Out of labour force: not working – military, community service, in school, retired, maternity leave/child rearing leave, other
Unemployed – registered unemployed

Table C3: Highest degree of education based on a modified CASMIN classification at baseline (t-2) for the mortality cohort

Skill Classification	Germany (1984-1995)		United States (1984-1995)	
	Compulsory general elementary certificate (1a, 1b)	1,523 (14.1%)	Less than high school (1a, 1b)	2,183 (22.4%)
Specific	Basic vocational qualification (1c)	3,816 (35.4%)	These educational qualifications do not exist in the United States	NA
Specific	Intermediate vocational qualification (2a)	2,675 (24.8%)		
Specific	Vocational Maturity Certificate (2c_voc)	470 (4.4%)	Vocational degree or certificate (2c_voc, 3a_voc) (Not able to distinguish between 2c_voc and 3a_voc in the PSID)	1,741 (17.9%)
Specific	Tertiary Education (3a_voc)	252 (2.4%)		
General	Intermediate general qualification or maturity certificate (2b, 2c_gen)	626 (5.8%)	High school or GED - includes some college (2b, 2c_gen)	3,924 (40.4%)
General	Tertiary Education – (3b, 3c)	1,406 (13.1%)	Associate, bachelor, professional or graduate degree (3a_gen, 3b, 3c)	1,870 (19.2%)
		10,768		9,718

Appendix D: Supplementary Tables for the Unemployment and Mortality Analysis

Table D1: Comparison of the health model with and without accounting for survey design for all three labour force statuses, German cohort, 1986-2004

	Health	Health with RE controlling for survey design	Health	Health with RE controlling for survey design	Health	Health with RE controlling for survey design
Unemployed	1.417 [0.984,2.042]	1.405 [0.974,2.026]				
Not Working	2.005*** [1.605,2.505]	1.994*** [1.594,2.494]				
Number of months unemployed			1.049** [1.013,1.086]	1.048** [1.012,1.085]		
Number of month not working			1.073*** [1.052,1.095]	1.072*** [1.051,1.094]		
% of yrs followed unemployed					1.007* [1.001,1.012]	1.007* [1.001,1.012]
% of yrs followed not working					1.007*** [1.004,1.011]	1.008*** [1.004,1.011]
Age	1.045*** [1.035,1.054]	1.046*** [1.037,1.056]	1.044*** [1.034,1.053]	1.045*** [1.035,1.055]	1.050*** [1.040,1.059]	1.051*** [1.042,1.061]
Male	2.466*** [2.017,3.015]	2.509*** [2.046,3.076]	2.436*** [1.989,2.984]	2.469*** [2.011,3.031]	2.460*** [2.007,3.014]	2.504*** [2.038,3.076]
East German	1.280** [1.071,1.529]	1.253* [1.042,1.506]	1.306** [1.091,1.563]	1.283** [1.067,1.543]	1.235* [1.030,1.481]	1.208* [1.001,1.457]
Immigrant	0.814 [0.593,1.117]	0.761 [0.540,1.071]	0.814 [0.591,1.122]	0.775 [0.551,1.088]	0.808 [0.589,1.110]	0.760 [0.541,1.068]
Spouse	0.941 [0.763,1.162]	0.948 [0.766,1.172]	0.933 [0.753,1.155]	0.938 [0.756,1.163]	0.931 [0.752,1.153]	0.935 [0.753,1.159]
Single	1.487* [1.045,2.115]	1.510* [1.055,2.162]	1.463* [1.021,2.097]	1.487* [1.033,2.142]	1.384 [0.965,1.986]	1.406 [0.975,2.028]
Div or Sep	1.359* [1.021,1.808]	1.383* [1.033,1.851]	1.432* [1.073,1.912]	1.452* [1.083,1.948]	1.337* [1.002,1.783]	1.362* [1.016,1.827]
Widowed	1.120 [0.867,1.445]	1.082 [0.832,1.405]	1.193 [0.925,1.539]	1.164 [0.898,1.510]	1.120 [0.868,1.447]	1.086 [0.836,1.411]
Household size(#)	1.171** [1.046,1.311]	1.169** [1.042,1.311]	1.181** [1.055,1.323]	1.180** [1.052,1.323]	1.163** [1.040,1.301]	1.161* [1.036,1.301]
Children(#)	0.715*** [0.593,0.863]	0.720*** [0.596,0.870]	0.718*** [0.594,0.866]	0.722*** [0.597,0.872]	0.699*** [0.579,0.844]	0.704*** [0.583,0.851]
Hhld income (t-1,1og)	0.825***	0.830***				

	[0.752,0.906]	[0.756,0.912]				
Hhld income (t-2,1og)			0.827***	0.829***	0.816***	0.819***
			[0.751,0.910]	[0.753,0.914]	[0.744,0.894]	[0.746,0.899]
Med_skill	1.186	1.218	1.235	1.259	1.231	1.260
	[0.939,1.499]	[0.961,1.544]	[0.974,1.567]	[0.990,1.601]	[0.974,1.558]	[0.993,1.599]
No occupation	1.582**	1.583**	1.546**	1.550**	1.291	1.284
	[1.163,2.152]	[1.159,2.162]	[1.131,2.115]	[1.130,2.127]	[0.914,1.825]	[0.905,1.823]
Bus/sales occ	1.079	1.058	1.076	1.061	1.080	1.059
	[0.793,1.469]	[0.775,1.445]	[0.786,1.473]	[0.772,1.456]	[0.792,1.473]	[0.774,1.449]
Services occ	0.991	0.986	0.990	0.983	0.960	0.952
	[0.699,1.406]	[0.692,1.405]	[0.694,1.411]	[0.687,1.407]	[0.675,1.366]	[0.666,1.360]
Agr/For/Min occ	1.103	1.076	1.109	1.087	1.094	1.062
	[0.669,1.819]	[0.644,1.796]	[0.675,1.822]	[0.654,1.806]	[0.667,1.795]	[0.639,1.764]
Manufacturing occ	0.995	0.973	0.979	0.962	0.998	0.974
	[0.724,1.367]	[0.705,1.343]	[0.708,1.355]	[0.693,1.335]	[0.724,1.375]	[0.704,1.346]
Hlth sat good (t-1)	0.919	0.908				
	[0.676,1.251]	[0.667,1.237]				
Hlth sat satisfied (t-1)	1.512**	1.493**				
	[1.123,2.035]	[1.107,2.014]				
Hlth sat poor (t-1)	1.895***	1.887***				
	[1.381,2.601]	[1.372,2.596]				
Hlth sat bad (t-1)	3.808***	3.832***				
	[2.772,5.231]	[2.782,5.277]				
Disabled (t-1)	1.426***	1.455***				
	[1.217,1.671]	[1.238,1.711]				
Hlth sat good (t-2)			0.949	0.941	0.959	0.950
			[0.714,1.260]	[0.707,1.251]	[0.724,1.271]	[0.716,1.260]
Hlth sat satisfied (t-2)			1.244	1.232	1.261	1.246
			[0.939,1.646]	[0.929,1.633]	[0.955,1.665]	[0.942,1.648]
Hlth sat poor (t-2)			1.743***	1.736***	1.762***	1.752***
			[1.294,2.349]	[1.286,2.343]	[1.310,2.369]	[1.300,2.360]
Hlth sat bad (t-2)			2.808***	2.811***	2.903***	2.905***
			[2.066,3.817]	[2.063,3.829]	[2.141,3.937]	[2.137,3.949]
Disabled (t-2)			1.468***	1.492***	1.522***	1.554***
			[1.248,1.726]	[1.265,1.760]	[1.295,1.789]	[1.318,1.831]
sigma_u		0.352		0.310		0.343
		[0.231,0.536]		[0.185,0.523]		[0.220,0.533]
rho		0.070		0.055		0.067
		[0.313,0.148]		[0.020,0.142]		[0.287,0.147]
Observations	117123	117123	115649	115649	116877	116877
AIC	9658.0	9652.6	9536.7	9534.2	9717.2	9712.6
BIC	9909.4	9913.7	9787.8	9795.0	9968.6	9973.7

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D2: Comparison of health model with and without accounting for survey design for all three labour force status, American cohort, 1986-2004

	Health	Health with RE controlling for survey design	Health	Health with RE controlling for survey design	Health	Health with RE controlling for survey design
Unemployed	2.353*** [1.656,3.343]	2.353*** [1.656,3.343]				
Not Working	2.428*** [1.956,3.014]	2.428*** [1.956,3.014]				
Number of months unemployed			1.090*** [1.047,1.135]	1.090*** [1.047,1.135]		
Number of month not working			1.061*** [1.043,1.079]	1.061*** [1.043,1.079]		
% of yrs followed unemployed					1.016*** [1.008,1.024]	1.016*** [1.008,1.024]
% of yrs followed not working					1.007*** [1.004,1.010]	1.007*** [1.004,1.010]
Age	1.052*** [1.044,1.060]	1.052*** [1.044,1.060]	1.059*** [1.051,1.066]	1.059*** [1.051,1.066]	1.065*** [1.057,1.073]	1.065*** [1.057,1.073]
Male	1.722*** [1.397,2.125]	1.722*** [1.397,2.125]	1.742*** [1.410,2.151]	1.742*** [1.410,2.151]	1.761*** [1.425,2.175]	1.761*** [1.425,2.175]
Black	1.203* [1.021,1.419]	1.203* [1.021,1.419]	1.255** [1.063,1.481]	1.255** [1.063,1.481]	1.248** [1.057,1.474]	1.248** [1.057,1.474]
Other	0.864 [0.613,1.218]	0.864 [0.613,1.218]	0.854 [0.606,1.204]	0.854 [0.606,1.204]	0.832 [0.590,1.173]	0.832 [0.590,1.173]
Spouse	0.981 [0.955,1.007]	0.981 [0.955,1.007]	0.984 [0.958,1.011]	0.984 [0.958,1.011]	0.985 [0.959,1.012]	0.985 [0.959,1.012]
Single	1.596** [1.201,2.122]	1.596** [1.201,2.122]	1.643*** [1.234,2.188]	1.643*** [1.234,2.188]	1.625*** [1.219,2.166]	1.625*** [1.219,2.166]
Div or Sep	1.049 [0.819,1.343]	1.049 [0.819,1.343]	1.039 [0.809,1.334]	1.039 [0.809,1.334]	1.022 [0.796,1.313]	1.022 [0.796,1.313]
Widowed	1.239 [0.965,1.591]	1.239 [0.965,1.591]	1.249 [0.972,1.607]	1.249 [0.972,1.607]	1.243 [0.967,1.599]	1.243 [0.967,1.599]
Household size(#)	0.985 [0.895,1.084]	0.985 [0.895,1.084]	0.991 [0.901,1.090]	0.991 [0.901,1.090]	0.987 [0.898,1.086]	0.987 [0.898,1.086]
Children(#)	0.881 [0.762,1.019]	0.881 [0.762,1.019]	0.873 [0.754,1.010]	0.873 [0.754,1.010]	0.875 [0.756,1.013]	0.875 [0.756,1.013]
Hhld income (t-1,1og)	0.925* [0.864,0.990]	0.925* [0.864,0.990]				
Hhld income (t-2,1og)			0.907** [0.846,0.972]	0.907** [0.846,0.972]	0.909** [0.848,0.975]	0.909** [0.848,0.975]
Educ - Medium skill	1.109 [0.864,1.422]	1.109 [0.864,1.422]	1.192 [0.928,1.530]	1.192 [0.928,1.530]	1.187 [0.925,1.525]	1.187 [0.925,1.525]
No occupation	1.115	1.115	1.144	1.144	0.979	0.979

	[0.840,1.479]	[0.840,1.479]	[0.859,1.523]	[0.859,1.523]	[0.706,1.359]	[0.706,1.359]
Bus/sales occ	0.924 [0.699,1.223]	0.924 [0.699,1.223]	0.910 [0.688,1.204]	0.910 [0.688,1.204]	0.905 [0.684,1.198]	0.905 [0.684,1.198]
Services occ	1.003 [0.733,1.372]	1.003 [0.733,1.372]	1.027 [0.750,1.405]	1.027 [0.750,1.405]	1.009 [0.737,1.381]	1.009 [0.737,1.381]
Agr/For/Min occ	1.177 [0.778,1.781]	1.177 [0.778,1.781]	1.179 [0.779,1.784]	1.179 [0.779,1.784]	1.185 [0.783,1.793]	1.185 [0.783,1.793]
Manufacturing occ	1.213 [0.906,1.625]	1.213 [0.906,1.625]	1.262 [0.942,1.691]	1.262 [0.942,1.691]	1.264 [0.944,1.693]	1.264 [0.944,1.693]
Very good SRHS (t-1)	1.468* [1.034,2.084]	1.468* [1.034,2.084]				
Good SRHS (t-1)	2.028*** [1.447,2.841]	2.028*** [1.447,2.841]				
Fair SRHS (t-1)	3.810*** [2.681,5.414]	3.810*** [2.681,5.414]				
Poor SRHS (t-1)	7.249*** [4.976,10.560]	7.249*** [4.976,10.561]				
Disabled (t-1)	1.103 [0.926,1.315]	1.103 [0.926,1.315]				
Very good SRHS (t-2)			1.050 [0.783,1.409]	1.050 [0.783,1.409]	1.051 [0.783,1.410]	1.051 [0.783,1.410]
Good SRHS (t-2)			1.254 [0.944,1.666]	1.254 [0.944,1.666]	1.256 [0.946,1.670]	1.256 [0.946,1.670]
Fair SRHS (t-2)			2.229*** [1.648,3.015]	2.229*** [1.648,3.015]	2.250*** [1.664,3.042]	2.250*** [1.664,3.042]
Poor SRHS (t-2)			3.441*** [2.460,4.813]	3.441*** [2.460,4.813]	3.582*** [2.560,5.011]	3.582*** [2.560,5.011]
Disabled (t-2)			1.313** [1.100,1.566]	1.313** [1.100,1.566]	1.350*** [1.130,1.612]	1.350*** [1.130,1.612]
sigma_u		0.004 [4.49e-09, 3505.953]		0.003 [1.27e-07, 93.902]		0.004 [1.50e-07, 96.08]
rho		0.000 [1.22e-17, 0.9999]		0.000 [9.80e-15, 0.9998]		0.000 [1.37e-14, 0.9998]
Observations	99175	99175	99129	99129	99129	99129
AIC	8907.9	8909.9	9020.2	9022.2	9047.2	9049.2
BIC	9155.0	9166.5	9267.3	9278.8	9294.4	9305.9

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix E: Supplementary Tables for the Unemployment and Self-reported Health Analysis

Table E1: Testing proportional odds assumption of the ordered logit model for SRHS with current labour force status as the principal dependent variable, German cohort, 1995-2005

	SRHS ordered logit	SRHS - P/FGVGE	SRHS - PF/GVGE	SRHS - PFG/VGE	SRHS - PFGVG/E
Unemployed	1.227***	2.402***	1.564***	1.217***	1.062
	[1.160,1.297]	[2.056,2.807]	[1.444,1.695]	[1.138,1.302]	[0.935,1.207]
Not Working	1.055*	1.811***	1.246***	1.039	0.979
	[1.008,1.104]	[1.558,2.105]	[1.161,1.338]	[0.982,1.100]	[0.883,1.084]
Age	1.077***	1.140***	1.106***	1.076***	1.068***
	[1.066,1.088]	[1.094,1.188]	[1.087,1.125]	[1.062,1.089]	[1.045,1.091]
Age Squared	0.999***	0.999***	0.999***	1.000***	1.000*
	[0.999,1.000]	[0.998,0.999]	[0.999,0.999]	[0.999,1.000]	[0.999,1.000]
Male	0.943***	1.024	0.906**	0.924***	0.906**
	[0.910,0.976]	[0.900,1.165]	[0.853,0.963]	[0.884,0.967]	[0.843,0.975]
Single	0.950	0.978	0.984	0.945	0.945
	[0.901,1.001]	[0.791,1.209]	[0.892,1.084]	[0.885,1.009]	[0.861,1.038]
Div or Sep	0.965	1.393***	1.071	0.945	0.821***
	[0.913,1.021]	[1.168,1.661]	[0.982,1.167]	[0.884,1.009]	[0.734,0.917]
Widowed	0.932	1.031	0.985	0.856**	0.916
	[0.861,1.009]	[0.822,1.293]	[0.873,1.112]	[0.768,0.954]	[0.724,1.161]
Spouse	1.035*	1.046	1.023	1.041	1.086*
	[1.001,1.070]	[0.920,1.189]	[0.964,1.086]	[0.998,1.087]	[1.012,1.166]
Children(#)	0.958***	0.815***	0.927***	0.951**	0.940*
	[0.935,0.982]	[0.738,0.900]	[0.888,0.967]	[0.922,0.981]	[0.887,0.997]
Household size(#)	1.028**	1.059	1.034	1.029*	1.088**
	[1.007,1.050]	[0.982,1.142]	[0.999,1.070]	[1.001,1.057]	[1.032,1.148]
Hhld income (t-1,1og)	0.855***	0.788***	0.819***	0.825***	0.811***
	[0.829,0.882]	[0.736,0.844]	[0.781,0.858]	[0.793,0.859]	[0.757,0.868]
Educ - Minimum skill	1.267***	1.328**	1.374***	1.366***	1.197**
	[1.201,1.337]	[1.094,1.613]	[1.258,1.501]	[1.275,1.463]	[1.061,1.351]
Educ - Medium skill	1.105***	1.094	1.122***	1.133***	1.115**
	[1.065,1.147]	[0.929,1.288]	[1.048,1.202]	[1.080,1.187]	[1.036,1.200]
No occupation	1.060	0.992	1.050	1.109*	0.953
	[0.982,1.145]	[0.721,1.363]	[0.921,1.198]	[1.005,1.224]	[0.811,1.120]
Professionals and Technicians	0.932*	0.770	0.919	0.932	0.911
	[0.874,0.995]	[0.559,1.061]	[0.815,1.037]	[0.858,1.012]	[0.804,1.033]
Clerical	0.951	0.817	0.901	0.999	0.887
	[0.882,1.025]	[0.577,1.156]	[0.785,1.034]	[0.908,1.099]	[0.766,1.026]
Services and Sales	1.077	0.917	1.047	1.115*	1.088

	[0.998,1.163]	[0.650,1.293]	[0.911,1.203]	[1.011,1.229]	[0.934,1.267]
Skilled_Trades	1.078*	1.095	1.039	1.124*	1.110
	[1.004,1.158]	[0.802,1.494]	[0.912,1.183]	[1.026,1.233]	[0.961,1.283]
Plant and Equipment operators	1.040	1.088	1.073	1.083	1.005
	[0.959,1.127]	[0.777,1.522]	[0.932,1.236]	[0.978,1.199]	[0.853,1.184]
Agricultural	1.023	1.082	1.045	1.023	1.141
	[0.897,1.167]	[0.653,1.792]	[0.820,1.333]	[0.866,1.209]	[0.840,1.551]
Labourers	1.013	0.938	1.047	1.015	1.088
	[0.936,1.096]	[0.677,1.299]	[0.912,1.201]	[0.916,1.124]	[0.919,1.289]
VG srhs (t-1)	5.611***				
	[5.239,6.008]				
Good srhs (t-1)	28.016***				
	[25.952,30.245]				
Fair (t-1)	116.297***				
	[106.078,127.501]				
Poor srhs (t-1)	635.501***	18.896***			
	[547.064,738.234]	[16.404,21.767]			
Fair/poor srhs (t-1)			10.334***		
			[9.756,10.945]		
Good/Fair/poor srhs (t-1)				8.118***	
				[7.796,8.454]	
VG/Good/Fair/poor srhs (t-1)					11.174***
					[10.424,11.979]
Disabled (t-1)	2.165***	3.720***	2.567***	2.988***	5.276***
	[2.058,2.277]	[3.332,4.154]	[2.403,2.741]	[2.740,3.258]	[3.729,7.465]
Baden_Wurtemburg	0.938*	1.155	1.028	0.882***	0.867**
	[0.893,0.986]	[0.971,1.374]	[0.945,1.118]	[0.828,0.939]	[0.783,0.961]
Bayern	0.923**	0.993	1.008	0.905**	0.831***
	[0.879,0.969]	[0.824,1.197]	[0.927,1.095]	[0.851,0.963]	[0.751,0.919]
Berlin	0.992	1.106	1.122	1.047	0.756**
	[0.892,1.104]	[0.818,1.495]	[0.957,1.315]	[0.923,1.187]	[0.613,0.931]
Brandenburg	1.091*	1.068	1.006	1.162**	1.246*
	[1.018,1.169]	[0.847,1.347]	[0.889,1.138]	[1.056,1.278]	[1.030,1.508]
Bremen	0.899	1.154	0.950	0.914	0.707*
	[0.737,1.095]	[0.724,1.841]	[0.695,1.298]	[0.741,1.127]	[0.514,0.972]
Hamburg	0.777***	1.176	0.922	0.670***	0.580***
	[0.672,0.899]	[0.808,1.713]	[0.736,1.155]	[0.563,0.797]	[0.466,0.722]
Hessen	0.983	1.067	1.038	0.986	0.874*
	[0.924,1.046]	[0.866,1.315]	[0.940,1.147]	[0.910,1.067]	[0.767,0.995]
Mecklenburg_Vn	0.997	0.784	0.963	1.002	1.175
	[0.917,1.084]	[0.564,1.090]	[0.826,1.121]	[0.891,1.127]	[0.948,1.456]

Niedersachen	0.968 [0.917,1.023]	0.991 [0.801,1.226]	0.928 [0.844,1.020]	0.972 [0.905,1.044]	0.976 [0.864,1.102]
Rheinland_Sd	0.951 [0.890,1.015]	0.940 [0.741,1.192]	0.957 [0.856,1.069]	0.939 [0.865,1.019]	0.864* [0.755,0.988]
Sachsen	0.998 [0.946,1.053]	0.780* [0.629,0.967]	0.946 [0.857,1.045]	1.000 [0.929,1.077]	1.130 [0.990,1.288]
Sachsen_Anhalt	1.088* [1.014,1.167]	1.322* [1.038,1.685]	1.099 [0.976,1.238]	1.084 [0.984,1.194]	1.319** [1.092,1.592]
Schleswig_Holstein	0.756*** [0.687,0.833]	1.054 [0.756,1.471]	0.815* [0.691,0.961]	0.767*** [0.685,0.859]	0.540*** [0.463,0.629]
Thuringen	1.059 [0.992,1.131]	1.091 [0.841,1.415]	0.920 [0.811,1.045]	1.061 [0.968,1.163]	1.454*** [1.214,1.741]
1996	0.973 [0.911,1.038]	0.986 [0.786,1.236]	0.933 [0.839,1.036]	1.033 [0.954,1.119]	0.907 [0.794,1.036]
1997	0.934* [0.881,0.989]	0.978 [0.795,1.203]	0.902* [0.819,0.994]	0.919* [0.856,0.987]	1.017 [0.897,1.153]
1998	0.937* [0.883,0.993]	0.934 [0.753,1.157]	0.965 [0.875,1.064]	0.928* [0.863,0.997]	0.933 [0.823,1.057]
1999	0.980 [0.925,1.038]	0.879 [0.710,1.089]	0.938 [0.853,1.032]	1.002 [0.933,1.076]	0.932 [0.823,1.056]
2000	0.973 [0.918,1.031]	0.820 [0.657,1.023]	0.938 [0.852,1.033]	1.011 [0.940,1.086]	0.973 [0.859,1.100]
2001	0.895*** [0.848,0.945]	0.947 [0.775,1.156]	0.903* [0.826,0.987]	0.914** [0.855,0.978]	0.775*** [0.693,0.867]
2002	0.995 [0.943,1.051]	0.901 [0.735,1.103]	0.956 [0.873,1.046]	1.016 [0.950,1.087]	0.975 [0.869,1.095]
2003	0.864*** [0.819,0.913]	0.957 [0.785,1.167]	0.912* [0.835,0.996]	0.857*** [0.801,0.918]	0.783*** [0.699,0.878]
2004	0.919** [0.870,0.971]	0.969 [0.792,1.184]	0.973 [0.890,1.065]	0.917* [0.857,0.981]	0.816*** [0.727,0.916]
Observations	103684	103684	103684	103684	103684
Pseudo R^2	0.213	0.278	0.251	0.258	0.208
AIC	211061.0	19019.3	66870.8	106788.7	45646.0
BIC	211576.7	19477.7	67329.2	107247.1	46104.4

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table E2: Testing proportional odds assumption of the ordered logit model for SRHS with current labour force status as the principal dependent variable, dynamic health model, 1996-2005, Canadian cohort (SLID)

	SRHS ordered logit	SRHS - P/FGVGE	SRHS - PF/GVGE	SRHS - PFG/VGE	SRHS - PFGVG/E
Unemployed	1.152***	1.691***	1.457***	1.247***	1.131***
	[1.096,1.212]	[1.394,2.051]	[1.325,1.601]	[1.174,1.325]	[1.054,1.214]
Not Working	1.309***	4.608***	2.150***	1.296***	1.156***
	[1.275,1.345]	[4.199,5.057]	[2.046,2.260]	[1.255,1.339]	[1.114,1.200]
Age	1.066***	1.174***	1.129***	1.073***	1.053***
	[1.060,1.073]	[1.145,1.204]	[1.114,1.145]	[1.065,1.082]	[1.043,1.062]
Age Squared	0.999***	0.998***	0.999***	0.999***	1.000***
	[0.999,0.999]	[0.998,0.999]	[0.999,0.999]	[0.999,0.999]	[0.999,1.000]
Male	0.960*	1.075	0.968	0.939**	0.918***
	[0.927,0.993]	[0.966,1.196]	[0.907,1.033]	[0.899,0.981]	[0.873,0.965]
Single	1.064**	1.016	1.153***	1.108***	1.050
	[1.025,1.104]	[0.884,1.168]	[1.068,1.245]	[1.056,1.163]	[0.997,1.105]
Div or Sep	1.073***	1.194**	1.189***	1.119***	0.995
	[1.034,1.112]	[1.060,1.345]	[1.109,1.275]	[1.068,1.171]	[0.946,1.047]
Widowed	0.994	0.926	0.969	1.024	0.985
	[0.933,1.060]	[0.778,1.102]	[0.869,1.080]	[0.945,1.110]	[0.891,1.089]
Spouse	0.934***	0.765***	0.823***	0.929**	0.948*
	[0.900,0.969]	[0.677,0.864]	[0.766,0.884]	[0.887,0.974]	[0.900,1.000]
Children(#)	1.028***	1.029	1.039**	1.037***	1.030***
	[1.016,1.040]	[0.983,1.077]	[1.013,1.065]	[1.022,1.053]	[1.013,1.048]
hhldsize	0.950***	0.867***	0.898***	0.940***	0.961***
	[0.937,0.963]	[0.817,0.919]	[0.871,0.926]	[0.924,0.957]	[0.943,0.980]
lhhinc_tm1	0.918***	0.905***	0.886***	0.905***	0.914***
	[0.907,0.930]	[0.880,0.930]	[0.871,0.902]	[0.891,0.918]	[0.895,0.934]
Educ - Minimum skill	1.576***	1.676***	1.896***	1.755***	1.632***
	[1.529,1.624]	[1.474,1.904]	[1.773,2.028]	[1.687,1.826]	[1.564,1.703]
Educ - Medium skill	1.232***	1.274***	1.314***	1.288***	1.271***
	[1.203,1.262]	[1.129,1.439]	[1.235,1.397]	[1.246,1.332]	[1.231,1.312]
No occupation	1.279***	1.351**	1.355***	1.334***	1.234***
	[1.225,1.334]	[1.128,1.619]	[1.239,1.481]	[1.264,1.408]	[1.160,1.312]
Professionals and Technicians	1.038*	1.219*	1.075	1.054*	1.024
	[1.003,1.073]	[1.001,1.483]	[0.984,1.175]	[1.006,1.104]	[0.979,1.071]
Clerical	1.045*	1.128	1.055	1.058*	1.046
	[1.008,1.083]	[0.921,1.382]	[0.962,1.158]	[1.007,1.112]	[0.996,1.099]
Services and Sales	1.102***	1.257*	1.229***	1.157***	1.099***
	[1.065,1.140]	[1.045,1.512]	[1.130,1.337]	[1.105,1.211]	[1.050,1.151]
Skilled_Trades	1.117***	1.063	1.157**	1.143***	1.152***

	[1.073,1.162]	[0.857,1.319]	[1.049,1.276]	[1.083,1.207]	[1.090,1.217]
Plant and Equipment operators	1.153***	1.217	1.186***	1.223***	1.175***
	[1.108,1.200]	[0.991,1.495]	[1.079,1.305]	[1.159,1.290]	[1.111,1.242]
Agricultural	0.997	0.963	1.017	1.018	0.990
	[0.952,1.043]	[0.756,1.227]	[0.912,1.134]	[0.957,1.082]	[0.929,1.055]
Labourers	1.166***	1.288*	1.197**	1.249***	1.180***
	[1.102,1.233]	[1.008,1.647]	[1.057,1.356]	[1.161,1.343]	[1.091,1.276]
VG srhs (t-1)	3.600***				
	[3.510,3.692]				
Good srhs (t-1)	10.307***				
	[9.982,10.642]				
Fair (t-1)	38.422***				
	[36.534,40.407]				
Poor srhs (t-1)	198.628***	11.071***			
	[182.4,216.3]	[10.16,12.07]			
Fair/poor srhs (t-1)			9.520***		
			[9.093,9.968]		
Good/Fair/poor srhs (t-1)				5.545***	
				[5.407,5.687]	
VG/Good/Fair/poor srhs (t-1)					5.995***
					[5.836,6.158]
Disabled (t-1)	2.036***	6.054***	3.314***	2.436***	2.465***
	[1.983,2.089]	[5.612,6.530]	[3.187,3.446]	[2.366,2.508]	[2.361,2.575]
Newfoundland	0.855***	0.828**	0.824***	0.729***	0.931*
	[0.822,0.889]	[0.720,0.952]	[0.759,0.895]	[0.692,0.769]	[0.880,0.986]
PEI	0.970	0.835	0.862*	0.838***	1.133**
	[0.925,1.017]	[0.688,1.014]	[0.767,0.968]	[0.782,0.898]	[1.051,1.221]
Nova_Scotia	1.035*	0.874*	1.022	0.982	1.149***
	[1.002,1.070]	[0.776,0.985]	[0.953,1.095]	[0.939,1.028]	[1.090,1.210]
New_Brunswick	1.045*	0.941	1.168***	1.017	1.083**
	[1.008,1.082]	[0.831,1.065]	[1.088,1.254]	[0.971,1.065]	[1.029,1.140]
Quebec	0.892***	0.914*	0.951*	0.909***	0.851***
	[0.870,0.914]	[0.838,0.998]	[0.905,0.999]	[0.881,0.938]	[0.823,0.879]
Manitoba	1.078***	0.733***	0.923*	1.077***	1.191***
	[1.044,1.114]	[0.635,0.845]	[0.856,0.996]	[1.031,1.126]	[1.132,1.252]
Saskatchewan	1.101***	0.903	1.006	1.113***	1.208***
	[1.065,1.138]	[0.788,1.035]	[0.934,1.084]	[1.063,1.164]	[1.148,1.272]
Alberta	1.045**	1.032	1.006	1.042	1.105***
	[1.013,1.078]	[0.911,1.167]	[0.938,1.079]	[0.999,1.087]	[1.056,1.156]
British_Columbia	0.984	0.869*	0.904**	0.995	1.013
	[0.954,1.016]	[0.767,0.984]	[0.843,0.970]	[0.956,1.037]	[0.969,1.058]
1998	1.017	0.987	1.006	1.014	1.043*
	[0.985,1.050]	[0.871,1.118]	[0.940,1.077]	[0.974,1.055]	[1.000,1.088]

1999	1.071***	1.038	1.161***	1.072**	1.065**
	[1.033,1.109]	[0.904,1.192]	[1.077,1.251]	[1.025,1.121]	[1.016,1.116]
2000	1.161***	0.982	1.096**	1.185***	1.179***
	[1.127,1.196]	[0.880,1.096]	[1.029,1.168]	[1.141,1.231]	[1.133,1.227]
2001	1.117***	1.142*	1.165***	1.119***	1.150***
	[1.084,1.150]	[1.023,1.275]	[1.094,1.240]	[1.077,1.162]	[1.104,1.197]
2002	0.986	0.828**	0.926	1.032	1.015
	[0.949,1.024]	[0.718,0.953]	[0.854,1.004]	[0.983,1.084]	[0.964,1.068]
2003	1.027	0.834**	0.907**	1.014	1.057**
	[0.996,1.059]	[0.743,0.937]	[0.849,0.968]	[0.975,1.055]	[1.014,1.102]
2004	1.040*	0.871*	0.921*	1.055**	1.056*
	[1.008,1.072]	[0.776,0.978]	[0.862,0.984]	[1.013,1.098]	[1.012,1.101]
2005	1.099***	0.894	0.914*	1.109***	1.132***
	[1.059,1.141]	[0.776,1.030]	[0.844,0.991]	[1.056,1.165]	[1.074,1.193]
Observations	217530	217530	217530	217530	217530
Pseudo R^2	0.177	0.396	0.329	0.203	0.169
AIC	491589.4	37135.1	101956.5	227437.9	203215.2
BIC	492083.3	37567.3	102388.7	227870.0	203647.3

Exponentiated coefficients; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table E3: Testing proportional odds assumption of the ordered logit model for SRHS with current labour force status as the principal dependent variable, American cohort, 1985-1997

	SRHS ordered logit	SRHS - P/FGVGE	SRHS - PF/GVGE	SRHS - PFG/VGE	SRHS - PFGVG/E
Unemployed	1.127***	2.755***	1.464***	1.144***	1.015
	[1.057,1.202]	[2.262,3.356]	[1.317,1.627]	[1.058,1.237]	[0.925,1.113]
Not Working	1.231***	3.336***	1.625***	1.203***	1.030
	[1.175,1.290]	[2.885,3.859]	[1.504,1.756]	[1.132,1.279]	[0.954,1.112]
Age	1.046***	1.179***	1.106***	1.053***	1.030***
	[1.037,1.055]	[1.141,1.219]	[1.087,1.125]	[1.040,1.065]	[1.014,1.045]
Age Squared	1.000***	0.999***	0.999***	1.000***	1.000
	[1.000,1.000]	[0.998,0.999]	[0.999,0.999]	[1.000,1.000]	[1.000,1.000]
Male	0.887***	1.218*	0.949	0.839***	0.790***
	[0.838,0.940]	[1.024,1.449]	[0.855,1.054]	[0.776,0.906]	[0.722,0.864]
Black	1.357***	1.275***	1.612***	1.558***	1.306***
	[1.301,1.416]	[1.113,1.461]	[1.484,1.750]	[1.472,1.650]	[1.221,1.397]
Other	1.162***	1.103	1.328***	1.305***	1.070
	[1.068,1.263]	[0.847,1.437]	[1.142,1.544]	[1.172,1.452]	[0.937,1.222]
Single	1.013	1.017	1.055	1.017	1.024
	[0.954,1.077]	[0.825,1.253]	[0.934,1.192]	[0.937,1.105]	[0.936,1.120]
Div or Sep	1.067	1.004	1.056	1.042	1.343**
	[0.976,1.166]	[0.819,1.230]	[0.916,1.217]	[0.912,1.190]	[1.099,1.640]
Widowed	1.050	1.099	1.085	1.102*	1.047
	[0.986,1.117]	[0.902,1.339]	[0.968,1.216]	[1.013,1.198]	[0.949,1.155]
Spouse	0.945	0.898	0.857**	0.963	0.975
	[0.889,1.004]	[0.738,1.092]	[0.765,0.960]	[0.887,1.046]	[0.886,1.074]
Children(#)	0.942***	0.993	0.935**	0.948**	0.924***
	[0.916,0.967]	[0.908,1.085]	[0.891,0.982]	[0.913,0.985]	[0.883,0.966]
Household size(#)	1.067***	1.027	1.073***	1.072***	1.089***
	[1.042,1.092]	[0.962,1.096]	[1.032,1.117]	[1.037,1.107]	[1.046,1.133]
Hhld income (t-1,1og)	0.879***	0.835***	0.841***	0.858***	0.891***
	[0.855,0.903]	[0.790,0.883]	[0.810,0.874]	[0.828,0.888]	[0.853,0.931]
Educ - Minimum skill	1.590***	3.023***	2.287***	1.706***	1.610***
	[1.489,1.698]	[2.197,4.160]	[1.988,2.631]	[1.560,1.866]	[1.450,1.788]
Educ - Medium skill	1.250***	1.857***	1.544***	1.348***	1.312***
	[1.188,1.315]	[1.365,2.525]	[1.357,1.756]	[1.254,1.448]	[1.218,1.412]
No occupation	1.222***	1.201	1.285***	1.177**	1.253**
	[1.121,1.332]	[0.902,1.599]	[1.110,1.488]	[1.049,1.321]	[1.072,1.464]
Professionals and Technicians	0.970	0.854	0.942	0.976	0.969
	[0.912,1.032]	[0.584,1.248]	[0.805,1.102]	[0.894,1.066]	[0.887,1.058]
Clerical	1.072*	0.856	1.014	1.141**	1.142**
	[1.009,1.139]	[0.619,1.183]	[0.885,1.161]	[1.049,1.241]	[1.041,1.254]
Services and Sales	1.073*	0.984	1.114	1.161***	1.101*
	[1.009,1.140]	[0.745,1.301]	[0.979,1.268]	[1.069,1.260]	[1.005,1.207]

Skilled_Trades	1.146*** [1.068,1.230]	1.016 [0.740,1.394]	1.157 [0.994,1.347]	1.217*** [1.106,1.339]	1.289*** [1.158,1.435]
Plant and Equipment operators	1.194*** [1.118,1.276]	1.201 [0.895,1.611]	1.237** [1.079,1.418]	1.326*** [1.212,1.450]	1.317*** [1.188,1.461]
Agricultural	0.909 [0.753,1.098]	1.263 [0.716,2.226]	0.933 [0.645,1.349]	0.884 [0.692,1.128]	0.837 [0.648,1.083]
Labourers	1.127** [1.030,1.234]	1.218 [0.875,1.696]	1.158 [0.982,1.364]	1.175** [1.046,1.320]	1.153* [1.011,1.315]
VG srhs (t-1)	5.018*** [4.743,5.308]				
Good srhs (t-1)	16.947*** [15.803,18.173]				
Fair (t-1)	81.861*** [73.852,90.739]				
Poor srhs (t-1)	446.622*** [378.087,527.580]	10.985*** [9.493,12.711]			
Disabled (t-1)	2.092*** [1.990,2.200]	4.522*** [4.014,5.095]	2.916*** [2.717,3.129]	2.588*** [2.427,2.760]	2.657*** [2.402,2.938]
Middle_Atlantic	1.220*** [1.095,1.359]	0.807 [0.505,1.288]	1.254 [0.989,1.591]	1.261** [1.084,1.467]	1.308*** [1.123,1.523]
East_North_Central	1.180** [1.061,1.313]	0.857 [0.543,1.354]	1.178 [0.935,1.486]	1.198* [1.032,1.391]	1.262** [1.087,1.466]
West_North_Central	1.119 [0.998,1.254]	0.801 [0.492,1.305]	1.205 [0.938,1.547]	1.127 [0.959,1.323]	1.173 [0.998,1.378]
South_Atlantic	1.214*** [1.094,1.348]	0.885 [0.565,1.387]	1.223 [0.974,1.537]	1.271** [1.099,1.471]	1.250** [1.082,1.444]
East_South_Central	1.399*** [1.251,1.564]	1.108 [0.697,1.763]	1.530*** [1.207,1.938]	1.487*** [1.270,1.742]	1.560*** [1.323,1.839]
West_South_Central	1.244*** [1.114,1.390]	0.911 [0.572,1.449]	1.348* [1.062,1.712]	1.312*** [1.125,1.530]	1.287** [1.100,1.506]
Mountain	1.106 [0.975,1.255]	0.660 [0.384,1.136]	0.946 [0.710,1.261]	1.048 [0.874,1.257]	1.229* [1.023,1.476]
Pacific	1.124* [1.009,1.252]	0.852 [0.535,1.358]	1.107 [0.873,1.405]	1.126 [0.967,1.310]	1.206* [1.037,1.402]
1986	1.087* [1.005,1.175]	0.720** [0.563,0.921]	0.927 [0.809,1.064]	1.053 [0.957,1.159]	1.283*** [1.149,1.432]
1987	1.027 [0.960,1.098]	0.944 [0.762,1.169]	0.955 [0.848,1.077]	0.988 [0.908,1.074]	1.161** [1.055,1.277]
1988	0.896** [0.839,0.958]	0.717** [0.580,0.887]	0.773*** [0.685,0.872]	0.870** [0.800,0.946]	0.990 [0.900,1.091]
1989	1.135*** [1.063,1.213]	0.750* [0.602,0.934]	0.938 [0.833,1.057]	1.053 [0.969,1.145]	1.333*** [1.208,1.471]

1990	1.019	0.788*	0.882*	0.988	1.157**
	[0.954,1.089]	[0.636,0.974]	[0.782,0.996]	[0.908,1.075]	[1.050,1.274]
1991	1.012	0.727**	0.806***	0.996	1.179***
	[0.949,1.081]	[0.591,0.894]	[0.713,0.910]	[0.916,1.083]	[1.071,1.296]
1992	0.999	0.701**	0.824**	0.926	1.237***
	[0.936,1.067]	[0.563,0.872]	[0.728,0.933]	[0.852,1.008]	[1.123,1.364]
1993	1.020	0.641***	0.825**	0.978	1.241***
	[0.956,1.088]	[0.518,0.795]	[0.730,0.931]	[0.899,1.064]	[1.126,1.368]
1994	1.066	0.875	0.888	1.014	1.293***
	[0.998,1.139]	[0.704,1.086]	[0.784,1.006]	[0.932,1.104]	[1.174,1.425]
1995	0.953	0.767*	0.792***	0.893**	1.154**
	[0.893,1.017]	[0.622,0.948]	[0.701,0.893]	[0.822,0.971]	[1.049,1.269]
1996	1.086*	0.682**	0.937	1.020	1.295***
	[1.013,1.163]	[0.537,0.866]	[0.824,1.067]	[0.932,1.116]	[1.168,1.435]
Observations	78941	78941	78941	78941	78941
Pseudo R^2	0.250	0.442	0.402	0.286	0.265
AIC	172239.4	15994.9	42915.5	77941.8	60842.8
BIC	172721.8	16421.6	43342.2	78368.5	61269.5

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Robust standard errors were calculated to account for correlation within individuals. Random effects models are not calculated as these model were not estimable for Poor versus Fair/Good/Very Good/Excellent logit models.

Table E4: Odds ratio of self-reported health status for current labour force status, dynamic health model, German cohort, with and without a random effect controlling for survey design

	PF vs GVGE	PF vs GVGE survey RE	PFG vs VGE	PFG vs VGE survey RE
Unemployed	1.678*** [1.518,1.854]	1.678*** [1.519,1.854]	1.238*** [1.135,1.350]	1.244*** [1.140,1.356]
Not Working	1.166*** [1.067,1.274]	1.180*** [1.081,1.289]	0.951 [0.883,1.023]	0.962 [0.894,1.035]
Age	1.125*** [1.099,1.152]	1.121*** [1.095,1.147]	1.098*** [1.077,1.119]	1.099*** [1.078,1.120]
Age Squared	0.999*** [0.999,0.999]	0.999*** [0.999,0.999]	1.000*** [0.999,1.000]	1.000*** [0.999,1.000]
Male	0.873** [0.798,0.955]	0.875** [0.801,0.956]	0.874*** [0.812,0.941]	0.878*** [0.817,0.944]
Single	1.084 [0.949,1.238]	1.075 [0.942,1.227]	1.026 [0.931,1.131]	1.012 [0.918,1.115]
Div or Sep	1.134* [1.006,1.278]	1.123 [0.997,1.265]	0.947 [0.859,1.043]	0.942 [0.855,1.037]
Widowed	1.042 [0.871,1.246]	1.032 [0.865,1.232]	0.808* [0.684,0.954]	0.806* [0.684,0.950]
Spouse	1.038 [0.952,1.133]	1.034 [0.950,1.125]	1.098** [1.024,1.178]	1.092* [1.020,1.169]
Children(#)	0.889*** [0.839,0.941]	0.893*** [0.843,0.945]	0.926*** [0.886,0.968]	0.927*** [0.887,0.969]
Household size(#)	1.034 [0.987,1.084]	1.037 [0.989,1.087]	1.031 [0.992,1.071]	1.036 [0.997,1.077]
Hhld income (t-1,1og)	0.781*** [0.735,0.828]	0.763*** [0.719,0.810]	0.794*** [0.754,0.836]	0.779*** [0.739,0.821]
Educ - Minimum skill	1.615*** [1.419,1.838]	1.651*** [1.451,1.880]	1.647*** [1.479,1.834]	1.700*** [1.526,1.895]
Educ - Medium skill	1.213*** [1.101,1.337]	1.249*** [1.134,1.376]	1.270*** [1.178,1.368]	1.292*** [1.199,1.393]
No occupation	1.494*** [1.250,1.786]	1.453*** [1.217,1.734]	1.509*** [1.314,1.733]	1.488*** [1.297,1.708]
Professionals and Technicians	0.922 [0.787,1.080]	0.929 [0.794,1.087]	0.923 [0.823,1.035]	0.929 [0.829,1.041]
Clerical	0.913 [0.761,1.095]	0.928 [0.775,1.111]	1.028 [0.900,1.175]	1.037 [0.908,1.185]
Services and Sales	1.068 [0.887,1.286]	1.075 [0.895,1.293]	1.208** [1.052,1.386]	1.209** [1.054,1.387]
Skilled_Trades	1.091 [0.915,1.301]	1.090 [0.915,1.298]	1.246** [1.093,1.420]	1.246*** [1.094,1.420]

Plant and Equipment operators	1.159	1.152	1.199*	1.205*
	[0.957,1.402]	[0.953,1.393]	[1.037,1.386]	[1.043,1.393]
Agricultural	1.080	1.100	1.097	1.111
	[0.788,1.482]	[0.804,1.506]	[0.856,1.405]	[0.868,1.422]
Labourers	1.143	1.139	1.116	1.122
	[0.949,1.376]	[0.948,1.370]	[0.969,1.286]	[0.975,1.292]
Fair/poor srhs (t-1)	3.363***	3.429***		
	[3.147,3.594]	[3.208,3.665]		
Disabled (t-1)	3.091***	3.105***	4.291***	4.251***
	[2.813,3.396]	[2.828,3.408]	[3.834,4.802]	[3.801,4.753]
Baden_Wurtemburg	0.985	0.983	0.786***	0.797***
	[0.864,1.122]	[0.855,1.132]	[0.706,0.875]	[0.707,0.897]
Bayern	0.977	0.960	0.819***	0.815***
	[0.861,1.108]	[0.838,1.099]	[0.738,0.909]	[0.726,0.914]
Berlin	1.253	1.212	1.060	1.067
	[0.985,1.593]	[0.944,1.555]	[0.864,1.301]	[0.861,1.323]
Brandenburg	0.917	0.930	1.238**	1.232*
	[0.760,1.107]	[0.761,1.136]	[1.059,1.448]	[1.037,1.463]
Bremen	0.969	0.972	0.896	0.891
	[0.639,1.469]	[0.635,1.487]	[0.637,1.261]	[0.625,1.271]
Hamburg	0.872	0.859	0.525***	0.507***
	[0.617,1.232]	[0.604,1.222]	[0.399,0.692]	[0.381,0.676]
Hessen	1.076	1.082	0.973	0.971
	[0.923,1.255]	[0.919,1.272]	[0.857,1.104]	[0.847,1.114]
Mecklenburg_Vn	0.837	0.840	0.976	0.979
	[0.662,1.058]	[0.653,1.080]	[0.803,1.185]	[0.790,1.214]
Niedersachen	0.915	0.921	0.948	0.990
	[0.790,1.059]	[0.786,1.079]	[0.841,1.068]	[0.866,1.132]
Rheinland_Sd	0.945	0.947	0.913	0.925
	[0.800,1.117]	[0.793,1.130]	[0.796,1.048]	[0.797,1.073]
Sachsen	0.783**	0.823*	0.948	1.008
	[0.671,0.913]	[0.702,0.964]	[0.835,1.076]	[0.882,1.151]
Sachsen_Anhalt	1.016	1.020	1.099	1.074
	[0.845,1.222]	[0.837,1.243]	[0.938,1.287]	[0.902,1.277]
Schleswig_Holstein	0.740*	0.740*	0.601***	0.610***
	[0.582,0.940]	[0.576,0.953]	[0.498,0.725]	[0.498,0.748]
Thuringen	0.792*	0.811*	0.990	0.983
	[0.655,0.958]	[0.665,0.990]	[0.847,1.158]	[0.831,1.162]
1996	0.867*	0.864**	1.036	1.032
	[0.776,0.968]	[0.774,0.965]	[0.951,1.128]	[0.948,1.124]
1997	0.812***	0.805***	0.905*	0.899*
	[0.725,0.908]	[0.720,0.901]	[0.830,0.986]	[0.825,0.980]
1998	0.867*	0.857**	0.881**	0.873**
	[0.775,0.971]	[0.766,0.959]	[0.807,0.961]	[0.800,0.952]

1999	0.874*	0.861**	0.999	0.988
	[0.782,0.977]	[0.771,0.962]	[0.917,1.088]	[0.906,1.076]
2000	0.880*	0.863**	1.059	1.043
	[0.787,0.984]	[0.772,0.965]	[0.971,1.155]	[0.956,1.137]
2001	0.982	0.949	1.077	1.045
	[0.885,1.090]	[0.855,1.053]	[0.993,1.167]	[0.964,1.133]
2002	1.040	0.999	1.239***	1.197***
	[0.936,1.155]	[0.899,1.109]	[1.141,1.345]	[1.103,1.299]
2003	1.045	0.977	1.087*	1.031
	[0.940,1.162]	[0.879,1.087]	[1.001,1.180]	[0.950,1.120]
2004	1.156**	1.071	1.178***	1.108*
	[1.039,1.287]	[0.962,1.193]	[1.084,1.281]	[1.019,1.205]
Good/Fair/poor srhs (t-1)			2.807***	2.832***
			[2.678,2.942]	[2.702,2.969]
Observations	103684	103684	103684	103684
AIC	65463.9	65389.9	103695.4	103576.6
BIC	65931.8	65867.3	104163.3	104054.1

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates for area and year fixed effects are not shown.

2. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

3. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

Table E5: Odds ratio of self-reported health status for current labour force status, dynamic health model, American cohort, with and without a random effect controlling for survey design

	PF vs GVGE	PF vs GVGE survey RE	PFG vs VGE	PFG vs VGE survey RE
Unemployed	1.702*** [1.506,1.922]	1.684*** [1.492,1.902]	1.189*** [1.085,1.303]	1.190*** [1.085,1.304]
Not Working	2.179*** [1.973,2.407]	2.130*** [1.929,2.351]	1.295*** [1.201,1.396]	1.297*** [1.203,1.399]
Age	1.131*** [1.104,1.159]	1.116*** [1.090,1.143]	1.016 [0.998,1.034]	1.016 [0.999,1.034]
Age Squared	0.999*** [0.999,0.999]	0.999*** [0.999,1.000]	1.000 [1.000,1.000]	1.000 [1.000,1.000]
Male	0.986 [0.841,1.156]	0.964 [0.825,1.126]	0.762*** [0.680,0.854]	0.764*** [0.682,0.856]
Black	2.865*** [2.487,3.302]	2.673*** [2.315,3.086]	2.430*** [2.199,2.686]	2.439*** [2.196,2.710]
Other	1.781*** [1.363,2.328]	1.565*** [1.203,2.037]	1.723*** [1.422,2.088]	1.626*** [1.339,1.975]
Single	1.163 [0.983,1.376]	1.193* [1.011,1.408]	1.140* [1.017,1.277]	1.148* [1.025,1.287]
Div or Sep	1.168 [0.951,1.434]	1.161 [0.948,1.422]	1.004 [0.843,1.197]	1.004 [0.842,1.197]
Widowed	1.142 [0.982,1.327]	1.131 [0.974,1.313]	1.161** [1.043,1.293]	1.161** [1.043,1.293]
Spouse	0.780** [0.668,0.911]	0.787** [0.675,0.917]	1.009 [0.904,1.126]	1.009 [0.904,1.125]
Children(#)	0.919* [0.861,0.981]	0.920* [0.863,0.982]	0.924** [0.880,0.970]	0.926** [0.882,0.972]
Household size(#)	1.055* [1.001,1.113]	1.062* [1.008,1.119]	1.072*** [1.029,1.117]	1.072*** [1.029,1.117]
Hhld income (t-1,1og)	0.811*** [0.773,0.851]	0.814*** [0.776,0.854]	0.863*** [0.831,0.897]	0.862*** [0.830,0.896]
Educ - Minimum skill	7.248*** [5.777,9.094]	6.267*** [5.023,7.820]	3.432*** [2.958,3.982]	3.416*** [2.943,3.966]
Educ - Medium skill	2.597*** [2.138,3.155]	2.444*** [2.022,2.954]	1.943*** [1.729,2.183]	1.952*** [1.736,2.195]
No occupation	2.398*** [1.931,2.978]	2.343*** [1.893,2.899]	1.658*** [1.412,1.947]	1.640*** [1.397,1.926]
Professionals and Technicians	1.023 [0.841,1.244]	1.055 [0.869,1.282]	0.980 [0.876,1.095]	0.997 [0.891,1.116]
Clerical	1.204* [1.007,1.439]	1.177 [0.987,1.404]	1.219*** [1.095,1.357]	1.212*** [1.089,1.349]
Services and Sales	1.465*** [1.234,1.739]	1.400*** [1.183,1.658]	1.296*** [1.162,1.445]	1.265*** [1.136,1.409]

Skilled_Trades	1.317**	1.261*	1.253***	1.236***
	[1.076,1.611]	[1.039,1.531]	[1.101,1.426]	[1.092,1.399]
Plant and Equipment operators	1.532***	1.485***	1.444***	1.402***
	[1.273,1.842]	[1.239,1.780]	[1.282,1.627]	[1.246,1.578]
Agricultural	1.076	0.907	1.076	0.818
	[0.835,1.387]	[0.531,1.547]	[0.917,1.262]	[0.577,1.161]
Labourers	1.416**	1.353**	1.373***	1.306***
	[1.123,1.786]	[1.088,1.682]	[1.173,1.607]	[1.125,1.515]
Fair/poor srhs (t-1)	2.774***	2.866***		
	[2.564,3.002]	[2.647,3.104]		
Disabled (t-1)	2.739***	2.768***	2.540***	2.537***
	[2.516,2.983]	[2.543,3.013]	[2.352,2.743]	[2.349,2.740]
Middle_Atlantic	1.317	1.263	1.380**	1.362**
	[0.927,1.870]	[0.889,1.793]	[1.104,1.724]	[1.083,1.712]
East_North_Central	1.051	1.105	1.274*	1.303*
	[0.746,1.482]	[0.781,1.564]	[1.023,1.586]	[1.037,1.637]
West_North_Central	1.121	1.227	1.222	1.306*
	[0.771,1.630]	[0.837,1.797]	[0.961,1.554]	[1.014,1.681]
South_Atlantic	1.183	1.177	1.449***	1.478***
	[0.847,1.651]	[0.842,1.644]	[1.173,1.791]	[1.189,1.837]
East_South_Central	1.669**	1.608*	1.850***	1.858***
	[1.164,2.393]	[1.112,2.325]	[1.460,2.344]	[1.447,2.384]
West_South_Central	1.419	1.368	1.608***	1.638***
	[0.995,2.026]	[0.957,1.954]	[1.280,2.022]	[1.293,2.073]
Mountain	0.951	0.969	1.154	1.182
	[0.619,1.460]	[0.625,1.501]	[0.885,1.505]	[0.895,1.559]
Pacific	1.109	1.044	1.233	1.228
	[0.777,1.584]	[0.725,1.504]	[0.984,1.545]	[0.968,1.557]
1986	0.910	0.916	0.742***	0.741***
	[0.794,1.043]	[0.800,1.048]	[0.673,0.817]	[0.673,0.816]
1987	0.909	0.919	0.532***	0.531***
	[0.793,1.043]	[0.802,1.054]	[0.483,0.586]	[0.482,0.585]
1988	0.685***	0.698***	0.368***	0.368***
	[0.595,0.788]	[0.607,0.803]	[0.334,0.406]	[0.334,0.406]
1989	0.843*	0.863*	0.388***	0.387***
	[0.734,0.969]	[0.751,0.990]	[0.352,0.428]	[0.351,0.427]
1990	0.819**	0.839*	0.326***	0.325***
	[0.712,0.942]	[0.730,0.965]	[0.295,0.360]	[0.295,0.359]
1991	0.732***	0.761***	0.295***	0.295***
	[0.635,0.844]	[0.661,0.877]	[0.267,0.326]	[0.267,0.325]
1992	0.732***	0.763***	0.244***	0.243***
	[0.634,0.845]	[0.661,0.880]	[0.221,0.270]	[0.220,0.269]
1993	0.743***	0.781***	0.238***	0.237***
	[0.643,0.859]	[0.676,0.902]	[0.215,0.263]	[0.214,0.262]

1994	0.832*	0.878	0.236***	0.235***
	[0.721,0.961]	[0.760,1.013]	[0.213,0.261]	[0.213,0.261]
1995	0.750***	0.823**	0.201***	0.200***
	[0.649,0.867]	[0.713,0.950]	[0.182,0.222]	[0.181,0.221]
1996	0.876	1.002	0.211***	0.210***
	[0.749,1.025]	[0.857,1.172]	[0.189,0.235]	[0.188,0.234]
Good/Fair/poor srhs (t-1)			2.329***	2.328***
			[2.213,2.451]	[2.212,2.450]
Observations	79319	78941	78944	78941
AIC	41534.6	41056.1	74089.8	74078.7
BIC	41970.8	41501.4	74525.8	74524.0

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates for area and year fixed effects are not shown.

2. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

3. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

Table E6: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, *males only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.265***	1.358***	1.391***						
	[1.116,1.434]	[1.235,1.494]	[1.208,1.603]						
Not Working	1.112	1.750***	1.480***	1.102	1.752***	1.492***			
	[0.975,1.269]	[1.630,1.879]	[1.279,1.714]	[0.966,1.258]	[1.632,1.882]	[1.288,1.728]			
Unemployed, No Benefits				1.008	1.572***	1.537***			
				[0.773,1.314]	[1.356,1.822]	[1.307,1.807]			
Unemployed, Benefits				1.383***	1.303***	1.031			
				[1.206,1.587]	[1.151,1.472]	[0.787,1.350]			
# of months unemployed							1.039***	1.033***	1.010
							[1.026,1.053]	[1.023,1.044]	[0.991,1.029]
# of months not working							1.029***	1.045***	1.035***
							[1.017,1.042]	[1.038,1.053]	[1.022,1.047]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				4.86	3.90	6.58			
prob > χ^2:				0.028	0.048	0.010			
sigma_u	1.584	1.073	1.600	1.584	1.07	1.600	1.583	1.066	1.596
	[1.516,1.655]	[1.022,1.126]	[1.520,1.683]	[1.516,1.655]	[1.020,1.123]	[1.521,1.684]	[1.516,1.654]	[1.015,1.119]	[1.517,1.680]
rho	0.433	0.259	0.437	0.433	0.258	0.438	0.432	0.257	0.437
	[0.411,0.454]	[0.241,0.278]	[0.413,0.463]	[0.411,0.454]	[0.240,0.277]	[0.413,0.463]	[0.411,0.454]	[0.239,0.276]	[0.412,0.462]
Observations	49171	102508	33790	49171	102508	33787	49173	102440	33793
AIC	48516.5	107506.6	31231.8	48509.7	107489.8	31223.3	48485.3	107518.6	31249.1
BIC	48939.1	107907.2	31611.0	48949.8	107909.5	31619.4	48907.9	107919.1	31628.4

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E7: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, *females only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.232***	1.224***	1.052						
	[1.092,1.391]	[1.104,1.358]	[0.933,1.186]						
Not Working	0.899*	1.255***	1.207***	0.900*	1.246***	1.212***			
	[0.822,0.984]	[1.197,1.316]	[1.104,1.320]	[0.822,0.985]	[1.188,1.306]	[1.108,1.325]			
Unemployed, No Benefits				1.286*	1.299***	1.081			
				[1.038,1.593]	[1.119,1.509]	[0.949,1.232]			
Unemployed, Benefits				1.299***	1.232**	0.926			
				[1.130,1.494]	[1.071,1.419]	[0.701,1.224]			
# of months unemployed							1.027***	1.025***	1.000
							[1.014,1.039]	[1.017,1.034]	[0.984,1.016]
# of months not working							1.001	1.021***	1.025***
							[0.993,1.009]	[1.016,1.027]	[1.016,1.033]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				0.01	0.26	1.01			
prob > χ^2:				0934	0.612	0.315			
sigma_u	1.571	.882	1.637	1.569	0.879	1.638	1.571	0.878	1.638
	[1.508,1.634]	[0.834,0.934]	[1.569,1.709]	[1.506,1.633]	[0.831,0.930]	[1.569,1.709]	[1.509,1.635]	[0.829,0.929]	[1.569,1.710]
rho	0.428	0.191	0.449	0.427	0.190	0.449	0.429	0.190	0.449
	[0.409,0.448]	[0.175,0.209]	[0.428,0.470]	[0.408,0.448]	[0.173,0.208]	[0.428,0.470]	[0.409,0.448]	[0.173,0.208]	[0.428,0.470]
Observations	54513	115022	45154	54513	115022	45153	54514	114922	45161
AIC	55181.7	120043.9	42832.9	55172.4	120012.0	42835.6	55186.7	119953.1	42817.5
BIC	55609.2	120449.3	43233.9	55617.7	120436.7	43254.1	55614.2	120358.5	43218.5

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E8: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, *minimum skilled only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.485***	1.314***	1.143						
	[1.211,1.821]	[1.163,1.485]	[0.963,1.357]						
Not Working	1.172	1.516***	1.467***	1.178	1.527***	1.468***			
	[0.979,1.403]	[1.401,1.640]	[1.270,1.694]	[0.984,1.412]	[1.410,1.652]	[1.271,1.696]			
Unemployed, No Benefits				1.375	1.467***	1.165			
				[0.977,1.935]	[1.224,1.759]	[0.970,1.399]			
Unemployed, Benefits				1.679***	1.258**	0.992			
				[1.328,2.124]	[1.070,1.480]	[0.645,1.524]			
Months unemployed							1.048***	1.023***	0.997
							[1.028,1.069]	[1.012,1.035]	[0.975,1.020]
Months not working							1.027**	1.038***	1.035***
							[1.011,1.044]	[1.030,1.047]	[1.022,1.048]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				1.09	1.63	0.48			
prob > χ^2:				0.296	0.201	[0.486]			
sigma_u	1.498	0.890	1.447	1.498	0.887	1.445	1.495	0.888	1.445
	[1.378,1.629]	[0.825,0.960]	[1.346,1.556]	[1.378,1.629]	[0.822,0.957]	[1.344,1.554]	[1.376,1.625]	[0.823,0.959]	[1.344,1.554]
rho	0.406	0.194	0.389	0.406	0.193	0.388	0.405	0.193	0.388
	[0.366,0.446]	[0.171,0.219]	[0.355,0.424]	[0.366,0.446]	[0.170,0.218]	[0.354,0.423]	[0.365,0.445]	[0.171,0.218]	[0.354,0.423]
Observations	14935	48127	17762	14935	48127	17758	14936	48090	17763
AIC	14575.2	53698.7	16258.3	14570.5	53696.9	16255.7	14565.0	53676.0	16251.4
BIC	14932.9	54058.8	16608.7	14943.5	54074.5	16621.6	14922.7	54036.0	16601.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E9: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, medium skilled only**, dynamic health model, German, Canadian and American cohorts**

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.229***	1.301***	1.280***						
	[1.105,1.366]	[1.188,1.425]	[1.139,1.437]						
Not Working	0.942	1.375***	1.321***	0.937	1.364***	1.334***			
	[0.858,1.033]	[1.307,1.446]	[1.199,1.457]	[0.854,1.028]	[1.297,1.435]	[1.210,1.471]			
Unemployed, No Benefits				1.069	1.470***	1.399***			
				[0.864,1.323]	[1.278,1.692]	[1.228,1.594]			
Unemployed, Benefits				1.327***	1.270***	0.946			
				[1.179,1.494]	[1.129,1.429]	[0.749,1.200]			
Months unemployed							1.030***	1.036***	1.009
							[1.019,1.041]	[1.027,1.045]	[0.994,1.025]
Months not working							1.008*	1.028***	1.032***
							[1.000,1.017]	[1.022,1.034]	[1.023,1.041]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				3.43	2.55	8.46			
prob > χ^2:				0.064	0.111	0.004			
sigma_u	1.569	0.971	1.613	1.569	0.967	1.615	1.570	0.966	1.612
	[1.510,1.630]	[0.925,1.019]	[1.547,1.683]	[1.510,1.630]	[0.922,1.015]	[1.548,1.684]	[1.511,1.630]	[0.921,1.014]	[1.546,1.682]
rho	0.428	0.223	0.442	0.428	0.221	0.442	0.428	0.221	0.442
	[0.410,0.447]	[0.207,240]	[0.421,0.463]	[0.410,0.447]	[0.205,0.239]	[0.422,0.463]	[0.410,0.447]	[0.204,0.238]	[0.421,0.462]
Observations	63870	130189	44878	63870	130189	44878	63872	130090	44885
AIC	64934.0	137977.3	44716.7	64927.3	137935.4	44711.9	64926.9	137896.5	44713.7
BIC	65360.0	138378.2	45108.7	65371.5	138355.8	45121.4	65352.9	138297.3	45105.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E10: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, *high skilled only*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.039	1.256	1.041						
	[0.824,1.311]	[0.998,1.580]	[0.771,1.405]						
Not Working	0.870	1.297***	0.958	0.866	1.280***	0.955			
	[0.737,1.028]	[1.171,1.436]	[0.771,1.191]	[0.732,1.023]	[1.156,1.417]	[0.768,1.187]			
Unemployed, No Benefits				1.387	1.336	0.966			
				[0.891,2.157]	[0.981,1.818]	[0.682,1.367]			
Unemployed, Benefits				1.010	1.230	1.235			
				[0.774,1.315]	[0.880,1.719]	[0.708,2.156]			
Months unemployed							1.021	1.032**	1.014
							[0.998,1.045]	[1.008,1.055]	[0.970,1.061]
Months not working							1.000	1.016**	0.996
							[0.985,1.015]	[1.004,1.028]	[0.976,1.015]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				1.58	0.13	0.57			
prob > χ^2:				0.209	0.718	0.452			
sigma_u	1.558	1.036	1.772	1.554	1.031	1.773	1.559	1.029	1.772
	[1.450,1.661]	[0.942,1.140]	[1.635,1.921]	[1.457,1.658]	[0.937,1.135]	[1.635,1.922]	[1.462,1.663]	[0.934,1.132]	[1.634,1.921]
rho	0.424	0.246	0.488	0.423	0.244	0.489	0.425	0.243	0.488
	[0.393,0.456]	[0.213,0.283]	[0.448,0.529]	[0.392,0.455]	[0.211,0.281]	[0.448,0.529]	[0.394,0.457]	[0.210,0.280]	[0.448,0.529]
Observations	24879	39214	16304	24879	39214	16304	24879	39182	16306
AIC	24645.0	35992.2	13092.6	24640.9	35984.7	13095.5	24644.8	35982.4	13093.7
BIC	25026.8	36343.9	13439.0	25038.9	36353.5	13457.4	25026.5	36334.1	13440.1

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E11: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, *excluding those in poor or fair health at baseline,* dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.197***	1.291***	1.172**						
	[1.092,1.313]	[1.196,1.394]	[1.064,1.291]						
Not Working	0.908*	1.318***	1.211***	0.905*	1.311***	1.217***			
	[0.840,0.982]	[1.262,1.376]	[1.118,1.311]	[0.837,0.979]	[1.256,1.369]	[1.124,1.318]			
Unemployed, No Benefits				1.138	1.451***	1.227***			
				[0.950,1.362]	[1.293,1.630]	[1.102,1.366]			
Unemployed, Benefits				1.279***	1.268***	0.982			
				[1.153,1.418]	[1.148,1.401]	[0.804,1.200]			
Months unemployed							1.028***	1.031***	0.999
							[1.018,1.037]	[1.023,1.039]	[0.986,1.012]
Months not working							1.003	1.021***	1.022***
							[0.996,1.010]	[1.016,1.026]	[1.014,1.029]
Unemployed, no benefits= Unemployed, benefits				1.38	3.12	3.86			
$\chi^2(1)$ test:				0.240	0.077	0.050			
prob > χ^2:									
sigma_u	1.564	1.151	1.582	1.563	1.147	1.583	1.564	1.146	1.582
	[1.517,1.612]	[1.115,1.188]	[1.529,1.637]	[1.517,1.612]	[1.111,1.185]	[1.530,1.628]	[1.518,1.613]	[1.110,1.183]	[1.529,1.637]
rho	0.426	0.287	0.432	0.426	0.286	0.432	0.427	0.285	0.432
	[0.412,0.441]	[0.274,0.300]	[0.415,0.449]	[0.411,0.441]	[0.273,0.299]	[0.416,0.449]	[0.412,0.442]	[0.272,0.298]	[0.415,0.449]
Observations	89847	194965	67321	89847	194965	67319	89850	194828	67330
AIC	93291.3	206007.5	66301.4	93277.8	205956.9	66299.6	93286.2	205909.2	66302.1
BIC	93752.2	206445.2	66729.9	93757.5	206415.0	66746.3	93747.1	206346.9	66730.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E12: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, *excluding those unemployed or not working at baseline*, dynamic health model, German, Canadian and American cohorts

	GSOEP	SLID	PSID	GSOEP	SLID	PSID	GSOEP	SLID	PSID
Unemployed	1.294***	1.283***	1.158*						
	[1.162,1.442]	[1.168,1.410]	[1.027,1.306]						
Not Working	0.967	1.474***	1.263***	0.962	1.446***	1.266***			
	[0.884,1.059]	[1.397,1.554]	[1.144,1.394]	[0.879,1.053]	[1.371,1.526]	[1.147,1.397]			
Unemployed, No Benefits				1.124	1.322**	1.217**			
				[0.884,1.429]	[1.115,1.567]	[1.059,1.398]			
Unemployed, Benefits				1.397***	1.350***	1.04			
				[1.240,1.574]	[1.207,1.511]	[0.835,1.304]			
Months unemployed							1.035***	1.024***	1.008
							[1.024,1.047]	[1.014,1.034]	[0.991,1.026]
Months not working							1.011*	1.033***	1.026***
							[1.002,1.019]	[1.027,1.039]	[1.017,1.035]
Unemployed, no benefits= Unemployed, benefits									
$\chi^2(1)$ test:				2.74	0.05	1.39			
prob > χ^2:				0.098	0.831	0.239			
sigma_u	1.600	1.116	1.631	1.599	1.113	1.630	1.600	1.113	1.630
	[1.546,1.655]	[1.074,1.159]	[1.570,1.694]	[1.546,1.654]	[1.072,1.156]	[1.569,1.694]	[1.546,1.655]	[1.072,1.157]	[1.569,1.694]
rho	0.438	0.275	0.447	0.437	0.274	0.447	0.438	0.237	0.447
	[0.421,0.454]	[0.260,0,290]	[0.428,0.466]	[0.421,0.454]	[0.259,0.289]	[0.428,0.466]	[0.421,0.454]	[0.259,0.289]	[0.428,0.466]
Observations	75594	156324	56050	75594	156324	56047	75597	156213	56056
AIC	77456.7	164413.8	53319.6	77445.3	164365.1	53315.1	77440.5	164380.8	53321.3
BIC	77909.1	164842.1	53739.5	77916.2	164813.3	53752.9	77893.0	164809.1	53741.2

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.
2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.
3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E13: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, stratified by East and West German, dynamic health model, German cohort

	East German	West German	East German	West German	East German	West German
Unemployed	1.175*	1.294***				
	[1.021,1.352]	[1.156,1.449]				
Not Working	0.924	0.973	0.920	0.970		
	[0.785,1.089]	[0.896,1.057]	[0.781,1.083]	[0.893,1.053]		
Unemployed, No Benefits			1.100	1.203		
			[0.820,1.475]	[0.982,1.473]		
Unemployed, Benefits			1.288***	1.382***		
			[1.103,1.505]	[1.215,1.572]		
# of months unemployed					1.032***	1.034***
					[1.017,1.047]	[1.023,1.046]
# of months not working					1.015	1.009*
					[0.999,1.030]	[1.001,1.016]
Unemployed, no benefits= Unemployed, benefits						
$\chi^2(1)$ test:			1.03	1.44		
prob > χ^2:			0.311	0.231		
sigma_u	1.663	1.534	1.664	1.533	1.660	1.534
	[1.569,1.762]	[1.481,1.589]	[1.570,1.764]	[1.481,1.588]	[1.566,1.759]	[1.482.1.589]
rho	0.457	0.417	0.457	0.417	0.456	0.417
	[0.428,0.486]	[0.400,0.434]	[0.428,0.485]	[0.400,0.434]	[0.427,0.485]	[0.400,0.434]
	26141	77543	26141	77543	26142	77545
AIC	25283.4	78440.2	25277.6	78431.7	25273.6	78429.4
BIC	25602.1	78847.6	25612.6	78857.6	25592.3	78836.7

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).

Table E14: Odds ratio of self-reported health status (poor/fair/good vs. very good/excellent) for all three labour force status measures, stratified by Race (Black and White/Other), dynamic health model, American cohort

	Black	White/Other	Black	White/Other	Black	White/Other
healthgood						
Unemployed	1.263***	1.203**				
	[1.119,1.425]	[1.046,1.384]				
Not Working	1.526***	1.215***	1.533***	1.220***		
	[1.354,1.721]	[1.104,1.338]	[1.358,1.730]	[1.107,1.345]		
Unemployed, No Benefits			1.292***	1.337***		
			[1.135,1.471]	[1.135,1.575]		
Unemployed, Benefits			1.033	0.934		
			[0.765,1.395]	[0.724,1.204]		
# of months unemployed					1.003	1.014
					[0.988,1.019]	[0.994,1.034]
# of months not working					1.035***	1.027***
					[1.025,1.046]	[1.018,1.036]
Unemployed, no benefits= Unemployed, benefits						
$\chi^2(1)$ test:			1.89	5.71		
prob > χ^2:			0.170	0.017		
sigma_u	1.466	1.714	1.462	1.707	1.462	1.705
	[1.390,1.546]	[1.644,1.787]	[1.386,1.543]	[1.637,1.78]	[1.385,1.542]	[1.635,1.778]
rho	0.395	0.472	0.394	0.470	0.394	0.469
	[0.370,0.421]	[0.451,0.493]	[0.369,0.420]	[0.449,0.491]	[0.368,0.420]	[0.448,0.490]
Observations	28068	50873	28066	50871	28071	50880
AIC	28256.6	45733.0	28251.8	45702.4	28262.1	45694.5
BIC	28578.0	46077.7	28639.2	46126.6	28633.0	46101.0

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. Estimates are based on random effects logistic models to account for correlation within individuals across panel waves.

2. Models include an exposure offset of the log of years followed to account for differences in follow-up across cohorts and within individuals.

3. Unemployed, benefits is the Exponentiated linear combination of the interaction between unemployment and unemployment benefits and unemployment benefits (i.e., unempXuiyes+uebenfits). The Wald test of the difference of unemployed, benefits and unemployed, no benefits is the test of this linear combination against unemployed, no benefits (i.e., unempXuiyes+uebenfits= unemp_uiyes).