Capital Flows and Macroeconomic Performance: Lessons from the Golden Era of International Finance

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ABSTRACT

This paper analyzes the relationship between capital flows and returns during the “golden era” of international flows from 1880 – 1913 and the interwar period from 1918 – 1938. We construct two measures of returns in a country based on, alternatively, the marginal product of capital, and on consumption growth. Our main finding is that flows during the golden era are indeed consistent with standard theory, as capital flows from low to high return countries when returns are measured from consumption growth. However, this relationship breaks down during the interwar period. When returns are measured from the marginal product of capital, there is no tendency for capital to flow from low to high return countries during the golden era, a finding that is quite similar to the main findings in our analysis of the postwar period (Ohanian and Wright 2008).

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1 Introduction

Where does international capital flow? Robert E. Lucas, Jr. (1990) asked why capital did not flow from rich countries to poor, developing, countries implicitly assuming that returns to capital in developing countries were higher than those in the developed world. Lee E. Ohanian and Mark L.J. Wright (2008) measured capital flows and rates of return over the last 50 years to assess whether capital indeed flowed from low return countries to high return countries. We found that capital flows for much of the post-World War II period are the reverse of the flows predicted by theory. That is, capital has tended to flow to countries with relatively low returns, rather than high returns.

This paper analyzes where capital flowed during the “golden era” of international flows from 1880 – 1913, when capital mobility is considered to have been quite high, and during the interwar period from 1918 – 1938, when capital flows were increasingly restricted following the First World War and the Great Depression. We evaluate the relationship between capital flows and differences in returns to investment across countries using the same methodology as in our earlier paper. We construct two measures of the level of returns in a country and compare these returns to observed capital flows. The first return measure, based on the marginal product of capital, is constructed using a Cobb-Douglas technology and measured from the observed capital-output ratio. The second return measure is based on observed consumption growth, which is the return to capital when consumers have log preferences over consumption, and which otherwise is a good proxy for the return for the class of constant relative risk aversion utility functions.

Our main finding is that flows during the golden era are indeed consistent with standard theory, as capital flows from low to high return countries when returns are measured from consumption growth. However, this relationship breaks down during the interwar period. When returns are measured from the marginal product of capital, there is no tendency for capital to flow from low to high return countries during the golden era, a finding that is quite similar to the main findings in our analysis of the postwar period. This failure of capital flows to line up with the marginal product of capital suggests quantitatively important domestic factors that drive a sizeable wedge between net returns and the marginal product of capital.
Our paper is related to a large literature that has studied capital flows during the golden era and interwar periods. Most of these studies have built on research by Martin Feldstein and Charles Y. Horioka (1980) who analyzed cross-country data and showed that there is a high correlation between investment and savings across countries in postwar data. Feldstein and Horioka interpreted this high correlation as suggesting highly imperfect capital markets.

Research in this tradition for the golden era includes Tamim Bayoumi (1990), Barry Eichengreen (1992), Alan M. Taylor (1996), and Maurice Obstfeld and Taylor (2004), all of whom examine the correlation between savings and investment during the mid-late 1800s through the early 1900s, and compare those estimates to those from other time periods. A common finding in these studies is that there was a weaker correlation between savings and investment during the golden era of flows than during the interwar period and much of the postwar period. The interpretation of this finding is that there were significantly fewer impediments to capital mobility during the golden era than during other times. But even if there were fewer impediments to international capital flows during this golden era, the literature in the style of Feldstein and Horioka is silent on whether capital flowed to those countries that should have been the importers of capital, as predicted by standard theory. This paper sheds new light on capital flows during this time period by directly addressing this question.

The paper is organized as follows. In Section 2 we present an open-economy growth model in which returns may differ across countries as the result of (possibly very small) frictions in the operations of markets and derive conditions under which capital should flow from low return to high return countries in equilibrium. Section 3 describes our dataset, Section 4 presents our results, and Section 5 concludes.

2 Model

Our analysis is based on a simple open-economy version of the deterministic neoclassical growth model, in which the representative consumers in each country have identical
preferences given by

$$\sum_{t=0}^{\infty} \beta^t \{ \ln (c_{jt}) + v (1 - h_{jt}) \} n_{jt},$$

where $c_{jt}$ is per capita consumption in country $j$ at time $t$, $v$ is a concave function that defines preferences over non-market time which is equal to the household’s time endowment normalized to one less market hours $h$, and $n$ is the size of the population. The representative competitive firm in country $j$ produces output per capita using a Cobb-Douglas technology with country-specific productivity

$$y_{jt} = A_{jt} k_{jt}^{\theta} h_{jt}^{1-\theta},$$

in which $A$ is total factor productivity, and $k$ is the capital stock per capita.

Each country chooses per capita levels of consumption, leisure, and holdings of domestic capital and foreign bonds $b$ subject to the flow budget constraint

$$c_{jt} + \frac{n_{jt+1}}{n_{jt}} (k_{jt+1} + b_{jt+1})$$
$$\leq (1 - \tau_B) (1 + r_K - \delta) k_{jt} + w_{jt} h_{jt}$$
$$+ (1 - \tau_B (b_{jt+1}, b_{jt})) (1 + r_B) b_{jt},$$

in which $r_K$ is the gross return to domestic capital, $w$ is the wage and $r_B$ the return on foreign bonds which is common across countries. Both the return to capital and the return to foreign bonds may differ from the returns received by the consumer due to the presence of “wedges” denoted $\tau_K$ and $\tau_B$. It is easiest to interpret these wedges as taxes on the returns to both forms of investment, although they also proxy for the presence of both technological frictions and market imperfections in domestic and international capital markets, respectively. Both wedges may vary across countries and over time, and the international wedge may also vary with the foreign investment decisions of the country. For simplicity, we restrict attention to the case of a friction (such as capital controls) that increase the cost of foreign borrowing (so that $\tau_B (b_{t+1} < b_t) = \tau_- \leq 0$) and decrease the return to foreign lending (so that $\tau_B (b_{t+1} \geq b_t) = \tau_+ \geq 0$).
We now show how the theory is used to interpret the relationship between capital flows and returns, and to assess under what conditions capital should flow to countries with either high marginal products of capital and/or high consumption growth rates. The first order conditions yield the familiar result that consumers allocate their savings until the returns from domestic capital and foreign bonds – after adjusting for the effect of the wedges – are equalized. This implies the following expression for consumption growth:

\[
\frac{c_{jt}}{c_{jt-1}} = \beta (1 - \tau_{Bjt}) (1 + r_{Bt}) \\
\frac{c_{jt}}{c_{jt-1}} = \beta (1 - \tau_{Kjt}) (1 + r_{Kjt} - \delta).
\]

Firm profit maximization yields \( r_{Kjt} = \theta y_{jt}/k_{jt} \).

It is straightforward to see that if all wedges, both domestic and international, are zero, then returns to foreign investment and domestic capital will be equalized both within countries as well as across countries, implying that the marginal product of capital is also equalized across countries. In this case of neither domestic nor international impediments, then international capital flows are not determined without placing more structure on, amongst other things, current and future productivity levels and world interest rates. But as long as there is some wedge, no matter how small, between borrowing and lending rates (so that \( \tau_- < \tau_+ \)), consumption growth rates (and hence the implied return to foreign bonds) will be higher in countries running current account deficits (\( b_{t+1} < b_t \)) than in countries running surpluses. That is, in this simple model and if returns differ due to the presence of a friction with the above form, capital will flow from low return to high return countries.

While the theory makes a strong prediction about capital flows to countries with high consumption growth rates, it makes no such strong prediction regarding capital flows and the marginal product of capital. That is, capital will tend to flow to countries with high marginal products only in the absence of domestic financial market distortions, or in the case where domestic distortions are largest for capital importers. This suggests that the relationship between consumption growth and flows will be much more informative than the relationship between the marginal product of capital and flows. Moreover, the relationship between capital flows and consumption growth, on the one hand, and the marginal product
of capital, on the other, can shed light on the relative size of domestic versus international capital market distortions.

Given these implications of the theory, we first use data on the growth rate of per capita consumption and equation (1) to estimate the implied return on investments in foreign bonds in a country (the bond return). Then we use data on gross domestic product and gross capital expenditure and equation (2) to estimate the return on domestic capital (the capital return). We then compare our estimates to observed capital flows.

3 Data and Parameterization

We have collected data on population, the main GDP expenditure aggregates (real output, consumption, investment, government purchases, net exports), and the current account for the years prior to 1940 for fourteen countries: Argentina, Australia, Canada, Denmark, Finland, France, Japan, the Netherlands, Norway, Russia, Spain, Sweden, the United Kingdom, and the U.S.A. The data sources are typically country specific and are detailed along with our methods in an (unpublished) data appendix. We follow Matthew T. Jones and Obstfeld (2001) in adjusting the current account for changes in the stock of gold, although our results are robust to using unadjusted current account data. To our knowledge, this is the most comprehensive analysis of capitals flows during this period, including data from more countries than most other studies, and with multiple estimates of both returns and capital flows.

Capital stocks are constructed as in the theory above using the perpetual inventory method with initial year capital stocks set to the steady state level implied by the first two decades of data. In many cases, we have data for several decades prior to 1880 so that the effect of the initial capital stock assumption is small. Motivated by the large share of structures in investment in the 19th and early 20th centuries, we assume a depreciation rate \( \delta \) of 4\%. The capital share \( \theta \) is set to 25\% as a result of the substantial role played by non-reproducible capital in the larger agricultural sectors observed in this period. The discount factor \( \beta \) is set to 0.96. The choices of \( \theta \) and \( \beta \) have no impact on relative returns displayed below.
4 Results

Figure One plots the relationship between the bond return (consumption growth) and capital flows (current account surplus as a percentage of GDP) for the golden era of international capital markets 1880 – 1913. The result is quite striking, and is consistent with the theory. All of the capital exporters are identified as having relatively low bond returns (consumption growth), while of the group of capital importers all but Australia have relatively high returns.¹ This systematic pattern between consumption growth and capital flows is consistent with the effective operation of international capital markets in a world economy subject only to the imperfections that allow for differences in return across countries.

¹Australia may be the exception that proves the rule: these results were derived using data from N. G. Butlin (1964) which has been criticized for understating growth during this period (see, for example, Bryan Haig 2001).
in the first place. This pattern is also striking when compared to that in the postwar period, in which there is little tendency for capital to flow to high return countries.

Figure Two plots the same variables for the interwar period 1918 – 1938. These patterns of flows and returns contrast sharply with those during the golden era. First, capital flows are much smaller during the interwar period. This forms the basis for a substantial literature that concludes that capital mobility in the interwar period was much more limited than during the golden era. But perhaps the most striking aspect of this figure is that there is no tendency for the high return countries to be capital importers. Instead, capital tends to flow from high return to low return countries, as three of the four capital importers in the sample have relatively high consumption growth. This finding is strongly at variance with the theory, and is similar to our findings for the postwar period (see Ohanian and Wright 2008).
There are a number of possible interpretations of this deviation from theory, but perhaps the most plausible is a significant breakdown in the operation of international capital markets that prevents capital from flowing out of low return countries to high return countries.

Figure Three examines the relationship between the marginal product of capital and capital flows for the golden era. The relationship between the marginal product and capital flows is strikingly at odds with that between consumption growth and flows. The theory interprets this pattern as domestic factors that drive a wedge between the marginal product of capital and the return to capital, including capital income taxation or inefficiencies in domestic financial markets. However, a puzzle with this interpretation is that the third highest estimated marginal product is for the United Kingdom (UK), a capital exporter, which possessed some of the deepest and most sophisticated financial markets at the time.
The high returns for the UK are not obviously the result of measurement error in the marginal product of capital: our capital expenditure data for the UK begin in 1830 so that the effect of the assumptions on the initial capital stock on later stocks are small.\textsuperscript{2} Instead, the high returns for the UK are driven by the relatively low investment shares in the mid 19th Century. A similar pattern is observed for the interwar period as shown in Figure Four.

\textsuperscript{2}Mismeasurement of the initial capital stock could affect estimated returns in Russia, where our data begin in 1885, Canada and Denmark, where data begin in 1870, or in Australia and Argentina, where data begin in the 1860s.
which consumption goods and investment goods are produced with different technologies will generate an Euler equation in which the return to capital also depends on the relative price of investment goods, and their evolution over time.

5 Conclusion

A substantial literature has asked whether or not international capital markets were more efficient during the golden era from 1880 – 1913 than during the interwar period 1918 – 1938 or the postwar period. Many of these studies propose a test for the operation of perfect international capital markets, including analyses based on comparing savings and investment rates, and interpret the extent to which the data fail these tests as a metric for quantifying capital market imperfections. A problem with this approach is that these tests may have low power against reasonable alternatives. This is difficult to circumvent since observed capital flows are a function both of imperfections in international capital markets and the underlying motive to engage in international borrowing and lending in the first place. As a result, it is unclear whether rejection of a test for perfect capital markets is due to capital market imperfections or to a rejection of the often very strong auxiliary assumptions made about the underlying gains from international trade in capital.

In this paper, we build on our recent work (Ohanian and Wright 2008) in assembling a series of facts regarding capital flows and rates of return that can be used to discipline alternative theories of capital market imperfections. The simple theory presented here shows that it is useful to examine the relationship between observed capital flows and observed consumption growth rates, and between the relationship between capital flows and estimates of the marginal product of capital. Using data on the postwar period, Ohanian and Wright (2008) found that there was a tendency for countries with low returns, measured either from consumption growth or the marginal product of capital, to be capital importers which is inconsistent with a number of simple theories of the operation of international capital markets.

The analysis presented here shows a very different pattern between flows and returns during the golden era of international capital flows, as capital importers during this period tended to be the highest return countries as identified by observed consumption growth
rates, and capital exporters were the lowest return countries. For the interwar period, by
contrast, this relationship breaks down. These findings are not inconsistent with the view
that capital markets operated effectively during the classical gold standard period, and less
effectively during the interwar period despite widespread adherence to the gold standard.
Future research should be directed towards understanding why the effectiveness of capital
markets fluctuates so much over time, and why these capital markets were apparently so
effective around the turn of the 20th century.

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6 Data Sources

6.A Argentina

Data after 1913 from Della Paolera et al [11], as well as some data before 1913. Before 1913, data from Ferreres [13] as follows: constant price expenditure aggregates from Table 3.1.1; implicit price deflator for gross domestic product from Table 3.3.1; price indices for exports and imports in US dollars from Table 8.1.7 with the peso US dollar exchange rate from Table 7.2; price index for consumption from Table 5.1.1.

6.B Australia

From 1861 to 1900, population from Vamplew [36] Table POP 17-25 for years 1891, 1881, and 1861. This was extrapolated from later data using data for Australia. For 1871, interpolate using growth in population of NSW and Victoria. For 1886, 1876, 1868 and 1864 interpolate using growth of population in Queensland. For all other years, use geometric interpolation. Gross domestic product and gross fixed capital expenditure in current and constant 1911 pounds from Butlin [2] Tables 1, 8, 270A and 270B. Change in current price inventories represented by change in livestock from Jones and Obstfeld [6]. Private final consumption expenditure per capita in constant 1900 prices from Vamplew [36] Table PC 182-183. Consumer prices extrapolated using movements in retail prices from Vamplew [36] PC 30-31. Exports and imports at current prices from Butlin [2] Table 247, with export and import price indices from Vamplew [36] Table ITFC 81-83 used as deflators for constant price data. Public consumption calculated as residual. Gross capital expenditure extrapolated using movements in gross fixed capital expenditure. Balance of Payments from Butlin [2] Table 247, with the correction for gold exports from Jones and Obstfeld [6].

From 1900, population from Maddock and McLean [26] Table 1. National income and expenditure accounts in both current and 1966/67 constant prices from Butlin [9] Tables IV.1 and IV.3. Balance of payments from Butlin [9] Table IV.17, and Vamplew [36] Table ITFC 84-100, with the correction for gold exports from Jones and Obstfeld [6].
6.C Canada

After 1926, all data are from Urquhart and Buckley [35]. Before 1926, data sources vary. Data on population (Table 1.6), as well as gross fixed capital expenditure (Table 1.2), government consumption (Table 1.3) – all at current prices – as well as gross national product at both current and constant prices (Table 1.6), and the balance of payments (Table 1.4) are from Urquhart [34]. Data on import and export price indices from Urquhart and Buckley [35] Table G 386-388. Gross domestic product at current prices was constructed from gross national product using data on net factor incomes from the balance of payments, and deflated using the implicit price deflator for gross national product. Private consumption expenditure at current prices was calculated as a residual.

Data on the national accounts expenditure aggregates at current and constant prices for the years 1870, 1880, 1890, 1900, 1910, 1920, and 1929 are from Firestone [14]. For other years, gross domestic product, exports and imports are interpolated using movements in the constant price analogues from Urquhart [34] and Urquhart and Buckley [35] cited above. Private and government consumption, gross fixed capital expenditure and changes in inventories are interpolated using current price analogues deflated using movements in the corresponding implicit price deflators for the USA to interpolate between benchmark years.

6.D Denmark


6.E Finland

All data from 1860 to 2000 from Hjerpe [17], except the current account which is adjusted for gold as in Jones and Obstfeld [6].
6.F France

Population data from Maddison [25]. All other data from 1890 to 1939 from Villa [37], with the exception of data on private consumption and change in inventories which begin in 1896. Prior data from Lévy-Leboyer and Bourguignon [24] with current price national expenditure aggregates in Table A-III deflated by the price series in Tables A-IV and A-VI.

6.G Japan

Data on population (Table A53), the balance of payments (Table A31) and national accounts expenditure aggregates at both current (Table A1 and A2) and constant (Table A3) prices from Ohkawa, Shinohara and Rosovsky [28] with reference also to Okawa and Rosovsky [27]. Current account data adjusted for gold flows as in Jones and Obstfeld [6].

6.H The Netherlands

All data from 1800 to 1913 is from Smits, Horlings, and Zanden [32]: current and constant price private and public consumption from tables E.1 and E.3; current and constant price gross fixed capital expenditure and change in stocks from Tables E.2, E.3 and E.4; current price data on merchandise exports and imports from Table H.1; current and constant price data on gross domestic product and gross national income from tables I.2 and I.5; population from Table A.1. Export and import prices for 1913 and 1928 from Kindelberger [?] Table 3.1E.

Most data from 1913 to 1950 from Bochove and Huitker [7]: current price data on the national accounts expenditure aggregates from Table H.5; implicit price deflators for the national accounts expenditure aggregates from Tables H.4 and H.7; population from Table H.1; data on national product, income and current account from Table H.2. Data on gross domestic product at constant prices from Ark and Jong [3] Table C.1. Data on gross fixed capital expenditure from 1913 to 1921 from Groote, Albers and Jong [16] Appendix 1. From 1940 to 1946, gross domestic product in current prices interpolated using movements in current price net national product.
6.1 Norway

All data from from 1830 to 2000 Honde and Grytten [19] and [20], except the change in inventories and the current account, adjusted for gold, which are from Jones and Obstfeld [6].

6.2 Russia

All national accounts (excluding gross exports and imports) and population data from Gregory [15] Tables 3.1 and 3.2, using the recommended variant 1 of private final household consumption expenditures and gross domestic product. Balance of payments data from Tables 4.1 and M.1, and from Jones and Obstfeld [6]. Unlike the Jones and Obstfeld [6] calculations for investment, we add investment in livestock to the change in inventories.

6.3 Spain

Population (Table A.13.2) and national accounts expenditure aggregates at current (Table A.9.1) and constant (Tables A.9.10 and A.9.11) prices from Prados de la Escosura [29]. Balance of payments data from 1850-1913 from Prados de la Escosura [30] Appendix 2. These figures exclude all gold and silver imports and exports following Prados de la Escosura [30].

6.4 Sweden

All data from Krantz and Schön [23], except the current account which is adjusted for gold as in Jones and Obstfeld [6].

6.5 United Kingdom

Population data from Maddison [25]. All other data from 1870 to 1965 from Feinstein [12] Tables 2, 3 and 5. Data from 1830 to 1870 on constant and current price private and public consumption, gross fixed capital expenditure, and gross domestic product, from Deane [10] Tables A and B. Data from 1796 to 1970 on constant and current price exports and imports
from Imlah [21] Table 8, with missing data for 1813 interpolated geometrically; data on the current account from 1815 to 1870 from Table 4.

6.N United States of America

All national income and expenditure data at both current and constant prices, as well as all balance of payments data, from 1929 on from BEA [8] Tables 1.1.5 and 1.1.6. Prior to 1929, balance of payments data from The U.S. Department of Commerce [33] series U1, U5, U6, U8, U13, U16, U17, U225, U226, Ee 7 and Ee12 was used to interpolate both the current account and the current and constant price exports and imports series in the national accounts. National accounts data in both current and constant prices from 1889 to 1928 were taken from Kendrick [22] Tables A-IIa and A-IIb. Constant price national accounts data from 1834 to 1859 as well as both constant and current price national accounts data from 1869 to 1888 from Rhode [31] Tables 1,2 and 3. For years prior to 1834/1869, and to interpolate years between 1860 and 1869, data from Berry [4] Tables 3 and 9 were used. Population data from 1820 onwards from Maddison [25] Table 1, and from 1789 to 1820 from Berry [4] Table 6.

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