THE DETERMINANTS OF GOLD HOARDING IN ARGENTINA, 1900 - 1914

by

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in the Department of Economics

We accept this thesis as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

August, 1969
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Date August 13, 1969
ABSTRACT

The thesis sets out to determine the causes of the gold hoarding and dishoarding in Argentina between 1900 and 1914. It was found that gold (dis)hoarding was part of a mechanism whereby the money supply was altered to meet demand through the exchange of gold pesos for paper. Speculation was important only in late 1913 and 1914 when the possibility emerged that paper would become inconvertible, the price of gold would rise and capital gains would accrue to gold holders.

Five assumptions were made:
(1) that the money supply was a function of the gold stock,
(2) that the demand for money was a function of the level of income,
(3) that the Neoclassical explanation of the determination of income fitted Argentina during this period,
(4) that price and money income levels were given on world markets, and,
(5) that the level of exports determined the level of income.

In Argentina during the period 1900 - 1914, gold served two functions:
(1) it provided the money supply, and
(2) it balanced the international accounts.

The thesis argues that although Argentinians were constrained by fixed levels of prices and income and by the rules of the gold standard they were able to alter the real supply of domestic currency by (dis)hoarding gold from their
private stocks. Hoarding was found to be correlated with the velocity of money. Consequently it is argued that gold was used to adjust the money supply toward the level of income regardless of what the level of income was. Gold was also found to be correlated with income, although less highly than with velocity. Consequently gold tended to be dishoarded in years after a good spring crop when paper was needed to buy land and real estate and to expand production. In this way gold acted as a precautionary asset which could be used to make advantageous purchases and which was secure in value, the two criterion suggested by Keynes. However, gold behaved in the opposite way to the precautionary balance described by Friedman who felt that the asset would be dishoarded when income was low.

Other possible determinants of gold (dis)hoarding were tested and rejected. Two proxies for the interest rate, railroad receipts, and the note issue (the money supply) were correlated with gold (dis)hoarding but the coefficients were not significant.

The thesis also suggested that the definition of balance of payments equilibrium should allow for a persistent gold import which would provide a domestic money supply. In equilibrium the rate of gold import equals the rate of growth of income if a constant velocity of money is desired. A second subconclusion was that the international import of gold responded to demands for
reserves made by the countries doing the trading. Although these demands were satisfied in the long run, they were not satisfied in the short run, and gold (dis)hoarding took place.
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INTRODUCTION

The economic features of Argentina in the period 1880 - 1900, were the opposite of those that were to prevail from 1900 - 1914. While the earlier period had been one of slow, uncertain economic growth, the later one saw rapid, sustained expansion. Whereas the export and landed class, the dominant political group, adopted a flexible exchange rate in the first period because it was in its economic interest, when economic conditions changed the group ensured that the gold standard was resumed (Conversion Law of 1899). A.G. Ford, the principal source on the gold standard in Argentina, has noted that, despite the stability of the period of expansion, there was substantial gold hoarding and dishoarding (defined as the movement to and from private holding of gold) in Argentina.¹. This thesis seeks to explain this gold hoarding and dishoarding.

It is suggested in this thesis that gold (dis)hoarding in Argentina was determined by the demand for money under the gold standard and was highly correlated with the velocity of money (defined as the ratio of money income to money supply). Five assumptions are made about the Argentine economy:

(1) that the money supply was a function of the gold stock;
(2) that money demanded was a function of the level of exports;

(3) that the levels of money income and price were given on world markets;
(4) that the level of income was a function of the level of exports; and
(5) that the Neoclassical explanation of income determination applied to Argentina during this period.

The hypothesis is developed from these five premises. Since gold imports were determined by the balance of international payments, by assumption the money supply also depended upon the international accounts. However, the demand for money depended upon the level of income and the level of exports. In the long run the supply of gold via the international accounts grows at the same rate as the level of income and the level of exports; but in the short run this equation need not hold and the demand for money (on these assumptions) does not equal the supply. The balancing item in these circumstances is the private stock of gold. This paper argues that gold flowed to and from private holdings in response to demands for domestic paper.

The private demand for gold in Argentina in the period 1880 - 1900, can be explained by speculation against changes in the value of the paper peso. Chapter 1 of this paper contrasts the period under flexible exchange rates (1880 - 1900) with that under the gold standard (1900 - 1914). It also demonstrates that the choice of exchange rate depended upon the exporters and the
landed class who were able to select by legislation the system which caused the distribution of income to shift in their favour. In the second half of Chapter 1 the assumptions of the model used subsequently in the thesis are discussed.

Building on the five assumptions, Chapter 2 develops the conditions of gold import in both the short and long run. It will be found that in the long run the rate of growth of gold imports equals the rate of growth of income and of the demand for money. In the short run the size of the gold import need not equal the change in the demand for money.

Chapter 3 examines the demand for money and for gold and suggests that in the short run gold (dis)hoarding fills the gap between the demand for money and the supply of money. Chapter 4 provides statistical substantiation for these propositions, draws conclusions and makes some observations for further study.
CHAPTER 1

HISTORICAL BACKGROUND AND THE ASSUMPTIONS OF THE MODEL

The central feature of the political-economic structure of Argentina between 1880 and 1914 was the dominance of the exporting and landed class. According to Ford this group was able to alter the exchange rate system to that which shifted the distribution of income in its direction. Under a flexible exchange rate, Ford argues, income shifted toward the exporters if the rate was depreciating. He claimed that this shift was caused by two factors:

1. the gold value of income from exports was rising more rapidly than costs which typically were paid in paper;

2. debts which were payable in paper could be repaid at lower real cost.

Consequently when the paper peso began to depreciate the exporters applied pressure to adopt a flexible exchange rate. When paper began to appreciate they sought to fix the rate.

Monetary reforms legislated in 1881 by the Argentine government established parity between the gold and paper pesos but this rate was inappropriate and a premium soon appeared on gold. Ford believed that the failure to maintain parity between gold and the paper peso was due to the pressure on the paper peso caused by the

2. Ibid, P. 90 - 1
adverse balance of payments and the speculation against the price of paper. By 1884, the attempt to maintain the price of paper had resulted in a net drain of 77 million paper pesos in gold. Of this amount 50 million was absorbed into private holdings in the expectation that the price of gold would rise further and capital gains would accrue to gold holders. The remainder of the gold withdrawn from the banks was used to finance the deficit in the balance of payments. In 1885, specie payments were suspended and Argentina adopted a flexible exchange rate as a result of pressure from the exporters.

Ford states that two later events brought a further depreciation of the value of paper currency. The first was the expansionary banking and credit policy which was pursued by the Celman administration, elected in 1887. Despite heavy inflows of funds from abroad and successive export booms, the gold price of paper fell. The second event was the sharp fall in exports and loans in 1889. This coupled with steadily rising imports and debt interest payments, led to a sharp decline in the price of the paper peso. During the 1890's, capital imports to Argentina were negligible and, although exports rose steadily, the paper peso failed to strengthen.

3. Ibid., p. 136.
4. Ibid., p. 141 - 2.
5. Ibid., p. 143.
Ford shows that in Argentina the last two decades of the nineteenth century were characterized by limited economic growth and by instability of the domestic currency but that the period after the turn of the century witnessed substantial growth. This growth, based on the increased production of grain, beef and hides, had begun before 1900 and had caused an improvement in the balance of payments and an appreciation of the paper peso. The exporters responded by pressing for a return to convertibility in order to prevent further increase in the price of paper and adverse shifts in the distribution of income.

According to the Conversion Law of 1899, gold was freely convertible into paper at the rate of 100 paper to 44 gold pesos (which was the prevailing rate at the time). A conversion fund was established with a limit of 30 million gold pesos and the chief bank, the Bank of the Nation, was entrusted with the fund deposit. Gold imports could be exchanged at the Caja de Conversion or they could be deposited with the commercial banks. Paper, instead of gold, was the only currency in Argentina between 1900 and 1914. If gold was exchanged for paper or deposited it led to expansion of the money supply since the banks were required to hold at least 25% of their deposits in cash. If zero gold

6. Ibid., p. 143

7. Ibid., pp. 95 - 6

8. They could also be held privately (hoarded). In this case they did not lead to an expanded money supply.
(dis)hoarding is assumed Argentina in effect, behaved according to the rules of the gold standard in allowing gold imports to alter the domestic supply of money.

Expansion between 1900 and 1914 was extensive. Ford reports that imports grew at 7.5% per annum, note issue in paper pesos at 8.8%, railroad receipts at 9.5%, home consumption of wheat at 5.4%, and the population at 4.0%. Ferrer shows a rise in gross product of 5.5% per annum and a population increase of 4.2%; income per capita grew at 1.3% per annum. Renewed capital exports accompanied the expansion; foreign investment increased from 1,013 million gold pesos in 1900 to 3,240 in 1913. Ferrer claimed that increases in the capital stock amounted to 6% per annum while investment was 39% of gross product. Smithies showed that investment constituted 45% of gross national product and that 40% of the capital stock was foreign-owned.

Ford believes that wages and interest rates in Argentina remained constant because the rate of immigration and the rate of capital import were high and the supply schedules of labour and


10. Aldo Ferrer, The Argentine Economy, (Berkeley, University of California Press, 1967), p. 120.

11. Ibid., p. 106.

12. Ibid., p. 102.

capital were elastic. Since capital went predominantly into housing and transportation, mortgage banks were the central financial institutions. Domestic savings were low, claims Ford, with most of them going out of the country in immigrant remittances which were 20% of export values. The remainder of domestic savings went into the banks and mortgages.

There were net gold imports in every year until 1914 as exports and capital imports grew strongly. The paper peso continued to be healthy and there was no apparent threat to the operation of the gold standard. However, it began to appear toward the end of the period that this rate of growth could not be maintained. Because capital imports rose, debt service payments increased from 59 million gold pesos in 1900, to 168 million in 1911 - 12, but fell to 160 million in 1912 - 13, and to 139 million in 1913 - 14. Fortunately, as Ford points out, rising export values prevented debt service from rising above 35% of export proceeds. On the other hand, the capital inflow was only 71% of gross profits and interest (most of the latter went abroad).

15. *Ibid.*, p. 120
The collapse came in 1913 and 1914. As a consequence of the failure of the wheat crop, the value of exports fell by 30%. At the same time the prices of imports and capital imports (as represented by London Issues to Argentina) fell. After mid-1913 gold flowed from Argentina, there was domestic pressure against the paper peso, and a flight into gold. Following precedent, the exporters legislated a return to inconvertibility.

The central features of the years 1880 - 1913 were, first, the contrast between the stagnation of the earlier period (1880 - 1900) and rapid growth in the latter period (1900 - 1913) and, second, the ability of the exporting group to alter the exchange rate system to suit their economic interests. As long as the paper peso was depreciating the exporters were content with a flexible exchange rate since the falling value of the paper peso reduced their real costs which were accrued in paper. When the paper peso strengthened and appreciated, or threatened to appreciate, exporters sought to secure adherence to the gold standard in order to prevent further increases in the price of paper and further adverse shifts in the distribution of income.

Throughout both periods there was considerable movement to and from private holdings of gold. In the years 1880 - 1900 gold (dis)hoarding in Argentina can be explained by the attempt to earn capital gains from holding gold which is rising in price.

20. Ibid, p. 159
From 1900 to 1913 the price of gold was fixed and the rate of economic growth was high. There were net gold imports in every year. Under these conditions why were Argentinians willing to hold gold? This thesis argues that gold was held as a precautionary balance which could be (dis)hoarded and exchanged for gold when the import of gold from abroad did not provide a supply of paper equal to the demand. In order to demonstrate this proposition the following model is developed:

THE ASSUMPTIONS OF THE MODEL

Several critical assumptions are made in this thesis to describe the economy of Argentina, a small country on the gold standard. The assumptions made in the model are:

1. Argentina followed the rules of the gold standard:
   a. the price of the currency was fixed in terms of gold,
   b. the money supply was dependent on the size of the gold stock;

2. the demand for money in Argentina depended primarily on the level of income;

3. the Argentine price and money income levels were given in world markets;

4. the level of exports determined the level of income; and

5. the Neoclassical explanation of income, as developed
primarily by Swan, Solow, Meade and Borts, applied to Argentina. 21. Each of these assumptions must be explained and appraised critically.

ASSUMPTION 1 THE COUNTRY FOLLOWED THE RULES OF THE GOLD STANDARD

The Price of the Currency

The price of the currency was fixed in terms of gold. Between 1884 and 1899 the gold peso was fixed in terms of ounces of gold but the paper peso fluctuated in gold pesos. According to the Conversion Law of 1899, the price of the paper peso was set at 100 paper to 44 gold pesos.22. The excess demand for foreign exchange was met through international flows of gold rather than through changes in the price of gold.

The Size of the Note Issue

The note issue (the proxy for the money supply) was dependent on the stock of gold held at the Caja. Since the paper value of the gold held by the Caja in 1899 was 295 million paper pesos, the note issue of that year had the same value. Subsequent exchanges of gold for paper at the Caja lead to an equal expansion of the note issue.


22. See above, p. 6
Hence  \( M = qG \)

where \( M \) is the money supply (note issue plus bank deposits), \( G \) is the stock of gold and \( q \) is the functional relationship of the money supply to note issue. Since there was no domestic production of gold in Argentina, the source of all new gold must be the international accounts, i.e., gold imports.

There are two ways in which gold imports did not lead to an equal expansion of the money supply where the money supply is defined as the sum of privately-held note issue and bank deposits. First, not all gold imports lead to issue of paper since some of the gold was hoarded instead of being exchanged for paper at the Caja. Second, the relationship of the total money supply and the note issue was not fixed because the former is affected by the reserve/deposit ratios of the banks and the cash/deposit preferences of private individuals. Appendix A demonstrates the arithmetic of the relationship between the money supply and the stock of gold at the Caja. The two means by which gold imports do not lead to a proportionate increase in the money supply will be discussed.

**Gold Hoarding:** Gold held by private individuals in Argentina affected the size of the note issue by being withheld from exchange for notes at the Caja. In his book Ford does not dwell at length with gold hoarding except when national economic crises in the country caused abnormal private accumulation of gold in expectation that paper would become inconvertible and the price of
gold would rise. He suggests that gold had little impact on the supply of notes since, in the main, gold imports were converted into paper.

To demonstrate this proposition Ford introduced the concept of potential note issue:

"(potential note issue)...is the note issue which would have resulted if all net gold imports (less the quantity absorbed by the Conversion Fund) had been deposited at the Caja in exchange for notes." 23

He thus suggests that potential note issue is the sum of all gold imported into Argentina whether it is held privately, deposited with the banks, or exchanged for paper at the Caja. The difference in size between the actual and the potential note issue is the amount of gold withheld from the Caja.

Ford compared actual with potential note issues and asserted that there was a close relationship between total domestic gold holding, public and private, (i.e., potential note issue) and actual note issue and consequently that the leakage from the Caja (the gold withheld) was insignificant. 24 Table I, derived from Ford, shows the percentages of potential note issue that were realized. The lowest percentage of total potential note issue realized was 87% in 1911 and 1912 (if the crisis year of 1914 is ignored). Ford concluded that:

"...the balance of payments as represented by the net

24. Ibid, p. 98
**TABLE 1**

ARGENTINE ACTUAL AND POTENTIAL NOTE ISSUE

1900 - 1914

(MILLIONS OF PAPER PESOS)

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual</th>
<th>Potential</th>
<th>Increment</th>
<th>Increment</th>
<th>Increment</th>
<th>Potential</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Note</td>
<td>Note</td>
<td>as a %</td>
<td>to actual</td>
<td>as a %</td>
<td>minus</td>
<td>between</td>
</tr>
<tr>
<td></td>
<td>Issue</td>
<td>Issue</td>
<td>of potential</td>
<td>note issue</td>
<td>of potential</td>
<td>actual (4) and (5)</td>
<td></td>
</tr>
<tr>
<td>1900</td>
<td>295</td>
<td>310</td>
<td>95</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>1901</td>
<td>295</td>
<td>310</td>
<td>95</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>1902</td>
<td>296</td>
<td>317</td>
<td>93</td>
<td>1</td>
<td>7</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>1903</td>
<td>380</td>
<td>379</td>
<td>100</td>
<td>84</td>
<td>62</td>
<td>135</td>
<td>-22</td>
</tr>
<tr>
<td>1904</td>
<td>408</td>
<td>423</td>
<td>96</td>
<td>28</td>
<td>46</td>
<td>61</td>
<td>15</td>
</tr>
<tr>
<td>1905</td>
<td>498</td>
<td>480</td>
<td>104</td>
<td>90</td>
<td>57</td>
<td>158</td>
<td>-18</td>
</tr>
<tr>
<td>1906</td>
<td>527</td>
<td>506</td>
<td>104</td>
<td>29</td>
<td>26</td>
<td>112</td>
<td>-4</td>
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<tr>
<td>1907</td>
<td>532</td>
<td>545</td>
<td>98</td>
<td>5</td>
<td>39</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>1908</td>
<td>581</td>
<td>598</td>
<td>97</td>
<td>49</td>
<td>53</td>
<td>93</td>
<td>17</td>
</tr>
<tr>
<td>1909</td>
<td>685</td>
<td>740</td>
<td>92</td>
<td>104</td>
<td>142</td>
<td>74</td>
<td>55</td>
</tr>
<tr>
<td>1910</td>
<td>716</td>
<td>817</td>
<td>88</td>
<td>31</td>
<td>77</td>
<td>40</td>
<td>101</td>
</tr>
<tr>
<td>1911</td>
<td>723</td>
<td>838</td>
<td>87</td>
<td>7</td>
<td>21</td>
<td>33</td>
<td>115</td>
</tr>
<tr>
<td>1912</td>
<td>800</td>
<td>928</td>
<td>87</td>
<td>77</td>
<td>90</td>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>1913</td>
<td>823</td>
<td>938</td>
<td>88</td>
<td>23</td>
<td>10</td>
<td>230</td>
<td>-115</td>
</tr>
<tr>
<td>1914</td>
<td>803</td>
<td>966</td>
<td>83</td>
<td>-20</td>
<td>28</td>
<td>-</td>
<td>163</td>
</tr>
</tbody>
</table>

**NOTES:** DATA AT 31. DECEMBER

**SOURCE:** COLUMNS (1) - (3) FORD, A.G., OP. CIT., P. 96
COLUMNS (4) - (8) DERIVED FROM IBID, P. 96
import of gold did determine for the most part the Argentine note issue and the variations in it during this period."\(^{25}\).

As a consequence Ford believed that the impact of gold hoarding was not great.

Ford's logic and use of statistics are unconvincing. It should be noted that the percentage of potential issue (calculated in column 3 of Table I) that was actually realized declined steadily after 1906. Column 6 of Table I shows the increment to actual note issue in each year as a percentage of the increment to potential note issue in the same year. The percentage of the increment to potential issue that was actually realized was less than 50% in 1907, 1910, 1911 and 1912, and was low in every year after 1906 except 1908 and 1913. Column 7 of Table I shows the absolute difference between actual and potential note issue (which is also the amount of gold that was withheld from the Caja). This shows that the value of the gold that did not arrive at the Caja increased substantially after 1906. In only one year after 1906 (i.e., in 1913), did the increment to actual note issue exceed that to potential issue. In all other years the gap between actual and potential note issue expanded. In summary, Ford has concealed the effect of the gold that was withheld from the Caja because he used total figures instead of examining the increments to actual and to potential note issue.

\(^{25}\) Ibid, p. 96 n
### TABLE II

CHANGES IN THE SIZE OF PRIVATE GOLD HOARDS

ARGENTINA 1904 - 1914

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Change in Gold Hoards (Gold Pesos)</th>
<th>Annual Change in Gold Hoards (Paper Pesos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1904</td>
<td>-4.1</td>
<td>-9.3</td>
</tr>
<tr>
<td>1905</td>
<td>-6.9</td>
<td>-15.7</td>
</tr>
<tr>
<td>1906</td>
<td>+6.1</td>
<td>+13.9</td>
</tr>
<tr>
<td>1907</td>
<td>+5.3</td>
<td>+12.0</td>
</tr>
<tr>
<td>1908</td>
<td>-5.9</td>
<td>-13.2</td>
</tr>
<tr>
<td>1909</td>
<td>-2.9</td>
<td>-6.8</td>
</tr>
<tr>
<td>1910</td>
<td>+19.9</td>
<td>+45.3</td>
</tr>
<tr>
<td>1911</td>
<td>+11.7</td>
<td>+26.6</td>
</tr>
<tr>
<td>1912</td>
<td>-4.2</td>
<td>-9.6</td>
</tr>
<tr>
<td>1913</td>
<td>+0.3</td>
<td>+0.7</td>
</tr>
<tr>
<td>1914</td>
<td>+40.2</td>
<td>+91.1</td>
</tr>
</tbody>
</table>

NOTES: NEGATIVES ARE DISHOARDING (NET LOSS TO PRIVATE GOLD STOCK)

SOURCE: CALCULATED FROM FORD, OP. CIT., P. 97
Table II shows the amount of gold that was withheld from the Caja by being held in private hoards. Statistics were available in Ford only for the years 1904 to 1914. The large increase in hoards in 1914 can be explained by speculation against an increase in the price of gold when exports and loans to Argentina (London Issues) fell sharply. Gold hoarding in other years, when economic conditions were more stable, was, nevertheless, substantial and it is this hoarding that this thesis seeks to explain.

It should be noted that gold hoarding is of the same magnitude as the gap between actual and potential note issue. Column 8 of Table I shows the difference between the increment to actual and the increment to potential note issue in each year. Column 1 of Table II shows the gold (dis)hoarded in the same years. The values of these two sets of figures are roughly the same magnitude. Gold (dis)hoarding was not insignificant in its impact on the supply of money in Argentina.

The relationship of total money supply to actual note issue:

The previous section (see "The Price of the Currency") demonstrated that not all of the gold imported found its way into the Caja and

26. It should not be expected that the figures will be exactly the same size in each year. This can be explained by the observation that gold hoarding will be found to be a function of the velocity of money. Gold (dis)hoarding is used to adjust the actual note issue to the level determined by the level of income and not to the potential note issue which reflects the rate of gold import and not the level of income.
increased the note issue. This section examines the relationship between the note issue (i.e., the gold stock at the Caja) and the supply of money, defined to include both notes and deposits. The arithmetic of this relationship in Argentina is set out in Appendix A. It is shown that there were three ways in which the ratio of money supply to actual note issue may differ:

1. the percentage of the note issue deposited with the banks may change;
2. the banks' reserve ratio (cash reserves/deposits) may change; or
3. the amount of gold deposited with the banks may change and alter the size of the reserves.

(1) Table III indicates the variables involved in the relationship between the note issue and the total money supply. Column 1 shows that the percentage of the note issue deposited with the banks rose from 1908 to 1913 (even if the low figure for 1908 is ignored). Consequently there was a net increase in the size of the money supply due to the larger proportion of the note issue being deposited with the banks, leading to an expansion of deposits via the reserve/deposit ratio.

(2) Table III, Column 2 shows that the reserve ratio fell from 1909 to 1911, but rose in 1912 and 1913. In other words, for a given proportion of note issue deposited with the banks, the money supply increased relative to the note issue during the first period but fell during the latter.
### TABLE III

**THE MONEY SUPPLY IN ARGENTINA**

**1908 - 1914**

<table>
<thead>
<tr>
<th>Year</th>
<th>(1) PER CENT</th>
<th>(2) BANKS RESERVE/DEPOSIT RATIO</th>
<th>(3) GOLD ABSORBED BY BANKS</th>
<th>(4) TOTAL MONEY (m. gold pesos)</th>
<th>(5) ACTUAL NOTE ISSUE (m. paper pesos)</th>
<th>(6) RATIO OF NOTE ISSUE HELD BY BANKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1908</td>
<td>40</td>
<td>n/a</td>
<td>+12.9</td>
<td>n/a</td>
<td>581</td>
<td>-</td>
</tr>
<tr>
<td>1909</td>
<td>47</td>
<td>41.8</td>
<td>+23.1</td>
<td>1,520</td>
<td>685</td>
<td>2.22</td>
</tr>
<tr>
<td>1910</td>
<td>47</td>
<td>37.6</td>
<td>+ 1.8</td>
<td>1,711</td>
<td>716</td>
<td>2.44</td>
</tr>
<tr>
<td>1911</td>
<td>47</td>
<td>36.6</td>
<td>- 5.0</td>
<td>1,762</td>
<td>723</td>
<td>2.44</td>
</tr>
<tr>
<td>1912</td>
<td>48</td>
<td>37.5</td>
<td>+ 6.3</td>
<td>1,897</td>
<td>800</td>
<td>2.37</td>
</tr>
<tr>
<td>1913</td>
<td>53</td>
<td>40.8</td>
<td>- 7.0</td>
<td>1,849</td>
<td>823</td>
<td>2.25</td>
</tr>
<tr>
<td>1914</td>
<td>51</td>
<td>42.3</td>
<td>-41.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**SOURCE:**
- COL. (4), calculated for 1912 by deriving the note issue held by the public from per cent held, and adding this to bank deposits. Figures for the other years calculated by subtracting the change in money supply (adding for 1913) - FORD, *Op. Cit.*, p. 107.
- COL. (5), Ratio of Col. 4 to Col. 5.
(3) Gold deposited with the banks was positive from 1909 to 1910 but negative in the remaining years. Since gold served as a reserve against the expansion of deposits, the money supply expanded from 1908 to 1910 but contracted afterward.

Unfortunately data for the total money supply (defined as cash holdings plus deposits) are available only for the period 1909-13. Consequently actual note issue is used as a proxy for the total money supply. An estimate must therefore be made of the bias introduced to the analysis through the use of this proxy.

Comparison of the size of the total money supply with actual note issue can be made only for the period 1909-13 when data for both statistics are available. The ratio of total money supply to actual note issue in each year is shown in Table III. The average of these ratios is 2.34:1. If it is assumed that 2.34:1 is the long-run average about which the current ratio fluctuated we can state in which direction use of the note issue biased the index for the money supply. Since the statistical analysis below correlates gold (dis)hoarding with the velocity of money we must determine the direction in which velocity is biased through the use of note issue instead of total money supply in the denominator of the velocity expression. Table IV shows the velocity of money between 1900 and 1914 with velocity defined as the ratio of exports to note issue.
In 1909 and 1913 note issue was high relative to the money supply since the ratio was less than 2.34:1 (Table III) and velocity was above average (Table IV). Hence if total money supply were used in the velocity index, velocity would have been higher than it was. In 1910 and 1911 note issue was low relative to total money supply (ratio greater than 2.34:1 in Table III) and velocity was below average (Table IV). If total money supply were used in the velocity index, velocity would have been lower than it was. In 1912, however, note issue was high relative to the total money supply, i.e., the ratio was slightly less than 2.34:1, but velocity was above average. In this case alone, velocity would have been closer to, rather than further from, the mean velocity if total money supply were used in the denominator of the velocity index.

The overall impact of using note issue instead of total money supply in the velocity expression is to dampen the fluctuations in velocity. Consequently if total money supply were used instead of note issue the fluctuations in velocity under this definition would have been larger than under the definition used in this analysis and the correlation of velocity and gold (dis)hoarding would have been higher than shown below. Furthermore if it is assumed that these same relationships between actual note issue, total money supply and velocity held for the period 1904-1909 as well as for 1909-13 the conclusions reached in this analysis, i.e., that gold (dis)hoarding is closely associated with the velocity of money, would have been reinforced.
TABLE IV

THE VELOCITY OF MONEY
IN ARGENTINA
1884 - 1914

<table>
<thead>
<tr>
<th>Year</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1884</td>
<td>2.48</td>
</tr>
<tr>
<td>1885</td>
<td>2.54</td>
</tr>
<tr>
<td>1886</td>
<td>1.75</td>
</tr>
<tr>
<td>1887</td>
<td>2.02</td>
</tr>
<tr>
<td>1888</td>
<td>1.72</td>
</tr>
<tr>
<td>1889</td>
<td>1.70</td>
</tr>
<tr>
<td>1890</td>
<td>0.93</td>
</tr>
<tr>
<td>1891</td>
<td>0.89</td>
</tr>
<tr>
<td>1892</td>
<td>0.91</td>
</tr>
<tr>
<td>1893</td>
<td>0.65</td>
</tr>
<tr>
<td>1894</td>
<td>0.78</td>
</tr>
<tr>
<td>1895</td>
<td>0.91</td>
</tr>
<tr>
<td>1896</td>
<td>0.89</td>
</tr>
<tr>
<td>1897</td>
<td>0.78</td>
</tr>
<tr>
<td>1898</td>
<td>1.02</td>
</tr>
<tr>
<td>1899</td>
<td>1.43</td>
</tr>
<tr>
<td>1900</td>
<td>1.18</td>
</tr>
<tr>
<td>1901</td>
<td>1.29</td>
</tr>
<tr>
<td>1902</td>
<td>1.36</td>
</tr>
<tr>
<td>1903</td>
<td>1.32</td>
</tr>
<tr>
<td>1904</td>
<td>1.48</td>
</tr>
<tr>
<td>1905</td>
<td>1.48</td>
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<td>1906</td>
<td>1.27</td>
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<td>1907</td>
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<td>1908</td>
<td>1.43</td>
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<tr>
<td>1909</td>
<td>1.32</td>
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<tr>
<td>1910</td>
<td>1.18</td>
</tr>
<tr>
<td>1911</td>
<td>1.02</td>
</tr>
<tr>
<td>1912</td>
<td>1.36</td>
</tr>
<tr>
<td>1913</td>
<td>1.34</td>
</tr>
<tr>
<td>1914</td>
<td>0.98</td>
</tr>
</tbody>
</table>

ASSUMPTION 2  THE DEMAND FOR MONEY IS ASSUMED TO DEPEND PRIMARILY UPON THE LEVEL OF INCOME.

The quantity theory expression\(^{27}\) is adopted to describe the demand for money,

\[ Mv = PZ_r \]

where \( M \) is the money supply, \( P \) is the price level, \( v \) is the velocity of money, and \( Z_r \) is the level of real income. This expression is a general one which allows for other determinants of the demand for money than income. It will be demonstrated later that income is the most important of the possible determinants.

Because this thesis seeks to relate the private demand for gold to the demand for money (through velocity), some features of the quantity expression will be developed. Given,

\[ Mv = PZ_r, \]

taking logarithms,

\[ \log M + \log v = \log P + \log Z_r \]

and differentiating

\[ M'v' = P' + Z'_r, \]

where the slash marks denote percentage changes. In other words the sum of the rates of change of money and velocity equals the sum of the rates of change of prices and income.

---

The Quantity Theory expression can be generalized for the open economy. Total domestic money income \((Z)\) is the sum of domestically produced goods consumed by domestic \((P_y Y_d)\) plus production of investment goods used domestically \((P_i I_d)\) plus exports \((P_x X)\).

\[
Z = P_y Y_d + P_i I_d + P_x X.
\]

This expression can be inserted into the quantity theory equation, \((Mv = Z)\) thus,

\[
Mv = P_y Y_d + P_i I_d + P_x X.
\]

By changing the expression to absolute changes, multiplying by one \(\left\{ \frac{Mv}{Mv} \ldots \text{ etc.} \right\}\) and dividing by \(Z\) the following is derived:

\[
(Mv)' = y (P_y Y_d)' + i (P_i I_d)' + x (P_x X)',
\]

and

\[
M' + v' = y P_y' + y Y_d' + i P_i' + i I_d' + x P_x' + x X',
\]

where

\[
y = \frac{P_y Y_d}{Z}
\]

\[
i = \frac{P_i I_d}{Z}
\]

\[
x = \frac{P_x X}{Z}
\].
Since \( y + x + i = 1 \),
and \( Z_r = Y_d + I_d + X \),
where \( Z \) is real gross domestic money income,

\[
M + v = (yP' + IP_i' + xP_x') + Z_r'.
\]

If the rate of change of prices is equal in all sectors, the expression is the same as for the closed economy, i.e.,

\[
M' + v' = P' + Z_r'.
\]

The sum of the rates of change of the money supply and velocity is equal to the sum of the rates of change of the universal price level and real income.

In a large country domestic policy can be invoked to alter the value of these variables. Give the demand for cash balances represented by the velocity function, the money supply or the level of real income can be altered to achieve the desired price level. With a given level of the nominal money supply and of real income, individuals adjust their cash balances in accordance with their velocity function. If individuals hold too large cash balances, they attempt to get rid of their excess balances but in doing so they drive up the level of prices until they are satisfied with the real value of their cash balances.

A small country facing a large world does not have the same policy options. In the case of Argentina the levels of money income and of prices were given exogenously (see Assumption 3). The money supply was determined by the inflow of gold from abroad.
In order to adjust their cash balances to the specifications of the velocity function, Argentinians were able to exchange gold for paper or paper for gold, i.e., to (dishoard). This thesis demonstrates that this mechanism of adjustment was in operation.

The velocity function can also be used as an index of the stability of the currency. Kindahl\textsuperscript{28} examined the situation in the United States during the period of rapid inflation which preceded the resumption of specie conversion in 1879. He argued that the premium on gold must be zero for a stable return to convertibility. Otherwise there would be increased inflation as gold imports caused increases in the supply of the undervalued currency. In order to achieve gold parity, either the money stock or the velocity of money must fall or real income must rise. (In the quantity expression high $M'$ must be offset by a fall in $v$ or $M$ or a rise in $Z_r$ to prevent further increases in $P$.) Since velocity was determined by individuals' preferences and since the money supply was not altered, the burden of adjustment fell on real income. Kindahl claimed the equilibrium was attained because real income grew up to the money stock by the resumption date.

A similar situation developed in Argentina in the late 1890's when the return to specie conversion was being contemplated. After 1887 there had been an immoderate monetary policy which had caused

decreases in the value of the paper peso in terms of gold. Consequently velocity had fluctuated substantially in a downward direction to 1893 (Table IV). After that date restrictions were placed on the growth of the money supply and velocity rose until the enactment of the Conversion Law in 1899. Since the velocity of money at that time was close to the long-run average, the shift to convertibility was stable as long as the international accounts continued to provide gold at the same rate as the growth of real income. This condition was fulfilled until late 1913 and early 1914 when confidence in the paper peso fell and there was a run on gold. (Ford noted that prior to this date confidence was high and speculation was non-existent). Table IV demonstrates that the velocity of money was relatively constant from 1900 to 1913 and substantiates the hypothesis that the currency was stable.

ASSUMPTION 3 THE LEVELS OF MONEY INCOME AND PRICES IN ARGENTINA WERE GIVEN BY WORLD MARKETS

This can be demonstrated by the following argument taken from Borts. Interest rates are assumed to be given in the world market since London was the commercial center of the world and Argentina occupied only a small part of the market. The return to capital in the export industry is given by

\[ rP_i = P_i f_i \]

29. Ford, Op. Cit., p. 96, notes that confidence in the paper peso was higher after 1900 and that speculation in gold ceased.
where \( r \) is the interest rate, \( P_i \) is the price of capital goods, \( P_x \) is the price of exports and \( f_i \) is the marginal physical product of capital in the export sector. The prices \( r, P_i \), and \( P_x \) are given exogenously; therefore \( f_i \) is determined. If there is no technological change in a production function which has constant returns to scale, the labour/capital ratio and the marginal physical product to labour in the export sector \( (f_i) \) are determined. With given prices for exports, \( P_x \), the money wage in the export sector \( (P_x f_i) \) is given and, on the assumption of a competitive wage market, the money wage in the domestic sector is determined.

Furthermore if the capital stock is fixed and the labour/capital ratio in the export sector does not change because of the assumption of homogeneity the level of employment in the export sector is determined. At a given moment the total supply of labour is fixed; consequently, the level of employment (and of output) in the labour-intensive domestic sector are given. The value of output is the sum of the payments to labour and to capital in both sectors.

**ASSUMPTION 4 THE LEVEL OF EXPORTS DETERMINES THE LEVEL OF INCOME**

This can be written as

\[ Z = bX, \]

where \( Z \) is the level of income, \( X \) is the level of exports, and \( b \) is a constant. This assumption is important because exports are used as a proxy for the level of income in the demand for money
equation and in the velocity function. The use of a proxy was made necessary by the absence of income data, consequently, it was not possible to demonstrate the validity of this assumption by statistical means. 30.

The minimum condition for using exports as a proxy is that exports and income grow at the same rate; a stronger condition is that exports determine income. Intuitively it might be argued that the stronger condition is met because investment which went into the export sector, and domestic output which depended on the income multiplier, are both determined by the success of exports. However, Assumption 5 shows that all variables grow at the same rate in equilibrium. Consequently exports and income grow at the same rate which satisfies the minimum condition that exports and income change proportionately.

ASSUMPTION 5 THE NEOCLASSICAL EXPLANATION OF INCOME IS ASSUMED TO HOLD IN ARGENTINA 31.

The chief assumptions of the model are:
(1) the economy is at full employment (Ford suggests that this was true in Argentina. 32.); and

30. Ferrer, Op. Cit., p. 120, estimates that exports were 25-30 per cent of total G.N.P. but this does not demonstrate the direction of causation.


(2) there is no technological change in a production function which is homogeneous of the first degree. The result is that the ratio of labour to capital is constant. From this the conditions of long-run equilibrium can be derived: the rate of growth of income, exports, the capital stock, investment and savings will equal the rate of growth of the labour force. Chapter 2 builds the conditions of long-run gold import upon these assumptions.

These five assumptions are used in the theoretical analysis of the import of gold in the short and long run in Chapter 2 and in the discussion of the private demand for money and gold in Chapter 3.
CHAPTER 2

DETERMINANTS OF GOLD IMPORT

This chapter examines the conditions of gold import. The first part will use Assumption 2 (that the desired money supply is a function of the level of income as set forth in Chapter 1), to deduce the rate of gold import in the long run. It will be argued that equilibrium in the balance of payments should provide for a persistent secular gold import. The second part will examine the flow of gold as a short-run balancing item in the balance of payments.

GOLD FLOWS IN LONG-RUN EQUILIBRIUM

International gold flows serve two functions in a country like Argentina on the gold standard. First, they serve to balance the international accounts by acting as payment for the excess of payments over receipts on non-gold account. Second, gold imports are the base for the money supply since the rules of the gold standard dictate that balance of payments surpluses (and gold inflows) must be accompanied by monetary expansion; and deficits (and gold outflows) must be accompanied by contraction. Given the assumptions of the model it can be shown that both of these functions are performed in long-run equilibrium. The analysis applies to any small country on the gold standard where the country has no gold production.
BALANCING THE INTERNATIONAL ACCOUNTS

In a small country a persistent balance of payments surplus is consistent with long-run equilibrium. The discussion of the Neoclassical model under Assumption 5 (above, Chapter 1) pointed out that in the long-run exports, imports and capital imports grow at the same rate. Gold imports can be shown to grow at this same rate under conditions of long-run equilibrium.

In Argentina gold was the only short-run equilibrating device for equating receipts and payments. The short-run capital market was non-existent and Argentina was unable to pursue an independent interest-rate policy. The paper peso was not an international currency and did not act as an equilibrating item. Consequently the excess of receipts over payments was taken in gold.

The following identity relates gold imports to the other items in the international accounts:

\[ G_n = (X + K_n) - (N + D), \]

where \( G_n \) is the net gold balance,
\( X \) is visible exports,
\( K_n \) is net capital import (or security exports),
\( N \) is visible imports, and
\( D \) is interest payments on foreign debt.

This identity states that gold imports are equal to the difference between receipts and expenditures on current and capital account in the balance of payments.

Taking first differences of the identity,

\[ \Delta G_n = \Delta X - \Delta N + \Delta K_n - \Delta D \]

multiplying through by one,

\[ \frac{\Delta G_n}{G_n} = \frac{\Delta X}{X} - \frac{\Delta N}{N} + \frac{\Delta K_n}{K_n} - \frac{\Delta D}{D} \]

and dividing by \( G_n \),

\[ G_n' = xX' - nN' + kK_n' - dD', \]

where the slash marks denote percentage changes. The small letters denote the following ratios:

\[ x = \frac{X}{G_n} \]
\[ k = \frac{K_n}{G_n} \]
\[ n = \frac{N}{G_n} \]
\[ d = \frac{D}{G_n} \]

The equation states that in the long run the rate of growth of gold imports is equal to the sum of the products of the rates of growth of each component in the balance of payments and the ratio of that component to gold imports.

Since \( x + n + k + d = 1 \),

and since in long run (by Assumption 5 discussed in Chapter 1),

\[ X' = K' = N' = D', \]

therefore \( G_n' = X' \).
i.e., the rate of gold import is equal to the rate of export of goods and services. Secular gold imports and a balance of payments surplus are consistent with long-run equilibrium.

**A BASE FOR THE MONEY SUPPLY**

Gold imports serve as a base for the money supply. It can be shown that the gold import which is desired to serve as a base for the money supply grows at the same rate as the economy and as the balance of payments surplus.

Assume, as above, that the money supply is a constant multiple of the size of the gold stock.

\[ M = gG, \]

where \( M \) is the size of the money supply, \( g \) is a constant, and \( G \) is the size of the gold stock (at the Caja).

Assume also that money demanded in the long-run is a constant proportion of money income,

\[ Mv = PZ_r, \]

where \( v \) is the velocity of money, \( P \) is the price level and \( Z_r \) is the level of real income (Assumption 2).

Therefore the rate of growth of the gold stock must equal the rate of growth of income,

i.e., \( G' = Z'. \)

Assume that there is no domestic production of gold and that there is no gold hoarding. Therefore,

\[ G_n = \Delta G, \]
where $G$ is gold import and $\Delta G$ is the addition to the gold stock. It can be shown by substitution that the rate of growth of gold imports must also equal $Z$;

$$\text{hence, } \frac{\Delta Gn}{Gn} = G_n' = Z' = x'. $$

In other words the demand for gold imports to provide a money supply grows at the same rate as the level of income and exports. This is the same result that was obtained '(above p.33) for the rate of growth of gold import due to the persistent balance of payments surpluses. In long-run equilibrium the supply of gold via the international accounts to a small country on the gold standard equals the demand for gold to provide a money supply.

Definition of balance of payments equilibrium must take into account that in a dynamic economy gold imports perform both functions. The traditional analysis has considered gold imports to be a sign of disequilibrium. Johnson, for example, offered this definition of disequilibrium,

"(disequilibrium)....is defined by changes in the official reserves associated with imbalances between foreign receipts and foreign payments of residents of the country."^2

When two static states are compared, gold imports are interpreted as evidence of disequilibrium. Ford, too, defines equilibrium as the absence of gold flows. ^3. However in a growing economy,


when the demand for money is rising, a new definition is required. For the purposes of the thesis, equilibrium is regarded as being achieved when gold flows take place at the rate required by the demand for money.\(^4\).

The provision of gold through the international accounts is not a random event determined by the state of the balance of payments but is a result of demands made by the economy. Johnson demonstrates this proposition by examining the accounting identity for the balance of payments.\(^5\). He begins by stating that gold imports are the difference between total income accruing to domestics and total expenditure by domestics,

\[ G_n = Z - E, \]

where \( G_n \) is gold imports, \( Z \) is money income, and \( E \) is total expenditure by domestics. The relationship between this expression and the balance of payment equation can be obtained by breaking down \( Z \) and \( E \) into their components,

\[ Z = X + Y_d + I_d + f', \]

where \( X \) is exports, \( Y_d \) is domestically produced goods consumed by domestics, and \( I_d + f' \) is net investment in domestic industry by domestics and foreigners.

\(^4\) Given the assumptions of this model, the analysis suggests that a growing economy on the gold standard must import increasing absolute amounts of gold. Either world gold production must keep pace with monetary demands or there must be changes in the price of gold or in the gold/fiat money ratio. Otherwise gold must be demonetized.

\(^5\) Johnson, Op. Cit., p. 155 ff
and \( E = N + Y_d + I_d + f'' + D \),

where \( N \) is imports of consumer goods and services, \( Y_d \) is domestically produced goods consumed by domestics, and \( I_d + f \) is interest payments on foreign debt.

Subtracting \( E \) from \( Z \) gives the balance of payments equation,

\[
Z - E = G_n = (X - N) + (I_f - D)
\]

where \( I_f = I_f' - I_f'' \).

This is the same expression as the accounting identity described on page 32 above. However Johnson argues that this approach suggests a positive role for gold flows. Instead of acting passively to balance the accounts as a residual item in the international accounts, gold flows result from demands made by the countries involved. Gold flows represent the excess demand for the currency by domestics and foreigners. Since internal demand, i.e., the demand for domestic goods by domestics, cancels out, only the items in the international accounts are left. Consequently gold flows take place in response to the excess demand for one currency over the demand for another.

Williamson has noted in the same vein that in a growing economy the demand for real balances and for gold is similar to the demand for capital and for import goods. "During periods of rapid growth and concomitant capital inflow and trade deficit a tendency toward increased demand for real balances is expected". 5.

This demand for money results in gold flows to satisfy these demands. Like the other items in the balance of payments gold is imported to satisfy demands and is not just a residual which balances the international accounts.

**GOLD FLOWS IN THE SHORT RUN**

Due to the inability of humans to predict the future, there is a lag in the short run between the establishment of demand for gold and the gold flows that result. In the long run the gold flows tend toward those desired until in long-run equilibrium they are equal.

Appendix B lists the possible directions of change in the short run in the size of the gold import as a result of the changes in the other items in the balance of payments identity. Appendix B is intended to emphasize the wide range of possibilities rather than to provide a framework for analysis of Argentina since the wide fluctuations in the international accounts means that Argentina switched from category to category from one period to another.

**GOLD FLOWS IN THE SHORT AND LONG RUN**

In the short run, gold flows in response to demands in the economy; but the demand for currency is not quite satisfied due to the imperfect foresight of mankind. In the long run the lags are worked out and gold flows in at the rate given by the growth of the economy. If the gold flows in the short run are not adequate
to meet the demand, how are the demand and supply equated?

Chapter 3 will suggest that gold (dis)hoarding performed this function.
CHAPTER 3

THE PRIVATE DEMAND FOR MONEY AND GOLD

This chapter deals simultaneously with the demand for gold and for money (1) because they are both currencies (one of which is international) which were freely convertible in the period 1900 - 1914 in Argentina and (2) because the demand for money and gold were complementary. It will be argued that the demand for money was a function of the level of income and that gold was hoarded or dishoarded in order to maintain the functional relationship between money and income.

THE DEMAND FOR MONEY AND GOLD

Milton Friedman has provided a general demand equation which can be applied to money or to gold.\(^1\). He adopted the Classical identity,

\[
Mv = P Z_r
\]

which is described under Assumption 2 (see above, Chapter 1). He furnished this identity with analytic content by hypothesizing causal relationships. The central features of his approach are (1) that the velocity of money (the ratio of money income to the money supply) is a stable function of a limited number of variables, and

that the theory involves the demand for money and is not a theory about real output, money income, or the price level. He points out that the latter variables require additional information to establish their determinants. By this method Friedman has altered velocity from an identity to a testable hypothesis about real world behaviour.

The demand for money is expressed as:

\[
\frac{Zr}{M} = v \left( r_b, r_e, \frac{1dP}{Pdt}, \frac{Zr}{P}, w, u \right),
\]

where \( r_b \) is the bond interest rate, \( r_e \) is the rate of return on equities, \( \frac{1dP}{Pdt} \) is the rate of change of the general price level, \( \frac{Zr}{P} \) is the level of permanent real income, \( w \) is wealth, and \( u \) is a taste variable. The Friedman formulation will be discussed with reference to the situation in Argentina.

**INCOME**

The classicists assumed that the velocity of money (the ratio of income to money supply) was constant in the short run since payments institutions do not change and the money supply is a function of income. Therefore, argued the classicists, with full employment, prices changed proportionately with nominal money balances in the short run. Although an individual could not change the price level, individuals in total could do so by

\[2. \text{Ibid., p. 147} \]

\[3. \text{Members of this school of thought include Ricardo, Marshall, Pigou and Fisher.} \]
increasing, or decreasing, money balances that were short of, or in excess of, desired money balances. This caused the price level to fall or rise, until real balances bore the desired relationship to income.

Friedman pointed out that individuals in the United States could alter their real balances in the manner described by the classicists but he also noted that the nominal money supply was determined by the money authority. Friedman's description of the United States differs from that for Argentina. The Argentine could alter his nominal balances by exchanging gold for paper. With a given price level he adjusted his real balances proportionately. Consequently the Argentines had control over the money supply to the amount of gold held in their private stocks.

In the long run Friedman's empirical work for the United States (1870 - 1955) suggested that the velocity of money had an income elasticity of 1.8, i.e., that a one percent change in the demand for money resulted from a 1.8 percent change in income, when money was defined to include both time and demand deposits as well as cash. When money included only demand deposits and cash, the income elasticity of the velocity of money was 1.0. In other words,


5. Ibid., p. 328 - 9
the demand for money grows at least at the same rate as the level of income in the long run. In the short run Friedman found contradictory results. The velocity of money with respect to current income conformed positively to the income cycle: when income rose, velocity rose, when income fell, velocity fell. This behaviour is opposite to that of the long run.

Friedman invoked the concept of permanent income to reconcile the long with the short run. According to this approach money is treated as an asset which like other luxury goods, grows more rapidly than income and causes velocity to fall in the long run.

**PRECAUTIONARY OR ASSET DEMAND FOR MONEY**

The concept of permanent income is the key to the explanation of the demand for money in the short and the long run according to Friedman. Permanent income is the return on the stock of wealth, $w$, (which is broadly defined to include all sources of income, both human and non-human),

\[ i.e., W = \frac{Z_p}{r} \]

where $r$ is the general interest rate and $Z_p$ is the permanent income. Thus with a constant interest rate, income and wealth vary positively and permanent income is the level of income expected from past trends.

6. M. Friedman, "The Quantity Theory.....", p. 147

7. Friedman, "The Demand for Money....", p. 336
Friedman suggests that consumption is a function of permanent income. When current income falls below permanent income, the level of consumption is maintained by drawing down asset balances. When a transient increment to income raises current income above permanent income, the increment is added to asset balances rather than being consumed.

Friedman also suggests that the demand for money is a function of permanent income. Because permanent income fluctuates less than current income, the demand for money may change more than permanent income but less than current income. Friedman concludes that velocity moves inversely with permanent income in both the long and short run. Following this approach, money is a precautionary balance which is built up in upswings and falls in troughs.

Keynes has developed a precautionary demand for money which is similar to that of Friedman. He explains the motives for holding precautionary balances. Keynes states that money is held:

"To provide for contingencies requiring sudden expenditures and for unforeseen opportunities of advantageous purchases, and also to hold an asset of which the value is fixed in terms of money to meet a subsequent liability fixed in terms of money."11.

8. Ibid, p. 333
9. Ibid, p. 334
11. Ibid, p. 170
The need for this asset to make future payments is based upon "...the desire for security as to the future cash equivalent of a certain proportion of total resources." The chief determinants of the amount held are the level of economic activity and of money income. The higher the level of income and activity, the larger are the balances held, because larger balances can be afforded and because larger payments must be made.

The Keynes definition has two parts. The asset (1) must be shown to be held against contingent purchases or against liabilities, and (2) it must be shown to have a fixed and secure value in terms of money. The demand for money and for gold in Argentina over the period 1900-1914 is appraised by this author as a precautionary asset balance which meets these two criteria.

**Provision for Contingencies and Liabilities**

The behaviour of the demand for money in Argentina was similar to that in the United States. Unfortunately the data was not sufficient in the case of Argentina to test both the narrow and broad definitions of the money supply. However it is possible to assert that the velocity of money did fall in Argentina in the long run but changed positively with the income cycle in the short run. This agrees with Friedman's hypothesis that the demand for money was a function of the level of a "permanent" income and that money was held as a precautionary balance to maintain the level of consumption.

12. Ibid., p. 170
Gold, however, was also highly correlated with the velocity of money. Chapter 4 will demonstrate that gold (dis)hoarding in Argentina was positively related to velocity, i.e., gold was dis-hoarded when velocity rose and hoarded when velocity fell. Gold moved from private holdings in order to make advantageous purchases. This relationship can be explained by the pattern of payments and receipts during the year.

The Argentine economic year was divided into two parts. According to Ford and Williams, the crop was shipped in the early part of the year, but costs were laid out in paper in the later months leading up to December.\textsuperscript{13} As a result, gold flowed in during the first half of the year but paper payments were made in the fall in anticipation of the crop to be harvested in the new year. After a good year paper was required for purchases of land and real estate. One source of this paper was gold which was dissaved (or dishoarded). Williams notes this sequence of payments and receipts when he claims that during the period of depreciating paper (1885 - 1897) it was in the interests of the exporters for the gold premium to rise since costs were laid out in paper before receipts came in.\textsuperscript{14} A pair of references in Ford suggest that there was an air of


\textsuperscript{14} Williams, \textit{Op. Cit.}, p. 160
speculation and expansion in the second half of the calendar year. He notes that cash/deposit ratios tended to fall from June to December during the period of expansion from 1900 - 1912, and that the severe monetary stringency of 1913 led to a fall in rents and to a cutback in land speculation. Furthermore, the chief destination of the small domestic savings was mortgage and real estate purchases (otherwise savings went into immigrant remittances). All these factors suggest that there was pressure on savings when expansion was contemplated. In summary the Argentine monetary system allowed individuals to expand the money supply by exchanging gold for money in order to obtain cash to make purchases of land and real estate. Gold balances were built up when no expansion was undertaken but exchanged for paper when expansion was planned.

An Asset of Fixed Value

Gold also meets the Keynesian criterion that the precautionary asset must be fixed in value. First the price of gold was fixed in sterling and this relationship was maintained independent of events in Argentina. Gold could be exchanged for sterling in times of crises in Argentina. Second, since the strongest political group, the exporters, favoured a depreciating paper because it reduced their costs in paper, gold holders could expect that if the peso price of gold in paper did change, that movement would be up and

16. Ibid, p. 128
not down. Third, although confidence in the banks grew during this period, this trust was tentative and the Argentinians were quick to withdraw their deposits in favour of gold when crisis loomed in 1913 - 1914.  

These conditions suggest that gold was prized for the stability of its value.

The private demand for gold in Argentina was based upon the precautionary motives presented by Keynes since there were opportunities for advantageous purchases and since gold was fixed in value. The amount of gold held was determined by the marginal benefits of holding a secure asset to make advantageous purchases and the marginal costs of the interest foregone.

**SPECULATIVE DEMAND FOR MONEY AND GOLD**

Keynes has suggested that speculation might explain the demand for money. Speculation is defined as having "...the object of securing profit from knowing better than the market what the future will bring forth". Keynes argued that speculation was directed specifically against the interest rate on bonds. People prefer bonds to money when interest is high since (1) the opportunity cost of holding money is large, and (2) the price of the bond is expected to rise and bring capital gains. When the interest


rate is low individuals hold cash. At some low level of the interest rate the demand for money becomes infinitely elastic—increases in the money supply would be absorbed into balances indefinitely. This is the "liquidity trap."

Speculation could be directed against any asset. Ford points out that speculation against the paper currency may have caused the large private accumulation of gold in 1883 - 4 and 1913 - 4. In both instances the balance of payments went heavily against Argentina leading to expectations that paper would become inconvertible and depreciate. In Chapter 2 it was contended that if gold flows were not sufficient to satisfy monetary demands the alternatives were gold price increases, gold/fiat money ratio decreases, or the demonetization of gold. Because gold was the chief international currency and Argentina had no control over it, the latter two possibilities were more plausible. Either of them led to capital gains.

Although speculation may explain periods of crisis in Argentina it is not plausible to argue that it can explain the large movements of gold to and from private hoards. Inconvertibility did not appear to be a danger in the period 1900 - 13 and the first major gold outflow was not until late 1913. Throughout the period there were net gold inflows in every year and exports grew at rapid rates. Under such conditions speculation in gold does not appear to explain private gold holding.

21. Above, p. 36
It also seems unlikely that individuals speculated in paper. First, it will be shown (Chapter 4) that velocity was relatively constant. Second, a return to inconvertibility would only happen if depreciation of the currency was expected since appreciation was against the economic interest of the dominant political group. Third, there were relatively stable prices for goods. Therefore the demand for money cannot be explained by the attempt to avoid losses in the real value of paper money balances. In conclusion, it seems safe to ignore the possibility that speculation can explain the demand for either money or gold in the period of prosperity.

THE DEMAND FOR MONEY AND FOR GOLD

On the basis of the preceding discussion the following motives for private demand for gold and money in Argentina are suggested. The demand for both was determined by the level of income. The demand for money was a function of the level of income and the two are highly correlated as Chapter 4 will demonstrate. Gold acts as a precautionary balance but in the opposite way to that suggested by Friedman. Gold is dishoarded when the money supply was insufficient to meet the demand for money determined by the economic prospects for the next year. The motivational complex will be verified empirically in the next chapter.
CHAPTER 4

APPLICATION OF THE MODEL TO ARGENTINA

Chapter 2 and 3 developed the theoretical bases for the empirical investigations to be undertaken in this chapter. Chapter 2 developed the conditions of gold import and suggested that although the gold import in the short-run did not meet the demand for money the demand was met in the long run. Chapter 3 argued that the Argentinian was able to adjust the supply of money by (dis)hoarding gold. This chapter will demonstrate empirically that in the short run gold dishoarding was used to alter the money supply in order to make purchases of real estate and land.

GOLD FLOWS IN THE LONG RUN

Gold imports to Argentina over the period 1900 - 1913 were more than sufficient to satisfy the demand for money. Two factors suggest this - the constancy of the velocity of money and the percent potential note issue realized.

The velocity of money was remarkably constant over the period 1900 - 1913 but there was a slight downward trend (see Table V). This fall in velocity can be explained à la Friedman by treating money as a luxury good which is accumulated as income flows. It also reflected the growing confidence in the paper peso as the Argentine economy continued to grow.
Another measure of the extent of gold flows and the impact on the money supply is what Ford calls the potential note issue.

"(Potential note issue)....is the issue which would have resulted if all net gold imports (less the quantity absorbed by the Conversion Fund) had been deposited at the Caja in exchange for notes."¹

The potential note issue is the cumulative sum of the gold import after 1899 and the note issue of 1899. The ratio of exports to potential note issue is a proxy for the potential velocity. This ratio fell substantially between 1900 and 1914 (Table V). It is concluded that gold imports were more than sufficient to satisfy the monetary demands of the Argentines. The excess gold was absorbed into private holdings (see Table I and the discussion of Assumption 1). Note also that gold hoarding was particularly heavy after 1909. The Argentinians found that the money supply was growing sufficiently rapidly to meet their requirements for expansion and they decided instead to add incoming gold to their private stocks.

GOLD FLOWS IN THE SHORT RUN

As Chapter 2 and Appendix B demonstrate, short-run gold flows are the net of the other items in the balance of payments. Since Argentina was very dependent upon agriculture for its international trade, changes in exports and capital imports were violent and

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual Velocity</th>
<th>Potential Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>1.18</td>
<td>1.17</td>
</tr>
<tr>
<td>1901</td>
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</tr>
<tr>
<td>1902</td>
<td>1.36</td>
<td>1.27</td>
</tr>
<tr>
<td>1903</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>1904</td>
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<td>1.41</td>
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<td>1909</td>
<td>1.32</td>
<td>1.22</td>
</tr>
<tr>
<td>1910</td>
<td>1.18</td>
<td>1.05</td>
</tr>
<tr>
<td>1911</td>
<td>1.02</td>
<td>0.89</td>
</tr>
<tr>
<td>1912</td>
<td>1.36</td>
<td>1.18</td>
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<tr>
<td>1913</td>
<td>1.34</td>
<td>1.18</td>
</tr>
<tr>
<td>1914</td>
<td>0.98</td>
<td>0.82</td>
</tr>
</tbody>
</table>

**Source:** Col. 1. Ratio of exports to actual note issue calculated from Ford, *Op., Cit.*, p.95

Col. 2. Ratio of exports to potential note issue calculated from *Ibid.*, p.95
imports of consumer goods and investment goods followed suit.\(^2\).

A formula to demonstrate how imports of goods and capital imports respond to changes in the level of exports yet provide in the long run the required gold reserves to back the currency was beyond the scope of this thesis but is a possibility for further study at a more advanced level. Instead of considering this broader mechanism, this thesis considers only the use of the private stock of gold to adjust the money supply.

**FORD ON GOLD HOARDING**

Ford did not examine the private demand for gold in depth during this period in Argentina but he did make some comments in passing. He felt that income was the chief determinant of gold hoarding.

"Gold would move to and from private sources as confidence varied which might well be assumed to vary with changes in prosperity and economic activity (for example, rising activity brings a net addition to the stocks of gold in the Caja as private hoarders diminished their gold stocks through growing confidence in paper currency); secondly, according to the needs of internal activity for paper rather than gold or cheques was generally used for transactions."\(^3\).

Ford assumed the level of income to be a test of both the level of economic activity and of confidence in the paper peso. He argued

---


that when income was high the demand for the paper peso was high --

(1) because the Argentinians had confidence in the paper peso, and
(2) because they needed domestic currency to conduct transactions.

The opposite is true when income falls.

Ford supports his argument by finding the correlation co-

efficients of income and gold (dis)hoarding. He finds a
correlation coefficient $r = +0.85$ between gold hoarding and the first
difference in exports (which was the only available proxy for
income) for the period 1904 - 1914. I recalculated his statistics
and discovered a correlation coefficient of

$$r = +0.83$$

for the same time span.

It should be noted that 1914 was a year of unusual gold
hoarding and of crop failure in Argentina. There was heavy gold
export in the second half of 1913 which cancelled the heavy import
in the first half. Thus if 1914 is excluded from the calculation
the correlation is lower.

$$r = +0.67;$$

and if both 1913 and 1914 are excluded the correlation is

$$r = +0.67.$$

Ford's failure to take the uniqueness of 1914 into account
reduces the impact of his analysis. We must look to see if there
aren't higher correlations with gold (dis)hoarding elsewhere.

4. Ibid., p. 47
GOLD (DIS)HOARDING AND VELOCITY

This section will demonstrate that the relationship between gold (dis)hoarding and the velocity of money is closer than that between gold (dis)hoarding and income, particularly when 1914 is excluded from the calculations. This changes the emphasis from the need to finance changing levels of income to the need to finance discrepancies between the supply of cash and the demand for money which is determined by the level of income.

Notes on the Methodology

The simple correlation test used by Ford does not establish lines of causation between the variables. However, a regression would produce the same coefficients since the t-test is the same. The direction of causation seems clear in the analysis. It is likely that the velocity of money (or income) determined gold (dis)hoarding rather than vice-versa.

A problem in performing the correlations of gold (dis)hoarding and note issue was that gold (dis)hoarding appeared on both sides of the correlation since (dis)hoarding was part of the note issue. The solution to this difficulty was to remove from note issue that part which was due to gold (dis)hoarding in that year and then to recalculate velocity. The assumption is made that the individual was concerned with what his money supply would have been if he hadn't (dis)hoarded. The correlations were higher after this operation.
TABLE VI

DEVIATION OF THE VELOCITY OF MONEY
ABOUT THE AVERAGE VELOCITY OF MONEY
IN THE PERIODS, 1904-1912, 1904-1913 AND 1904-14

ARGENTINA

<table>
<thead>
<tr>
<th>Year</th>
<th>1904-1912</th>
<th>1904-1913</th>
<th>1904-1914</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DEVIATION</td>
<td>DEVIATION</td>
<td>DEVIATION</td>
</tr>
<tr>
<td></td>
<td>FROM MEAN</td>
<td>FROM MEAN</td>
<td>FROM MEAN</td>
</tr>
<tr>
<td></td>
<td>HOARDING INCLUDED</td>
<td>HOARDING INCLUDED</td>
<td>HOARDING INCLUDED</td>
</tr>
<tr>
<td>1904</td>
<td>+0.16</td>
<td>+0.19</td>
<td>+0.20</td>
</tr>
<tr>
<td>1905</td>
<td>+0.16</td>
<td>+0.21</td>
<td>+0.20</td>
</tr>
<tr>
<td>1906</td>
<td>-0.05</td>
<td>-0.09</td>
<td>-0.01</td>
</tr>
<tr>
<td>1907</td>
<td>-0.05</td>
<td>-0.07</td>
<td>-0.01</td>
</tr>
<tr>
<td>1908</td>
<td>+0.11</td>
<td>+0.15</td>
<td>+0.15</td>
</tr>
<tr>
<td>1909</td>
<td>0.00</td>
<td>+0.02</td>
<td>+0.04</td>
</tr>
<tr>
<td>1910</td>
<td>-0.14</td>
<td>-0.20</td>
<td>-0.10</td>
</tr>
<tr>
<td>1911</td>
<td>-0.30</td>
<td>-0.33</td>
<td>-0.26</td>
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<tr>
<td>1912</td>
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<td>1913</td>
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<td>+0.06</td>
</tr>
<tr>
<td>1914</td>
<td>-0.30</td>
<td>-0.38</td>
<td></td>
</tr>
</tbody>
</table>

Notes on the Data

Statistics were not available for the Argentine money supply or for Argentine total income. Consequently the proxy used for income was the level of exports. The discussion of Assumption 5 (Chapter 1) justified the use of exports for income.

The proxy used for the money supply was note issue. The discussion of Assumption 1 (Chapter 1) established that use of the actual money supply rather the proxy, the note issue, would have reinforced the correlation for the years 1908 - 1913.

Correlation of Gold (Dis)hoarding and Velocity

The correlation of gold (dis)hoarding and the velocity of money is high both when 1913 and 1914 are included and when they are not:

\[ r = +0.88 \quad (1904 - 1914), \]
\[ r = +0.84 \quad (1904 - 1913), \]
\[ r = +0.84 \quad (1904 - 1912). \]

These coefficients are higher than those between hoarding and income.

Removal of the effects of gold (dis)hoarding from the note issue alters the velocity of money to the level it would have been at if there had been no private gold holding. The coefficients are:

\[ r = +0.91 \quad (1904 - 1914) \]
\[ r = +0.88 \quad (1904 - 1913) \]
\[ r = +0.88 \quad (1904 - 1912). \]
The improvement in the coefficients when (dis)hoarding is removed from the note issue is marginal but in the direction that conforms the hypothesis. The coefficients with gold (dis)hoarding included in note issue are lower because the situation which the (dis)-hoarding is intended to correct has been corrected in the desired direction.

Gold (dis)hoarding reduced the deviation between the current velocity and the average velocity during the period. The degree to which this happened is demonstrated by Table VI. The first column for each period indicates the deviation from the mean velocity if the results of gold (dis)hoarding are included in note issue and the second column shows the deviation if gold (dis)hoarding is removed. This deviation was reduced in the extremes by 80% in 1906 and 1907 and by 0% in 1913 when gold (dis)hoarding is included.

The partial movement toward the mean velocity suggests that Argentinians were satisfied with a velocity that fluctuated about the average. This is in agreement with Friedman's argument that in the United States the demand for money is a function of a concept of income which fluctuated less in percentages terms than the level of exports. Gold (dis)hoarding was used to adjust the money supply toward the level of income but not so much as to make the velocity of money a constant.
The correlation between note issue and the level of income (exports) was high:

\[ r = +0.79 \quad (1904 - 1914), \]
\[ r = +0.87 \quad (1904 - 1913), \]
\[ r = +0.83 \quad (1904 - 1912). \]

This supports the argument that the demand for money is dependent upon the level of income.

The velocity of money did conform to the income cycle. The correlation coefficients are:

\[ r = +0.80 \quad (1904 - 1914), \]
\[ r = +0.66 \quad (1904 - 1913), \]
\[ r = +0.66 \quad (1904 = 1912). \]

These coefficients are of the same magnitude as the coefficients for income and gold (dis)hoarding. This is not surprising because gold (dis)hoarding was more highly correlated with the velocity of money than income. The failure of the correlation of velocity and income to be higher emphasizes that gold (dis)hoarding was used to adjust the money supply toward the income level (whatever its level) rather than to finance changes in the level of income.

Other correlations did not provide significant results. The correlation between velocity and gold (dis)hoarding using railroad receipts as a proxy for income did not yield significant results except for 1904 - 1914.

\[ r = +0.68 \quad (1904 - 1914), \]
\[ r = \text{insig.} \quad (1904 - 1913), \]
\[ r = \text{insig.} \quad (1904 - 1912). \]
The correlation of gold (dis)hoarding and changes in actual note issue was not significant. This result substantiates earlier conclusions. What was important to the Argentine gold holder was not the size and direction of the changes in the note issue but its changes in size and direction with respect to changes in income.

Another variable which might explain gold (dis)hoarding is the interest rate. According to this approach gold would be exchanged for other assets when the interest rate on these assets rose and increased the opportunity cost of hold gold. Unfortunately the data was not available to demonstrate directly the correlation coefficients of (dis)hoarding with the interest rate.

In Argentina during this period it might be expected that the interest rate was dependent upon the level of income (exports). However, income did not correlate with (dis)hoarding more strongly than velocity. Capital imports, which respond to changes in the interest rate, were also used as a proxy. However, the correlation of gold (dis)hoarding and gold imports was not significant. This suggests that gold holdings were not responsive to the interest rate.

In conclusion, the private holding of gold in Argentina was most highly correlated with velocity, particularly when the effects of gold (dis)hoarding are removed. The demand for money was most highly correlated with income. These correlations substantiate the hypothesis that private stocks of gold were held as a precautionary balance which could be (dis)hoarded in order to bring the supply
of money to its desired relationship to income. The short-run inequality between the demand and supply of money was due to the failure of gold imports to respond perfectly to demands for gold to back the Argentine currency. In the long-run, as long as gold was being produced in sufficient quantities, the import of gold took place at the rate determined by the rate of growth of the economy.

Two possibilities for study at a more advanced level emerged from the preparation of this thesis. The first is a learning model to relate the import of gold to the demand for money which would make allowance for gold (dis)hoarding as a short-run safety device to equate the demand for money (and gold) with the supply. The second is a model to relate expectations about the crop to the demand for money (and gold). Both of these analyses were beyond the scope and level of sophistication of this master's thesis but might be done if research were undertaken to obtain data not available in the sources used above.
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APPENDIX A

THE SIZE OF THE MONEY SUPPLY - THE ARITHMETIC

A proper definition of the money supply should include both bank deposits and cash. The size of the money stock depends upon the preferences of individuals to hold gold notes and deposits and upon the cash/deposit ratios of the banks. An arithmetical demonstration of the constitution of the money stock aids in explaining this point.

Suppose:

- \( n \) is the proportion of notes held by the public
- \( 1 - n \) is the proportion of note issue deposited with the banks,
- \( d \) is the proportion of the gold stock deposited in the banks,
- \( c \) is the proportion of the gold stock held at the Caja.
- \( j \) is the deposit/cash ratio of the banks,
- \( M \) is the total money supply
- \( N \) is note issue
- \( G \) is the gold stock,
- \( R \) is total bank reserves,

the total money supply equals the note issue held by the public plus deposits

\[ M = nN + jR. \]
But note issue is equal to the proportion of gold stock held by the Caja,

\[ N = cG, \]

and reserves are equal to the sum of the note issue and the gold stock deposited at the bank,

\[ R = (1-n)N + dG. \]

Therefore,

\[ M = ncG + j(1-n)N + jdG, \]

\[ = ncG + j(1-n)cG + jdG, \]

\[ = G(nc + j - jn) + jd, \]

\[ = G(c(n + j - jn) + jd). \]

The money supply is a constant multiple of the gold stock only if the expression in brackets is a constant. Therefore, the money supply depends on the decision of individuals to hold gold notes and deposits and on the banks deposit/reserve ratio.
GOLD IMPORTS IN THE SHORT RUN - THE ARITHMETIC

Receipts are the sum of exports and capital imports in an export economy like Argentina,

\[ R = X + I_f. \]

Hence the rate of change of receipts is equal to the rate of change of exports times the proportion of exports to total receipts \((x)\) plus the rate of change of capital imports times the ratio of capital imports to total receipts \((i)\),

\[ R = xX + iI_f. \]

If capital imports and exports are growing at the same rate, the rate of growth of receipts is equal to that rate,

since \( X = I \),

and \( x + i = 1 \).

In equilibrium it is equal to the rate of growth of gold imports.

Similarly the rate of growth of payments is equal to the sum of the rate of growth of each of its components times the ratio of that component to total payments,

\[ P* = nN* + qD*. \]

In equilibrium \( P* = N* = D* = X* = I_f* = G*_n \). Note that this is compatible with increasing absolute gold imports.

Gold imports are equal to the difference between \( P \) and \( R \).

Hence the rate of growth of gold imports is equal to the sum of
the rate of growth of receipts times the ratio of receipts to gold imports plus the rate of growth of payments times the ratio of payments to gold imports,

\[ G_n^* = \frac{RR^*}{G_n} - \frac{PP^*}{G_n}. \]

For expositional purposes this expression is awkward. Therefore the equation was divided by \( G_n \) and the absolute change in gold imports was treated as a function of receipts and payments alone,

\[ \Delta G_n = RR^* - PP^*. \]

Table VII classifies the possible ways in which changes in receipts and payments determine changes in gold imports.

(1) In Part A balance of payments surplus (\( R > P \)) situations are considered; in Part B, deficits. In Part A gold inflows are positive; in Part B negative.

(2) Growing economies are listed on the left hand side where the rate of growth of receipts is positive; declining economies are on the right.

(3) In the upper row of each part the rate of growth of receipts exceeds that of payments and in the lower rows the reverse is true.

The results of the chart can be summarized as follows: The desired rate of growth of gold imports is positive in a growing economy. This condition is met when,
TABLE VII
THE SIGN OF THE CHANGE
IN GOLD IMPORTS
\( G_m = \Delta (\Delta G) \)

<table>
<thead>
<tr>
<th>PART A</th>
<th>(BALANCE OF PAYMENTS SURPLUS)</th>
<th>POSITIVE GROWTH RATE</th>
<th>NEGATIVE GROWTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>R* POSITIVE</td>
<td>R* POSITIVE</td>
<td>R* NEGATIVE</td>
<td>R* NEGATIVE</td>
</tr>
<tr>
<td>P* POSITIVE</td>
<td>P* NEGATIVE</td>
<td>P* POSITIVE</td>
<td>P* NEGATIVE</td>
</tr>
<tr>
<td>R*/P* POSITIVE</td>
<td>R*/P* POSITIVE</td>
<td>-</td>
<td>POSITIVE IF</td>
</tr>
<tr>
<td>P*/R* POSITIVE</td>
<td>R*/R* POSITIVE</td>
<td>-</td>
<td>NEGATIVE IF</td>
</tr>
<tr>
<td>R*/R* POSITIVE</td>
<td>R*/R* POSITIVE</td>
<td>R*/R* &lt; P*/R*</td>
<td>R*/R* &lt; P*/R*</td>
</tr>
<tr>
<td>R*/P* &lt; P*/R*</td>
<td>R*/P* &lt; P*/R*</td>
<td>R*/P* &gt; P*/R*</td>
<td>R*/P* &gt; P*/R*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART B</th>
<th>(BALANCE OF PAYMENTS DEFICIT)</th>
<th>POSITIVE IF</th>
<th>POSITIVE IF</th>
</tr>
</thead>
<tbody>
<tr>
<td>R*/P* POSITIVE</td>
<td>R*/P* POSITIVE</td>
<td>POSITIVE</td>
<td>R*/P* &lt; P*/R*</td>
</tr>
<tr>
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<td>R*/P* &lt; P*/R*</td>
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<td>R*/P* &gt; P*/R*</td>
<td>R*/P* &gt; P*/R*</td>
</tr>
<tr>
<td>R*/P* NEGATIVE</td>
<td>R*/P* NEGATIVE</td>
<td>-</td>
<td>NEGATIVE</td>
</tr>
<tr>
<td>R*/P* &lt; P*/R*</td>
<td>R*/P* &lt; P*/R*</td>
<td>R*/P* &gt; P*/R*</td>
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<tr>
<td>R*/P* NEGATIVE</td>
<td>R*/P* NEGATIVE</td>
<td>-</td>
<td>NEGATIVE</td>
</tr>
</tbody>
</table>
given \[ R > P, \]
\[ \text{if (a) } R^* > P^* > 0, \]
or if (b) \[ R^* > 0 > P^*, \]
\[ \text{or if (c) } P^* > R^* > 0, \text{ and } \frac{R^*}{P^*} > \frac{P}{R}. \]

In cases (a) and (b) gold imports may be larger or smaller than those desired depending on the rate of growth of exports. In case (c) although gold is being received at present the balance of payments is moving toward a deficit position. Nevertheless, given the second condition \[ \frac{R^*}{P^*} > \frac{P}{R}, \]
gold imports are increasing along with income.

When the balance of payments is in deficit it is possible for gold imports to be increasing, i.e., for gold exports to be falling. The most obvious case occurs when receipts are growing faster than payments,

\[ P > R \]
\[ \text{given (2) } \frac{R^*}{P^*} > \frac{P}{R}. \]

In cases (a) and (b) the balance of payments is moving to a surplus position but in case (c) the deficit is being reinforced.

It seems likely that 1(c) would become 2(c) in time and that 2(a) would become 1(a) as the balance of payments position switched.

This probability demonstrates a deficiency of the model - it is not sufficiently dynamic. On the other hand there has been developed
a set of models which show the changes in the balance of payments as a result of changes in income, exports, capital flows etc. Some of these are listed in the bibliography.

In recent centuries the instances of declining economies has been negligible but in the interests of symmetrical presentation the results are listed. When economies are declining (and velocity is assumed constant) less gold is desired for monetary purposes. This condition is met when

\[(3) \quad R > P,\]

not if (a) \(P^* < R^* < 0,\)

but if (b) \(R^* < 0 < P^*,\)

or if (c) \(R^* < P^* < 0 \quad \text{and} \quad \frac{P^*}{P} > \frac{P}{R}.\)

It is also met if

\[(4) \quad P > R,\]

if (a) \(P^* < R^* < 0 \quad \text{and} \quad \frac{P^*}{P} > \frac{P}{R},\)

(b) \(R^* < 0 < P^*\)

(c) \(R^* < P^* < 0.\)

Discussion of these cases is not warranted by the Argentine case and will not be undertaken since the changes in the items in the balance of payments were violent. Although the net gold import is known in any given year, it is not possible to discover whether this is due to rising or falling receipts or payments.