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British Capital and Merchandise Exports, 1870-1913:
The Bilateral Case of New Zealand*

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Abstract

The Ford thesis argued that there was a short-term causal relationship between British overseas investment and British merchandise exports in the late nineteenth century. However, economic historians since Ford have found little empirical evidence in support of this argument. Using data on bilateral British lending, this article finds that such a relationship did exist, with British *ex ante* lending preceding merchandise exports by two years. A case study of New Zealand, which had an extraordinarily high share of Britain in its imports, reveals that the relationship was conditional upon the lending being allocated to social overhead capital.

JEL Codes: F21, N73, N77

Keywords: Britain, gold standard, New Zealand, overseas investment, trade

INTRODUCTION

One of the main contributions of the Ford thesis was to identify a causal relationship between British capital and merchandise exports during the late nineteenth century, whereby British *ex ante* lending to a given country preceded an increase in British merchandise exports to that country by a period of one or two years.[1] Ford specifies two channels of causation. First, since the majority of British overseas lending was allocated to social overhead projects, these projects required capital goods, such as machinery and steel, which Britain exported in abundance.[2] Second, lending tended to increase the income of the borrowing country and thus raise its demand for manufactured consumption goods, which Britain also exported.

According to Ford, the causal relationship between British capital and merchandise exports functioned as an important equilibrating mechanism in the gold standard regime of the late nineteenth century.[3] Increased demand for merchandise exports diminished the extent to which overseas lending was settled in Britain's multilateral balance of payments through a transfer of specie, *ceteris paribus*. As the historical record indicates, the outflow of specie from Britain, even during peak periods such as the late 1860s, remained only a small component of the balance of payments.[4] Equilibrating mechanisms operated to prevent the acute outflow of specie from Britain, but was Ford's proposed relationship between British capital and merchandise exports one of these mechanisms? Subsequent scholars have expressed their doubts.

For the purposes of this paper, it will prove convenient to conceptualise Ford's argument as a lending-export loop, albeit an imperfect loop, since borrowed British capital was oftentimes diverted toward the purchase of imports from countries other than Britain. On this point, Brown argues that borrowing countries had, on average, low marginal propensities to import either capital or consumption goods from Britain.[5] In other words, the diversion of capital from the lending-export loop was significant. In support of this assertion, he invokes Tinbergen's finding that the marginal effect of British capital exports on British capital *goods* exports was just one-

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[1] Ford, British foreign lending, p. 305. *Ex ante* lending occurred when a creditor country committed to exporting capital, with the commitment usually taking the form of a primary security issue. The lending became *ex post* when the creditor country country actually exported merchandise, services, or specie.
[2] Simon, Portfolio foreign investment, p. 25. Between 1865 and 1914, nearly 70% of British portfolio foreign lending was directed toward social overhead capital.
[3] Ford, Gold standard, p. 59.
[4] Imlah, *Pax Britannica*, pp. 72-4.
[5] Brown, World economy, p. 52.

quarter during the period from 1880-1908.[6] Nevertheless, Brown acknowledges that there was likely considerable variation among the bilateral marginal propensities to import from Britain.

Brown identifies New Zealand as a colony with a 'high' marginal propensity to import from Britain.[7] Because New Zealand relied on Britain for more than three-fifths of its imports during the late nineteenth century, the likelihood is that the marginal propensity of New Zealand to import from Britain was quite high, certainly higher than the cross-country average of one-quarter.[8] Even within the context of the British Empire, New Zealand stands out for its atypically strong bilateral trade with Britain.[9] In 1890, New Zealand obtained 67 per cent of its imports from Britain, compared to other high-income colonies of the British Empire: Canada (38 per cent), New South Wales (38 per cent), and Victoria (42 per cent).[10] The discrepancy between New Zealand and Canada was largely due to the latter importing manufactured goods from the neighbouring United States. As for the Australian colonies, inter-colonial trade amongst each other reduced the share of Britain within the country-compositions of imports, since the trade statistics of these colonies treat inter-colonial trade as external. Adjusting for this convention by treating all Australasian inter-colonial trade as internal, New Zealand still had the highest share of Britain in imports (82 per cent), followed by New South Wales (74 per cent) and Victoria (66 per cent).[11]

Several factors contributed to the exceedingly high share of Britain within the country-composition of New Zealand's imports. The comparatively small domestic market of New Zealand offered limited economies of scale for a manufacturing sector and, in this way, helped to ensure that the colony continued to import manufactured goods from the workshop of the world.[12] Another explanation for the high share of Britain in imports is the high share of Britain

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[6] See Tinbergen, *Business Cycles*, p. 41.

[7] Brown, World economy, p. 52.

[8] *Official statistics of the colony (dominion) of New Zealand*. Between 1870 and 1914, the total nominal value of New Zealand's imports was £428.4 million, of which £263.4 million came from Britain.

[9] On this point, Platt is even more emphatic, writing that 'Britain's competitive position in New Zealand was almost absurdly strong' in Recent settlement, p. 112.

[10] *Statistical year-book of Canada for 1890*, *New South Wales statistical register for 1890*, and *Statistical register of the colony of Victoria for the year 1890*.

[11] Treating the trade between New Zealand and the six Australian colonies as internal is quite appropriate for the period prior to the Australian Confederation (1901), which New Zealand nearly joined. The seven Australasian colonies were: New South Wales, New Zealand, Queensland, South Australia, Tasmania, Victoria, and Western Australia.

[12] See, for example, Schedvin, Staples and regions, p. 544, which attributes the absence of a wool textile industry in New Zealand to the limited domestic market there, compared to in Britain. Partly for

in exports, and vice versa. Ships carrying manufactured goods to New Zealand returned to Britain with cargoes of primary goods, in a mutually reinforcing system that maintained the high share of Britain in New Zealand's total trade. As for New Zealand's leading export, wool enjoyed a growing demand from the textile mills of Yorkshire.[13] In the 1880s, when the advent of refrigerated shipping made possible the export of meat and dairy, high-income Britain once again proved an eager customer. Further strengthening bilateral commerce was regular steamship service between London and New Zealand, which began in the 1870s.[14] Moreover, as Hawke observes, merchant firms dealt in both imports and exports and, therefore, served as important 'institutional links' between Britain and New Zealand.[15]

Indeed, New Zealand presents an ideal case for ascertaining the presence of a causal relationship between British capital and merchandise exports, since the lending-export loop would have been little attenuated by demand for merchandise imports from countries other than Britain. In this respect, New Zealand surpasses even Argentina, which figures most prominently in Ford's empirical test of his theory. However, the validity of the Ford thesis should not rest upon the case of New Zealand (or Argentina) alone. Accordingly, this paper follows a twofold approach for assessing the empirical validity of the Ford thesis. The first part involves estimating a regression for a panel of countries (colonies). In this endeavour, the paper benefits from Stone's numerous series on bilateral British overseas lending that had been unavailable to those scholars critical of Ford's argument. The second part involves a bilateral case study of New Zealand, which should allow for a more granular understanding of whether and how the lending-export loop operated. Neither the first nor second parts of the approach should be regarded as superior to the other. A more representative sample inevitably entails the inclusion of countries with lower shares of Britain in the country-compositions of their imports. Finally, while this paper primarily aims to determine whether there existed a causal relationship between British capital and merchandise exports in the late nineteenth century, it also looks to gauge the magnitude of such a relationship, provided one existed.

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this reason, Schedvin considers New Zealand as having become caught in a staple trap in the late nineteenth century. See also Watkins, Staple theory.

[13] Between 1870 and 1913, British imports of wool increased by 204%, while imports of cotton increased by only 82%. Calculated from *Annual statement of the trade of the United Kingdom*.

[14] Simkin, *Dependent Economy*, p. 154.

[15] Hawke, *The Making*, p. 60.

The findings of this paper should appeal to monetary and trade historians alike. For monetary historians, the absence of a Fordian lending-export loop would imply that other equilibrating mechanisms accommodated Britain's overseas investment in the balance of payments.[16] For trade historians, the absence of this loop would imply that British *ex ante* lending was not a proximate determinant of British merchandise exports. For instance, the post-Baring falloff in British overseas lending in 1891 would not have resulted in any discernible decrease in British merchandise exports in 1892, assuming a one-year correspondence, or in 1893, assuming a two-year correspondence.[17]

This paper proceeds in the following manner. The next section discusses the Ford thesis in greater detail, as well as its subsequent treatment in the literature. This section also relates Ford's argument to some more recent research on the effect of empire on capital and commodity flows. The article then proceeds to an empirical test of the Ford thesis, taking advantage of Stone's data on bilateral British overseas lending. The following section offers a case study of British capital and merchandise exports to New Zealand. The final section offers some concluding remarks.

LITERATURE

Ford presented his argument for a causal relationship between late nineteenth-century British capital and merchandise exports in several articles published during the late 1950s and early 1960s. The initial articulation of his argument in 1958 states that British *ex ante* lending, usually taking the form of a primary security issue in London, preceded an increase in British merchandise exports to the borrowing country.[18] Social overhead projects in the borrowing country raised demand for British capital goods exports, whilst higher income arising from the social overhead projects raised demand for British consumption goods exports. The demand for capital goods exports can be regarded as the direct channel of the lending-export loop, whilst the demand for consumption goods exports can be regarded as the indirect channel.[19] Although Ford

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[16] One such equilibrating mechanism was the 'rules of the game'. See Whale, Pre-war gold standard.

[17] Between 1890 and 1891, British overseas lending contracted by just over half, as calculated from Simon, Portfolio foreign investment, p. 38.

[18] Ford, British foreign lending, p. 305.

[19] It should be noted that Ford does not use this exact terminology.

focuses on Argentina, he maintains that the relationship between lending and exports was 'typical of a large part of British investment overseas'.[20]

In a subsequent article, Ford considers whether the relationship between British capital and merchandise exports held in aggregate, and not just in the case of Argentina. Visually inspecting the deviations of aggregate *ex ante* lending and aggregate merchandise exports from their respective nine-year moving averages, Ford establishes that the inter-temporal relationship between lending and exports was either one or two years.[21] Backed by only this crude evidence, Ford's argument nevertheless persisted within the discipline of economic history for several decades.[22]

Hatton finds only the weakest possible empirical support for Ford's argument. He constructs a demand function for total (i.e. not bilateral) British exports during the period from 1870-1913 and includes an explanatory variable for British *ex ante* lending. In the initial specification of the regression, which includes explanatory variables for the main potential determinants of the demand for British exports, lending is the only explanatory variable without a statistically significant coefficient.[23] When Hatton omits the explanatory variable for the growth of industrial production in advanced economies, only then does lending acquire a statistically significant, though very small coefficient.[24] Although this finding casts doubt upon the existence of a causal relationship between British capital and merchandise exports at the aggregate level, there remains the possibility that such a relationship existed at the disaggregated (bilateral) level, especially for countries with strong financial and trade links to Britain, such as New Zealand.

Like Hatton, Eichengreen too assesses whether a Fordian lending-export loop operated, though with the broader objective of identifying equilibrating mechanisms during the classical gold standard, rather than identifying a determinant of British merchandise exports *per se*. Toward this end, Eichengreen estimates a battery of regressions, each with a different dependent variable. When the dependent variable is British merchandise exports, the joint significance of

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[20] Ford, British foreign lending, p. 305.

[21] Ford, British economic fluctuations, pp. 335-6.

[22] See, for example, Kennedy, Foreign investment, p. 436, and Lewis, *Growth and Fluctuations*, p. 119.

[23] Hatton, British exports, pp. 584-5. Hatton also tries leading British overseas lending by one and two years, but doing so does not alter his results.

[24] Ibid.

the three variables for British overseas lending, led by one, two, and three years relative to the dependent variable, fails to indicate a causal relationship between lending and exports.[25] Later in his analysis, Eichengreen finds that a positive shock to lending does not induce any substantial short-term increase in exports, but does raise exports above the steady-state level in the longer term.[26] Differentiating between short-term and long-term causal relationships between British capital and merchandise exports is important. Certainly, British overseas investment in social overhead projects, such as railways, could have facilitated a long-term structural increase in British merchandise exports. However, it should be emphasised that the scope of Ford's own argument does not extend beyond the short term.

Situating Ford's argument within economic theory is a difficult task, partly because it pertains specifically to late nineteenth-century Britain, which was far-and-away the foremost supplier to the international markets for both credit and manufactured goods. The Fordian lending-export loop therefore attempts to characterise an economically exceptional country during the period when her exceptionality was most pronounced. Given Mundell's finding that, in a 2x2x2 Heckscher-Ohlin model, the movement of factors and the movement of goods are usually substitutes for each other, Ford's argument describes an unusual economic case.[27] Yet, the nature of British overseas lending in the late nineteenth century helps to explain why British capital and merchandise exports were complements, rather than substitutes. The majority of British overseas lending took the form of social overhead capital: railways, tramways, bridges, ports, etc. In this respect, the movement of a factor (capital) did not directly induce the development of manufacturing in borrowing countries, but instead facilitated greater economic integration. British overseas investment funded the creation of a transportation infrastructure and, consequently, the geographic expansion of the market for British exports.

To a great extent, Ford's argument is one about the British Empire, which absorbed nearly two-fifths of British capital exports during the half-century before the First World War.[28] To be sure, the vast sums that London channeled to the Empire were the response of a well-

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[25] Eichengreen, Alec Ford, p. 66.

[26] Ibid., p. 68.

[27] Mundell, International trade. He finds that factor immobility increases trade flows, due to commodity price equalisation, and that trade restrictiveness increases factor mobility, due to factor price equalisation.

[28] Simon, Portfolio foreign investment, p. 24. This figure excludes Argentina, which is often treated as part of the informal Empire.

functioning capital market to the infrastructural needs of (more often than not) settler colonies. However, recent research suggests that the large share of lending to the Empire was partly attributable to the penchant that British investors exhibited for the Empire. Ferguson and Schularick estimate that membership in the British Empire conferred, on average, an approximately 100 basis-point reduction in the cost of capital borrowed in London, even after controlling for factors such as gold standard membership.[29] This preference for the Empire was hardly irrational, however. The common British investor, facing information asymmetries, readily identified the Empire with British legal institutions and commercial policies, that is to say, the underpinnings of secure and profitable investment.[30]

As with capital exports, British merchandise exports also exhibited a distinct empire effect during this period. Mitchener and Weidenmier quantify this effect using a gravity model. They find that membership in the British Empire alone more than doubled intra-Empire bilateral trade.[31] This finding was reinforced by Jacks, Meissner, and Novy, who estimate the determinants of bilateral trade costs, a standardised measure of the difference between actual and frictionless bilateral trade. When both trading partners were members of the British Empire, bilateral trade costs were halved, *ceteris paribus*.[32]

Long before it was quantified, the powerful effect of empire on trade had caused some scholars to regard Britain's imperial markets as soft, which generally meant that British exporters did not have to compete against foreign exporters either to secure or maintain these markets. Thompson and Magee challenge the so-called 'soft market' thesis.[33] According to them, three criteria must be satisfied in order for a market to be considered soft.[34] First, per capita spending on British exports must increase over time. Second, the share of per capita income spent on British exports must increase over time. And third, the growth rate of per capita spending on British exports must meet or exceed the growth rate of per capita spending on the exports of other countries. Thompson and Magee, who focus their analysis on the dominions, find that

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[29] Ferguson and Schularick, Empire effect, p. 297.
[30] Ibid., p. 284. For a discussion of the information asymmetries that British investors confronted, see Thompson and Magee, *Empire and Globalisation*, pp. 180-98.
[31] Mitchener and Weidenmier, Trade and empire, pp. 1813-4.
[32] Jacks, Meissner, and Novy, Trade costs, p. 135.
[33] Thompson and Magee, Soft touch. The authors acknowledge that previous scholars have not agreed upon a formal definition of a 'soft market', which remains a somewhat vague term, although tends to imply some lack of competition.
[34] Ibid., p. 701.

neither Australasia nor Canada satisfy all three criteria, although Australasia had debatable soft-market tendencies in the 1870s.[35] The implication of this finding for the Ford thesis is that the marginal effect of British capital exports on British merchandise exports varied, not only across countries and colonies, but also across time, and it depended upon how successfully British firms competed in each particular imperial market.

EMPIRICAL ANALYSIS

The method for testing the empirical validity of the Ford thesis is a country (colony) panel regression for the period from 1870-1913. The main specification of the regression equation can be written as follows:

$$ln\left(\frac{EXP_t}{EXP_{t-1}}\right) = C + \alpha_0 \ln\left(\frac{LEND_t}{LEND_{t-1}}\right) + \alpha_1 \ln\left(\frac{LEND_{t-1}}{LEND_{t-2}}\right) + \alpha_2 \ln\left(\frac{LEND_{t-2}}{LEND_{t-3}}\right) + \beta \ln\left(\frac{GDP_t}{GDP_{t-1}}\right) +$$

$$\gamma \ln\left(\frac{ToT_t}{ToT_{t-1}}\right) + \varepsilon \tag{1}$$

The dependent variable is real bilateral British merchandise exports. The explanatory variables of interest are real bilateral British *ex ante* lending led by one and two years relative to the dependent variable. This involves, for example, pairing merchandise exports in 1902 with lending in the years 1901 (one-year lead) and 1900 (two-year lead). Other explanatory variables are current-year lending, real GDP, and the terms of trade. The sources of data, including the deflators used, are noted in Appendix I.

The panel includes five countries: Australia, Canada, New Zealand, Uruguay, and the United States, which are selected largely on account of their non-negligible borrowings from Britain and their adherence to the gold standard for uninterrupted intervals of sufficient length.[36] Because a currency revaluation would have affected the volume of bilateral British exports, the panel excludes those countries that either abandoned the gold standard or joined too late to exhibit enough inter-temporal variation, as did many of the Latin American countries.[37] Since Uruguay and the United States joined the gold standard in 1876 and 1879, respectively, the panel is slightly unbalanced by the exclusion of annual observations for these countries prior to their joining the gold standard. Even though the panel includes only five countries, together these

[35] Ibid., pp. 703-5.
[36] It should be noted that these phenomena are related; the creditworthiness of the borrowing country was enhanced by adherence to the gold standard. Bordo and Rockoff, Seal of approval.
[37] Notably, the panel excludes Argentina, which had a chequered participation in the classical gold standard.

countries represent 43 per cent of British overseas lending during the period from 1880-1913.[38] Because Stone does not report any lending for New Zealand in 1870 and for Uruguay in 1877, 1879, 1892-4, 1898, and 1903-4, £0.1 million is added to every observation in the sample, so as to permit a log-difference expression of the variable. All variables are expressed in log differences in order to make the series stationary.[39] Augmented Dickey-Fuller test statistics for all variables are reported in Appendix II.

Before proceeding to the results of the panel regression, some attention must be given to Stone's annual series of bilateral British *ex ante* lending. Stone constructs these series using the data on London capital calls that Jenks and Simon assembled from more than forty sources, the *Investor's monthly manual* chief among them.[40] However, whereas Simon's (published) series are disaggregated by continent, Stone's series are disaggregated by country. Simply put, Stone's series represent a reclassification of the original Jenks-Simon data. In a temporal sense, capital calls are consistent with Ford's notion of *ex ante* lending, since both evidence a commitment to transfer capital, which precedes an *ex post* transfer of capital in the balance of payments, either through the export of merchandise, services, or specie.[41] For the purposes of this paper, capital calls and *ex ante* lending are interchangeable terms. However, Stone's series encompass just British portfolio foreign lending, whilst excluding foreign direct investment and other forms of lending conducted through the international banking system.[42] Moreover, there is the problem of double-counting British overseas lending.[43] Take the case of the Wellington and Manawatu Railway Co., incorporated in 1881 and capitalised—the former premier of New Zealand traveled to Britain to arrange the financing—at £850,000.[44] In 1908, New Zealand nationalised the railway at a cost of £900,000 and borrowed the funds necessary for doing so.[45] Whereas the first

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[38] Calculated from Stone, *Global Export*. The shares of the countries were: Australia (9%), Canada (10%), New Zealand (2%), Uruguay (1%), and the United States (21%).

[39] The log-difference expression of the variables prevents the inclusion of (time-invariant) distance. In other words, the empirical strategy cannot take the form of a gravity model. Most gravity models in economic history use time fixed effects, which is not a feasible approach here, given the small number of countries in the panel.

[40] Simon, Portfolio foreign investment, p. 18. These sources are listed in Stone, *Global Export*, pp. 419-20.

[41] For a discussion of what constitutes a capital call, see Stone, *Global Export*, p. 4.

[42] Ibid., p. 423.

[43] Stone mitigates this problem by excluding from his series those capital calls arising from debt consolidations. Ibid., p. 426.

[44] Le Rossignol and Stewart, Railways in New Zealand, p. 663.

[45] Ibid., pp. 664-5.

Table 1. *Bilateral British merchandise exports, 1871-1913*

	(1)	(2)	(3)	(4)	(5)
Lending	0.81	0.78	0.88	0.76	1.58
	(1.43)	(1.42)	(1.42)	(1.42)	(1.44)
Lending, one-year lead	0.16	0.12		0.27	1.00
	(1.46)	(1.44)		(1.44)	(1.44)
Lending, two-year lead	2.73*	2.69*		2.91**	3.29**
	(1.40)	(1.38)		(1.38)	(1.41)
Cumulative lending			1.48		
			(1.14)		
GDP	57.74***	58.07***	58.34***	55.08***	
	(18.30)	(18.13)	(18.19)	(18.03)	
Terms of trade	21.75	22.21	23.10		16.80
	(16.96)	(16.76)	(16.80)		(17.01)
Constant	0.81	0.80	0.73	1.09	2.93**
	(1.33)	(1.32)	(1.32)	(1.30)	(1.15)
Country fixed effects	YES	NO	NO	NO	NO
Overall R^2	0.08	0.08	0.07	0.07	0.04
Observations	200	200	200	200	202

All variables are expressed in log differences. Standard errors are noted in parentheses. Coefficients and standard errors are rescaled by a factor of 100. * indicates statistical significance at 10%, ** at 5%, and *** at 1%.

instance of lending would be expected to raise the demand for British merchandise exports, the second instance would not. Without denying that Stone's series present certain shortcomings with respect to the present exercise, these series are nevertheless used in the foregoing analysis, as they remain the only series of bilateral British *ex ante* lending.

The results of the panel regression are presented in Table 1. The first two specifications are identical, except for the use of country fixed effects in column 1 and random effects in column 2. Because the Hausman test indicates that there are no systematic differences in the coefficients, column 2 represents the preferred specification, and all further specifications employ random effects. The notable finding in column 2 is that lending (two-year lead) takes on a positive and statistically significant coefficient. It is also reassuring that GDP is statistically significant at the 1% level. In column 3, the variables for lending (one-year lead) and lending (two-year lead) are 'cumulated' in such a manner that the resulting variable is the log difference of lending between periods $t – 3$ and $t – 1$. If a Fordian lending-export loop operated with a one-year lead on some occasions and with a two-year lead on other occasions, then the division of British *ex ante* lending between two separate explanatory variables could obfuscate the relationship between British capital and merchandise exports. However, such is not the case, as indicated by the statistically insignificant coefficient of the variable for cumulative lending.

Table 2. *Correlation coefficients of bilateral British lending, 1880-1913*

	Australia	Canada	New Zealand	Uruguay	United States
Australia	--	-0.01	0.08	0.24	0.11
Canada	-0.01	--	0.11	-0.19	-0.17
New Zealand	0.08	0.11	--	0.02	0.03
Uruguay	0.24	-0.19	0.02	--	-0.02
United States	0.11	-0.17	0.03	-0.02	--

All variables are expressed in log differences. No correlation coefficient is statistically significant at the 10% level.

Columns 4 and 5 exclude GDP and the terms of trade, respectively. Excluding these explanatory variables increases the magnitude and statistical significance of lending (two-year lead).

In many respects, the model presented here is reminiscent of the model put forward by Hatton. Both are export demand functions for Britain during the period from 1870-1913. What then explains the stronger showing of British *ex ante* lending (two-year lead) in this model than in Hatton's model? One potential explanation lies in what Edelstein describes as 'short bursts' in bilateral British lending.[46] For New Zealand, this burst came in the 1870s. For Uruguay, it came in the late 1880s. Other countries realised their short bursts at different times. Such country-specific episodes of British overseas lending are dampened in Hatton's model, but are exploited in the panel regression here. To provide a sense of how much variation is lost through the aggregation of bilateral lending, Table 2 presents the correlation coefficients of bilateral British lending to all countries (colonies) included in the panel. None of the coefficients is statistically significant at any conventional level, reaffirming the desynchronised nature of bilateral lending.

The meaningful interpretation of the coefficient of lending (two-year lead) is made challenging by the log-difference expression of the variables. Because log differences can be treated as approximations of growth rates, the regression equation can be interpreted as a weighted average of growth rates, with the coefficients functioning as the weights. As such, column 2 implies that a one per cent increase in GDP would have been 22 times more of a determinant of bilateral British merchandise exports than would have been a one per cent increase in lending (two-year lead).

Eschewing this more abstract interpretation in favour of a historically founded one, consider the Baring Crisis, which resulted in the decline of foreign capital calls from £116.6

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[46] Edelstein, Foreign investment, pp. 195-6.

million in 1890 to £57.6 million in 1891.[47] This 50.6 per cent decline in British *ex ante* lending would have caused British merchandise exports to decline by 1.4 per cent, or £3.1 million, between 1892 and 1893. To place this figure in context, the total value of Britain's steam engine exports (to all countries) was £3.2 million in 1892.[48] Though the marginal effect of British capital exports on British merchandise exports was small, it was hardly trivial.

THE BILATERAL CASE OF NEW ZEALAND

British lending to New Zealand

New Zealand imported capital on a grand scale in the 1870s. Under the premiership of Julius Vogel, the colonial government undertook an ambitious program of infrastructure building, the centerpiece of which was the construction of a colonial railway system.[49] Other infrastructural projects included roads, telegraph lines, and waterworks.[50] Vogel's program was financed through the issuance of debt, which was overwhelmingly purchased by British investors. Rosenberg estimates that, over the course of the decade, the nominal value of the external debt of the colonial government increased from £7.0 million to £25.4 million.[51] Yet, it should be observed that the pace of borrowing was inconsistent, as there are clearly identifiable peaks in public capital calls for New Zealand in 1875 and 1878.[52]

A considerable portion of public borrowing in the 1870s was not allocated to social overhead projects, but instead to purchasing Maori lands and providing immigrants free passage to the colony. Collectively, the Immigration and Public Works Loan Acts of 1870, 1873, and 1874 authorised the borrowing of £0.7 million for land acquisition and £1.5 million for assisted immigration. Whether borrowing for these purposes resulted in a short-term increase in British merchandise exports is a question this article addresses shortly. In the case of assisted immigration, British lending would more likely have raised demand for British shipping services than for merchandise exports.

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[47] Stone, *Global Export*, p. 377. In real terms, the decline in lending was nearly identical at 50.1%, as calculated using the deflator noted in Appendix I. The Baring Crisis was one of the few instances in which bilateral lending was more synchronised.
[48] *Annual statement of the trade of the United Kingdom.*
[49] Simkin, *Dependent Economy*, pp. 146-50.
[50] Mackay, *Public Finance*, p. 57.
[51] Rosenberg, Capital imports, p. 109.
[52] Stone, *Global Export*, pp. 123-5. Stone further disaggregates each series of bilateral capital calls into public and private capital calls.

The profusion of British capital that New Zealand borrowed during the 1870s was achieved through the centralisation of public finance at the colonial level. Through the 1860s, the provincial governments made recourse to the London capital market.[53] However, as Attard describes, the provinces encountered increasing difficulty in attracting external capital, as both British investors and the London Stock Exchange doubted the creditworthiness of the provinces.[54] The centralisation of public finance at the colonial level effectively occurred in 1867, when the colonial government guaranteed and consolidated the provincial debts.[55] In 1876, the provinces were abolished altogether. Attard argues that the strengthening of the colonial government of New Zealand can be explained by its ability to raise capital for economic development, whereas the provincial governments ultimately proved deficient in this endeavor.[56]

Indeed, the central government of New Zealand was successful in attracting external capital during the 1870s. While public borrowing abated somewhat in the early 1880s, it resumed again in 1883 to finance another, fainter round of infrastructure building.[57] By this point, the burgeoning public debt had become an acute fiscal concern, especially as New Zealand was amid a depression.[58] In 1887, the newly elected Atkinson ministry adopted a policy of ending railway construction (and its finance) as swiftly as practicable.[59]

The central government made a distinct return to borrowing in 1895. Some of the borrowing was undertaken to fund the Government Advances to Settlers Act of 1894—yet another instance of borrowing directed toward something other than a social overhead project. The act, intended to promote capital-intensive family farming, empowered the government to provide mortgages to small landowners for less than the market rate of interest. In 1895, the government issued £1.5 million worth of 3 per cent bonds in the London capital market, which

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[53] Provincial borrowing in the 1860s was not altogether minor, with Simkin, *Dependent Economy*, p. 142, noting that provincial debt increased by over £2 million between 1860 and 1868.

[54] Attard, Colonial state, p. 118.

[55] Ibid., p. 119.

[56] Ibid., p. 122.

[57] Simkin, *Dependent Economy*, p. 150. This second round of infrastructure building was largely and characteristically presided over by Vogel, who served as Colonial Treasurer in the ministry of Robert Stout.

[58] According to Coghlan, *Statistical Account*, p. 702, New Zealand had the highest (colonial) public debt per capita of all seven Australasian colonies in 1881.

[59] Dowie, *New Zealand Investment*, p. 264. Railway construction did continue past 1887, but only in order to render nearly completed lines usable.

investors purchased at an average price of £94 8s 9d.[60] This capital was then re-lent to current and prospective small landowners at an interest rate of 5 per cent, undercutting the prevailing interest rates of 6-8 per cent for private mortgages.[61] Most of the original mortgages granted through this scheme represented the refinancing of pre-existing mortgages, rather than the financing of land purchases.[62] The Government Advances to Settlers Act was liberal in its extension of credit, as it permitted the issuance of mortgages to both freeholders and, interestingly, leaseholders. Many of the latter held 'leases-in-perpetuity' from the state, a system of land tenure introduced under the Land Act of 1892.[63] Throughout the early twentieth century, the popularity of the Advances to Settlers scheme continued to grow, and the colony (dominion after 1907) continued to borrow commensurately. By 1913, the nominal value of mortgages owned by the central government of New Zealand amounted to £7.7 million.[64]

Insofar as the Government Advances to Settlers Act permitted landowners and leaseholders to refinance their pre-existing mortgages through the government, this act brought about a private-to-public debt conversion. Private mortgages were provided through New Zealand's banks, which intermediated between depositors and borrowers, though the depositors were oftentimes Britons seeking to take advantage of more attractive rates.[65] However, circumstances changed following the Baring Crisis of 1890 and the Australian Banking Crisis of 1893, which caused British depositors to become fearful about the stability of overseas banks and to withdraw their deposits.[66] Hawke argues that the objective of the Government Advances to Settlers Act was to prevent the flight of British capital, transmitted through the international banking system, from hampering the availability of mortgages and, by extension, the economic development of the colony.[67]

New Zealand also imported private capital in the late nineteenth and early twentieth centuries, and the corresponding private capital calls are included in Stone's series. Some examples of private capital calls included the financing of the Wellington and Manawatu Railway Co. and the New Zealand Midland Railway Co. Still, the majority (64 per cent) of

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[60] Mackay, *Public Finance*, p. 254.
[61] Ibid.
[62] Condliffe, *In the Making*, p. 191.
[63] Stewart, Land tenure, pp. 84-5.
[64] *Official statistics of the dominion of New Zealand for the year 1913*.
[65] Hawke, *The Making*, p. 64.
[66] Simkin, *Dependent Economy*, p. 167.
[67] Hawke, *The Making*, p. 107.

capital calls for New Zealand were public.[68] The large share of public capital calls for New Zealand is easily explained by the interventionist role that the central government played in building infrastructure.[69]

Testing for the lending-export loop

Given the diversity of purposes for which New Zealand borrowed capital from Britain, this paper now proceeds to test the applicability of the Ford thesis to the bilateral case of New Zealand. The regression equation from the previous section is estimated as a time-series for just New Zealand. All of the sources of data remain the same. The results are presented in Table 3. In column 1, the surprising finding is that the coefficients of the lending variables are all statistically insignificant. This finding challenges the applicability of the Ford thesis to the case of New Zealand, which was expected to provide the most patent evidence for the operation of a lending-export loop. The outcome of the time-series regression for New Zealand further contrasts with the outcome of the panel regression in that the coefficient of the terms of trade is statistically significant at the 1% level.

The statistical significance and magnitude of the coefficient of the terms of trade are not entirely surprising. The lack of diversity in New Zealand's exports—wool comprised 49 per cent in 1883—left the economy predisposed to fluctuations in the prices of a narrow range of commodities, specifically wool and, later on, meat and dairy.[70] In general, New Zealand's terms of trade improved until 1883 and then remained mostly stationary for the next three decades.[71] Still, there were occasional sharp movements in the terms of trade, and these movements often corresponded with movements in real British merchandise exports to the colony. The single largest percentage change in both the terms of trade (27 per cent) and real British merchandise exports (52 per cent) came in 1872. Following the Franco-Prussian War, industrial dislocation on the European Continent left Yorkshire in the position of satisfying a greater demand than usual, with British exports of woolens increasing from 293 million to 413 million linear yards per

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[68] Calculated from Stone, *Global Export,* p. 131. This high public share in total capital calls for New Zealand contrasts with the low public share in total capital calls for all countries, which was 36%.
[69] See Le Rossignol and Stewart, *State Socialism.*
[70] Calculated from Condliffe, *In the Making*, p. 131.
[71] Easton and Wilson, *N. Z.'s terms*, pp. 36-7.

Table 3. *British merchandise exports to New Zealand, 1871-1913*

Dependent variable:	Total merchandise exports (£)			Iron exports (tonnes)		Cotton textile exports (yards)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lending	-0.63	0.73		2.98		-0.32	
	(2.37)	(3.57)		(7.31)		(4.47)	
Lending, one-year lead	-1.82	-0.37		2.49		-7.16	
	(2.49)	(3.47)		(7.09)		(4.34)	
Lending, two-year lead	-0.21	-2.37		-6.10		-6.12	
	(2.33)	(3.52)		(7.21)		(4.41)	
Railway capital formation			17.48**		50.73***		-10.18
			(7.86)		(14.79)		(11.27)
GDP	80.34*	160.45**	134.13**	325.36**	260.32**	235.42**	169.87**
	(45.51)	(69.29)	(53.71)	(141.83)	(101.10)	(86.71)	(77.02)
Terms of trade	75.30***	89.92**	83.71***	139.51**	126.13**	66.51	60.51
	(26.25)	(32.51)	(28.26)	(66.55)	(53.19)	(40.69)	(40.52)
Constant	0.86	-3.15	-3.08	-9.80	-9.80	-2.73	-0.28
	(2.70)	(3.95)	(3.37)	(8.09)	(6.35)	(4.95)	(4.84)
Interval	1871-1913	1872-1900	1872-1900	1872-1900	1872-1900	1872-1900	1872-1900
DW statistic	1.77	1.71	2.08	1.70	2.08	2.06	2.19
Adjusted R^2	0.17	0.25	0.41	0.19	0.46	0.18	0.15

All variables are expressed in log differences. Standard errors are noted in parentheses. Coefficients and standard errors are rescaled by a factor of 100. * indicates statistical significance at 10%, ** at 5%, and *** at 1%.

annum between 1870 and 1872.[72] The elevated demand for woolens exerted backward pressure along the supply chain, with the consequence that the price of wool increased from 9¼d to 15d per pound.[73] Yet, the strength of the relationship between New Zealand's terms of trade and its merchandise imports from Britain cannot account for the absence of an observable lending-export loop, since the terms of trade and British *ex ante* lending are not mutually exclusive determinants.

Was the absence of an observable lending-export loop in the bilateral case of New Zealand due to the fact that not all borrowing was allocated to social overhead projects? Recall the difference between the direct and indirect channels of the Fordian lending-export loop. The direct channel involved an increase in demand for British capital goods exports, whereas the indirect channel involved an increase in the demand for British consumption goods exports. Lending for a social overhead project would have stimulated demand for capital goods exports via the direct channel and, by raising the income of the borrowing country, would have also

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[72] Jenkins and Ponting, *Textile Industry*, pp. 222-3.
[73] McIlraith, *Course of Prices*, p. 52.

stimulated demand for consumption goods exports via the indirect channel. However, lending for some purpose other than a social overhead project, such as land reform, would have confined the operation of the lending-export loop to the indirect channel, presumably. Given the possibility that higher incomes were subject to consumption smoothing, a short-term causal relationship between British capital and merchandise exports via the indirect channel seems not especially likely.

The objective now is to determine whether the bilateral case of New Zealand exhibited a causal relationship between British capital and merchandise exports through the direct channel, that is to say, when lending was allocated to social overhead projects. Unfortunately, Stone's series on capital calls for New Zealand do not differentiate between social overhead lending and other lending. This article therefore employs Dowie's annual estimates of real gross railway capital formation in New Zealand as a proxy for social overhead lending.[74] The Dowie series for gross railway capital formation is preferable to the more recently produced Mulcare series, since the latter excludes private railway capital formation.[75] This difference is particularly important in the 1880s and early 1890s, when most of the private railway capital formation occurred.

There remains the question of the extent to which railway capital formation was actually financed through external borrowing in London, as opposed to through domestic borrowing. Private railway capital formation was effectively limited to the Wellington and Manawatu Railway Co. and the New Zealand Midland Railway Co., and these companies were financed by British investors.[76] It is assumed that nearly all public railway capital formation was financed externally before 1900. The *New Zealand official year-book* for 1900 is the first volume in this annual series to decompose the public debt into the amounts raised in London and domestically. Of the £47.9 million of central government debt outstanding in 1900, £43.3 million (90 per cent) had been raised in London.[77] However, after 1900, there was a marked decline in the dependence

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[74] Dowie, *New Zealand Investment*, pp. 39-40.

[75] Mulcare, Capital formation, p. 78. A related concern is that Mulcare treats the nationalisation of a private railway as public railway capital formation, whereas Dowie, *New Zealand Investment*, p. 48, explicitly does not. Thus, the spike in the Mulcare series of public railway capital formation in 1895 is likely attributable to the nationalisation of the New Zealand Midland Railway Co. in this year.

[76] Le Rossignol and Stewart, Railways in New Zealand, pp. 663 and 665.

[77] *New Zealand official year-book, 1900*, p. 401. The high share of the public debt raised externally was likely constant prior to 1900. In reconstructing New Zealand's balance of payments, Rosenberg, Capital imports, p. 109, assumes this share was 90% in every year from 1862-1900.

of the New Zealand central government upon the London capital market.[78] On this point, Simkin makes reference to the strained credit conditions that prevailed in the London capital market during the British economic downturn of 1900-4.[79] Of the additional debt incurred by the central government from 1900-13, only 61 per cent was raised in London.[80] The public finances of Edwardian New Zealand were becoming an increasingly domestic affair, and New Zealand broadly resembled Australia in this respect. Attard finds that the domestically *owned* share of the long-term debt of the six Australian colonies increased more than threefold from 1900-13.[81] Though, it should be observed that this increase was not due to a locational change in the placement of new debt, but instead to a net repatriation of outstanding debt. Of course, New Zealand may have realized a net repatriation of its outstanding debt, as well.

The growing reliance of the New Zealand central government on domestic sources of credit is perhaps best explained by the economic circumstances within New Zealand itself. The *New Zealand official year-book* for 1913 offers some insights: 'This remarkable change in the relative positions of the State creditors may be partly ascribed to the ability of the mass wage-earning population in the Dominion to save, and to the general appreciation of the manner in which their savings are invested'.[82] Public capital formation through domestic savings was greatly facilitated by growth in real per capita income, which recommenced in the 1890s following two decades of stagnation.[83] According to Greasley and Oxley, 70 per cent of the growth in real per capita income during New Zealand's pastoral boom (1890-1914) was due to the rising rental value of cultivated land.[84] To some extent, therefore, the refrigeration-driven pastoral boom was responsible for the increasing domestic share of public capital formation, which was most noticeable after 1900.

In recognition of the apparent turn-of-the-century break in the externally financed share of New Zealand's public capital formation, the proxy variable of gross railway capital formation

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[78] Mackay, *Public Finance*, p. 139.
[79] Simkin. *Dependent Economy*, p. 182.
[80] *New Zealand official year-book*. Not all of the remainder was raised domestically, as a substantial portion was raised in Australia during the early twentieth century. Until the twentieth century, however, a mere £0.2 million of New Zealand's public debt had been raised there.
[81] Attard, Australian public borrowing, pp. 166-7.
[82] *New Zealand official year-book, 1913*, p. 792.
[83] For the latest reconstructions of New Zealand's real GDP per capita, see Greasley and Oxley, Cointegration-based approach, pp. 365-6.
[84] Greasley and Oxley, Pastoral boom, p. 335.

is not extended beyond the nineteenth century. Hence, the interval is truncated to 1872-1900 for the remaining specifications of the regression in Table 3.

One further matter related to the proxy variable requires discussion, and that is the *a priori* inter-temporal relationship between railway capital formation and British merchandise exports, which would differ from Ford's proposed inter-temporal relationship between British *ex ante* lending and British merchandise exports. The sequence of these three events (lending, exporting, and capital formation) would proceed generally as follows. British investors would lend *ex ante* to the New Zealand central government via a primary security issue, with the funds deposited into a bank account. Sometime thereafter, the government would draw upon this account to purchase British capital goods exports. Dowie estimates capital formation using the 'flow of funds' method, whereby capital formation coincides with capital expenditure.[85] Thus, the *a priori* inter-temporal relationship between British merchandise exports and railway capital formation is a contemporaneous one.

Column 2 of Table 3 replicates the initial specification, but for the truncated interval of 1872-1900. Once again, the coefficients of the lending variables are all statistically insignificant. Column 3 replaces the lending variables with current-year railway capital formation, the proxy for social overhead lending. The coefficient of railway capital formation is positive and statistically significant at the 5% level. In the case of British lending for social overhead projects, a Fordian lending-export loop emerges. Moreover, the coefficient of railway capital formation in Table 3 is many times greater than the coefficient of lending (two-year lead) in Table 1.

A comparison of columns 2 and 3 suggests that the lending-export loop operated when British overseas lending was allocated to social overhead projects, but not otherwise. Social overhead lending likely stimulated demand for British merchandise exports via the direct channel. But is there empirical evidence for an indirect channel of the lending-export loop, whereby social overhead lending raised demand for British consumption goods exports in the short term? To answer this question, the direct and indirect channels are isolated by changing the dependent variable to capital goods exports and consumption goods exports, respectively. Iron is considered a representative capital good. Cotton textiles are considered a representative consumption good. Iron and cotton textiles are well-suited to this exercise because the *Annual*

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[85] Dowie, *New Zealand Investment*, p. 21.

statement of the trade of the United Kingdom reports the quantities of these commodities exported to New Zealand, thus obviating the need for deflators.

Columns 4 and 5 replicate columns 2 and 3, but with a dependent variable of iron exports. The coefficient of railway capital formation is now statistically significant at the 1% level. This outcome suggests, even more clearly than before, that the direct channel was the *modus operandi* of the Fordian lending-export loop. In columns 6 and 7, with a dependent variable of cotton textile exports, the coefficient of railway capital formation is statistically insignificant. British *ex ante* lending to New Zealand, whether for all purposes or for just social overhead projects, did not cause any short-term increase in British consumption goods exports to the colony.

CONCLUSION

This paper has revisited one of the main arguments of the Ford thesis: a causal relationship between British capital and merchandise exports during the late nineteenth century. The availability of annual data on bilateral British *ex ante* lending permitted the estimation of a country panel regression, which proved more conclusive than the econometric tests employed by Hatton and Eichengreen. The coefficient of British *ex ante* lending (two-year lead) was statistically significant at either the 10% or 5% level, depending upon the specification of the regression. The magnitude of this coefficient was small, but far from negligible. Indeed, it was estimated that the Baring Crisis, which precipitated a sharp decline in British overseas lending, curtailed British merchandise exports by several million pounds.

For monetary historians, the magnitude of the coefficient implies that the lending-export loop only minimally offset overseas lending in Britain's multilateral balance of payments. In this sense, Ford's argument does little to advance an understanding of how the classical gold standard worked, at least in the short term. As Eichengreen argues, there was likely a long-term causal relationship between British capital and merchandise exports. Certainly, the role that British capital exports played in the geographic expansion of the market for British exports is a subject ripe for future consideration. The specific focus of this article, though, has been on Ford's argument, which was concerned with just the short term.

The high share of Britain in the country-composition of New Zealand's imports rendered this bilateral case especially appropriate for better understanding the operation of the lending-

export loop. Surprisingly, there was no initial evidence for the operation of a lending-export loop in New Zealand. However, when only British *ex ante* lending for social overhead projects was considered, there emerged an obvious lending-export loop. Furthermore, by distinguishing between capital goods exports and consumption goods exports, it became clear that the operation of the Fordian lending-export loop was due to the direct channel. In this sense, the Ford thesis has been qualified.

At the risk of concluding on a speculative note, perhaps the most significant implications of this article are for imperial history. The existence of a causal relationship between British capital and merchandise exports may well alter the debate over the so-called balance sheet of empire.[86] Yes, the British Empire introduced a capital-market distortion—a liability—in favour of imperial borrowers. But any detrimental effect of this distortion, such as reducing otherwise profitable domestic investment (to say nothing of non-imperial overseas investment), was partly offset by a short-term increase in demand for British exports, provided the lending was directed toward social overhead capital. At the non-imperial cost of capital, would New Zealand have borrowed so liberally to finance railway construction in the 1870s? The same question can just as well be asked of Canada for the first decade of the twentieth century.[87] Britain lent more to its Empire and, consequently, exported more to its Empire, as well. In such a way, the lending-export loop supplements the more direct effects of empire on commodity trade.

REFERENCES

Attard, B. (2007) New estimates of Australian public borrowing and capital raised in London, 1849-1914. *Australian Economic History Review*, 47: 155-77.

Attard, B. (2012) Making the colonial state: development, debt, and warfare in New Zealand, 1853-76. *Australian Economic History Review*, 52: 101-27.

Bordo, M. D., and Rockoff, H. (1996) The gold standard as a "good housekeeping seal of approval". *Journal of Economic History*, 56: 389-428.

Brown, A. J. (1965) Britain in the world economy, 1870-1914. *Yorkshire Bulletin of Economic & Social Research*, 17: 46-60.

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[86] For one of the later contributions to this lengthy debate, see Offer, Waste of money.

[87] The Edwardian boom in British lending to Canada is covered extensively in Dilley, London finance, pp. 1008-16.

Butlin, N. G. (1962) *Australian Domestic Product, Investment and Foreign Borrowing, 1861-1938/39* (Cambridge: Cambridge University Press).

Canada, *Statistical year-book of Canada for 1890*.

Coghlan, T. A. (1904) *A Statistical Account of Australia and New Zealand, 1903-4* (Sydney: W. A. Gullick).

Condliffe, J. B. (1930) *New Zealand in the Making* (London: George Allen & Unwin).

Dilley, A. (2010) 'The rules of the game': London finance, Australia, and Canada, c.1900-14. *Economic History Review*, 63: 1003-31.

Dowie, J. A. (1965) *Studies in New Zealand investment, 1871-1900*. PhD thesis, Australian National University.

Easton, B., and Wilson, N. (1984) *An investigation of the data base of N. Z.'s terms of trade*, NZIER Working Paper, No. 84/10.

Edelstein, M. (2004) Foreign investment, accumulation and empire, 1860-1914. In: R. Floud and P. Johnson, eds. *The Cambridge Economic History of Modern Britain,* vol. II, *Economic Maturity, 1860-1939* (Cambridge: Cambridge University Press), pp. 190-226.

Eichengreen, B. (1992) The gold standard since Alec Ford. In: S. N. Broadberry and N. F. R. Crafts, eds. *Britain in the International Economy, 1870-1939* (New York: Cambridge University Press), pp. 49-79.

Ferguson, N., and Schularick, M. (2006) The empire effect: the determinants of country risk in the first age of globalization, 1880-1913. *Journal of Economic History*, 66: 283-312.

Ford, A. G. (1958) The transfer of British foreign lending, 1870-1913. *Economic History Review*, 11: 302-8.

Ford, A. G. (1960) Notes on the working of the gold standard before 1914. *Oxford Economic Papers*, 12: 52-76.

Ford, A. G. (1963) Notes on the role of exports in British economic fluctuations. *Economic History Review*, 16: 328-37.

Greasley, D., and Oxley, L. (2000) Measuring New Zealand's GDP, 1865-1933: a cointegration-based approach. *Review of Income and Wealth*, 46: 351-68.

Greasley, D., and Oxley, L. (2009) The pastoral boom, the rural land market, and long swings in New Zealand economic growth, 1873-1939. *Economic History Review*, 62: 324-49.

Hatton, T. J. (1990) The demand for British exports, 1870-1913. *Economic History Review,* 43: 576-94.

Hawke, G. R. (1985) *The Making of New Zealand: An Economic History* (Cambridge: Cambridge University Press).

Imlah, A. H. (1958) *Economic Elements in the Pax Britannica: Studies in British Foreign Trade in the Nineteenth Century* (Cambridge, MA: Harvard University Press).

Jacks, D. S., Meissner, C. M., and Novy, D. (2010) Trade costs in the first wave of globalization. *Explorations in Economic History*, 47: 127-41.

Jenkins, D. T., and Ponting, K. G. (1982) *The British Wool Textile Industry, 1770-1914* (London: Heinemann).

Kennedy, W. P. (1974) Foreign investment, trade and growth in the United Kingdom, 1870-1913. *Explorations in Economic History*, 11: 415-44.

Le Rossignol, J. E., and Stewart, W. D. (1909) Railways in New Zealand. *Quarterly Journal of Economics*, 23: 652-96.

Le Rossignol, J. E., and Stewart, W. D. (1910) *State Socialism in New Zealand* (New York: Thomas Y. Crowell).

Lewis, W. A. (1978) *Growth and Fluctuations, 1870-1913* (London: George Allen & Unwin).

Lipsey, R. E. (1963) *Price and Quantity Trends in the Foreign Trade of the United States* (Princeton: Princeton University Press).

Mackay, A. R. F. (1936) *New Zealand public finance*. PhD thesis, University of London.

Maddison, A. (2003) *The World Economy: Historical Statistics* (Paris: OECD).

Magee, G. B., and Thompson, A. S. (2010) *Empire and Globalization: Networks of People, Goods and Capital in the British World, c. 1850-1914* (Cambridge: Cambridge University Press).

McIlraith, J. W. (1911) *The Course of Real Prices in New Zealand* (Wellington: Government Printing Office).

Mitchener, K. J., and Weidenmier, M. (2008) Trade and Empire. *Economic Journal*, 118: 1805-34.

Mulcare, T. (1996) Capital formation in transport infrastructure in New Zealand to 1950. *Australian Economic History Review*, 36: 77-101.

Mundell, R. A. (1957) International trade and factor mobility. *American Economic Review*, 47: 321-35.

New South Wales, *New South Wales statistical register for 1890*.

New Zealand, *Official statistics of the colony (dominion) of New Zealand*, various years.

New Zealand, *New Zealand official year-book*, various years.

Offer, A. (1993) The British Empire, 1870-1914: a waste of money? *Economic History Review*, 46: 215-38.

Platt, D. C. M. (1993) Trade competition in the regions of recent settlement. In D. C. M. Platt, ed. *Decline and Recovery in Britain's Overseas Trade, 1873-1914* (London: Macmillan), pp. 91-138.

Rankin, K. (1992) New Zealand's gross national product: 1859-1939. *Review of Income and Wealth*, 38: 49-69.

Rosenberg, W. (1961) Capital imports and growth—the case of New Zealand—foreign investment in New Zealand, 1840-1958. *Economic Journal*, 71: 93-113.

Schedvin, C. B. (1990) Staples and regions of the Pax Britannica. *Economic History Review*, 43: 533-59.

Simkin, C. G. F. (1951) *The Instability of a Dependent Economy: Economic Fluctuations in New Zealand, 1840-1914* (London: Oxford University Press).

Simon, M. (1968) The pattern of new British portfolio foreign investment, 1865-1914. In: A. R. Hall, ed. *The Export of Capital from Britain, 1870-1914* (London: Methuen), pp. 15-44.

Stewart, W. D. (1909) Land tenure and land monopoly in New Zealand: I. *Journal of Political Economy*, 17: 82-91.

Stone, I. (1999) *The Global Export of Capital from Great Britain, 1865-1914* (London: Macmillan).

Sutch, R., and Carter, S. B., eds. (2006) *Historical Statistics of the United States: Millennial Edition* (New York: Cambridge University Press).

Thompson, A., and Magee, G. (2003) A soft touch? British industry, empire markets, and the self-governing dominions, c. 1870-1914. *Economic History Review*, 56: 689-717.

Tinbergen, J. (1951) *Business Cycles in the United Kingdom, 1870-1914* (Amsterdam: North Holland).

United Kingdom, *Annual statement of the trade of the United Kingdom*, various years.

Urquhart, M. C. (1993) *Gross National Product, Canada, 1870-1926: The Derivation of the Estimates* (Kingston: McGill-Queen's University Press).

Urquhart, M. C., and Buckley, K. A. H. (1965) *Historical Statistics of Canada* (Cambridge: Cambridge University Press).

Victoria, *Statistical register of the colony of Victoria for the year 1890*.

Watkins, M. H. (1963) A staple theory of economic growth. *Canadian Journal of Economics and Political Science*, 29: 141-58.

Whale, P. B. (1937) The working of the pre-war gold standard. *Economica*, 11: 18-32.

Wilson, R. (1931) *Capital Imports and the Terms of Trade* (Melbourne: Melbourne University Press).

British exports

For all countries, these figures are obtained from *Annual statement of the trade of the United Kingdom* and deflated by the British export price index from Imlah, *Pax Britannica*, pp. 96-8. For consistency, figures for Canada include Newfoundland and Labrador.

British lending

For all countries, these figures are obtained from Stone, *Global Export* and deflated by the British export price index from Imlah, *Pax Britannica*, pp. 96-8.

Real GDP

Australia: Butlin, *Australian Domestic Product*, pp. 33-4.

Canada: Urquhart, *Derivation of the Estimates*, pp. 24-5.

New Zealand: Calculated as the real GDP per capita reported in Greasley and Oxley, Cointegration based approach, pp. 365-6, multiplied by the non-Maori population of New Zealand reported in Rankin, Gross national product, pp. 58-9.

Uruguay: Maddison, *World Economy*, p. 132.

United States: Sutch and Carter, *Historical Statistics of the United States*, table Ca9.

Terms of trade

Australia: Wilson, *Capital Imports*, p. 89.

Canada: Calculated from Urquhart and Buckley, *Historical Statistics of Canada*, p. 184. This series pertains to fiscal years ending 31 March (until 1908) and ending 30 June (thereafter). Therefore, the terms of trade lag British exports by either one-quarter or one-half years.

New Zealand: Calculated from Easton and Wilson, *N. Z.'s terms*, pp. 36-7. The author thanks Brian Easton for supplying this data.

Uruguay: Baptista and Bértola, 1999, unpublished data. The author thanks Belén Baptista for supplying this data.

United States: Lipsey, *Quantity Trends*, p. 442. This series pertains to fiscal years ending 30 June. Therefore, the terms of trade lead British exports by one-half year.

Augmented Dickey-Fuller test statistics

	Interval	I(0)	I(1)
Australia			
Exports	1871-1913	-2.50	-5.85***
Lending	1871-1913	-2.75*	-7.30***
GDP	1871-1913	-1.78	-8.80***
Terms of trade	1871-1913	-2.55	-9.56***
Canada			
Exports	1871-1913	0.04	-7.49***
Lending	1871-1913	-2.56	-10.10***
GDP	1871-1913	1.60	-6.46***
Terms of trade	1871-1913	-2.53	-6.85***
New Zealand			
Exports	1871-1913	-2.65*	-5.75***
Lending	1871-1913	-4.04***	-9.11***
GDP	1871-1913	-2.27	-6.10***
Terms of trade	1871-1913	-3.65***	-7.51***
Railway capital formation	1872-1900	-3.19**	-3.82***
Iron	1872-1900	-3.41**	-5.11***
Cotton textiles	1872-1900	-1.29	-5.77***
Uruguay			
Exports	1877-1913	-2.18	-8.01***
Lending	1877-1913	-3.65**	-6.57***
GDP	1877-1913	-0.59	-8.12***
Terms of trade	1877-1913	-1.91	-6.13***
United States			
Exports	1880-1913	-3.47**	-8.99***
Lending	1880-1913	-3.09**	-7.57***
GDP	1880-1913	-0.35	-8.67***
Terms of trade	1880-1913	-2.55	-5.61***

All variables are expressed in natural logarithms. * indicates statistical significance at 10%, ** at 5%, and *** at 1%.