

WEALTH BIAS IN THE FIRST GLOBAL CAPITAL MARKET BOOM, 1870-1913

by

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July 2001

This study would not have been possible without the generosity of Irving Stone, who supplied detailed information documenting British foreign investment that was not published in his book. We are also grateful to Robert Allen, Chris Meissner and Luís Bertola who kindly provided some of their unpublished data. The authors thank John Baldiserotto, Ximena Clark, John Collins, David Foster, Heather McMullen, Ann Richards, and Danila Terpanjian for their excellent research assistance. We have benefited from extended discussions with Francesco Caselli and Andrew Warner, as well as from comments by Michael Bordo, John Coatsworth, Daniel Devroye, Scott Eddie, Barry Eichengreen, David Good, Yael Hadass, Matt Higgins, Macartan Humphreys, John Komlos, Michael Kremer, Philip Kuhn, Deirdre McCloskey, Chris Meissner, Kevin O'Rourke, Ken Rogoff, Matt Rosenberg, Dick Salvucci, Howard Shatz, Max Schulze, Alan Taylor, Yishay Yafeh and participants at the May 2001 Cliometrics Conference. Remaining errors belong to us. Williamson acknowledges with pleasure financial support from the National Science Foundation SES-0001362, and both authors thank the Center for International Development for allocating office space to the project.

Abstract

Why do rich countries receive the lion's share of international investment flows? Though this *wealth bias* is strong today, it was even stronger during the first great global capital market boom, after 1870. Very little of British capital exports went to poor, labor-abundant countries. Indeed, only about a quarter went to labor-abundant Asia and Africa where almost two-thirds of the world's population lived, while about two-thirds went to the labor-scarce New World where only a tenth of the world's population lived. Was this geographic distribution of capital flows caused by some international capital market failure, or was it due to a shortfall in underlying economic, demographic or geographic fundamentals that diminished the productivity of capital in poor countries? This paper constructs a panel data set for 34 countries that as a group received 92% of British capital, and uses it to conclude that international capital market failure (including whether the country was on or off the Gold Standard) had only second-order effects on the geographical distribution of British capital. It then ranks the three big fundamentals that mattered most—schooling, natural resources and demography.

JEL No. F21, N20, O1

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I. Introduction

Rich countries receive the lion's share of cross-border investment. A large literature has proposed theoretical explanations for this *wealth bias* (Barro 1989; King and Rebelo 1989; Gertler and Rogoff 1990; Lucas 1990; and others since), but exploration of the wealth bias during the *first* great global capital boom, after 1870, has only just begun (Lane and Milesi-Ferretti 1999; Kohl and O'Rourke 2000; Obstfeld and Taylor 2001). It appears, in fact, that no study has yet investigated the determinants of the geographic distribution of international investment before World War I.

Table 1 summarizes the destination of European foreign investment just prior to World War I, and very little of it went to poor, capital-scarce and labor-abundant countries.¹ Indeed, only about a quarter of British foreign investment went to labor-abundant Asia and Africa where almost two-thirds of the world's population lived, while about two-thirds went to the labor-scarce New World where only a tenth of the world's population lived. The simplest explanation of this bias is that British capital chased after European emigrants and that both were seeking cheap land and other natural resources (O'Rourke and Williamson 1999, Chap. 12), although Table 1 shows that French and German capital did not chase after the emigrants heading to the New World anywhere near as much as did the British. While French and German capital preferred European to New World opportunities, the same small capital export shares went to Asia and Africa.² Furthermore, Table 2 suggests that the wealth bias was even stronger before World War I than it is today since the elasticity of foreign capital received with respect to GDP per capita was almost twice as big then as now.³

The venerable capital-chased-after-labor explanation argues that there must have been an omitted variable at work, and most economic observers of the late 19th century would say that it was natural

¹ Almost thirty years ago one economic historian used some of the same data used here (only for five New World countries: Argentina, Australia, Canada, New Zealand, United States) and concluded that GDP was the only variable that consistently predicted British capital distribution (Richardson 1972, p. 109).

² We have not been able to secure the same kind of panel data for France and Germany in the four decades prior to World War I. Too bad, since we'd like to know whether French and German investors obeyed the same laws of motion that characterized British investors, even though the latter favored the New World over Europe.

resources. In contrast, most economic observers of the late 20th century would say it was human capital. But surely the phenomenon deserves more serious attention than that offered by some mono-causal natural resource or human capital endowment explanation. Furthermore, we want to sort out what role policy and institutions played in the process—like the Gold Standard—after we have controlled for the economic, demographic and political fundamentals. Finally, we hope to combine this study of late 19th century British investment abroad with a similar study of late 20th century United States investment abroad (Clemens ongoing) to learn how the determinants of the wealth bias have changed with time.

The debate over the cause of the wealth bias breaks down into two camps: those who believe that capital is in fact highly productive in poor countries but does not flow there due to failures in the global financial capital market or in the global capital goods market, and those who believe that capital would not be very productive in poor countries even with perfect capital markets and thus has no reason to flow there. We refer to the first claim as the *global capital market failure* view, and the second as the *unproductive domestic capital* view.

II. Potential Explanations for the Wealth Bias: A Review of the Literature

The Global Capital Market Failure⁴ View

Studies positing that the wealth bias can be explained by failure in a competitive international capital market invite the following organization. The demand for foreign savings can be choked off by domestic tariffs, distance from source, and other distortions that yield wide user cost differentials between countries even where financial costs are equalized. The supply of foreign savings can be deflected by other global capital market failures, like adverse selection, herding, the absence of a stable monetary standard, and colonial intervention through the application of force. Each will be discussed in turn.

³ Also note that the elasticity on market size (e.g. GDP) was smaller in 1907-1913 than it is today.

Tariffs, Distance from London and Other Distortions. Matthew Higgins (1993; summarized in Taylor 1998) demonstrates that after correcting for higher prices of capital goods, much of the incentive to invest in many contemporary less developed countries (LDCs) evaporates. Empirical work by Charles Jones (1994) on the years following 1950, and William Collins and Jeffrey Williamson (2001) on the years before 1950, extend the work of J. Bradford DeLong and Lawrence Summers (1991) to show that distortions in equipment prices significantly depress domestic investment as well as growth. What distortion might prevent the capital market from sending enough financial capital to poor countries where the marginal product of capital is high? The idea that tariffs on manufactures early in industrial development could deter foreign capital inflows is as old as List (1856, pp. 227, 314) and Pigou (1906, p.11).⁵ Citing the example of Argentina after the 1930s, Alan Taylor (1998) shows how import substitution policies—and their accompanying price distortions—stifled capital flows (and accumulation) even when the undistorted marginal product of capital was high. High transportation costs or distance from London might do the same.

Adverse Selection and Costly State Verification. Applying asymmetric information theories, several authors have argued that the international credit market is rationed by adverse selection and costly state verification (e.g. Boyd and Smith 1992; Gordon and Bovenberg 1996; Razin, Sadka and Yuen 1999; Hanson 1999). That is, wealthy investors will not accept the high returns to capital available in developing countries because the presence of that capital may attract high-risk borrowers, creating potential losses which exceed the gains due to otherwise outstanding investment opportunities.

Herding and the Foreign Bias. One of the older hypotheses used to explain Victorian and Edwardian Britain's economic slowdown was that the City of London had an irrational foreign bias, systematically discriminated against domestic borrowers, starved the home industry for funds, and contributed to an accumulation slowdown. According to this thesis, market failure at home accounted

⁴ We define "market failure" as that which occurs "when the allocations achieved with markets are not efficient" (Eatwell et al., 1987), for any reason. Thus what some refer to as "government failure," we call "market failure."

⁵ O'Rourke (2000) provides evidence that protective tariffs raised TFP before WW1 in ten economies more advanced in their industrialization, just as List said it would.

for the huge capital export from Britain (O'Rourke and Williamson 1999, p. 226). Evidence offered by Michael Edelstein (1976, 1981, 1982) certainly did grave damage to the thesis, but it may still have power in accounting for the heavy preference for New World investment. After all, this foreign capital export boom seems to be characterized by the same attributes theorists assign to herding behavior in financial capital markets today (Banerjee 1992; Cont and Bouchaud 2000).

Stable Monetary Systems. The global economy was dominated by the Gold Standard after the 1870s, and many observers argue that it promoted international capital mobility by eliminating exchange risk (Eichengreen 1996). Others argue that the Gold Standard commitment provided an investor guarantee that the country in question would pursue conservative fiscal and monetary policies (Bordo and Kydland 1995; Bordo and Rockoff 1996), policies that would make potential investors more willing to risk their capital overseas. While the argument certainly seems plausible, it is, of course, possible that the Gold Standard policy choice and the foreign capital inflow were both determined by more fundamental influences. Barry Eichengreen (1992) has persuasively argued the case for these political and economic fundamentals, a position taken some time ago by Karl Polanyi (1944) and restated in modern economic language recently by Maurice Obstfeld and Taylor (1998).

Colonial Intervention. Late 19th century colonial intervention (plus gun-boat diplomacy) created a friendly environment for international lending, or so says a very large literature. After controlling for other things that mattered to investors, did British foreign capital follow the flag or follow the market?

The Unproductive Domestic Capital View

The alternative view of the wealth bias is to explain it by appealing to absent third factors. This *unproductive domestic capital* view actually assumes perfect financial capital markets, although it stresses that there may be failures in other markets that might impact on this one. The *supply* of foreign capital may be cut back by positive correlations of business cycles between developed and developing countries, since wealthy-country investors seek both high average returns and insurance against financial

disaster that a diversified portfolio offers. The *demand* for international investment can be choked off by limitations on internationally immobile third factors such as schooling, skills, natural resources, demographic factors, unenforceable property rights, and what has come to be called social capital (Putnam 1995; Glaeser et al. 2000).

Business Cycle and Long Swing Correlations. Several economists (Cox et al. 1985; Tobin 1992; Bohn and Tesar 1996) have sought to explain gross (rather than net) capital flows by the increased supply of foreign capital available to countries with business cycles uncorrelated or, even better, inversely correlated with that of the host country, allowing portfolio diversification for investors in the latter. This theoretical view will find a comfortable haven in history since the inverse pre-1913 correlation between British domestic investment and capital exports has long been appreciated by economic historians (Cairncross 1953; Thomas 1954; Williamson 1964; Abramovitz 1968). Perhaps this correlation also played a role in influencing the direction taken by British foreign capital.

Third Factors: Natural Resources, Skills and Schooling. Consider a neoclassical production function $Y = AK^\alpha L^\beta S^\gamma$, where S is some third factor and there are constant returns ($\alpha + \beta + \gamma = 1$). The marginal product of capital Y_K and the marginal product of labor Y_L are

$$Y_K = A\alpha K^{\alpha-1} L^\beta S^\gamma$$

$$Y_L = A\beta L^{\beta-1} K^\alpha S^\gamma$$

It is easy to see that low marginal products of capital and low marginal products of labor can coexist—provided the country is sufficiently poor in S .

Economic historians would be quick to offer a candidate for this immobile third factor role—natural resources, and David Bloom and Jeffrey Sachs (1998) have argued the same case when looking for explanations of African performance more recently. It has a venerable tradition in economic history,⁶ and we will give that tradition plenty of scope to influence the empirical results later in this paper.

⁶The literature is large. See, for example, Cairncross 1953; DiTella 1982; Green and Urquhart 1976; Kuznets

Robert Lucas (1990) took the view that the immobile third factor was human capital—skills and schooling. While there are reasons to suppose that human capital was much less central to the growth process in the 19th than in the 20th century, Gabriel Tortella (1994) has effectively argued the contrary to help account for Iberian backwardness. Kevin O’Rourke (1992) has done the same for Ireland: if Irish workers with the greatest human capital endowments self-selected for emigration, capital’s marginal product would have fallen in 19th century Ireland, thus choking off capital flows from Britain. Similarly, the work of Gregory Clark (1987) shows enormous differences in the profitability of cotton textile mills across the globe just before World War I, and cheap labor did not help poor countries much since labor was not very productive. However, Clark thinks that cultural forces reduced worker productivity in poor countries, not the absence of skills and schooling.

Third Factors: Demography. The dependency ratio, defined as the percentage of the population not engaged in productive activities (whether remunerated or not), is typically viewed as an immobile characteristic of a country’s labor force. It increases in response to baby booms, improved child survival rates and adult longevity, although the latter was a minor event in the 19th century. It decreases in response to an inflow of working-age immigrants. Assuming that dependents affect a household’s ability to save and that labor force participation affects productivity and therefore investment, dependency rates have the potential to impact capital flows. Demographic models like those of Higgins and Williamson (1997) and Bloom and Williamson (1998) show how changes in the demographic structure can matter. As the country develops, the demographic transition to a lower youth dependency burden and a more mature adult population increases the productivity of both the population and the labor force. Further development, of course, can reverse the effect as the elderly dependency burden rises.

In order for the demographic structure to affect capital flows, it must have differential effects on investment and savings. Its effect on investment is clear from the simple third factor equations above:

lower youth dependency and higher adult participation rates means a higher marginal product of capital, which, in turn, implies more investment demand. And more investment demand implies more demand for foreign capital unless domestic savings increases. The domestic saving response to a change in the dependency burden is, however, less clear as those who have followed the life cycle debate will appreciate. Guided by previous work using late 19th century evidence (Taylor and Williamson 1994), we expect the dependency rate to play a role in determining capital flows, young populations being more dependent on foreign capital.⁷

Third Factors: Unenforceable Property Rights. Even if an investor can easily prove noncompliance to an investment contract, this information is of little use if the enforcement mechanism is inadequate or, even worse, non-existent. Thus, foreign investment will not take place in potential-borrowing countries where contract enforcement and property rights are absent, and wide differences in the marginal product of capital can exist. Contracts may be unenforceable due to the absence of needed judiciary and executive public institutions, both at the national and international level. Aarón Tornell and Andrés Velasco (1992) proposed just such an explanation for low capital flows to poor countries. Sometimes these capital flows can even be negative, as in Cecil Rhodes' Africa, when rents from mines underwent capital flight to rich countries where returns were low but property rights were enforced by law rather than by gunpowder and steel. Riccardo Faini (1996) offers another example: labor mobility out of countries with low capital stocks toward those with high capital stocks (and thus high wages) can by depopulation keep the marginal product of capital low even in countries with low capital. Since labor cannot be used as collateral for loans, these countries cannot borrow against their labor force to build sufficient physical capital stocks to prevent the emigration.

Third Factors: Geography and Others. There are other candidates for the third factor role. In their recent effort to reclaim the importance of geography on recent economic performance, Bloom and Sachs (1998) stress distance from periphery to core, a factor which is likely to have been even more

⁷ This prediction has been confirmed with late 20th century evidence (Higgins and Williamson 1997).

important in the 19th century when distance had a bigger impact on cost. Helmut Reisen (1994) has explicitly pointed to the potential role of geographic distance to neighboring markets and urban agglomerations on capital flows. The seminal industrial organization theories of Raymond Vernon (1966) and Stephen Hymer (1976) fall into this category as well; their vision of scale effects, managerial knowledge, distribution networks, product cycles and other firm-specific intangibles can all be modeled as immobile third factors affecting the marginal product of capital. Others have explored yet another immobile third factor—specialized, nontraded intermediate inputs.

It is very clear that there is no shortage of theoretical assertions to motivate empirical analysis. What's missing in the wealth bias literature, however, is empirical analysis. In this regard, economic history has much to offer.

III. A Simple Model: Testable Predictions of the Two Views

This exposition uses the standard Ramsey open-economy growth model, recently formalized by Robert Barro and Xavier Sala-i-Martin (1995), to motivate the regression specifications found in Section IV. We begin by holding to the initial assumptions made by Lucas (1990): two factors and no capital market imperfections. Like Lucas, we show that the wealth bias can be explained by relaxing either of these assumptions. We go on to derive which empirically testable conditions are necessary for either explanation to be correct.

The Wealth Bias

Let Y_i represent the output of country i , K_i represent the stock of capital in country i , and L_i represent the population of country i . The lower case y_i and k_i signify per capita output and per capita capital stock, respectively, and $y_i = A_i f(k_i)$ where A_i is the level of technology or total factor productivity in country i . The function f is neoclassical (i.e. $f(0) = 0$, $f' > 0$, and $f'' < 0$). For the simplest

illustrative case, take there to be three countries such that $k_1 > k_2 > k_3$. For concreteness, take country 1 to be the United Kingdom and countries 2 and 3 to be alternative hosts for British investment.

Autarky. Let r_i be the return to a capital investment in country i , and let δ_i be the depreciation rate in country i . If firms maximize profits, then in the absence of international capital flows $r_i = f'(k_i) - \delta_i \forall i$. As in the standard Ramsey model, utility-maximizing consumers and the preceding equation uniquely determine the level of capital intensity in each country as $k_i = A_i f'^{-1}(\delta_i + \rho_i + \theta_i x_i)$ where ρ_i is the pure rate of time preference, θ_i is the intertemporal elasticity of substitution, and x_i is the growth rate of the level of technology in country i . For the present purpose all that matters is that under autarky, each country achieves a unique capital intensity k_i .

Open economy. Assume that technology is constant everywhere ($A_i = A \forall i$) and the rate of depreciation is the same across countries ($\delta_i = \delta \forall i$). Let K_i = the capital stock in country i under autarky, and K_i^* = the capital stock in country i under free-flowing capital. When capital flows freely across borders,

$$r_1 = r_2 = r_3 \Rightarrow k_1^* = k_2^* = k_3^*. \quad (1)$$

In the adjustment from autarky to open economies, capital flows instantaneously to the country where it can earn the highest return and is invested there costlessly. The volume of this flow into country i is therefore $\Delta K_i = K_i^* - K_i$. According to (1),

$$\Delta K_2 = \frac{L_2}{L_1} K_1^* - K_2 \quad \text{and} \quad \Delta K_3 = \frac{L_3}{L_1} K_1^* - K_3 \quad (2)$$

are the volumes of capital flow into countries 2 and 3 respectively.

Let σ_i represent the share of capital flows out of country 1 that is received by country i . Let $j \in \{2,3\}$. Thus,

$$\sigma_j \equiv \frac{\Delta K_j}{\Delta K_2 + \Delta K_3}. \quad (3)$$

As long as both countries 2 and 3 receive capital, that is as long as the denominator above is positive,

then (2) and (3) imply that $\frac{\partial \sigma_j}{\partial K_j} < 0$, which together with the obvious $\frac{\partial k_j}{\partial K_j} > 0$ and $\frac{\partial y_j}{\partial k_j} > 0$ gives

$$\frac{\partial \sigma_j}{\partial y_j} < 0. \quad (4)$$

Countries with lower income per capita should receive greater shares of international capital flows. In fact, the large majority of these flows go to the highest-income countries.⁸ This is the wealth bias.

The Global Capital Market Failure View

We can explain this apparent contradiction between theory and observation by relaxing the assumption of perfect international capital markets. Assume now that country i can only borrow up to a fraction ϕ_i of its capital stock K_i . That is, $\phi_i = \infty$ if country i faces no borrowing constraint,⁹ and $\phi_i = 0$ if country i is totally blocked from world capital markets.

If country j is not credit-constrained (i.e. $\Delta K_j \leq \phi_j K_j$), then the above analysis remains unchanged. However, if the credit constraint binds for, say, country 2, then

$$\sigma_2 = \frac{\phi_2 K_2}{\phi_2 K_2 + \frac{L_3}{L_1} K_1^* - K_3}, \quad (5)$$

and a similar condition *mutatis mutandis* holds for σ_3 . From this we find

⁸Note also that countries whose population represents a larger fraction of the aggregate populations of capital recipients get a larger share of the flows: i.e., $\frac{\partial \sigma_2}{\partial \left(\frac{L_2}{L_2 + L_3} \right)} > 0$, a result to which we return later.

⁹Even if $\phi_i > 1$, country i still faces a potentially binding credit constraint unless $\phi_i = \infty$. Nothing in equation (2) prevents a totally unconstrained borrower from receiving loans whose value exceeds the initial capital stock. A reputation mechanism could allow countries to borrow more than their collateral.

$$\frac{\partial \sigma_2}{\partial K_2} = \left(\frac{\phi_2 + K_2 \frac{\partial \phi_2}{\partial K_2}}{\phi_2 K_2 + \frac{L_3}{L_1} K_1^* - K_3} \right) \left(1 - \frac{1}{\phi_2 K_2 + \frac{L_3}{L_1} K_1^* - K_3} \right). \quad (6)$$

Again, a similar condition holds for country 3. Therefore if we assume that, for any reason, richer

countries are more creditworthy (i.e. $\frac{\partial \phi_j}{\partial K_j} > 0$), then

$$\frac{\partial \sigma_j}{\partial K_j} > 0 \Rightarrow \frac{\partial \sigma_j}{\partial k_j} > 0 \Rightarrow \frac{\partial \sigma_j}{\partial y_j} > 0. \quad (7)$$

That is, if rich countries are more creditworthy and country j faces a binding credit constraint, then richer countries should receive a larger share of international capital flows; imperfections in the international capital market have explained the wealth bias. It also follows from (5) that

$$\frac{\partial \sigma_j}{\partial \phi_j} > 0. \quad (8)$$

Anything, then, which increases the creditworthiness of country j will increase the share of international capital flows received by country j .

Note that rates of return can now vary across countries. Specifically,

$$r_j^* = f'((1 + \phi_j)k_j) + \delta_j. \quad (9)$$

We then have

$$\frac{\partial}{\partial \phi_j} (r_j^* - r_1^*) = \frac{\partial r_j^*}{\partial \phi_j} = f''((1 + \phi_j)k_j) \cdot k_j < 0, \quad (10)$$

which together with (8) gives us

$$\frac{\partial \sigma_j}{\partial (r_j^* - r_1^*)} < 0. \quad (11)$$

That is, *ceteris paribus*, countries whose bonds exhibit a higher “spread” above those of Great Britain will receive a smaller share of international capital flows.

Now suppose country j is involved in a war and the government of j issues bonds to pay for fighting. It must offer a slightly higher rate of return than r_j^* in order to attract investors away from the private sector. Assuming infinite horizons and perfect domestic credit markets, domestic investors will not buy the war bonds.¹⁰ This is because even if domestic lenders were to hold 100% of the war bonds, they would realize that at some point in the future the government would need to tax them to pay for the return on those bonds—Ricardian Equivalence obtains, and the bonds would represent net wealth of zero. Indeed, as long as (untaxable) foreigners hold a single war bond, then domestic holders of war bonds must suffer a future tax to pay the return both to their own bonds *and* to those held by foreigners. Thus, the bonds are negative net wealth to domestic investors, and foreigners purchase the entire war bond issue.

Foreigners do not care whether the higher rate of return offered by the government is driven by technological advance or war. We can thus model the war bond issue in country j as $A_j > A_i \forall i$. Assuming for a moment *no* borrowing constraint and a Cobb-Douglas production function ($y_i = A_i k_i^\alpha$), equation (2) becomes¹¹

$$\Delta K_j = \left(\frac{A_j}{A_1} \right)^{\frac{1}{1-\alpha}} \left(\frac{L_j}{L_1} \right) K_1^* - K_j. \quad (12)$$

Subtracting equation (2) from (12), we get the change in capital flows into country j due to the war in the

¹⁰ This assumption is made to simplify the analysis; it is not essential to the argument.

absence of credit constraints:

$$\Delta K_{j, \text{ war}} - \Delta K_{j, \text{ no war}} = \left[\left(\frac{A_j}{A_1} \right)^{\frac{1}{1-\alpha}} - 1 \right] \left(\frac{L_j}{L_1} \right) K_1^* > 0. \quad (13)$$

Suppose now that there *is* a borrowing constraint. **Case 1:** There was no borrowing constraint before the war, but the increased capital flow due to the war caused the borrowing constraint to bind. With war, then, $\Delta K_{j, \text{ war}} = \phi_j K_j - K_j$, and $\Delta K_{j, \text{ no war}}$ is given by (12) with A_j set equal to A_l (only in war does $A_j > A_l$). Thus,

$$\Delta K_{j, \text{ war}} - \Delta K_{j, \text{ no war}} = \phi_j K_j - \left(\frac{L_j}{L_1} K_1^* \right) < 0. \quad (14)$$

Case 2: the borrowing constraint binds both before and during the war,

$$\Delta K_{j, \text{ war}} - \Delta K_{j, \text{ no war}} = \phi_j K_j - \phi_j K_j = 0. \quad (15)$$

Thus in the presence of borrowing constraints, the war either depresses capital flows or leaves them unaffected. Note that the war's effect on σ_j mirrors its effect on ΔK_j in sign, which is evident from (3).

Summary of the global-capital-market-failure-view predictions: Equation (7) shows that it is possible to explain the wealth bias if borrowing countries are credit-constrained and wealth is associated with creditworthiness. We then derive some necessary conditions for this explanation to be correct: Equation (8) shows that any factor which tends to increase creditworthiness will increase the share of international capital received, and equation (9) shows that countries with greater spreads between their bond return and that of a riskless asset receive a smaller share of flows. Equations (14) and (15) show that involvement in warfare will not increase capital inflows.

¹¹ Since $r_1^* = r_j^* \Rightarrow A_1 \alpha k_1^{\alpha-1} = A_j \alpha k_j^{\alpha-1} \Rightarrow k_j = \left(\frac{A_1}{A_j} \right)^{\frac{1}{\alpha-1}} k_1 \Rightarrow K_j = \left(\frac{A_1}{A_j} \right)^{\frac{1}{\alpha-1}} \left(\frac{L_j}{L_1} \right) K_1$

The Unproductive Domestic Capital View

We now reinstate the assumption of unconstrained international borrowing and relax the assumption that there are only two factors of production. There is a third factor Z such that $Y_i = A_i K_i^\alpha L_i^\beta Z_i^\gamma$ (where $\alpha + \beta + \gamma = 1$) and thus $y_i = A_i k_i^\alpha z_i^\gamma$. The factor Z could represent human capital, the endowment of land and other natural resources, or others.

Autarky. In the absence of cross-border capital flows, $r_i = f_k(k_i, z_i) - \delta_i$, where f_k represents the partial derivative of f with respect to its first argument. Each country, as before develops a unique equilibrium capital intensity k_i .

Open economy. With international capital flows uninhibited, $r_1^* = r_2^* = r_3^*$, and equation (2) becomes:¹²

$$\Delta K_j = \left(\frac{Z_1}{Z_j} \right)^{\frac{\gamma}{\alpha-1}} \left(\frac{L_j}{L_1} \right)^{\frac{\gamma+\alpha-1}{\alpha-1}} K_1^* - K_j \quad (16)$$

It is always true that $\frac{\partial \sigma_j}{\partial Z_j} > 0$, which combined with the obvious $\frac{\partial z_j}{\partial Z_j} > 0$ gives

$$\frac{\partial \sigma_j}{\partial z_j} > 0. \quad (17)$$

Controlling for the capital intensity, then, countries with a greater intensity of factor Z receive a larger share of international capital flows. Likewise, controlling for Z intensity, $\frac{\partial \sigma_j}{\partial k_j} < 0$ which combined

with $\frac{\partial y_j}{\partial k_j} > 0$ gives

¹² Derived in the same manner as equation (12).

$$\frac{\partial \sigma_j}{\partial y_j} < 0. \quad (18)$$

Controlling for Z intensity, then, wealth bias is still with us. What if, however, we do *not* control for Z intensity, and for some reason there is a positive association between wealth and the stock of Z (i.e.,

$\frac{\partial Z_j}{\partial K_j} > 0$)? Then, without loss of generality we can define the units of our variables such that

$\frac{\partial \sigma_j}{\partial K_j} > 0$ always holds. In this case,

$$\frac{\partial \sigma_j}{\partial y_j} > 0. \quad (19)$$

That is, if there is an important third factor Z which was ignored by the analysis of (1) through (4), and the endowment of that factor happens for any reason to be positively correlated with wealth, then this distribution of the third factor is capable of explaining the wealth bias.

Certain necessary conditions must hold if this is the explanation. First of all, nothing like equation (11) can obtain because the rate of return to capital is equal everywhere. Equation (12) becomes:

$$\Delta K_j = \left(\frac{Z_1}{Z_j} \right)^{\frac{\gamma}{\alpha-1}} \left(\frac{A_j}{A_1} \right)^{\frac{1}{1-\alpha}} \left(\frac{L_j}{L_1} \right)^{\frac{\gamma+\alpha-1}{\alpha-1}} K_1^* - K_j, \quad (20)$$

and equation (13) becomes:

$$\Delta K_{j, \text{ war}} - \Delta K_{j, \text{ no war}} = \left[\left(\frac{A_j}{A_1} \right)^{\frac{1}{1-\alpha}} - 1 \right] \left(\frac{Z_1}{Z_j} \right)^{\frac{\gamma}{\alpha-1}} \left(\frac{L_j}{L_1} \right)^{\frac{\gamma+\alpha-1}{\alpha-1}} K_1^* > 0. \quad (21)$$

That is, in this case involvement in warfare *increases* capital flows to j . Note again, from (3), that the

war's effect on σ has the same sign as its effect on ΔK .

Summary of the unproductive-domestic-capital-view predictions: Equation (19) shows that it is possible to explain wealth bias with the presence of some previously-omitted third factor of production. Equation (17) shows that a greater intensity of the third factor encourages capital flows, and equation (21) shows that involvement in warfare likewise encourages capital flows.

IV. Testing the Theory: What Explains the Wealth Bias in British Capital Exports?

To the degree that return-maximizing international investors were attracted to or deterred from countries with fundamental national characteristics which affected in equal measure the returns to national or international investors, we can reject the *global capital market failure* view.¹³ To be precise, we say that the market for British capital exports exhibits the wealth bias when countries with higher GDP per capita—controlling *only* for log GDP—receive a significantly larger share of total British capital exports than do countries with lower GDP per capita. We say that we “explain” the wealth bias when variables representing country fundamentals and market failure have a statistically significant effect on British capital inflows and GDP per capita loses its positive significance.

We turn now to the behavior of British overseas investors during the first great globalization boom between 1870 and 1913.¹⁴ British foreign investment is selected for two reasons. First, the British evidence is available, and it is not for other capital exporters. Second, Britain was then the world's leading capital exporter, far exceeding the combined capital exports of its nearest competitors, France and Germany (Feis 1930, pp. xix-xxi, 71). The keystone of our analysis is the data on gross British

¹³ Remember that this view posits international capital market failure rather than domestic capital market failure; the latter implies unproductive capital for investors of all flags. Note also that the converse of our test is not true. That is, while the determination of flows by fundamental national characteristics is sufficient to reject the capital market failure view, lack of such determination is merely a necessary condition to reject the unproductive capital view.

¹⁴ Certainly Britain (and others) exported capital before this period, as studied by Larry Neal (1990) and others. But such international investment did not approach the levels attained in the years preceding World War I, which at times exceeded 10% of British GDP.

capital exports collected by Leland Jenks (1927) and Matthew Simon (1968), as reported by Irving Stone (1999; 2000), broken down annually by destination and type.

We have assembled a large database documenting 34 of the countries which received most of the British capital during this period. In 1914, our 34 countries held approximately 86% of the world's population, produced 97% of the world's GDP, and received 92% of British capital exports.¹⁵ We break down the recipient countries into 10 "more developed countries" and 24 "less developed countries" (LDC) according to GDP per capita at the turn of the century (Figure 1).

The database contains a range of variables related to market failure and capital productivity. On the capital market failure side, it includes import duties as a fraction of total import value, colonial affiliation, monetary regime, exchange rate variance against the pound sterling, changes in the terms of trade, and an index combining shipping costs and distance from London. On the capital productivity side, it includes the youth dependency ratio, net immigration rates, primary school enrollment rates,¹⁶ urbanization, and indices of natural resource abundance made popular by Sachs and Andrew Warner (1995). The database also includes real PPP-adjusted unskilled urban wages relative to Great Britain for thirty countries, and prices of capital equipment for eight.

Each data point represents one country in each of six time periods, shown in Figure 2. The decision to aggregate our annual data into multi-year periods was based on a desire to defuse the effects of outlier years and the need for a right-hand side matrix of significant variance. Six periods were chosen to utilize local minima as divisions between successive waves of outflows. Economists since Hobson (1914, pp. 142-9) have divided prewar British capital exports into three periods, separated by two large troughs. The first corresponds to a depression in the aftermath of the Franco-Prussian war and a series

¹⁵ The countries are Argentina, Australia, Austria-Hungary, Brazil, Burma, Canada, Ceylon, Chile, China, Colombia, Cuba, Denmark, Egypt, France, Germany, Greece, India, Indonesia (Dutch East Indies), Italy, Japan, Mexico, New Zealand, Norway, Peru, the Philippines, Portugal, Russia, Serbia, Spain, Sweden, Thailand (Siam), Turkey (Ottoman Empire without Egypt and European territories), the USA, and Uruguay. They are distributed: Europe 12; North America and Australasia 4; Latin America 8; Middle East 2; and Asia 8. See Data Appendix.

¹⁶ Estimates of the educational attainment of the work force is unavailable for almost all of the countries in our sample, but following the suggestions of Barro and Lee (most recently, 2000), we use enrollment rates among the school-aged fifteen years previously as a proxy for the current schooling stock per capita.

of defaults in 1874, and the second to economic collapse in Argentina, Australia, and elsewhere in 1890-91. We exploit minor local minima to achieve a slightly higher resolution, balancing the need to aggregate against our desire to reveal dynamic changes in flow determinants.¹⁷

Unlike most studies of British capital exports,¹⁸ ours focuses exclusively on what pulled British capital into some countries versus others, rather than what pushed it out of Great Britain. Our dependent variable is therefore the value of total British capital exported to a given country during a given period as a fraction of all British capital exported during that period. Push effects are thus entirely eliminated. Scale effects from market size are eliminated by the inclusion of log GDP on the right hand side.

The Determinants of Capital Destination

Our central result, presented in Tables 3, 4, and 5, is that the wealth bias was alive and well during the latter half of the period 1870-1913, and that it can be explained in a way that is sufficient to reject the global capital market failure view. We stress that we are *not* asking, as many others have,¹⁹ whether perfect global capital markets existed during this period. Instead, we are asking whether global capital market failure can be viewed as a primary explanation for the wealth bias.

Identifying the Fundamentals That Mattered. In Table 3, note the significant, negative effect of the LDC dummy on flows when that variable is accompanied only by log GDP. Furthermore, the negative unit elasticity on the LDC dummy is relatively constant over time. This is one manifestation of the wealth bias. The inclusion of proxies for global market failure and for fundamental national characteristics eliminates this negative LDC elasticity in periods I and II, but by periods V and VI this elasticity has become positive and statistically significant, with an elasticity of 1.3. In other words, after

¹⁷ Another concern influencing the division of flows into periods was the possible creation of a large number of left-hand-side zeros in a given period if the divisions were too fine, with the consequent risk of censored data and material non-linearities. Given our six-period division, an average of 2.2 countries out of 34 received no British capital in each period, with the largest number being 4 (in Period I) and the smallest number being 0 (in Period VI). The substance of our results does not depend on whether the years 1870-1913 are divided into ten, six, or three periods, or even considered as a single pooled period; all were tested.

¹⁸ Such as Richardson (1972), Cain and Hopkins (1980), Edelstein (1983), and Davis and Huttenback (1988).

¹⁹ Including Bordo, Eichengreen and Kim (1998), Kohl and O'Rourke (2000), among many.

accounting for the effects of other variables, poor countries received more than twice the share of British capital than did rich countries in the years leading up to World War 1. Natural resource endowment, education, and demography dominate all other variables in terms of elasticities and statistical significance. Capital flows are more than six times as sensitive to variation in natural resources endowment and more than twice as sensitive to variation in education levels than they are to any competing determinant. Minor, statistically significant determinants include participation in the Gold Standard, effective distance from London,²⁰ lagged net immigration, and the yield spread between sovereign bonds and the riskless British Consol.

Rejecting the Global Capital Market Failure View of the Wealth Bias. The evidence from 1902 to 1913 is consistent with the predictions of the unproductive domestic capital view of the wealth bias, but not with those of the global capital market failure view. The global capital market failure view predicts that involvement in warfare should have choked off British capital inflows, that countries with a higher sovereign bond spread should have received a smaller share of British capital, and that country fundamentals unrelated to creditworthiness should not have affected inflows. In fact, between 1902 and 1913 involvement in warfare did not dampen capital flows, bond spreads attracted capital, and country fundamentals were the best determinants of flows. It cannot be said that the global capital market failure view is totally without merit; after all, the Gold Standard and effective distance from London both have the predicted signs between 1902 and 1913. However, the failure view pales in importance compared with the competing unproductive domestic capital view, and increasingly so as time wore on between 1870 and 1913.

How can we be sure that the “fundamentals” are not proxies for creditworthiness? Could natural resource endowment or education have made a recipient country more creditworthy in the eyes of British investors, rather than directly affecting the return to capital? Table 4 explores this issue. In the

²⁰ Effective distance from London is calculated as the physical distance of the shortest available shipping route between London and the closest principal port of the country in question (pre-Panama Canal, post-Suez Canal) multiplied by an index of transoceanic shipping costs. See Data Appendix for details.

first column, the dependent variable is the spread between the yield on sovereign bonds in 27 countries and the yield on the riskless British Consol, averaged over each of our six periods 1870-1913. The results are consistent with the premise that the bond spread captures investment risk: British colonies and those on the Gold Standard had lower spreads, while highly protected countries far from London had higher spreads. In the second column, we see that natural resource endowment did not affect bond spread in a statistically significant way, although education was a (barely) statistically significant predictor of lower bond spread. Recall from Table 3, however, that even after accounting for the effect of education on creditworthiness (by including bond spread as a regressor), education was one of the top determinants of capital flows. It is for this reason that we describe natural resource endowment and education as “fundamentals,” or factors that affect capital flows through their effect on the return to domestic capital.

Just because the predictors of bond spread have the “right” sign does not, of course, prove unambiguously that bond spreads capture creditworthiness. In the transition from autarky (around 1870) to integrated world capital markets (around 1913), bond spreads would have had very different meaning: bond spreads would have attracted capital at the start, while at the end they should have been an indicator of risk, thus deterring foreign capital. Figure 2 reveals a massive global convergence in bond spreads in the years leading up to World War 1, a phenomenon discussed elsewhere (e.g. Mauro, Sussman, and Yafeh 2000). Not only does the mean of these spreads fall from 4.07% to 1.65% between periods III and VI, but the coefficient of variation also falls from 1.75 to 1.07. We interpret this evidence as support for the view that bond spreads were increasingly an indicator of creditworthiness.

Specification. Our conclusions are robust to several changes of regression specification. One of these, shown in Table 5, shows that the results of Table 3 do not spring in any way from a paucity in degrees of freedom. Inclusion of just a few of the variables associated with the unproductive domestic capital view largely reproduces the results of Table 3, while inclusion of the same number of variables

related to the global capital market failure view cannot explain the wealth bias.²¹ Why use random effects? For example, a Hausman test on the regression in the last column of Table 3 gives a $\chi^2(12)$ statistic of 5.95, which fails to reject the null hypothesis that the random error associated with each cross section is uncorrelated with the regressors (p-value 0.92).

Endogeneity Bias. We have treated immigration as exogenous to capital flows and to the other fundamentals of the right-hand side. That certainly would have been so if European “push” conditions dominated. But a rich literature makes it clear that the mass migrations were also determined by “pull” in receiving regions (Hatton and Williamson 1998). Since we are uncertain about whether push or pull dominated, we estimate Tables 3, 4, and 5 using lagged immigration, defined as average net immigration during the ten years preceding the first year of the period in question.

We have also treated education and natural resource endowment as exogenous. We are sympathetic to any argument suggesting that British investment may have raised the returns to education in recipient countries. Note, however, that our education regressor is lagged by 15 years. We also agree that British investment contributed to the development of natural resources in the recipient countries. But regressing period VI capital flows on period I natural resource endowment does not alter the status of this regressor as the primary determinant of capital flows. This is not a surprise, since less than 10% of British capital exports were invested directly in projects to extract natural resources such as metals, nitrates, oil, tea, coffee, and rubber (Stone 1999). The vast majority of British capital went to railroads and other transportation infrastructure, financial institutions, factories, and communications infrastructure—activities whose effect on the resource composition of exports is long-term rather than immediate.

²¹ Neither do several other changes of specification, not reported here, alter the results of Table 3. OLS cross section regressions on each of the six periods reveal the same time progression in the ability of fundamentals to explain wealth bias. Division of the years 1870-1913 into ten periods rather than six gives similar results. Including exchange rate variance or an indicator of Gold, Silver or Bimetallic standard instead of just the Gold Standard; including for variance in Terms of Trade instead of cumulative change in Terms of Trade; or defining “LDC” according to relative PPP-adjusted real wage levels do not materially alter the results.

Influential Observations. Although no single country received more than a quarter of British capital in any given period, a few countries taken together received most of it. Major recipients included the United States, Argentina, Australia, and Canada. Was one of these countries largely responsible for the results in Table 3? Additionally, it is not known how much British investment in resource-rich “China” was actually investment in resource-poor Hong Kong. Would the elimination of China alter the results? The following are the elasticities of British capital share with respect to the LDC dummy from the specification in the last column of Table 3 when various countries are omitted from the sample: Argentina, 1.61; Australia, 1.36; Canada, 1.06; China 1.18; USA, 1.39. The elasticity on natural resource endowment when China is omitted is 5.26. In short, none of these countries materially affect the ability of fundamentals to explain the wealth bias between 1901 and 1913.

Global Capital Market Deepening and Transitions through Time. Table 3 documents an upward drift in the share of British capital flows explained, and, furthermore, that the fundamentals exhibit a stronger impact as the decades unfold.²² What made flows respond to fundamentals after the 1890s more than they had previously? Figures 2 and 3 suggest that the international capital market was simply deeper than it had been before.²³ Transoceanic trade awoke from post-Boer War depression, the Russo-Japanese war stimulated borrowing, the Canadian and Argentine railways expanded, and British capital spread to a wider area than ever before—including major movements to Brazil, Mexico, Chile, Egypt, South Africa, India, Russia, and the Far East (Hobson 1914, pp. 157-8). Herbert Feis (1930, pp. 12-13) puts it thus:

Changing political relations took British capital into countries from which it had previously abstained--Japan [Alliance of 1902], Russia [Anglo-Russian agreement, 1907], and Turkey. But more important than these causes in producing a great growth in foreign investment was the fact that during the 1900-1914 period those distant lands to which the capital had been going in earlier periods, seemed to have overcome the risks and crashes of their first growth. Now in the greater stability and greater order of their development, they needed still more capital than before and offered surer return. Or—the idea presents itself in alternative form—it was as

²² This shift is statistically significant. For example, a Chow test ($\chi^2[9]=17.96$, p-value 0.0357) rejects at the 5% level the null hypothesis that the coefficients for Periods III & IV are the same as the coefficients in Periods V & VI in Table 3.

²³ Only about 40% of British capital exports that occurred during 1870-1914 flowed overseas before 1895.

though many regions of the world in which British capital had invested itself had come to fit themselves better for the investment, learning from pioneer failures.

Robert Gallman and Lance Davis (2001, Ch. 7) provide extensive evidence of “financial deepening” in British capital recipient countries during this period, including rising measures of total financial assets and assets of financial intermediaries as a fraction of GNP. We suspect that regularities dictating who got British capital prior to the 1890s are hidden by a thin global market for that capital. The deepening of that market in the fifteen years prior to 1913 allows us to better isolate the determinants of those flows. It is here that the evidence rejecting global-capital-market-failure explanations of the wealth bias is strongest.

There may, of course, be other reasons why the fundamentals exhibit an increasingly powerful influence through time. Economic historians have long argued that conventional physical capital accumulation mattered far more in the 19th century, while human capital accumulation mattered far more in the 20th century, the changing mode of accumulation driven by the evolution of technologies on the demand side and/or by the release of constraints on schooling investment on the supply side. Perhaps the increasing importance of human capital endowment as a determinant of British capital inflows simply reflects this transition.

One explanation for the increasing importance of fundamentals over time can be easily ruled out. If the data on British capital exports included re-investment in debt that was periodically “rolled over,” one might expect that a country with fundamentals that attracted capital would build up a larger and larger stock of debt over time, thus experiencing ever larger “rollover” inflows of capital. The flows explored here do not, however, include debt rollover. Rather, they were compiled to include only “new issues,” and only reflect actual financial transfers rather than accounting changes (Stone 1999; Jenks 1927). Furthermore, a necessary condition for this “rollover” explanation would be to observe long-term persistence in the geographical distribution of flows. Table 6 shows Spearman’s correlation coefficient

between the rankings of British capital recipients in the six periods; there is very little persistence in the evidence.

Capital Flows to Governments and to the Private Sector

Disaggregating capital flows by recipient sector allows us to learn even more about how they were determined. Table 7 shows that during most of the prewar years, British capital exports were primarily invested in the private sector of the destination country. What drove flows to governments, and how did these interact with flows to the private sector? The last column of Table 4 explores the determinants of flows to governments. Abundant anecdotal evidence suggests that warfare was an important determinant of demand for sovereign borrowing, which in itself would make capital flows to governments unrelated to recipient country characteristics even without international market failure. There were massive loans to the French and German governments during the Franco-Prussian War in the 1870's, to the South African government at the time of the Boer War in the 1890's, and to the Japanese government to finance its war with Russia just after 1900. For each of these countries, total wartime sovereign borrowing dramatically exceeded the cumulative total of all peacetime borrowing during the five decades that preceded the First World War. Contemporary observers (e.g. van Oss 1898, p. 228) likewise identified warfare as the primary determinant of sovereign borrowing from Britain. The last column of Table 4 confirms that warfare and British colonial status were the only determinants of borrowing by governments that remained statistically significant throughout the capital boom. Since the analysis of Section III showed that the global-capital-market-failure view predicts a *negative* coefficient on warfare, the evidence in Table 4 rejects that view.

Yet, the last column of Table 4 does not offer very strong support for the view that “fundamentals” determined flows to governments either. True, the lack of evidence supporting the unproductive capital view is a necessary condition for acceptance of the capital markets failure view, not a sufficient condition. After all, this necessary condition could easily be satisfied by the preeminence of warfare over other considerations in sovereign borrowing behavior, and there is ample anecdotal evidence that this was indeed

the case. Still, historians such as Feis (1930, pp. 98-117) have documented highly unreliable contract enforcement efforts by the British government on behalf of British investors in foreign governments that suffered in the many defaults catalogued by Peter Lindert and Peter Morton (1989). Such interventions were often guided more by British political or territorial aspirations than by a sense of duty to its investors. In light of such qualitative accounts, we cannot reject global-capital-market-failure explanations for government-bound flows, even though we have rejected such explanations for total flows.

We must be cautious, of course, in drawing a hard and clear line between flows to governments and flows to the private sector, as Simon, Jenks and Stone defined them. For one thing, government involvement in many of these “private sector” loans tended to be heavy—especially in the case of railroads, the largest category of private sector borrowing. Whether through land grants, subsidies, or loan guarantees, governments were indirect partners to many private sector investments (Nurkse 1954, p. 749). Furthermore, when analyzing these flows from the perspective of the 21st century, we must remember that most of these private-sector flows went to investments in what Simon (1968, p. 23) calls “social overhead capital.” These included projects with significant positive externalities -- projects like railroads and public utilities – projects often undertaken today by government borrowers.

Investment in Governments Crowded-in Private Investment

Table 8 suggests that previous investment in governments “crowded in” subsequent private sector investment. Capital flow data in this table were divided into ten periods of five years each, and “lagged” refers to the five-year period preceding the one in question. Because two lags were necessary for the panel fixed-effects model, the number of observations is $(34 \text{ countries} \times 10 \text{ periods}) - (34 \text{ countries} \times 2 \text{ lags}) = 272$. Similarly, the Anderson-Hsiao estimator, which uses 3 lags, lowers the number of observations to 238.

The panel fixed-effect estimates reveal a positive effect of lagged public sector investment on current private sector investment (significant at 9%), while the effect of lagged private sector investment on current public sector investment is much smaller and insignificant. It is well known, however, that

inclusion of a lagged dependent variable in a fixed-effects panel regression can produce severely biased coefficients, especially for small panels like this one (Nickell 1981). Anderson and Hsiao (1981) offer a solution by instrumenting for the once-differenced dependent variable with the twice-differenced dependent variable.²⁴ The results of this Anderson-Hsiao estimation are also reported in Table 8. The crowding-in effect of public sector investment on private is confirmed, and again no such causation is seen from private sector investment to public. Note the negative coefficient for past private investment regressed on current private investment, likely reflecting the fact that in each period private investment was expanding into countries that had never received it before. This illustrates the again deepening of the global capital market over time. Furthermore, it argues against geographic persistence of public (and thus total) investment flows: public investment tended to grow in wartime and shrink in peacetime; it did not progressively expand.

Why did crowding-in take place? One explanation might be that loaning to public entities contributed to financial deepening: for example, investment in the government debt of South Africa during the Boer War may have opened investors' eyes to private sector opportunities subsequently. Alternatively, private investment followed investment in governments because governments borrowed to make war, and the private sector subsequently borrowed to rebuild the country or to make good on foregone private accumulation.

V. Discussion and Historiography

The question of whether pre-WWI British capital exports were driven by domestic capital productivity or by global market failure has been around at least since C. K. Hobson, who was writing at the capital export peak. Hobson raised the question and then offered as an explanation the declining importance of global market failure and thus, presumably, the rising importance of capital productivity

²⁴Judson and Owen (1996) use a Monte Carlo approach to demonstrate that the Anderson-Hsiao estimator

fundamentals (Hobson 1914, p. xii). Were Hobson alive today, he probably would want to leave his explanation unchanged. After all, the evidence we have presented suggests that the largest capital exporter in history was indeed sending its money where it could earn the highest return, and that was where the fundamentals served to raise capital's productivity.

As Edelstein (1982, p. 7) points out, the idea that third factors like land could allow for increasing returns to British capital exports in newly-settled regions goes back at least to Adam Smith (1776, pp. 89-93). Feis (1930, pp. 25, 31) also favored third-factor fundamentals by asserting that the "British investor was sending his capital where there was the growth of youth, and where the land was yielding riches to the initial application of human labor and technical skill," undeterred by "[s]trong risks, bad climates" and "isolation." After clearly identifying the wealth bias by stating that "income per head in the principal debtor countries of the nineteenth century—the newly settled regions—can never have been far below European levels," Ragnar Nurkse (1954, p. 757) also concludes that capital was attracted "not to the neediest countries with their 'teeming millions,'" but rather chased the "great migration" to the "spacious, fertile, and virtually empty plains" of certain countries (pp. 745, 750). Thus, our answer to Hobson's question is not new.

Second-Order Determinants of Flows

The contribution of this paper is to provide empirical confirmation of the views of pioneer analysts of the global capital market and to show that they are superior to competitors. We now consider several popular competing explanations of British capital flows which we find to be of only secondary importance.

Terms of Trade. We can find no evidence supporting the view that capital flows were primarily driven by recent terms of trade shocks. Brinley Thomas (1968, pp. 49-50) felt that "movements in the terms of trade are to be looked upon more as consequences than as causal forces" of capital flows.

essentially eliminates this bias, though it is not as efficient as other methods for small panels.

“Cairncross [1953],” he writes, “has to go out of his way to find reasons why heavy British capital exports in the eighties should have coincided with a *deterioration* in the terms of trade of the borrowing countries, for the link seemed to work so well in the nineties and the 1900s.” In defense of his critique, Thomas expounds a plausible model of causation from capital flows to terms of trade. Our results support his critique (but not necessarily his model).

Colonial Status. Many historians have viewed British capital exports as part and parcel of British colonial expansion. This view appears reasonable in light of such developments as the 1900 revision of the Colonial Stocks Act, which promoted Empire investment by allowing registered securities in British colonies and dominions to be purchased by trust bodies and large institutional investors previously banned from foreign investment (Feis 1930, pp. 92-95). Yet, many have criticized this view by simply citing counter-examples like non-Empire capital flows to Argentina and the United States (e.g. Simon 1968, p. 24; Platt 1986, p. 25). What we add here is multivariate, quantitative support their univariate, qualitative analysis. Our results leave no doubt whatsoever that markets mattered far more than flag for private-sector British investment heading abroad. British colonies did get a larger share of capital flows to government recipients, but market concern was the first-order determinant of destination.

The Gold Standard. Eichengreen (1996, p. 18) has stated unequivocally that in the 1870s, “[i]ndustrialization rendered the one country already on gold, Great Britain, the world’s leading economic power and the main source of foreign finance. This encouraged other countries seeking to trade with and import capital from Britain to follow its example.”²⁵ While we also detect a positive and statistically significant effect of participation in the Gold Standard, in Period III and after (as more and more countries joined the club), the elasticity of this effect on investment flows is much lower than the effects of natural resources, education, demographic structure, and capital scarcity.

There are many possible explanations for our finding, but the prominent one is that the effects of economic, demographic and geographic fundamentals simply outweighed the effects of the Gold Standard.

²⁵ For an anecdote on how capital flows to Brazil stagnated after departure from the Gold Standard, see

Michael Bordo and Anna Schwartz (1996, p. 41) find anecdotal evidence that “adherence to the rule by Argentina may have had some marginal influence on capital calls ... before 1890 ... but that the key determinant was the opening up of the country’s vast resources to economic development once unification and a modicum of political stability were achieved.” We confirm the Bordo and Schwartz Argentina finding on a global scale: if the fundamentals were not satisfied, going on gold didn’t bring in the capital. Based on a sample of nine capital-importing countries, Bordo and Hugh Rockoff (1996) argue that adopting the Gold Standard lowered the costs of borrowing in world capital markets, and that it served as a “good housekeeping seal of approval.” However, Bordo and Rockoff do not control for any economic, demographic or geographic fundamentals. Their view is also inconsistent with the more recent empirical work of Christopher Meissner (2000, p. 22) who, with a larger sample of 19 countries, rejects the idea that going on gold mattered after controlling for fundamentals.

VI. Conclusion

During the first globalization boom prior to World War I, British capital did not go to poor, labor abundant economies. We call this the wealth bias. The evidence rejects the global-capital-market-failure explanation of the wealth bias. British foreign investment went where it was most profitable—chasing natural resources, educated populations, migrants, and young populations. Flows to private sector investment opportunities abroad were also encouraged by previous investments in government-financed projects.

We should stress what our results do *not* imply. They do *not* suggest that global capital market failure was absent in the years leading up to the First World War. Rather, they suggest that the observed wealth bias was not explained by global capital market failure. It is surely possible to imagine capital flows that -- although unobservable because global capital market failure stopped them cold -- would have gone primarily to capital-poor countries. One candidate for such flows is investment in

manufacturing, which accounted for less than four percent of British capital exports (Simon 1968, p. 23). Edelstein (1982, pp. 41-2) points to market failure as the cause of this tiny figure, citing insuperable informational advantages of local manufacturers in local input and output markets. He also mentions the increasing importance of tariff barriers abroad in keeping British manufacturing investment at home. Feis (1930, p.31) agrees, calling foreign industrial investment “risky [and] difficult to manage well from a distance.” We do not have the evidence to assert that such imaginary flows would also have chased resources, education, migrants and youth.

British capital flowing to sub-saharan Africa was modest, but we certainly do not claim that this region lacked natural resources. Perhaps there is an extremely low GDP per capita threshold below which capital market failure is the primary determinant of capital flows. Since this level lies below the lowest GDP per capita in our data, however, we cannot test this hypothesis. We can only reiterate that the data cover about nine tenths of the world population and almost all of the global economy of that time, as well as an extremely wide range of GDP per capita levels from the very wealthy to the very poor.

Global capital market failure did not determine how large a slice of the British-capital-export pie was received by a given capital-importing country at the height of the boom. Whether the relative size of that slice would have changed had the entire pie been augmented by a total absence of any global capital market failure is an entirely different question that may never be answered. We have also shown that the major fundamentals that determined where capital went were, in order of importance, natural resource endowment, schooling, and demographic attributes. Whether the fundamentals driving capital exports in the late 19th century were the same as those driving capital exports in the late 20th century is another question that can be answered, but must await future research.

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Table 1: Distribution of European Foreign Investment 1913-1914 (in percent)

Destination	Britain	France	Germany
Eastern Europe	3.6	35.5	27.7
Western Europe	1.7	14.9	12.7
Europe (not specified)	0.5	3.3	5.1
<i>Total Europe</i>	<i>5.8</i>	<i>53.8</i>	<i>45.5</i>
Latin America	20.1	13.3	16.2
North America and Australasia	44.8	4.4	15.7
Other New World (not specified)	2.8	0.0	2.1
<i>Total New World</i>	<i>67.7</i>	<i>17.7</i>	<i>34.0</i>
<i>Asia and Africa</i>	<i>26.5</i>	<i>28.4</i>	<i>20.5</i>
Total	100.0	100.0	100.0

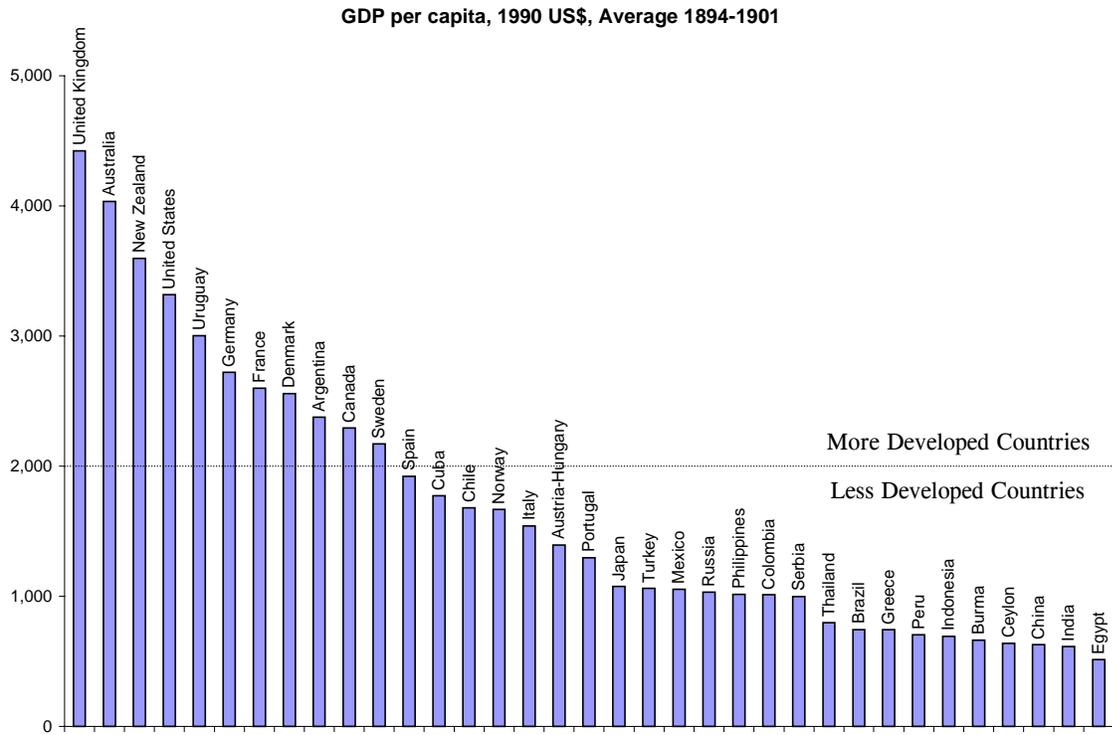
Sources and Notes: O'Rourke and Williamson (1999, p. 229), taken from Feis (1930). Columns may not add up due to rounding. Turkey is allocated to Asia.

Table 2: Wealth Bias During the Two Great Capital Export Booms

Time period	1907-1913	1992-1998
Dependent variable	Annual average gross British capital received (flow, in 1990 US\$)	Annual average change in stock of private capital liabilities (flow, in 1990 US\$)
GDP, 1990 US\$	0.000208 (3.32)*** [0.534]	0.00467 (8.68)*** [0.624]
GDP per capita, 1990 US\$	10,700 (2.43)** [0.965]	97,900 (2.20)** [0.410]
Constant	-11,100,000 (-1.06)	-44,700,000 (-0.11)
Estimator	OLS	OLS
N	34	155
R ²	0.414	0.463

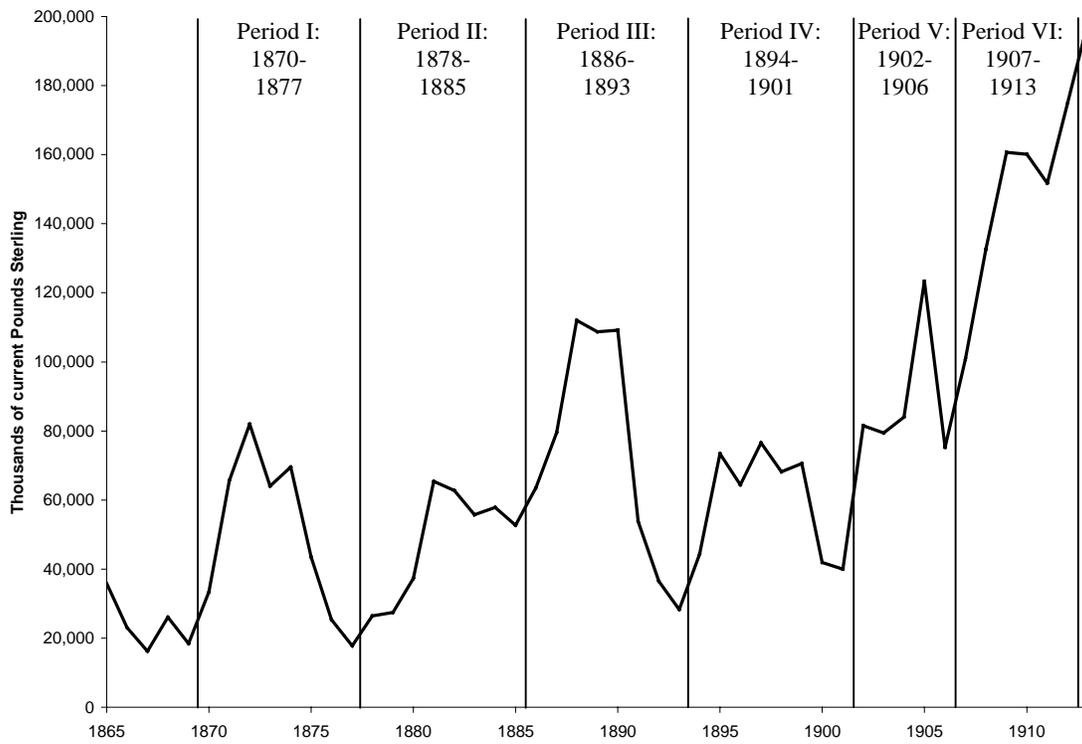
t-statistics are in parentheses. Elasticities (at average regressor values) are in square brackets. *** Significant at the 1% level. ** Significant at the 5% level. Source for 1992-1998 data: Capital flows from International Monetary Fund 2000 *International Financial Statistics* CD-ROM, rest from World Bank 2000 *World Development Indicators* CD-ROM.

Figure 1: Definition of “Less Developed Country” (LDC)



For the purposes of this study, it is assumed that any country with a GDP/capita in 1990 US\$ below \$2,000 in Period IV—that is, 1894-1901, or roughly the middle of the period under investigation—is an LDC. Sources: See Data Appendix

Figure 2: Division of Pre-WW1 British Capital Exports into Six Time Periods



Source: Stone 1999.

Table 3: Determinants of Total British Capital Flows to 34 Countries as a Fraction of all British Capital Exports in Three Periods 1870-1913

<i>Time period</i>	<i>I and II: 1870-1885</i>		<i>III and IV: 1886-1901</i>		<i>V and VI: 1902-1913</i>	
LDC dummy	-0.0451 (-3.06)*** [-1.08]	-0.000477 (-0.01) [-0.007]	-0.0440 (-2.63)** [-1.06]	0.0182 (0.59) [0.286]	-0.0379 (-2.06)** [-0.909]	0.0783 (2.41)** [1.30]
Log GDP	0.0118 (2.76)*** [9.17]	0.0180 (2.14)** [10.5]	0.0105 (2.08)** [8.31]	0.0251 (3.47)*** [15.2]	0.0138 (2.45)** [11.1]	0.0297 (4.96)*** [19.2]
Warfare ¹		-0.00713 (-0.41) [-0.044]		-0.00839 (-0.63) [-0.021]		0.0233 (1.54) [0.073]
Bond spread ²		-0.000695 (-0.53) [-0.089]		0.000241 (0.17) [0.023]		0.00733 (1.75)* [0.381]
British Colony dummy		0.00153 (0.05) [0.008]		0.0103 (0.38) [0.063]		-0.0144 (-0.58) [-0.075]
Fraction of period on Gold Standard		-0.00998 (-0.46) [-0.125]		0.0338 (2.34)** [0.487]		0.0334 (1.83)* [0.607]
Import duties over imports		0.00163 (1.25) [0.625]		0.000518 (0.72) [0.248]		-0.00139 (-1.41) [-0.698]
Lagged change in Terms of Trade ³		0.0000607 (0.19) [0.001]		-0.0000874 (-0.39) [0.006]		-0.000241 (-0.70) [0.007]
Effective Distance from London ⁴		-0.0000305 (-0.01) [-0.004]		0.00140 (0.22) [0.093]		-0.0111 (-1.92)* [-0.665]
Population growth rate		-0.00139 (-0.19) [-0.055]		0.0253 (4.37)*** [0.849]		0.0233 (2.26)** [0.841]
Lagged net immigration ⁵		0.00991 (1.26) [0.145]		0.00619 (0.95) [0.018]		0.0167 (3.01)*** [-0.079]
Fraction of exports based on primary products		0.0745 (1.09) [1.66]		0.100 (1.44) [2.25]		0.236 (3.64)*** [5.31]
Fraction of pop. < age 15 enrolled in primary school as of 15 years prior to start of period		0.0000135 (1.06) [0.641]		0.000011 (1.27) [0.605]		0.000028 (3.68)*** [1.89]
Urbanization ⁶		0.195 (1.21) [0.325]		0.00379 (0.03) [0.010]		0.0863 (0.52) [0.286]
Constant	-0.209 (-2.11)**	-0.497 (-2.25)**	-0.184 (-1.54)	-0.739 (-3.43)***	-0.269 (-1.98)**	-1.01 (-5.21)***
Estimator	Panel RE	Panel RE	Panel RE	Panel RE	Panel RE	Panel RE
N	68	49	68	51	68	52
Groups	34	25	34	27	34	26
R ²	0.309	0.535	0.281	0.659	0.257	0.759
Wald χ -squared	17.7***	27.0**	12.4***	44.9***	12.1***	67.7***

Z-statistics are in parentheses. Elasticities (at regressor mean values) are in square brackets. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level. ¹Involvement in a war during given period that was not against Great Britain ²Spread between yield on sovereign bonds and riskless British Consols. ³Cumulative change in Terms of Trade index during the five years leading up to and including the first year of the period. ⁴Pre-Panama Canal, post-Suez Canal shipping distance between London and the principal port of destination country, multiplied by an index of shipping costs per unit distance. ⁵Average net immigration during the ten years preceding the first year of the period in question. ⁶Fraction of population living in urban agglomerations of 100,000 or more.

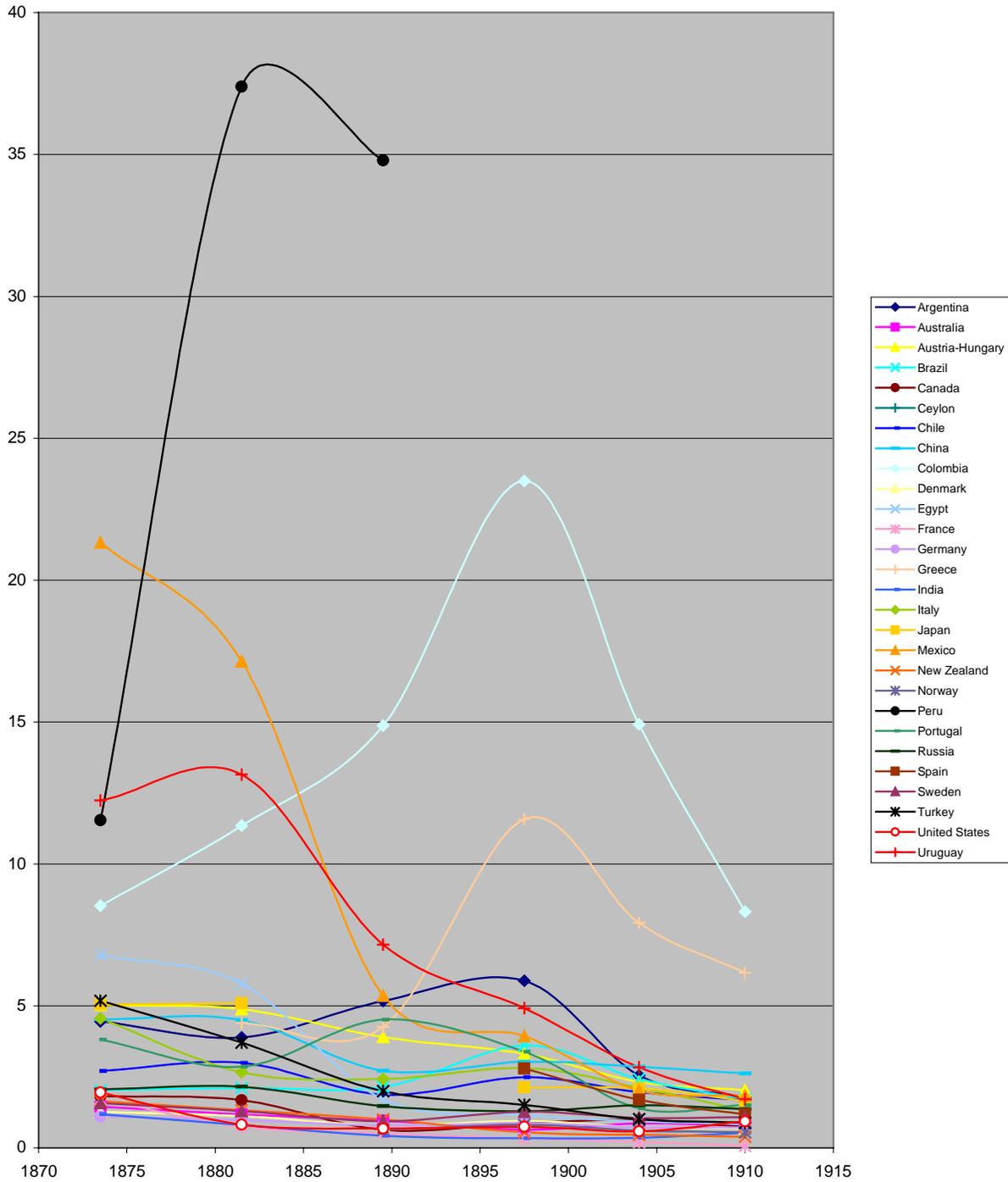
Table 4: Determinants of Spread Between Sovereign Bond Yields and British Consol Yields 1870-1913, and Determinants of Total British Capital Flows to Government Recipients in 34 Countries as a Fraction of British Capital Exports to all Government Recipients Worldwide, 1870-1913

<i>Dependent variable</i>	<i>Spread between sovereign bond yield and Consol yield</i>		<i>Fraction of total British capital exports to government recipients received by government of country in question</i>
LDC dummy			0.0226 (0.83) [0.350]
Log GDP			0.00493 (0.78) [2.96]
Warfare ¹			0.0353 (2.41)** [0.137]
Bond spread ²			-0.000492 (-0.36) [-0.0443]
British Colony dummy	-3.02 (-2.04)** [-0.169]		0.0458 (2.13)** [0.247]
Fraction of period on Gold Standard	-2.14 (-2.52)** [-0.327]		0.0170 (1.12) [0.251]
Import duties over imports	0.0700 (1.50) [0.323]		-0.000225 (-0.30) [-0.100]
Lagged change in Terms of Trade ³	-0.0127 (-0.90) [0.00407]		0.0000197 (0.08) [-0.000609]
Effective Distance from London ⁴	0.573 (3.13)*** [0.477]		-0.000166 (-0.05) [-0.0134]
Population growth rate		-0.490 (-1.37) [-0.177]	0.00867 (1.33) [0.309]
Lagged net immigration ⁵		0.0857 (0.23) [0.00363]	0.00725 (1.44) [0.0304]
Fraction of exports based on primary products		2.04 (0.37) [0.454]	-0.0150 (-0.24) [-0.331]
Fraction of pop. < age 15 enrolled in primary school as of 15 years prior to start of period		-0.000926 (-1.65)* [-0.520]	-0.00000269 (-0.34) [-0.150]
Urbanization ⁶		-11.1 (-1.69)* [-0.277]	0.120 (1.08) [0.298]
Constant	2.60 (1.75)*	5.90 (1.06)	-0.115 (-0.63)
Estimator	Panel RE	Panel RE	Panel RE
N	152	152	152
Groups	27	27	27
R ²	0.292	0.141	0.244
Wald χ -squared	26.0***	11.25**	27.3**

Z-statistics are in parentheses. Elasticities (at regressor mean values) are in square brackets. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level. ¹Involvement in a war during given period that was not against Great Britain ²Spread between yield on sovereign bonds and riskless British Consols. ³Cumulative change in Terms of Trade index during the five years leading up to and including the first year of the period. ⁴Pre-Panama Canal, post-Suez Canal shipping distance between London and the principal port of destination country, multiplied by an index of shipping costs per unit distance. ⁵Average net immigration during the ten years preceding the first year of the period in question. ⁶Fraction of population living in urban agglomerations of 100,000 or more.

Figure 3: Convergence in Sovereign Bond Yields During the First Global Capital Export Boom

Period average spread between government bond yields and yield on UK consol, in %, 27 countries, Periods I through VI



Source: B. Taylor 2000

Table 5: Determinants of Total British Capital Flows to 34 Countries as a Fraction of all British Capital Exports in Three Periods

<i>Time period</i>	<i>I and II: 1870-1885</i>		<i>III and IV: 1886-1901</i>		<i>V and VI: 1902-1913</i>	
LDC dummy	-0.0423 (-2.53)** [-1.01]	-0.00570 (-0.26) [-0.137]	-0.0290 (-1.59) [-0.696]	-0.000308 (-0.01) [-0.00738]	-0.0296 (-1.52) [-0.710]	0.0361 (1.51) [0.866]
Log GDP	0.0146 3.24*** [11.3]	0.0175 (3.89)*** [13.6]	0.0131 (2.49)** [10.4]	0.0225 (4.93)*** [17.8]	0.0176 (3.09)*** [14.1]	0.0260 (5.64)*** [20.8]
British Colony dummy	0.0258 (1.39) [0.180]		0.01768 (0.84) [0.141]		0.0226 (1.03) [0.158]	
Fraction of period on Gold Standard	-0.0154 (-1.01) [-0.199]		0.0219 (1.81)* [0.335]		0.0177 (1.06) [0.395]	
Import duties over imports	0.00202 (2.80)*** [0.933]		0.000821 (1.49) [0.465]		0.00152 (2.15)** [0.921]	
Lagged change in Terms of Trade ¹	0.00000938 (0.09) [-0.000856]		-0.0000496 (-0.28) [0.00316]		-0.000161 (-0.77) [0.0118]	
Effective Distance from London ²	-0.0001228 (-0.06) [-0.0202]		0.00584 (1.39) [0.580]		0.00139 (0.30) [0.121]	
Population growth rate		0.00109 (0.50) [0.0607]		0.0119 (2.95)*** [0.551]		0.0170 (2.39)** [0.818]
Lagged net immigration ³		0.0106 (2.40)** [0.238]		0.00779 (2.16)** [0.125]		0.00724 (2.22)** [0.0685]
Fraction of exports based on primary products		0.105 (2.40)** [3.19]		0.145 (3.07)*** [4.34]		0.190 (3.83)*** [5.54]
Fraction of pop. < age 15 enrolled in primary school as of 15 years prior to start of period		0.0000155 (2.13)** [0.856]		0.0000142 (2.12)** [0.850]		0.0000245 (3.81)*** [1.71]
Urbanization ⁴		0.0914 (0.89) [0.200]		0.0826 (0.87) [0.264]		-0.00162 (-0.02) [-0.00627]
Constant	-0.300 (-2.63)***	-0.499 (-3.92)***	-0.300 (-2.32)**	-0.673 [-4.91]***	-0.411 (-2.87)**	-0.847 (-5.87)***
Estimator	Panel RE	Panel RE	Panel RE	Panel RE	Panel RE	Panel RE
N	68	68	68	68	68	68
Groups	2	2	2	2	2	2
R ²	0.447	0.502	0.406	0.612	0.387	0.643
Wald χ -squared	30.23***	37.20***	21.89***	52.23***	20.63***	63.74***

Z-statistics are in parentheses. Elasticities (at regressor mean values) are in square brackets. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level. ¹Cumulative change in Terms of Trade index during the five years leading up to and including the first year of the period. ²Pre-Panama Canal, post-Suez Canal shipping distance between London and the principal port of destination country, multiplied by an index of shipping costs per unit distance. ³Average net immigration during the ten years preceding the first year of the period in question. ⁴Fraction of population living in urban agglomerations of 100,000 or more.

Table 6: Spearman's Correlation Coefficient for the Rank Order of the 34 British Capital Recipients in Six Periods, by Share of British Capital Received

	Period I	Period II	Period III	Period IV	Period V	Period VI
Period I	1.000	0.039	0.053	-0.024	-0.005	-0.061
Period II	-	1.000	0.263	0.342	0.099	0.300
Period III	-	-	1.000	0.268	0.108	0.206
Period IV	-	-	-	1.000	0.285	0.397
Period V	-	-	-	-	1.000	0.272
Period VI	-	-	-	-	-	1.000

In each period, all countries were ranked from 1 to 34 according to the share of total British capital exports in that period received by each country, in descending order. The numbers in the table represent Spearman's (equivalently Pearson's) correlation coefficient between rank orderings in different periods. They are intended as an indicator of period-to-period persistence in the geographic distribution of British capital exports. Periods are defined in Figure 2.

Table 7: Percentage of British Capital Exports to 34 Countries, by Recipient Sector

		<i>Public Sector</i>	<i>Private Sector</i>
Period I	1870-1877	55.4%	44.6%
Period II	1878-1885	42.3%	57.7%
Period III	1886-1893	33.0%	67.0%
Period IV	1894-1901	39.0%	61.0%
Period V	1902-1906	29.6%	70.4%
Period VI	1907-1913	28.1%	71.9%

Source: Stone 1999.

Table 8: Evidence that Investment in the Public Sector “Crowded In” Investment in the Private Sector, but Not the Other Way Around

<i>Regressand:</i>	Current investment in private sector		Current Investment in public sector	
<i>Estimator:</i>	Panel Fixed Effects	Anderson- Hsiao	Panel Fixed Effects	Anderson- Hsiao
<i>Regressor:</i>				
Lagged investment in private sector	-0.2393 (-3.670)***	-0.6698 (-4.415)***	0.05996 (1.465)	0.05299 (1.023)
Lagged investment in public sector	0.1587 (1.721)*	0.4817 (3.852)***	-0.3661 (-6.320)***	0.01493 (0.100)
N	272	238	272	238

T-statistics are in parentheses. * Significant at the 10% level. *** Significant at the 1% level. See text for a description of the particular Anderson-Hsiao estimator used.

Appendix: *The Data*

All data used come from a novel database constructed for the purposes of this study, often from primary sources held by the Harvard College Library. The construction of each variable and its sources will be discussed in turn.

British Capital Exports

Original gross capital flow numbers for Argentina, Australia, Austria-Hungary, Brazil, Canada, Chile, China, Cuba, Egypt, France, Germany, Greece, India, Italy, Japan, Mexico, New Zealand, Peru, Russia, Spain, Turkey, United States and Uruguay come from Irving Stone, 1999, *The Global Export of Capital from Great Britain, 1865-1914*, St. Martin's Press, New York. Additional figures for Burma, Ceylon, Colombia, Denmark, Indonesia, Norway, Philippines, Portugal, Serbia, Sweden, and Thailand were kindly provided by Professor Stone. Stone's division of the flows according to whether they were received by governments or by the private sector is maintained unchanged.

In the above, "Egypt" refers to the lands under rule of the Egyptian Pasha before British occupation, and thereafter to the lands of the *de facto* British protectorate, although it was officially part of the Ottoman Empire during the entire period in question. "Germany" refers to the lands of the Second German Reich. "India" refers to the British colonial boundaries for India, omitting lands contained within present-day Burma/Myanmar which we treat as a distinct recipient of capital. "Turkey" refers to the Ottoman Empire without Albania, Rumania, Serbia, Greece, Bulgaria, or Egypt. "Indonesia" refers to the Dutch East Indies and corresponds closely to the boundaries of the modern Republic of Indonesia. "Norway" refers to the area of land over which the Norwegian government retained limited autonomy during Swedish rule before 1905, and to the state of Norway thereafter. "Thailand" refers to the Kingdom of Siam.

Flows are converted first into real Pounds Sterling using the deflator found in John McCusker, 1992, *How Much Is That in Real Money?* American Antiquarian Society, Worcester, Mass. The left-hand side variable is then constructed by calculating the cumulative flow to each country during each period and dividing by the cumulative flow to all 34 countries during the same period.

Our use of prewar British capital flows rather than stocks sidesteps a significant literature criticizing the accuracy of the *stock* figures. The accuracy of figures on *flows* and their geographical distribution has survived decades of scrutiny essentially unsullied (D. C. M. Platt, 1986, *Britain's Overseas Investment on the Eve of the First World War: The Use and Abuse of Numbers*, MacMillan, London, p. 100). Why this difference? It is one thing to say that capital flowed from Great Britain to a given country—a well-documented fact. It is another thing to say that the investments thereby purchased were held by Great Britain, thus representing a *stock* of 'British' capital. In fact, the nationality of those who purchased securities in London during this period is very poorly documented. By eschewing stocks in favor of flows we avoid the issue.

GDP per Capita

The units on this variable are 1990 US dollars per inhabitant of any age. The regressor used is GDP per capita in the first year of each period. GDP per capita estimates for Australia, Brazil, Canada, China, Denmark, France, Germany, India, Indonesia, Italy, Japan, Mexico, New Zealand, Norway, Portugal, Russia, Spain, Sweden, Thailand, and the United States come from Angus Maddison, 1995, *Monitoring the World Economy, 1820-1992*, OECD, Paris. Missing years are estimated by geometric interpolation.

Estimates for Egypt after 1900 and Turkey in 1913 come from Maddison. Before this date it is assumed that GDP per capita grew at the same year-on-year rate as did estimates of Egyptian and Turkish real wages from Jeffrey Williamson, 2000, "Real wages and relative factor prices around the

Mediterranean, 1500-1940,” in Şevket Pamuk and Jeffrey G. Williamson, eds. *The Mediterranean Response to Globalization Before 1950*, Routledge, New York.

Data for Greece are estimated by projecting Maddison’s (*op. cit.*) 1913 figure backwards, assuming the growth rate found in James Foreman-Peck and Pedro Lains, 2000, “European Economic Development: The Core and the Southern Periphery, 1870-1910,” in Şevket Pamuk and Jeffrey G. Williamson, eds., *The Mediterranean Response to Globalization Before 1950*, Routledge, New York.

Data for Argentina after 1890 come from Maddison *op. cit.* Before this date, GDP per capita is assumed to grow at the same year-on-year rate as the estimates of Argentine real wages found in Jeffrey G. Williamson, 1995, “The Evolution of Global Labor Markets since 1830: Background Evidence and Hypotheses,” *Explorations in Economic History*, 32:141-196. Data for Uruguay after 1882, and Peru and Chile after 1900, come from Maddison *op. cit.* Before these dates it is assumed that all three grew at the same year-on-year rate as did our estimates of Argentine GDP per capita.

Estimates for Cuba for 1850 and 1913 are based on estimates of Cuban GDP per capita relative to that of Mexico and Brazil presented in John H. Coatsworth, 1998, “Economic and Institutional Trajectories in Nineteenth-Century Latin America,” in John H. Coatsworth and Alan M. Taylor, eds., *Latin America and the World Economy Since 1800*, Harvard University Press, Cambridge, Mass. An unweighted average of the figures implied by Coatsworth’s proportion of our estimates for Mexico and Brazil is calculated for both years, and the intervening years estimated by geometric interpolation.

Data for Colombia after 1900 come from Maddison *op. cit.* Before this date, it is assumed that GDP per capita grew at an unweighted average of the growth rates for Mexico and Brazil between 1850 and 1900 given in Coatsworth *op. cit.*

Data for the Philippines and Burma after 1900 come from Maddison *op. cit.* Before this date it is assumed that Philippine GDP per capita grew at the same year-on-year rate as our estimates for Thailand, and that Burmese growth mirrored that of India.

GDP per capita estimates for Austria-Hungary come from David F. Good, 1994, “The Economic Lag of Central and Eastern Europe: Income Estimators for the Habsburg Successor States, 1870-1910,” *Journal of Economic History*, 54(4)(December): 69-891. These are converted from 1980 to 1990 dollars using a GDP deflator obtained from the Bureau of Economic Analysis of the United States Department of Commerce (online at <http://www.bea.doc.gov/bea/dn/gdplev.htm>).

Estimates for Serbia after 1890 come from Foreman-Peck and Lains, *op. cit.* Before 1890 GDP per capita is assumed to grow at the same year-on-year rate as it did between 1890 and 1913.

Ceylon presented the most difficult data challenge in this category, as we are not aware of any published figures for GDP in Ceylon during this period. Campbell (Burnham O. Campbell, 1993 “Development Trends: A Comparative Analysis of the Asian Experience,” in Naohiro Ogawa et al., eds., *Human Resources in Development along the Asia-Pacific Rim*, Oxford University Press, New York) has estimated that in 1914, GDP per capita in Ceylon was 1.95 times that of India. Before 1914, it is assumed that real GDP per capita grew at the same rate as did the ratio of the real value of British colonial revenue from Ceylon to the population of the Island. A full series of annual nominal colonial revenues and population figures come from the 1905 and 1914 editions of the annual *Ceylon Blue Book*, a statistical publication of the colonial administration in Colombo. Some of these figures were recorded in rupees, and are converted to pounds sterling using conversion rates from Bryan Taylor II, 2000, *Encyclopedia of Global Financial Markets*, Global Financial Data, Los Angeles, California (online at <http://www.globalfindata.com>). The resulting figures are converted to real pounds sterling using the deflator in McCusker *op. cit.*

Population Share

Population Share is calculated by dividing the population of the country in the first year of the period by the total population of all 34 countries in the same year. The regressor used is log of population share in the first year of each period.

Annual estimates of the population of Argentina, Austria-Hungary, Colombia, and Denmark come from Banks, Arthur S. Banks, 1976, *Cross-National Time Series, 1815-1973* [Computer File], ICPSR ed. Ann Arbor, MI: Inter-University Consortium for Political and Social Research [producer and distributor]. Estimates for Chile, Indonesia, New Zealand, Peru, the Philippines, Russia and Thailand come from Maddison *op. cit.* Estimates for Greece and Turkey after 1900 also come from Maddison *op. cit.* Before this date we assume that Greek population grew at the year-on-year rate implied by the population figures in B. R. Mitchell, 1981, *European Historical Statistics*, 2nd rev. ed., Macmillan, London. We assume that Turkish population (omitting Egypt) before 1900 grew at the year-on-year rate implied by the figures in Halil Inalcik, ed., 1994, *An Economic and Social History of the Ottoman Empire*, Vol. 2, Cambridge University Press, New York, p. 779.

Population estimates for Australia, Brazil, Burma, Canada, Cuba, Egypt, France, Germany, India, Italy, Japan, Mexico, Norway, Serbia, Spain, and Sweden are from the appropriate volume of Mitchell 1998 *op. cit.*

Estimates for China are from Angus Maddison, 1998, *Chinese Economic Performance in the Long Run*, OECD, Paris. Figures for Ceylon come from Colonial Secretary's Office, 1914, *Ceylon Blue Book*, H.C. Cottle Government Printer, Colombo. Estimates for Portugal come from Ana Bela Nunes, 1989, "Portuguese Economic Growth: 1833-1985," *Journal of European Economic History*, 18(1)(Spring):291-330. Estimates for the United States come from *Historical Statistics of the United States: From Colonial Times to the Present*, Basic Books, New York, 1976. Data for Uruguay come from Mitchell *op. cit.*; from J. Wilkie, 1996, *Statistical Abstract of Latin America*, vol. 32, UCLA Latin American Publications, Los Angeles; and from *Uruguay*, Bureau of the American Republics, Washington, DC, 1892, p. 92.

Colonial Status

The regressor for British Colony is 1 if the country was a British colony for a majority of the period, and zero otherwise—the regressor for "other colony" is constructed similarly. The year-by-year colonial status of Australia, Brazil, Chile, Cuba, Egypt, India, and Uruguay is taken from the *Encyclopedia Britannica*. For Burma, Indonesia, and Thailand colonial status is taken to be as reported in B. R. Mitchell, 1998, *International Historical Statistics, Africa, Asia & Oceania*, 3rd ed., St. Martin's Press, New York., page xii. For Mexico it is as given in B. R. Mitchell, 1998, *International Historical Statistics, The Americas*, 4th ed., St. Martin's Press, New York. Serbia is taken to be a colony of the Ottoman Empire until 1878 and independent thereafter, as described in B. R. Mitchell, 1998, *International Historical Statistics: Europe 1750-1993*, 4th ed., St. Martin's Press, New York, page xiii.

China is assigned the status of "British colony" during all of 1870-1913 for the purposes of this study, in light of the special presence of Britain in Shanghai. Canada, Egypt (after 1882) and New Zealand are similarly assigned the status of "British colony" for the purposes of this study, though they were not technically colonies. The Philippines are taken to have been a Spanish colony until 1899 and a colony of the United States thereafter.

The Gold Standard

The regressor is calculated as the fraction of years in the period during which the country was on a pure gold standard; an alternative regressor allowed also a silver or bimetallic standard. A detailed, year-by-year assessment of monetary regime in 28 of our 34 countries during 1870-1914 was kindly provided to the authors by Chris Meissner. These data provided an indication of gold, silver, bimetallic, or paper standard.

Monetary regimes for Cuba, Peru, Serbia, Thailand, and Uruguay are taken to be as reported in Taylor *op. cit.* The regime for New Zealand is given in J. Ernesto Lopez-Cordova and Chris Meissner,

2000, "Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era," Dept. of Economics, University of California at Berkeley, Berkeley, California, Table 4.1.

Import Duties over Imports

The regressor is calculated as the total government revenue from import duties in the first year of the period, divided by the total value of imports into the country in that year.

Figures for Australia, Canada, Denmark, France, Germany, Italy, Norway, Sweden, and the United States are given in Kevin H. O'Rourke, 2000, "Tariffs and Growth in the Late 19th Century," *The Economic Journal*, 110(April): 456-83.

Figures for Argentina 1865-1900 are from the *Anuario de la Dirección General de Estadística Correspondiente al Año 1900*, vol. 1, Compañía Sud-Americana de Billetes de Banco, Buenos Aires, 1901, p. 357, while figures for 1910-1913 come from the 1915 edition of the same publication (p. 798 and 815).

Figures for Austria-Hungary are estimated in David F. Good, 1984, *The Economic Rise of the Habsburg Empire 1750-1914*, University of California Press, Berkeley, p. 227.

There are transcriptions of primary-source numbers for Brazilian imports, government income, and fraction of government income due to import duties in Laura Randall, 1977, *A Comparative Economic History of Latin America: 1500-1914, Volume 3: Brazil*, Institute for Latin American Studies, Columbia University, New York, pp. 219-249.

Figures for Burmese import duty revenue come from the *Report on the Administration of British Burma* (some years omit the word "British" from the title) printed in Rangoon, for 1891, 1892, 1906, 1907, 1909, and 1910. Burmese imports are given in various editions of the *Statistical Abstract Relating to British India*, Eyre & Spottiswoode for HMSO, Presented to both Houses of Parliament by Command of Her Majesty, London, and *Statistics of British India*, Part II: Commercial, Director-General of Commercial Intelligence, Calcutta, 1913. Missing years are interpolated geometrically; the 1891 figure is assumed to hold constant on 1870-1891, a period during which British trade policy in the area did not significantly change.

Figures for Ceylon 1902-1912 on import duties and imports come from the 1905 and 1914 editions of the *Ceylon Blue Book*. The 1902 figure is assumed to hold for 1870-1901 based on Batemen's contemporary report that the same rates seen in 1902 also prevailed in the years leading up to 1885 (A. E. Batemen, 1885, "Customs Tariffs," *Journal of the Statistical Society of London*, 48(4)(December): 617-27).

Figures for Chile are given directly in Markos J. Mamalakis, 1989, *Historical Statistics of Chile: Government Services and Public Sector and a Theory of Services*, Vol. 6, Greenwood Press, New York, p. 206.

The treaties of Nanking (1843) and Tientsin (1858), as well as other similar treaties, limited the Chinese *ad valorem* tariff rate on imports from essentially all of Europe to 5%. In fact, the treaties (and their revisions in 1870, 1902 and 1922) did not set *ad valorem* rates but rather absolute nominal duties that, although initially equivalent to a 5% *ad valorem* tariff, rapidly declined in effective value as prices rose (C. F. Remer, 1926, *The Foreign Trade of China*, The Commercial Press Ltd., Shanghai, pp. 171-181). "The average effective rates were often below three percent and were never above four percent even in the years immediately following the revisions" (Yu-Kwei Cheng, 1956, *Foreign Trade and Industrial Development of China: An Historical and Integrated Analysis through 1948*, The University Press, Washington, pp. 8-13). For this reason it is assumed that import-duties-over-imports for China started at 4% in each revision year and declined at a constant rate to 2.5% in the year immediately preceding the next revision.

Figures for Colombian customs revenue and imports come from José Antonio Ocampo, 1997, *Historia Económica de Colombia*, Presidencia de la República, Imprenta Nacional, Bogotá, pp. 187 and

194. It is assumed that the vast majority of customs revenue came from import rather than export taxes, as Ocampo reports.

In Cuba, “On February 10, 1818, freedom of trade was decreed. But the customs tariffs established in that connection were ferociously protective of Spanish commerce and ships ... with ... tariffs ranging from 20% to 36% ad valorem. ... This system lasted through the nineteenth century with occasional changes to increase protection against foreign products” (Julio Le Riverend, 1967, *Economic History of Cuba*, Ensayo Book Institute, Havana, p. 177). A benchmark of import duties and imports from 1840 comes from *Cuadro Analítico del Comercio, Navegación y Rentas de la Isla de Cuba en el Año de 1840*, Imprenta del Comercio, Havana, 1841, pp. 12 and 16, and is assumed to hold constant until 1882. Various authors support such an assumption, describing how trade policy changed little until the revenue-neutral shift of tariffs away from Spanish goods and towards the produce of other nations began in 1882 (e.g. Fidel G. Pierra, 1896, *Spanish Misrule in America*, Cuban Delegation in the United States, Washington, p.30 and Enrique José Varona, 1917, *Cuba vs. Spain*, p. 15). Customhouse revenue in 1895 is quoted from *The Cuban Question in Its True Light*, 1896, p. 25, and imports for that year from Gonzalo De Quesada, 1905, *Cuba*, International Bureau of the American Republics, Government Printing Office, Washington, p. 154. Import duties and imports for 1905-1914 come from *Comercio Exterior, Segundo Semestre de 1914*, Sección de Estadística, Secretaria de Hacienda, República de Cuba, Havana, 1915, pp. XII-XIV. The import-duties-over-imports figure for 1895 is assumed to hold until the Treaty of Paris in 1898, from which time through 1904 the 1905 figure is assumed to hold.

Data for Egypt on 1885-1908 come from the *Statistical Yearbook of Egypt for 1909*, National Printing Department, Cairo, pp. 83 and 103, and the *Annuaire Statistique de l’Égypte 1914*, Imprimerie Nationale, Cairo, pp. 303 and 410. Figures for 1909-1913 are estimated by assuming that import duties grew after 1908 at the same year-on-year rate as did total customs revenue. The 1885 figure is assumed to hold on 1882-1884. Before the 1882 British occupation, the figure for Turkey is used.

Figures on import duties and imports for Greece, 1887-1897 come from *Commerce de la Grèce avec les Pays Étrangers pendant l’Année 1900*, Imprimerie Nationale, Athens, 1901, p. 5, and figures for 1898-1910 from *Statistique du Commerce Spécial de la Grèce avec les Pays Étrangers pendant l’Année 1909*, Bureau de Statistique du Ministère des Finances, Imprimerie Nationale, Athens, 1911, pp. 2 and 40 (as well as the same pages of the 1912 edition). A single datapoint for 1868 is available in Demetrius Bikelas, 1868, “Statistics of the Kingdom of Greece,” *Journal of the Royal Statistical Society*, 31(3)(September): 265-98. When, then, during the period 1869-1886 did Greece make the transition from low tariffs to protective tariffs? Writing in 1878, Newmarch divides the countries of the world into five groups, according to “the degree in which the Tariffs of the respective groups are hostile to the admission of exports sent from the United Kingdom” (William Newmarch, 1878, “On the Progress of the Foreign Trade of the United Kingdom since 1856, with Especial Reference to the Effects Produced Upon it by the Protectionist Tariffs of Other Countries,” *Journal of the Royal Statistical Society*, 41(2)(June):187-298, p. 200). Greece figures in the “most hostile” group. Thus it is assumed that the protective tariff levels calculated for 1887 had already arrived in 1877, and the years 1869-1876 are interpolated geometrically.

Rider notes that India affected a “departure from free trade” in 1894 with the imposition of a “5 percent ad valorem duty on all imports except cotton goods and a list of raw materials and machinery used in major Indian industries.” With a few modifications, including a change that removed the cotton exemption, this arrangement survived “until the war” (Thomas Rider, 1970, “The Tariff Policy of the Government of India and Industrial Development,” *Journal of Economic History*, 30(1)(March): p.278).

Imports and import duties for Indonesia can be found in Korthals Altes, W. L., 1991, *Changing Economy in Indonesia: Volume 12a, General Trade Statistics 1822-1940*, Royal Tropical Institute, Amsterdam, p. 44-45, 50-54, and 185-187.

Between 1866 and 1895 the “unequal treaties” limited Japanese import tariffs to 5% ad valorem (William W. Lockwood, 1968, *The Economic Development of Japan: Growth and Structural Change*,

Expanded Edition, Princeton University Press, Princeton, New Jersey, pp. 18-19). Customs duties for 1893-1894 from *ibid.* (p. 523) together with imports figures for those years from Banks *op. cit.* (converted to Yen via factors from Taylor *op. cit.*) are used to benchmark this period. In 1899 Japan regained tariff autonomy, but “[e]ven the recovery of tariff autonomy in the nineties still left treaty restrictions on the duties applying to many items. Rates were generally no higher than 10 to 15% until the general tariff revision of 1911” (Lockwood, p. 539). Following this revision, “[i]n 1914 the ratio of customs revenue to the value of dutiable imports was just under 20 percent” (G. C. Allen, 1981, *A Short Economic History of Modern Japan*, 4th ed., St. Martin’s Press, New York, p. 133).

For Mexico, import duties for 1886-1891 come from Antonio Peñafiel, 1892, *Boletín Semestral de la Dirección General de Estadística de la República Mexicana*, Ministerio de Fomento, Mexico City, p. 154. Imports from this same period come from Banks *op. cit.*, converted to pesos using Taylor *op. cit.* Import duties and imports for 1894-1910 come from the *Boletín de Estadística Fiscal*, Palacio Nacional, Mexico City, pp. 63, 139, 146-7, and 173, except 1) imports 1894-96 which come from Banks *op. cit.* converted as before with Taylor *op. cit.* and 2) the assumption that on 1906-1910, the fraction of total customs revenue represented by import duties was equal to the average of what that fraction had been during 1894-1906. Tariffs during 1892-1893 are assumed to equal 1894 levels, since Porfirio Díaz reformed the tariffs in 1891 and we thus cannot assume continuity from 1891 to 1892 (Graciela Márquez, 1998, “Tariff Protection in Mexico, 1892-1909: Ad Valorem Tariff Rates and Sources of Variation,” in John H. Coatsworth and Alan M. Taylor, eds., *Latin America and the World Economy since 1800*, Harvard University Press, Cambridge, Massachusetts, p. 435). A benchmark for import duties in 1871 is found in *Exposición que el Ejectutivo Federal Dirige al Congreso de la Unión, Dando Cuenta del Uso que Ha Hecho de las Facultades que le Concedio el Artículo 3º de la Ley de 1º Diciembre de 1871, y del Estado que Guarda la Hacienda Federal en 1º de Abril de 1872*, Imprenta del Gobierno, en Palacio, Mexico City, 1872, p. 458. This is combined with imports from Banks *op. cit.* converted via Taylor *op. cit.* Figures from 1872-1885 are interpolated geometrically, guided by the 1844, 1865, and 1872 benchmarks for import duties given in Walter Flavius McCaleb, 1921, *The Public Finances of Mexico*, Harper & Brothers Publishers, New York, pp. 89, 121-2, and 134.

Tariff rates on all imports for New Zealand 1894-1925 are given in J. B. Condliffe, 1959, *New Zealand in the Making*, 2nd ed., George Allen & Unwin Ltd., London, p. 250. The source indicates that these figures describe the situation “preceding and following major tariff revisions,” suggesting the acceptability of backwards extrapolation to 1870.

Primary sources for Peru 1866-1878 and 1883-1913 are directly quoted in Laura Randall, 1977, *A Comparative Economic History of Latin America: 1500-1914. Volume 4: Peru*, Institute for Latin American Studies, Columbia University, New York, pp. 205-6. The period 1879-1882 is interpolated geometrically.

Import duties over imports for the Philippines from 1867-1892 are taken from the *Estadística Mercantil del Comercio Exterior de las Islas Filipinas* (1867, 1876) and the *Estadística General del Comercio Exterior de las Islas Filipinas* (1881, 1885, 1893). For the periods 1904-1907 and 1912-1914 statistics are available in McCoy, H. B., 1907, *Annual Report of the Bureau of Customs for the Fiscal Year Ending June 30, 1907*, Bureau of Printing, Manila, pp. 50-53 and *Foreign Commerce of the Philippine Islands, January-December 1914, July-December 1913*, Bureau of Customs, Department of Finance and Justice, Government of the Philippine Islands, Bureau of Printing, Manila, p. 138. Since protection under the Spanish doubled between 1890 and 1892 (from 7.4% to 14.7%), it is not clear how to fill in the missing years 1893-1903. Since it appears that protection was still rising between 1904 and 1907 (from 20.3% to 22.4%), it is assumed that it rose shallowly and slowly on the missing period; that is, the missing years are interpolated geometrically.

Figures for Portugal come from Pedro Lains, 1995, *A Economia Portuguesa no Século XIX: Crescimento Econômico e Comércio Externo 1851-1913*, Imprensa Nacional, Casa da Moeda, Lisbon, p. 41.

Figures for Russia are in Forrest Capie, 1983, "Tariff Protection and Economic Performance in the Nineteenth Century," in C. Knick Harley, ed., *Integration of the World Economy*, Cheltenham, Brookfield, Vermont, pp. 303-4.

A detailed, year-by-year account of Serbian import duties preceding World War 1 is found in Ivan Z. Nestorović, 1913, *Der Aussenhandel Serbiens*, Verlag von Veit & Comp., Leipzig, pp. 6-43.

Annual figures on customs revenue for Spain, nearly all of which was import duties, is in the *Estadística de los Presupuestos Generales del Estado y de los Resultados que Ha Ofrecido su Liquidación*, Intervención General de la Administración del Estado, Madrid, p. 69 in the 1850 to 1890-91 edition, and p. 178 in the 1890-91 to 1907 edition. For the period 1911-1914 the figures can be found in *Estadística General del Comercio Exterior de España en 1916*, Dirección General de Aduanas, Parte Primera, Gráfica Excelsior, Madrid, p. X. This is combined with data on imports from Taylor *op. cit.* The years 1908-1910 are interpolated geometrically.

Thai customs revenue 1894-1913 and Ticul-denominated imports 1907-1913 are in the *Statistical Year Book of the Kingdom of Siam 1917*, English edition, Department of Commerce and Statistics, Ministry of Finance, Bangkok, 1917, pp. 36 and 127. Imports for 1894-1906 are taken from Banks *op. cit.* and converted with Taylor *op. cit.* Between 1865 and 1890 treaties with all the major powers kept import duties below 3% (James C. Ingram, 1971, *Economic Change in Thailand 1850-1970*, Stanford University Press, Stanford, California, pp. 34-5). Geometrical interpolation between 1890 and 1894 produces a rapid doubling of tariff rates on this period, consistent with the record that the Thai government began in 1890 to revise the earlier treaties and increase its tariff revenue (*ibid.*, p. 138).

Statistics on import duties for Turkey after 1878 are found in Justin McCarthy, 1982, *The Arab World, Turkey, and The Balkans (1878-1914): A Handbook of Historical Statistics*, G. K. Hall & Co., Boston, pp. 230-1. Stability of the tariff rate during all of 1878-1900 is assumed to hold true during 1870-1877 as well.

Figures for Uruguay, 1882-1911, are in the *Anuario Estadístico de la República Oriental del Uruguay 1886*, Tipografía Oriental, Montevideo, 1887 (unnumbered page), and Julio M. Llamas, 1915, *Anuario Estadístico de la República Oriental del Uruguay, Años 1911 y 1912*, Tipografía Moderna, Montevideo, pp. 91 and 573. Before 1882 it is assumed that Uruguayan tariff rates mirror those of Argentina. This is justified because 1) Argentine and Uruguayan tariff rates were nearly identical during 1882-1890, and Uruguay was under the same military rule during this period as it was during the 1870s, 2) this military government had close ties to the Argentine government, with which it had fought against Paraguay 1865-1870, and 3) at the onset of civilian rule in Uruguay in 1890, tariff rates spiked upwards.

Lagged Change in the Terms of Trade

The regressor is the cumulative change in our best estimate of net barter terms of trade (ToT) during the five years leading up to and including the first year of the period in question.

The index for Argentina is calculated as an average price of principal exports (beef, hides, wool, grains, linen, tallow) divided by an average price of principal imports (sugar, iron & steel, liquor & wine, construction materials, textiles, tobacco, pharmaceuticals, machinery, fuel), where in each case averages are weighted by the share of the total value of each item in the total value of the named principal items. 1870 weights are used for the index during 1870-1891; 1910 weights are used to construct an index on 1889-1913. All figures are taken from various editions of the *Anuario del Comercio Exterior*, Dirección de Estadística, Buenos Aires.

Figures for Australia during 1870 to 1900 are from W. Vamplew, ed., 1987, *Australians: Historical Statistics*, Fairfax, Syme & Weldon, Broadway, NSW, ITFC 81-83, column 83, p. 194. Figures from 1901-1913 are from Vamplew, *op. cit.* PC 80-89, columns 87 and 88, p. 220.

Terms of trade for Austria-Hungary after 1882 are found in Scott M. Eddie, 1977, "The Terms and Patterns of Hungarian Foreign Trade, 1882-1913," *Journal of Economic History*, 37(2)(June):329-358. An index for 1876-1882 is constructed from indices of the physical quanta and values of exports

and imports given in *Statistik des Auswärtigen Handels des Österreichisch-Ungarischen Zollgebiets im Jahre 1891*, Statistischen Departement im K. K. Handelsministerium, Vienna, 1893, pp. LXVIII-LXIX.

For the period 1865-1875 the same source reports only export and import values, not physical quanta. Since the quanta display extremely stable trends during 1876-1892 (unlike the values, which are subject to the vagaries of prices), the quanta for 1865-1875 are extrapolated assuming the same, stable growth rate observed on 1876-1892. Combining these estimates with the trade value figures given for 1865-1875 yield a ToT estimate for this period.

Terms of trade for Brazil for the entire period are calculated in Reinaldo Gonçalves and Amir Coelho Barros, 1982, "Tendências dos termos de troca: a tese de Prebisch e a economia brasileira - 1850/1979," *Pesquisa e Planejamento Econômico*, Rio de Janeiro, 12(1)(April):109-132.

Burmese ToT for 1886-1913 are from Maung Shein, 1964, *Burma's Transport and Foreign Trade in Relation to the Economic Development of the Country, 1885-1914*, University of Rangoon Press, Rangoon, pp. 223-5, 232-3. During 1865-1885 Burma's ToT are assumed to change at the same rate as those of Thailand.

Figures for Canada come from M.C. Urquhart and K.A.H. Buckley eds., 1965, *Historical Statistics of Canada*, The University Press, Cambridge. Export price index: Series J, cols. 84 and 108 are linked, pp. 299 and 301. Import price index: Series J, cols. 96 and 118 are linked, pp. 300 and 302.

Ceylon's terms of trade from 1900-1913 are calculated from the export and import price indices in Elaine Gunewardena, 1965, *External Trade and the Economic Structure of Ceylon 1900-1955*, Central Bank of Ceylon, Colombo, pp. 225 and 227. Figures for before 1900 come from the *Ceylon Blue Book*, H.C. Cottle Government Printer, Colonial Secretary's Office, Colombo, 1914. This source gives imports and export values annually 1865-1912, which are converted to current pounds sterling via Taylor *op. cit.* and to real pounds sterling via McCusker *op. cit.* These values are used to construct overall export and import price indices through the use of physical quanta indices based on shipping tonnages entered and cleared at port. The source provides separate figures for tonnage entered and cleared for the period 1903-1910, and a combined "entered and cleared" figure for 1865-1902. Since the separate figures are close to equal for 1903-1910, it is assumed that this holds true during 1865-1902 as well.

Terms of Trade for Chile are constructed as follows. First, an export price index is calculated using copper prices before 1880, and an unweighted average of copper and nitrate prices from 1880 to 1914. Copper prices are from Charles L. Knight, 1935, *Secular and Cyclical Movements in the Production and Price of Copper*, University of Pennsylvania Press, Philadelphia. Although this is an "international" price, its movements on 1871-1887 closely reflect those of a copper price index for Valparaiso found in Joanne Fox Przeworski, 1978, *The Decline of the Copper Industry in Chile and the Entrance of North American Capital, 1870-1916*, PhD Dissertation, Department of History, Washington University, Saint Louis, Missouri. Nitrate prices 1870-1906 are found in E. Semper and Michels [surname only], 1908, *La Industria del Salitre en Chile*, Monografía publicada en la Revista Oficial de Minas, Metalurjía i Sustancias Salinas, Vol. 52, 1904, Berlin, traducida directamente del alemán i considerablemente aumentada por Javier Gandarillas Matta i Orlando Ghigliotto Salas, Imprenta Litografía i Encuadernación Barcelona, Santiago, pp. 334-337. Nitrate prices from 1909-1913 are found in James A. F. Brodie, 1915, *Nitrate Facts and Figures*, Mathieson & Sons, London, p. 7. Second, it is assumed that Chile had the same import price index as Argentina from 1885-1913, and the same as Uruguay from 1865-1884—an assumption justified by the close correspondence between separately-calculated indices for Argentine imports, Uruguayan imports, American exports, and British exports.

Chinese terms of trade for 1867-1913 are calculated in Yu-Kwei Cheng, 1956, *Foreign Trade and Industrial Development of China: An Historical and Integrated Analysis through 1948*, The University Press, Washington. The figures are reprinted in John K. Fairbank and Kwang-Ching Liu, 1980, *The Cambridge History of China*, Vol. II, Cambridge University Press, New York, pp. 46-7.

Terms of trade for Colombia are calculated in José Antonio Ocampo, 1984, *Colombia y la Economía Mundial: 1830-1910*, Siglo Veintiuno Editores, Bogota, pp. 95-6. Although Ocampo's figures are used, a separate calculation is performed to check them. An extremely similar ToT index can be

obtained by dividing an export index that is the unweighted average of coffee prices (from Taylor *op. cit.*) and banana prices (from D. W. Rodríguez, 1955, *Bananas: An Outline of the Economic History of Production and Trade with Special Relevance to Jamaica*, The Government Printer, Kingston) by the import price index of Uruguay.

Terms of Trade for Cuba are approximated by dividing an export price index by an import price index. The index of export prices is estimated as an unweighted average of sugar and tobacco price indices. International sugar prices are taken from Taylor *op. cit.* The assumption that an international sugar price index applies to Cuban exports is supported by Jørgen Pedersen and O. Strange Petersen, 1938, *An Analysis of Price Behaviour*, Institute of Economics and History, Copenhagen, p. 99, which demonstrates how sugar prices in the British West Indies, Bengal, and Java followed each other closely throughout the period in question; that is, there is evidence for the existence of a single world price for sugar at the time. An index of tobacco export prices is taken from Uitgave van den Dienst der Belastingen in Nederlandsch-Indië, 1925, *Tabak: Tabakscultuur en Tabakproducten van Nederlandsch-Indië*, Landsdrukkerij-Weltevreden. Again, why take a Dutch East Indies export price as a proxy for Cuban tobacco export prices? First of all, Cuba in the 1920s was exporting one sixth as much tobacco as the Dutch East Indies and one tenth as much as the United States. That is, Cuba was a price-taker in world markets relative to exporters like the Dutch East Indies (T. L. Hughes, 1925, *International Trade in Leaf and Manufactured Tobacco*, Trade Promotion Series No. 7, Dept. of Commerce, Government Printing Office, Washington D.C., p. 2). Second, we have anecdotal evidence that the prices of tobacco imported from Cuba and from the Dutch East Indies moved together in prewar Europe. When prices for Sumatran tobacco in Germany fell by half between 1907 and 1910, prices for Havana tobacco declined by nearly the same percentage (Jacob Wolf, 1922, *Der Tabak und die Tabakfabrikate*, Verlag von Bernh. Friedr. Voigt, Leipzig, p.130). An index of import prices for Uruguay is assumed to hold for Cuba as well, justified by the close correspondence of similar import price indices throughout Latin America, and moreover the close correlation between these indices and export price indices for the United States and Britain during this period.

For Denmark 1870-1875, ToT come from H.C. Johansen, 1985, *Danmarks Historie Bind 9: Dansk Økonomisk Statistik 1814-1980*, Gyldendalske Boghandel, Copenhagen, Table 4.7, col. 5, p. 217. This is linked with figures from 1875-1913 in Niels Kaergard 1991, *Økonomisk Vækst: En Økonometrisk Analyse af Danmark 1870-1981*, Jurist-og Økonomforbundets Forlag, Copenhagen, cols. 2 and 3, p. 578.

Figures for Egypt 1885-1913 come from B. Hansen and E. F. Lucas, 1978, "Egyptian Foreign Trade, 1885-1961: A New Set of Trade Indices," *Journal of European Economic History*, 7(2 and 3)(Fall/Winter): 429-60, Tables 1a and 1b. Export and import indices are calculated as a Fisher index of price over a Fisher index of quantity. Before 1885 the ToT are assumed to change as do those of the rest of the Ottoman Empire (Turkey).

Terms of Trade for France 1870-1896 come from Charles Kindleberger, 1956, *The Terms of Trade: A European Case Study*, MIT Technology Press, Cambridge, Table 2-1, pp. 12-13. This is linked to a series from 1896-1913 found in P. Villa, 1993, *Une Analyse Macroéconomique de la France au XXème Siècle*, CNRS Editions, Monographies d'Économetrie, Paris, pp. 445-6.

German ToT for the entire period come from Walther G. Hoffmann, 1965, *Wachstum der Deutschen Wirtschaft seit der Mitte des 19 Jahrhunderts*, Springer-Verlag, Berlin, Table 134, col. 1, p. 548.

Changes in the ToT for Greece between 1887 and 1899 are obtained by calculating a total value-weighted index of the unit-value of exports (wine, dried fruit and olive oil) and imports (grains and textiles) found in *Commerce de la Grèce avec les Pays Étrangers pendant l'Année 1900*, Ministère des Finances, Bureau de Statistique, Athens. 1901. Both before 1887 and after 1899, the export price index is linked to an index of dried fruit prices found in José Morilla Critz, Alan L. Olmstead and Paul W. Rhode, 2000, "International Competition and the Development of the Dried-Fruit Industry, 1880-1930," in Şevket Pamuk and Jeffrey G. Williamson, eds., *The Mediterranean Response to Globalization before*

1950, Routledge, New York. The import price index outside the period 1887-1899 is linked to an index of the prices of European manufactured exports found on page 75 of Charles P. Kindleberger, 1958, "The Terms of Trade and Economic Development," *Review of Economics and Statistics*, 40(1)(February):72-85.

Terms of trade for India are taken from B.M. Bhattal, 1969, "Terms of Trade and Economic Development: A Case Study of India," *Indian Economic Journal*, 16:417-419.

For Indonesia, ToT are calculated by dividing the export and import price indices given by W. L. Korthals Altes, 1994, *Changing Economy in Indonesia: Volume 15, Prices (Non-Rice) 1814-1940*, Royal Tropical Institute, Amsterdam, pp. 159-160.

Italy's terms of trade with Great Britain are taken as a proxy for overall Italian terms of trade. The former are found in I. A. Glazier, V. N. Bandera, and R. B. Berner, 1975, "Terms of Trade between Italy and the United Kingdom 1815-1913," *Journal of European Economic History*, 4(1)(Spring): 5-48.

Japanese ToT come from Kazushi Ohkawa, Miyoei Shinohara, and Mataji Umemura, eds., 1967, *Estimates of Long-Term Economic Statistics of Japan Since 1868*, Vol. 8, Toyo Keizai Shinpo Sha, Tokyo, Table 18, col. 3, p. 212.

Mexican ToT are estimated in the appendix of Laura Randall, 1977, *A Comparative Economic History of Latin America 1500-1914*, Vol. 1, Institute of Latin American Studies, Columbia University, New York.

New Zealand's terms of trade are given in C. G. F. Simkin, 1951, *The Instability of a Dependent Economy: Economic Fluctuations in New Zealand 1840-1914*, Oxford University Press, London, p. 37.

Norwegian ToT are calculated from a total value-weighted price index for principal exports (salted fish, animal skins, timber, and paper products) and imports (meats, grains, sugar, coffee, textiles, coal, salt, and sailing vessels) using numbers on value and physical volume from Central Statistics Bureau of Norway, *Historical Statistics 1978*, Oslo, pp. 262-3, 279-82, 305-9.

Peruvian ToT 1860-1900 are calculated in Shane Hunt, 1973, *Growth and Guano in Nineteenth Century Peru*, Discussion Paper 34, Research Program in Economic Development, Woodrow Wilson School, Princeton University, p. 42. Numbers for post-1900 are taken from the appendix of Randall *op. cit.* Vol. 1.

Terms of trade for the Philippines 1865-1897 are estimated by dividing an export price index by an import price index, where the export price index is calculated as the value of exports over total shipping tonnage clearing port and the import price index is calculated as the value of imports over total shipping tonnage entering port. All numbers are from Benito J. Legarda, Jr., 1999, *After the Galleons: Foreign Trade, Economic Change, & Entrepreneurship in the Nineteenth-Century Philippines*, Monograph No. 18, Center for Southeast Asian Studies, University of Wisconsin-Madison, pp. 108-9, 112-3. Terms of trade during American rule, specifically 1902-1913, are from Thomas B. Birnberg and Stephen A. Resnick, 1975, *Colonial Development: An Econometric Study*, Economic Growth Center, Yale University, Yale University Press, New Haven, p. 306.

Portuguese ToT are given in Lains 1995 *op. cit.*, pp. 237-8.

Russian terms of trade for 1856, 1881, and 1894 are calculated from an index of export prices (grains, textiles, oil seed, wool, and naphtha) and import prices (tea, coffee, cotton, copper, iron, zinc, wool, silk, jute, and wax), weighted by total value, from W. J. Kowalewski and E. Davidson, 1898, *Die Produktivkräfte Russlands*, Zusammengestellt im Kaiserl. Russischen Finanzministerium, Verlag von Otto Wigand, Leipzig, pp. 537-8, 543-4. After 1894 the export price index is approximated by an index of Odessa wheat prices (linked to Liverpool prices after 1906) from C. Knick Harley, 1980, "Transportation, the World Wheat Trade, and the Kuznets Cycle, 1850-1913," *Explorations in Economic History*, 17:218-250. This is justified by the observation that wheat represented almost half of all Russian export value in 1910 (Margaret Miller, 1967, *The Economic Development of Russia 1905-1915*, Frank Cass & Co. Ltd., New York, p. 42). Miller *op. cit.* also shows that coal and herrings made

up nearly half of Russian imports in 1910, so the import price index after 1894 is estimated as an average of coal and herring prices weighted by their relative value shares in imports in 1910. Coal prices come from Pierre Boca, 1937, *Salaires et Prix du Charbon dans le Bassin Houiller Rhenan-Westphalien*, 1850-1913, Les Editions Domat-Montchrestien, Paris, p. 47. Herring prices are taken to be the unit-value of herring exports from Norway in Central Statistics Bureau of Norway *op. cit.*

A total value-weighted index of Serbian export prices (pigs, cattle, grains) after 1878 comes from Holm Sundhaussen, 1989, *Historische Statistik Serbiens 1834-1914*, R. Oldenbourg Verlag, Munich, p. 361. The import price index is taken to be the index of European export prices faced by Serbia, 1850-1910, given by Sundhaussen *op. cit.* p. 336. Export prices are assumed to have remained stable 1865-1878.

Spanish ToT are from Leandro Prados de la Escosura, 1988, *De imperio a nación: Crecimiento y atraso económico en España 1780-1930*, Alianza Editorial, Madrid, pp. 257-9.

Sweden's terms of trade are taken from Simon Kuznets, 1996 [originally published 1967], "Quantitative Aspects of the Economic Growth of Nations: X. Level and Structure of Foreign Trade: Long-Term Trends," reprinted in C. Knick Harley, ed. *The integration of the world economy, 1850-1914*, Volume 1, Elgar Reference Collection: Growth of the World Economy Series, Vol. 3. Cheltenham, U.K., Table 12, p. 150.

An index of rice prices is assumed to adequately represent an export price index for Thailand, and import prices are approximated as the grey shirting (textiles) price. Their ratio approximates Thai terms of trade. All numbers are from Sompop Manarungsan, 1989, *Economic Development of Thailand, 1850-1950*, IAS Monograph No. 42, Institute of Asian Studies, Chulalongkorn University, Bangkok, Table A4, pp. 215-6.

Terms of trade for Turkey are calculated in Şevket Pamuk, 1978, *Foreign Trade, Foreign Capital and the Peripheralization of the Ottoman Empire, 1830-1913*, PhD Dissertation, Dept. of Economics, University of California, Berkeley, California, pp. 279-281.

United States ToT are from Jeffrey G. Williamson, 1964, *American Growth and the Balance of Payments 1820-1913*, University of North Carolina Press, Chapel Hill, North Carolina, Table B4, p. 262.

Export and import price indices for Uruguay were kindly provided by Luís Bertola, and ToT are approximated as their ratio.

Effective Distance from London

The regressor is the product of two quantities. The first is the shipping distance, in thousands of nautical miles, from London to the principal port of the destination country that is closest to London. These are taken from the pre-Panama Canal port-to-port distances for full-powered steam vessels recorded in George Philip, ed., 1914, *Philip's Mercantile Marine Atlas*, 4th ed., The London Geographical Institute, London, endsheet table. The second quantity is an index of tramp shipping freight charges (per distance and weight) shown in Table VIII (p. 122) of L. Isserlis, 1938, "Tramp Shipping Cargoes, and Freights," *Journal of the Royal Statistical Society*, 101(1):53-146, where the year 1869 = 1.00 (i.e. Isserlis' figures have been divided by 100).

Population Growth Rate

The regressor is the year-on-year percent change in population during the first year of the relevant period. See the aforementioned sources for population data.

Net Immigration

The regressor is an average, over the period in question, of an annual index taking an integer value between -3 and +3. The value +3 signifies large net immigration during that year and -3 signifies large net emigration. Index numbers are constructed for each country in each of five periods: 1865-69, 1870-79, 1880-89, 1890-99, and 1900-14, and assumed to hold in each year of these five periods for the purposes of constructing an average value for our periods I-VI.

Information used to construct the indices for Argentina, Austria-Hungary, Brazil, Canada, Chile, Cuba, Denmark, France, Germany, Italy, Norway, Portugal, Spain, Sweden, the United States, and Uruguay comes from T. J. Hatton and J. G. Williamson, 1998, *The Age of Mass Migration*, Oxford University Press, New York, p. 10, which draws heavily on I. Ferenczi and W. F. Willcox, 1929/1931, *International Migrations*, National Bureau of Economic Research, New York, Vol. I 1929 and Vol. II 1931. Chile and Uruguay are assumed to behave similarly to Argentina.

Figures for Australia are estimated based on A. Timmer and J. G. Williamson, 1996, "Racism, Xenophobia or Markets?" Working Paper 5867, National Bureau of Economic Research, Appendix A, and A. M. Taylor and J. G. Williamson, 1997, "Convergence in the Age of Mass Migration," *European Review of Economic History*, 1(1)(April): 27-63, Table 1. Based on Ferenczi and Willcox *op. cit.*, migration New Zealand is assumed to behave similarly to that of Australia.

Migration data for Egypt, Greece, Serbia and Turkey are from Williamson 2000, "Real wages and relative factor prices around the Mediterranean, 1500-1940," *op. cit.*, pp. 64-6, supplemented by the appendix of Jeffrey G. Williamson, 1998, "Real Wages and Relative Factor Prices in the Third World 1820-1940: The Mediterranean Basin," Discussion Paper 1842, Harvard Institute for Economic Research, Harvard University, Cambridge, Mass.

Documentation for migration flows in China, India, and Japan is relatively poor. It is common knowledge, however, that Madras, other eastern parts of India, and South China were important "labor surplus" or low-wage areas which supplied huge labor supplies to high-wage, labor-scarce areas like Ceylon, Burma, Thailand and the rest of Southeast Asia. For example, see the evidence presented in W. A. Lewis, 1969, *Aspects of Tropical Development*, Wiksell, Uppsala; W. A. Lewis, 1978, *Growth and Fluctuations 1870-1913*, Allen and Unwin, Cambridge, Mass.; and/or W. A. Lewis, 1978, *The Evolution of the International Economic Order*, Princeton University Press, Princeton, New Jersey. It is also true, however, that the population from whence the Chinese and Indian emigrants were exiting was itself immense. Thus, while the immigration rates into Burma and Thailand were very large (since the denominators were small), the emigration rates were hardly noticeable for the sending areas (since the denominators were huge). It is also well known that Japan never played a significant role in foreign migrations in either direction during the pre-1914 years (although Korean immigration during the World Wars and interwar was significant, as was 20th century Japanese emigrations to Hawaii and the US West Coast).

Estimates for Burma, Ceylon, Indonesia and Thailand are based on Lewis 1978 *op. cit.* p. 185. Further information on Burma is found in Teruko Saito and Lee Kin Kiong, 1999, *Statistics on the Burmese Economy*, Institute of Southeast Asian Studies, Singapore, Table I-2, p. 9. Further information on Thailand is in Manarungsan *op. cit.* Table. 1.3, p. 34. Low migration levels estimated for Colombia, Mexico, and Peru are based on the scant discussion of those countries in Ferenczi and Willcox *op. cit.* esp. pp. 581-90. Estimates for the Philippines are made based on aforementioned information about the suppliers of their immigrants, especially China and Indonesia, with some assistance from Daniel F. Doepfers and Peter Xenos, 1998, *Population and History: The Demographic Origins of the Modern Philippines*, Center for Southeast-Asian Studies, University of Wisconsin, Madison, Wisconsin.

Estimates for Russia are based on Ferenczi and Willcox *op. cit.* vol. 2, pp. 521-80. Estimates for Cuba are based on Blanca Sánchez Alonso, 1995, *Las causas de la emigración española 1880-1930*, Alianza Universidad, Madrid, Apéndice Cuadro A3.1, p. 281.

Fraction of Exports Based on Primary Products

The regressor is the fraction of total export value, in the first year of the period in question, represented by exports of “primary products” (defined below). This number was made popular as one possible indicator of the relative abundance of natural resources of all types by Jeffrey D. Sachs and Andrew M. Warner, 1995, “Natural Resource Abundance and Economic Growth,” Working Paper No. 5398, The National Bureau of Economic Research, Cambridge, Mass.

Sachs and Warner defined “primary products” as those commodities falling into categories 0, 1, 2, 3, 4, and 68 of the United Nations Standard International Trade Classification (SITC) Revision 1. These categories are, respectively, “food and live animals,” “beverages and tobacco,” “crude materials excluding fuels,” “mineral fuels,” “animal or vegetable oils and fats,” and “non-ferrous metals.” This study uses a slightly different definition of primary products, namely categories I, II, and III of the Brussels 1913 Commodity Classification (recorded in *Conférence Internationale de Statistique Commerciale, Bruxelles, 1913: Documents et Procès-Verbaux*, Établissements Généraux D’Imprimerie, Brussels, 1914). These categories are, respectively, “live animals,” “food and drink,” and “raw materials or simply-prepared products.” That is, our definition of “primary products” includes all exports except categories IV (“manufactured products”) and V (money and specie). The only substantive differences between our definition of “primary product” and that based on the SITC are that the former includes iron ore and excludes *manufactured* tobacco products like cigarettes and cigars.

Figures for the United States, France, Germany, Russia, Australia, Austria-Hungary, Italy, Japan, Spain, Sweden, and Chile are from League of Nations, 1945, *Industrialization and Foreign Trade*, Economic, Financial and Transit Authority, Geneva, pp. 157-9. An additional benchmark for Spain is available in *Estadística General del Comercio Exterior de España 1862*, Dirección General de Aduanas, Madrid, pp. xxxvii and xxxix.

The League of Nations data for Austria-Hungary, which only go back to 1881, are extended back to 1865 by numbers from *Statistik des Auswärtigen Handels des Österreichisch-Ungarischen Zollgebiets im Jahre 1891*, Statistisches Departement im K. K. Handelsministerium, Wien, 1893, pp. LXXVI-LXXVII. Note that manufactured food items had to be removed from “manufactured goods” to make these data fit the Brussels classification.

It is clear that Brazil had no significant exports outside Brussels classifications I-III during this period, from figures for 1904-5 in *Importação e Exportação: Movimento Marítimo, Cambial e do Café da República dos Estados Unidos do Brasil em 1905*, Serviço de Estatística Commercial, Ministério da Fazenda, Imprensa Nacional, Rio de Janeiro, 1907, pp. 193-5, and figures for 1913-14 in *Comercio Exterior do Brasil, Vol. 1, 1910 a 1914*, Directoria de Estatística Commercial, Ministério da Fazenda, República dos Estados Unidos do Brasil, Rio de Janeiro, 1915, pp. 21-4.

Figures for India for 1899 and after are found in H. Tyszynski, 1951, “World Trade in Manufactured Commodities,” *The Manchester School of Economic and Social Studies*, 19(3)(September): 272-304, on pages 277-8, 299, and 304. It is assumed that the fraction of Indian exports composed of manufactured goods grew at the same year-on-year rate during 1865-1898 as it did during 1899-1913. Burma is assumed to have the same figure as India in each period.

Figures for Canada are found in Canada Bureau of Statistics, 1910, *The Canada Year Book*, C. H. Parmelee Printer to the King’s Most Excellent Majesty, Ottawa, pp. 66, 69.

Detailed ledgers of Ceylon’s exports in 1904 are found in the 1905 *Ceylon Blue Book*, pp. U58-U87. Figures for 1912 are in the 1912 *Ceylon Blue Book*, pp. M44-M83. Both show that the fraction of exports falling into categories I-III is very close to unity, suggesting that reliable figures for earlier years can be extrapolated.

Figures for China are presented in C. Yang, H. B. Hau, and others, 1931, *Statistics of China’s Foreign Trade during the Last Sixty-Five Years*, Monograph No. IV, National Research Institute of Social Sciences, Academia Sinica, Beijing, p. 27.

Figures for Colombia are in Ocampo 1984, *op. cit.*, pp. 100-1, 391-5.

Cuban figures for 1899-1902 are in *Estadística General: Comercio Exterior*, Secretaria de Hacienda, República de Cuba, Mayo y Junio de 1902, Havana, p. 17. Figures for 1904-1913 are in

Comercio Exterior, Segundo Semestre del Año 1913 y Año de 1913, Sección de Estadística, Secretaria de Hacienda, Republica de Cuba, Havana, 1914, p. 9. The turn-of-the-century figures are assumed to hold throughout the late 19th century.

Data from Denmark 1896-1913 are taken from the export ledgers in *Importation et Exportations du Danemark (Danmarks Vareindførsel og -udførsel)*, Departement de Statistique, Copenhagen, various years. Since the resulting figure of 96% does not significantly change between 1896 and 1913, it is assumed to hold constant on 1870-1896.

Data for Egypt 1885-1909 are in the *Statistical Yearbook of Egypt for 1909*, First Issue, Statistical Department, Ministry of Finance, National Printing Department, Cairo, 1909, pp. 87, 98, 104-5. The figures from the early 80's are assumed to hold back to 1870.

Data on Greek exports 1887-1910 are in *Commerce de la Grèce avec les Pays Étrangers pendant l'Année 1900*, Ministère des Finances, Bureau de Statistique, Athens. 1901, p. 6. The 1887 figure is assumed to hold constant back to 1870.

Data on Indonesia for 1865-1913 are in W. L. Korthals Altes, 1991, *Changing Economy in Indonesia: Volume 12a, General Trade Statistics 1822-1940*, Royal Tropical Institute, Amsterdam, pp. 141, 144. The graph on page 141 clearly justifies extrapolation of 1865-1873 figures all the way to 1913.

Detailed Mexican export composition for 1880-1891 is found in Antonio Peñafiel, 1888, *Boletín Semestral de la Estadística de la República Mexicana*, Ministerio de Fomento, Mexico, pp. 186-189. That there was no decrease in this figure even right before the War is confirmed by figures for 1912-3 in *The Mexican Year Book: A Financial and Commercial Handbook*, compiled from Official and other Returns, 1914, Dept. of Finance, Mexico City, pp. 16-17.

Complete data for New Zealand are to be found in G. T. Bloomfield, 1984, *New Zealand: A Handbook of Historical Statistics*, G. K. Hall & Co., Boston, pp. 271-2.

Complete data for Norwegian export composition are in Central Statistics Bureau of Norway, *op. cit.*, pp. 262-3.

It is assumed that Peru had no exports in Brussels Class IV during this period, since it had developed none by 1918—as can be seen in *Extracto Estadístico Correspondiente al Año 1918*, Preparado por la Dirección de Estadística del Ministerio de Fomento, Lima, p. 89.

Detailed export ledgers for 1890-4, 1899-1904, and 1906-7 are in *Monthly Summary of Commerce of the Philippines Islands*, various years, Division of Insular Affairs, War Department, Washington. Benchmarks for the years 1867 and 1876 are in *Estadística Mercantil del Comercio Exterior de las Islas Filipinas*, Año de 1867 [and 1876], Manila.

Portuguese export composition is reported in Lains 1995 *op. cit.*, p. 92.

Figures for Serbia, 1879-1910, are in Nestorović *op. cit.* pp. 130, 134, 137, and 139.

Export breakdowns for Thailand 1908-12 are presented in *Foreign Trade and Navigation of the Port of Bangkok: Years 129 (1910-11) and 130 (1911-12)*, Prepared in the Statistical Office, H. S. M. Customs, and Published by Order of the Director-General, Bangkok, pp. 75-83. These ledgers reveal that manufactures in 1908 were less than 1% of export value, suggesting that reliable figures can be obtained from extrapolation back to 1870.

Full data for Turkey are presented in Pamuk 1978 *op. cit.*, pp. 235-249, and confirmed in Şevket Pamuk, 1995, *19. Yüzyılda Osmanlı Ticareti (Ottoman Trade in the 19th Century)*, T. C. Başbakanlık Devlet İstatistik Enstitüsü (State Institute of Statistics, Prime Ministry), Ankara, p. 36.

Detailed ledgers of Uruguayan export composition are given in *Anuario de Estadística de la República Oriental del Uruguay*, Dirección de Estadística General, Montevideo, years 1884, 1895, and 1911-12.

Data for Argentina come from Randall *op. cit.* Vol. 2, pp. 218-9.

Primary Product Based Exports as a Fraction of GDP

The above index of the fraction of exports based on primary products is multiplied by total export value and divided by total GDP to obtain the value of primary product-based exports as a fraction of GDP, an alternative indicator of natural resource abundance used in Sachs and Warner *op. cit.* Figures for GDP are obtained by multiplying the above estimates of GDP per capita by estimates of population. Export figures for Argentina, Australia after 1900, Austria-Hungary, Brazil, Canada, Chile, China, Colombia, Cuba after 1902, Denmark, France, Germany, Greece, Italy, Japan, Mexico, Norway, Peru, Portugal, Russia, Spain, Sweden, Thailand, Turkey, the United States, and Uruguay come from Banks *op. cit.* Those for Australia before 1900, Ceylon, Cuba before 1902, Egypt, India, Indonesia, New Zealand, Philippines, and Serbia come from Arthur Lewis, 1981, "The Rate of Growth of World Trade, 1830-1973," in Sven Grassman and Erik Lundberg, eds., *The World Economic Order: Past and Prospects*, St. Martin's Press, New York.

Burmese exports for 1913 come from *Statistical Abstract for British India*, Government of Calcutta, India Publication Branch, Commercial Intelligence Department, 1914. Burmese exports from 1902-1912 are from *Statistics of British India, Part II: Commercial*, Director-General of Commercial Intelligence, Calcutta, 1913. Burmese exports for 1874-1902 are from *Statistical Abstract Relating to British India*, Various Years, Eyre & Spottiswoode for HMSO, Presented to both Houses of Parliament by Command of Her Majesty, London. All export figures are converted into real, 1990 US dollars via McCusker *op. cit.*

Land Area

Land areas are in square miles and correspond to country borders as defined in the first section of this appendix.

Areas for Argentina, Australia, Austria-Hungary, Brazil, Canada, Chile, China, Colombia, Cuba, Denmark, France, Germany, Greece, Italy, Japan, Mexico, New Zealand, Norway, Peru, Portugal, Russia, Serbia, Spain, Sweden, Thailand, Turkey, the United States, and Uruguay come from Banks *op. cit.*

Areas for Burma, Ceylon, Egypt, India (sum of modern India, Pakistan, and Bangladesh), Indonesia, and the Philippines come from the *Encyclopedia Britannica*.

Urbanization

This regressor is the fraction of the population living in urban agglomerations of 100,000 or more in the first year of the period in question.

Data for Argentina, Austria-Hungary, Brazil, Canada, Chile, Colombia, Denmark, France, Germany, Greece, Italy, Japan, Mexico, Norway, Peru, Portugal, Russia, Serbia, Spain, Sweden, Turkey, the United States, and Uruguay come from Banks *op. cit.*

Data for Australia, Ceylon, Cuba, Egypt, India, the Philippines, and Thailand are in the appropriate volume of Mitchell 1998 *op. cit.* An additional benchmark for India is in Edwin S. Mills and Charles M. Becker, 1986, *Studies in Indian Urban Development*, The World Bank, Oxford University Press, New York, p. 34. An additional benchmark for the Philippines is in Rajeswary Ampalavanar Brown, 1994, *Capital and Entrepreneurship in South-East Asia*, St. Martin's Press, New York, p. 228.

Figures for Burma are in Saito and Kiong *op. cit.*, p. 16.

Data for China come from Kang Chao, 1986, *Man and Land in Chinese History: An Economic Analysis*. Stanford University Press, Palo Alto, California. Note that Chao defines an urban agglomeration as consisting of only 2,000 people, so this number can be best considered an upper-bound proxy. Since it is low in all years, the error introduced by overestimation cannot be large.

Figures for Indonesia are in P. Boomgaard and A. J. Gooszen, 1991, *Changing Economy in Indonesia: Volume 11, Population Trends 1795-1942*, Royal Tropical Institute, Amsterdam, pp. 213, 220.

Data for New Zealand are in G. T. Bloomfield, 1984, *New Zealand: A Handbook of Historical Statistics*, G. K. Hall & Co., Boston, p. 56.

School Enrollment

This regressor is the fraction of the population aged 14 years or less that is enrolled in primary school in the first year of the period in question, and is in units of enrolled students per 10,000 persons aged 14 years or below. It is calculated as the quotient of 1) primary enrollment as a fraction of the total population and 2) children aged 14 or below as a fraction of the total population. Each is discussed in turn.

Enrollment as a fraction of total population: Data for Argentina, Australia, Brazil, Burma, Ceylon, China, Egypt, France, Germany, India, Indonesia, Italy, Japan, Mexico, the Philippines, Russia, Serbia, Spain, Thailand, Turkey, and the United States are from Richard A. Easterlin, 1981, "Why Isn't the Whole World Developed?" *Journal of Economic History*, 41(1)(March):1-19., and Richard A. Easterlin, 1996, *Growth Triumphant*, University of Michigan Press, Ann Arbor, p. 61. Data for Australia, Austria-Hungary, Canada, Chile, Colombia, Denmark, Greece, Norway, Peru, Portugal, Sweden, and Uruguay are from Banks *op. cit.* Data for Ceylon are from the 1914 edition of the *Ceylon Blue Book*, endsheet. Additional data for Colombia are in 1869, 1870, and 1883 are found in Ocampo 1997 *op. cit.*, p. 160-1 and Gabriel Poveda Ramos, 1979, *Dos Siglos de Historia Económica de Antioquia*, Biblioteca Pro Antioquia, Medellin, p. 95. Additional data for Cuba are in Susan Schroeder, 1983, *Cuba: A Handbook of Historical Statistics*, G. K. Hall & Co., Boston. Additional data for New Zealand are in Bloomfield *op. cit.*, p.110.

Children aged 14 or below as a fraction of the total population (the "youth dependency ratio"): Data for Argentina, Australia, Austria-Hungary, Brazil, Burma, Canada, Denmark, France, Germany, Greece, India, Italy, Japan, Mexico, Norway, Portugal, Russia, Spain, Sweden, and the United States come from the appropriate volume of Mitchell 1998 *op. cit.* Figures for Chile are from Mamalakis *op. cit.* volume 2. Figures for Ceylon are approximated using a straightforward demographic model employing population growth figures from the 1914 *Ceylon Blue Book*, and viable birth and infant mortality statistics from L. J. B. Turner, 1923, *Report on the Census of Ceylon 1921*, H. Ross Cottle, Government Printer, Ceylon, pp. 11, 15.

Youth dependency ratio statistics for China are gathered from a range of sources, giving a picture of trends in the ratio from 1771 to 1990. Data for 1771-1835 and 1872 are from Ping-ti Ho, 1959, *Studies on the Population of China 1368-1953*, Harvard University Press, Cambridge, Mass., pp. 59, 68. A benchmark from 1842 is in Gilbert Rozman, 1982, *Population and Marketing Settlements in Ch'ing China*, Cambridge University Press, 1982, p. 59. A figure from 1953 is in S. Chandrasekhar, 1960, *China's Population: Census and Vital Statistics*, Hong Kong University Press, Hong Kong, p. 47, and figures from 1953, 1964, and 1982 are in Li Chengrui, 1992, *A Study of China's Population*, Foreign Languages Press, Beijing. A datapoint for 1958 is in Chai Sunclin, 1977, *Population and Population Policy in Mainland China*, Asia and the World Forum, Monograph 6, Taipei, Taiwan, p. 56. Benchmarks for 1926, 1929, 1931, 1934, and 1947 are in Yang Zi Hui, 1995, *China Historical Population Data and the Relevant Studies*, China Reform Publishing House, Beijing, pp. 1364, 1366, 1369. The general agreement of these disparate figures on long-term trends in the population structure allows confident interpolation for 1870-1914.

Data for Colombia come from Mitchell *op. cit.* 1998, Ocampo 1997 *op. cit.* p. 160, and Poveda *op. cit.* p. 95. Data for Cuba are from Schroeder, *op. cit.*, pp. 51-3. A benchmark for Egypt in 1917 is from Mitchell 1998 *op. cit.*, and in preceding years the Egyptian youth dependency ratio is assumed to change at the same rate as that of India. Data for Indonesia are from Boomgaard and Gooszen, *op. cit.*

pp. 200-3. Figures for New Zealand are in Bloomfield *op. cit.*, pp. 48-50. Peruvian figures for 1876 are benchmarked in Alida Díaz, 1974, *El Censo General de 1876 en el Peru*, Seminario de Historia Rural Andina, Lima, Table 8, page 33. These are compared with post-1940 statistics in Mitchell 1998 *op. cit.* to reveal long-term trends in the Peruvian population structure. For the Philippines, there is a 1918 benchmark in Felipe Buencamino, Sr., 1921, *Census of the Philippine Islands*, Vol. 2, Census Office of the Philippine Islands, Manila, p. 65, and a 1903 benchmark in J. P. Sanger, 1905, *Census of the Philippine Islands*, Vol. 2, United States Bureau of the Census 1905, p. 65. Serbian data come from Sundhaussen *op. cit.* p. 114. Data for Thailand in 1911, 1925, 1947, and 1960 come from the *Statistical Year Book of the Kingdom of Siam* published by the Ministry of Finance, and data points for 1929 and 1937 are in Mitchell 1998 *op. cit.* Together these give a clear view of long-term trends in the Thai population structure that allow confident extrapolation to the period 1870-1913. For Turkey, an 1886 benchmark can be found in McCarthy, *op. cit.*, p. 87, and comparison points for 1935-1960 are in Mitchell 1998 *op. cit.*, giving a clear picture of long-term trends in Turkish demographic structure. Uruguayan dependency ratios for 1900 and 1908 are in Mitchell 1998 *op. cit.*, and before 1900 they are assumed to have changed at the same rate as did those for Argentina.

Unskilled, Real, PPP-adjusted, Urban Wages relative to those of Great Britain

This regressor is an *index* of the unskilled, urban, real, purchasing power-adjusted urban wage in that country in the current year—where the unskilled, urban, real, purchasing power-adjusted urban wage in Great Britain in the current year corresponds to the index value 100.

Figures for Australia, Brazil, Canada, Denmark, France, Germany, Italy, Norway, Portugal, Spain, Sweden, and the United States come from Jeffrey G. Williamson, 1995, “The Evolution of Global Labor Markets since 1830: Background Evidence and Hypotheses,” *Explorations in Economic History*, 32:141-196.

Figures for Burma, China, India, Indonesia, Japan, the Philippines, and Thailand come from Jeffrey G. Williamson, 2000, “Globalization, Factor Prices and Living Standards in Asia before 1940,” in A. J. H. Latham and Heita Kawakatsu, eds., *Asia-Pacific Dynamism 1550-2000*, Routledge, New York.

Figures for Egypt, Serbia, and Turkey come from Jeffrey G. Williamson, 2000, “Real Wages and Relative Factor Prices around the Mediterranean, 1500-1940,” *op. cit.* It is assumed that the index value for Turkey is a good proxy for that of Greece, due to similarities of economy and geography as well as a high rate of labor mobility between the two.

Figures for Argentina, Colombia, Cuba, Mexico, and Uruguay come from Jeffrey G. Williamson, 1998, “Real Wages and Relative Factor Prices in the Third World 1820-1940: Latin America,” Discussion Paper 1853, Harvard Institute of Economic Research, Harvard University, Cambridge, Mass.

Austro-Hungarian nominal unskilled urban wages 1891-1913 come from Michael Mesch, 1984, *Arbeiterexistenz in der Spatgrunderzeit: Gewerkschaften und Lohnentwicklung in Österreich 1890-1914*, Europaverlag, Vienna, p. 287 (unweighted average of the eight cities shown). These are converted to real wages with a price index calculated as the unweighted average of three grain prices given in Alfred Francis Pribram, 1938, *Materialen zur Geschichte der Preise und Löhne in Österreich*, Carl Ueberreuters Verlag, Vienna, pp. 371-3. The resulting real wage series is adjusted for purchasing power based on data on Austrian and British prices for the year 1913 in Wesley C. Mitchell, 1919, *International Price Comparisons*, Government Printing Office, Washington, pp. 56-154 and 320-328. The British real wage series with which it is compared comes from Williamson 1995 *op. cit.* The result of extrapolation before 1891 matches well with a relative wage benchmark for the year 1884 in Michael G. Mulhall, 1885, *History of Prices since the Year 1850*, Longmans, Green, and Co., London, p. 125. The resulting series also corresponds to the observation that “...both money wages and real wages probably declined until the mid 1890s. Only after the effect of mass migration had made its impression

on the labor market, i.e., after the turn of the century, did wages rise again” (Scott M. Eddie, 1983, “Agriculture as a Source of Supply: Conjectures from the History of Hungary, 1870-1913,” in John Komlos, ed., *Economic Development in the Habsburg Monarchy in the Nineteenth Century: Essays*, Columbia University Press, New York, p. 111).

Russian real wages come from the unpublished manuscript *Russian Economic Growth before 1917* by Robert C. Allen of the University of British Columbia. These are compared to British real wages from Williamson 1995 *op. cit.* by information on 1913 relative consumer prices in Russia and Great Britain in Wesley Mitchell, *op. cit.*, pp. 56-154 and 210-225.

It is assumed that the index value for Australia is a good proxy for that of New Zealand. This is justified by economic and geographic similarities, labor mobility, and by a calculation showing that purchasing power-adjusted wages of “builders and general laborers” in New Zealand 1895-1900 were identical to those of their counterparts in Australia. For this calculation, New Zealand nominal unskilled urban wages came from M. B. Hammond, 1917, “The Regulation of Wages in New Zealand,” *Quarterly Journal of Economics*, 31(3)(May): 404-46. An index of New Zealand prices relative to those in Great Britain is found in J. W. McIlraith, 1913, “Price Variations in New Zealand,” *The Economic Journal*, 23(91)(September):348-354. British nominal unskilled urban wages are on page 310 of A. L. Bowley, 1900, “The Statistics of Wages in the United Kingdom during the Last Hundred Years. (Part IV) The Building Trades, English Towns,” *Journal of the Royal Statistical Society*, 63(2)(June): 297-315. Lastly, a British real wage index is found in Jeffrey G. Williamson, 1995, “The Evolution of Global Labor Markets since 1830: Background Evidence and Hypotheses,” *op. cit.*

For all other regressors we have complete data for all countries in all periods; for wages, however, we have no data for Ceylon, Chile, and Peru. For Cuba, we only have data for period VI. All other countries and periods are complete.