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EVIDENCE ON THE RELATION
BETWEEN INSTITUTIONS AND THE
COST OF CAPITAL**

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ABSTRACT

Constitutions and Commitment: Evidence on the Relation Between Institutions and the Cost of Capital*

This Paper challenges the North and Weingast (1989) view that institutional reforms and better protection of property rights lead to economic growth through a reduction in interest rates, and that a mechanism of this type accounted for Britain's ascendancy to economic supremacy. We show that, in contrast with North and Weingast, the risk premium on British sovereign debt remained high and even increased in the decades following the Glorious Revolution, and that during much of the 18th century interest rates in Britain fluctuated considerably in response to wars and political instability. We also show that debt *per capita* – a measure of financial deepening – remained lower in Britain than in Holland for over a century after the institutional changes described by North and Weingast. Finally, we show that British interest rates moved in tandem with interest rates in Holland, suggesting that Britain did not embark on a different path following the institutional changes of the late 17th century. We conclude that, in the short run, institutional reforms do not lead to higher growth by lowering the cost of capital.

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I. Introduction

The idea that the protection of property rights is of utmost importance for the economic and financial development of nations has become extremely influential in economics in recent years. In a famous article, Nobel Laureate Douglass North and Barry Weingast (North and Weingast, 1989) argue that institutions and property rights are the answer to the old question, why was Britain the first country to undergo an industrial revolution and embark on modern economic growth. They argue that the power sharing institutions that evolved in Britain following the Glorious Revolution made the government (and the Crown) credibly committed not to renege on its debt and to uphold the property rights of individual creditors to whom the government owed money. North and Weingast also argue that, following these institutional changes, the cost of capital to the British government declined substantially, a phenomenon, which they interpret as a fall in the required risk premium. They claim that this decline in interest rates prompted the development of financial markets in Britain and lowered the cost of capital to private entrepreneurs. As a result, economic development in Britain far exceeded the relatively slow economic progress experienced by France and the Netherlands in the eighteenth century, two countries that had been as developed as Britain up to the seventeenth century.

The discussion of institutions and property rights has spread far beyond Britain of the seventeenth and eighteenth centuries. In a series of studies that have dramatically changed the academic discourse in financial economics, La Porta et al. (e.g., 1997, 1998) argue that countries whose legal system is of the British common law tradition offer better protection to outside investors. As result, financial markets in common law

countries tend to be more developed and entrepreneurs enjoy better access to external finance. Other authors, e.g. Levine and Zervos (1998) have emphasized the empirical relation between such financial development and economic growth. Acemoglu et al. (2002) also view institutions transplanted from Europe as crucial for economic growth. North and Weingast's contribution and tremendous influence on this literature stems from the formulation of a well-specified and testable channel linking institutions to economic growth through a reduction in the cost of capital. It is therefore important to revisit the empirical foundations of the North and Weingast view that a mechanism of this type accounted for Britain's financial development.

In this paper we conjecture that, in contrast with the predictions of North and Weingast, revolutions and dramatic institutional changes, even when designed to uphold property rights, may create substantial instability, which, in the short-run, leads to an increase in interest rates. Furthermore, in contrast with the analysis of North and Weingast, where Britain is treated as a closed economy, we take into account the fact that domestic interest rates are influenced by the cost and supply of capital abroad. In particular, we argue that Britain's cost of capital was affected not only by the perceptions of property rights by local investors, but also by the perception of Britain's creditworthiness by foreign investors, mostly in the Netherlands.

Using data on British interest rates throughout the eighteenth century we contrast the North and Weingast view of the world - institutional reforms lead to lower interest rates and therefore to economic growth - with our view of the world - institutional reforms create instability and higher interest rates in the short run. Figure 1, which is discussed in more detail below, offers a preliminary answer. The interest rate differential

between Britain and Holland clearly shows that (international) financial markets did not reward Britain's institutional changes in the short run, perhaps because their credibility in the eyes of foreign investors was only established over time. By contrast, wars and instability had an immediate impact on the cost of capital.

Our analysis of Britain's cost of capital proceeds in two stages. In the first, we investigate British interest rates starting in the late seventeenth century and continuing throughout the eighteenth century, a much longer period of observation than North and Weingast's. In the second part we focus on interest rate dynamics, and examine changes in interest rates in Britain and the Province of Holland between the late-seventeenth century and the late eighteenth century, taking into account the existence of international capital movements from Holland to Britain.

We find that the *level* of interest rates in Britain continued to be fairly high for several decades following the Glorious Revolution, increased substantially in response to the outbreak of wars, and declined after major military victories. We also find, as expected in global open financial markets, that interest rate *dynamics* in Britain were often shared by Holland as well, during a period in which no dramatic institutional changes took place in that province. Some of our statistical tests suggest that interest rates in Britain were influenced, to a large extent, by the volume of borrowing in Holland and interest rates there, not by domestic institutional changes.¹ Moving from prices (interest rates) to quantities (volume of debt), we find that on a per-capita basis, Holland continued to be a larger borrower than Britain for the entire eighteenth century.

¹ Oppers (1993) shows, using a different methodology, that Dutch lending was important in keeping British borrowing rates low until the 1770s. A comparison with interest rates in France would have been interesting, but, to the best of our knowledge, data are not available for the early eighteenth century. Existing evidence on French interest rates in the second half of the eighteenth century is discussed below.

We conclude that, when British capital markets became important in the second half of the eighteenth century, the industrial revolution had already started, suggesting the possibility that much of the development of financial markets in Britain was in response to economic development rather than the other way around. This conclusion is not inconsistent with well-established notions that some institutions promote economic growth more than others, or with the idea that the protection of property rights is crucial for long run economic growth. Our main point is that the effect of such institutional changes on a country's cost of borrowing tends to be slow. This conclusion seems to hold both for eighteenth century Britain and for Japan in the late nineteenth century (Sussman and Yafeh, 2000). In both cases interest rate fluctuations were mostly in response to wars and instability, rather than in response to constitutions and commitments to uphold property rights. Thus, the evidence from both eighteenth century Britain and nineteenth century Japan suggests that financial markets do not reward the establishment of the "right" institutions by a swift reduction in the cost of capital.

The rest of the paper is organized as follows. The next section surveys some of the related literature; Section III describes the methodology and data used in this study; Section IV presents our empirical findings, and Section V concludes.

II. A Literature Survey

The present paper is related to several previous studies of the North and Weingast hypothesis and of the changes in Britain's financial markets starting in the late seventeenth century. Writing long before North and Weingast, McCulloch (1837) describes the determinants of interest rates in Britain as follows: "In the beginning of the

funding system, the term fund meant that the taxes or funds appropriated to the discharge of the principal and interest of loans.... Owing perhaps, to the scarcity of disposable capital, but far more owing to the supposed insecurity of the Revolutionary establishment, the rate of interest paid by the government in the early part of the funding system was, comparatively high. But, as the country became richer, and the confidence of the public in the stability of the government was increased, ministers were enabled to take measures for reducing the interest, first in 1716 and then in 1749” (p. 585). This view, dating back to 1837, suggests that the decline in interest rates in 1716 and 1749 followed the high interest rates caused by the instability of the Glorious Revolution (not by the Stuart regime). It also suggests that initially, the British funding system started out by assigning specific tax receipts to pay for interest and principal, a measure that was common among problematic sovereign borrowers of the nineteenth century, such as the Ottoman Empire – hardly the forebear of institutional reform.

Moving to more recent studies, Clark (1996) examines whether or not private (real) rents on agricultural land declined following the decline in interest rates on government debt in Britain, finding little support for this conjecture. Quinn (2001) also examines the conjecture that private interest rates declined in response to the decline in the government cost of capital. Using archival bank interest rates he rejects this conjecture, and provides a number of explanations why increased government borrowing did not lower private interest rates, as North and Weingast suggest. Temin and Voth (2004) whose focus is on the evolution of banking technology, report fragmentary data on interest rates at Hoare’s Bank, and find that the beginning of the eighteenth century was characterized by high (private) interest rates, again, in contrast with the North and

Weingast view of the world. Wells and Wills (2000) use Bank of England stock price information to examine the impact of threats to the institutional changes of the seventeenth century. Their analysis ends in 1714, but up to that period they find that stock prices declined in periods of threats to the newly established institutions, such as the Jacobite rebellion of 1708. Our analysis adds a long-term view to Wells and Wills' (2000) study, casting some doubt on institutions as the main cause of interest rate fluctuations in eighteenth century Britain.²

In addition to these attempts to provide evidence based on British interest rates, several other studies cast some doubt on the relative importance of changes in the protection of property rights, in comparison with other institutional changes in seventeenth and eighteenth century Britain. Brewer (1990), for example, attributes Britain's economic and military success to the emergence of a strong government, which he views as the most important transformation that took place at the time. O'Brien (2001) attributes Britain's success to the administrative foundations for a fiscal state, which were put in place in the seventeenth century, and made the British government far more able to collect taxes than her European rival governments. Finally, Allen (2003) argues that much of Britain's rise to pre-eminence took place before the Glorious Revolution for reasons related to patterns of intra-European trade.

The present study is also closely related to several studies of the relation between the cost of capital, institutional changes, and political events. Barro (1987) and Wright (1999) document the relationship between long-term interest rates and wars for the eighteenth and nineteenth centuries. Ferguson (2001) studies long-run fluctuations in

² Moving beyond Britain to France, Velde and Weir's (1992) study of French interest rates in the second half of the eighteenth century is also related to the present study.

British interest rates, and reaches the conclusion that political events were the most important determinant of these fluctuations. Epstein (2000, chapter 2) argues that differences in formal constitutional arrangements do not account for differences in interest rates across Europe between 1300 and 1750. Sussman and Yafeh (2000) investigate the importance of institutional changes and political events in determining the cost of Japanese government debt traded in London between 1870 and 1914, an era of dramatic institutional change in Japan. They find that institutional change, reforms, a constitution and other similar factors had little impact on yields on bonds issued by the Japanese government at that time. By contrast, political developments such as wars (e.g. with Russia), and economic changes (e.g. the Gold Standard) were far more important factors affecting Japan's cost of (foreign) capital. The main conclusion that emerges from that analysis is that a country's cost of capital does not respond immediately to institutional reforms, in contrast with what the North and Weingast view implies, and very much like our findings here.

III. Methodology and Data

Methodology

The North and Weingast view of the world can be expressed as

$$(1) \ i_t^{uk} = \gamma_0 + \gamma_1 Z_t .$$

A set of unobservable institutions, Z , determines British government borrowing rates in any given year, and this rate, in turn, may affect macro-economic performance. Because institutions are not directly observable and their quality cannot be easily measured, inferences are drawn from the time series properties of British interest rates, which could be driven by many factors. Perhaps the most intuitive way to capture Z is by

using a dummy variable, which takes the value one in periods of institutional changes. Note that the formulation in Equation (1) treats Britain as a closed economy, where interest rates are determined by domestic capital markets. Note also that, as is often the case in the finance literature, Equation (1) as well as the other equations that follow, assume that there is an infinite supply of savings available for a borrower at the appropriate (risk-adjusted) interest rate.

Using newly assembled data, we attempt to directly test the North-Weingast hypothesis as captured in Equation (1) by examining the evolution of Britain’s cost of capital during the century that followed the Glorious Revolution. Because Equation (1) calls for the use of a dummy variable to capture institutional changes, we search for “structural breaks” (sharp and drastic changes) in Britain’s cost of capital. This is equivalent to searching for a point in time in which a dummy variable capturing a structural (or institutional) change in the series is most significant.

Once a break is identified, we examine if its date corresponds to a major institutional change. This is done through iterative estimation of the following equation:

$$(2) \log (i^{uk})_t = \beta_0 + \beta_1 \log (i^{uk})_{t-1} + \beta_2 \Delta \log (i^{uk})_{t-1} + \beta_3 EVENT_{long} + \beta_4 EVENT_{short}$$

where $(i^{uk})_t$ represents interest rates on British government debt in year t , $EVENT_{long}$ is a dummy variable that takes the value zero at all times prior to the proposed break and the value one from the time of the break onwards, and $EVENT_{short}$ takes the value one at the time of the event, and zero at all other times. If an event had a long-term impact on yields and the series is stationary, then the “long” dummy variable will be different from zero. If the series is unit root, the “short” variable will capture permanent changes. The search for breaks involves repeated estimation of Equation (2) while moving the break date and the

corresponding *EVENT* dummy variables one observation at a time and recording their statistical significance. The first break date is at the point where the statistical significance of the appropriate *EVENT* dummy is highest (the process can then be repeated within each half of the sample to detect additional break points in sub-periods).³ Because there is substantial evidence that Britain was a borrower in global financial markets (especially Amsterdam, see Neal, 1990), we also estimate Equation (2) using the Britain-Holland interest rate differential (“spread”), rather than domestic interest rates in Britain.

The second part of our empirical analysis is driven by the conjecture that interest rates (or risk premia) in an open economy are determined on the basis macroeconomic conditions. We therefore replace Equation (1) by a standard risk premium model for an international borrower, where the dependent variable is the interest rate differential between Britain and Holland. Institutions, which are still unobservable, are left to be part of the error term:

$$(3) i_t^{uk} - i_t^{nl} = \delta_0 + \delta_1(\text{exports})_t + \delta_2(\text{debt/population})_t + \varepsilon_t.$$

Exports serve as a measure of the flow of revenues which can be used to repay debt⁴ and debt per capita proxies for the country’s “leverage” (there are no measures of debt to GDP for this time period). If Britain’s cost of capital can be explained using Equation (3), then any long-term impact of institutional changes must have been through a change in macroeconomic conditions, and not through a direct impact on interest rates as stipulated in Equation (1).

³ For further details on this methodology, see Sussman and Yafeh (2000).

⁴ Exports per capita can be used instead without changing the empirical results.

Following the estimation of Equation (3), we carry out a VAR (vector auto-regression) analysis of changes in the relation between interest rates in Britain and Holland during our period of observation:

$$(4) i_t^{uk} = \alpha_1 + \eta_1 i_{t-1}^{uk} + \phi_1 i_{t-1}^{nl} + \varphi_1 \frac{D_t^{nl}}{D_t^{uk}} + v_{1t}$$

$$(5) i_t^{nl} = \alpha_2 + \eta_2 i_{t-1}^{nl} + \phi_2 i_{t-1}^{uk} + \varphi_2 \frac{D_t^{nl}}{D_t^{uk}} + v_{2t},$$

where $\varphi_1 > 0$ implies “crowding out” of British debt by borrowing in Holland.

Data Issues

In support of their argument that there exists a relation between interest rates and institutional reforms, North and Weingast provide evidence on a decline in interest rates on British government debt following the Glorious Revolution. This evidence is based on an incomplete interest rate time series, with observations for several years in the late seventeenth and early eighteenth centuries. They also offer evidence on an increase in the volume of British government debt around the same time period, supplemented by a general description of the development of the London Stock Exchange in the eighteenth century.⁵

Data constraints have made a more precise test of the North and Weingast hypothesis virtually impossible. High frequency time series of government borrowing rates or government bonds yields for the period following the Glorious Revolution (1688) are not available until 1753, when British Consol prices become available for the first

⁵ However, part of the rise in the volume of trade on the London Stock Exchange during the period was related to the South Sea Bubble, an event that did not contribute to sustained growth, and led to popular resentment that hindered British equity markets for over a century.

time (although annuity prices are available earlier). Attempts to bridge this gap have generally followed two different routes. The first is based on examinations of interest rates on private loans, and attempts to infer from them whether or not interest rates declined starting in the late seventeenth century (Clark, 1996, Quinn, 2001). These studies essentially test the conjecture that the (assumed) reduction in the government's cost of capital led to a decline in the private cost of capital, but do not examine directly if, indeed, interest rates on government bonds experienced a significant change in the late seventeenth century. Moreover, this conjecture is based on the assumption that British capital markets were integrated, an assumption which contradicts Buchinsky and Polak (1993), who show that British capital markets were segmented up until the late eighteenth century.

The second route is based on substitute financial assets from which inference is made about government borrowing rates. Thus, Wells and Wills (2000) use the Bank of England shares as a proxy for government bonds, an approach, which requires that the Bank of England stock be correlated with British government bonds. This, however, need not be the case because, at the time, the Bank of England was a private lending institution that made out loans to the government. With the exception of a very severe threat to the existence of the London capital market, the Bank's profit could increase with the rate of interest charged to the government, so that Bank of England stock prices may well have been inversely related to government bond prices. In fact, during the Seven Years War (1756-1763), when, for the first time, both Bank of England stock prices and Consol daily yields are available, we find that the correlation between the yields on the two assets is close to zero (-0.07). Furthermore, for the period 1731 to 1753, we find that the

3 percent annuities and the Bank of England stock prices are not co-integrated at all, and that the R-squared of the first differences equation is quite low (0.18).

Rather than follow one of the existing two routes, our measure of Britain's cost of capital is a fiscal variable, the ratio of the debt service payments to total government debt, drawn from Mitchell (1988). For the initial years following the Glorious Revolution this may be an upward-biased measure of the government's cost of capital because many of the loans contracted were of short duration and debt service charges included not only interest payments but also debt retirement. We therefore examine also a measure of debt charges minus terminable loans. This measure of interest rates may be biased downwards, because the cost of short-term loans (of less than one year, common during war times) is ignored; the true cost of capital is probably in between these two measures. Nevertheless, the empirical results in the following sections are very similar for both interest rate series, and we therefore present results for the unadjusted debt service to debt series only.⁶ While we view this "fiscal interest rate series" as a good proxy for Britain's long-run cost of capital, it may not be very sensitive to short-run changes – an issue, which we address below.

An important feature of borrowing in the eighteenth century was that once a "permanent" debt level was established at a given interest rate, 3 percent, additional borrowing was made by issuing similar bonds with the same coupon. Variations in the risk premium were typically not reflected in new Consols with different interest rates, but rather in discounts on the purchasing price of new bond issues.⁷ Therefore, drawing

⁶ Implicitly, the use of both series is based on the assumption that the risk premium required by investors is constant, so that changes in the average interest rate trace marginal changes (up to a constant). This assumption could hold if investors have a CARA utility function.

⁷ According to McCulloch (1837), this form of borrowing became a feature of British debt management

conclusions from the fact that the coupon on British securities declined (for example, with the introduction of 3 percent coal duties in 1731) as reported by North and Weingast does not necessarily imply that from then on the British government borrowed at these rates.⁸ To address this point, as well as the fact that average fiscal measures of the government's cost of capital may not be very sensitive to marginal changes in the cost of capital, we generate an alternative series of British interest rates. This series is based on fragmentary data on actual (not coupon) marginal borrowing rates taken from Sinclair (1803)⁹, supplemented, starting in 1731 by annuity prices (also from Sinclair) and, starting in 1753, by daily Consol yields (from the European State Finance Database).¹⁰ Measures of the government's cost of capital are combined with data on population, total government expenditure and exports, also drawn from Mitchell (1988).

In addition to providing new estimates of the cost of capital to the British government, we also compare British government borrowing rates with those of the Province of Holland, the largest and wealthiest in the Netherlands.¹¹ Provincial government borrowing for Holland and the exchange rate between London and Amsterdam are based the European State Finance Database, and data on population are from de Vries and van der Woude (1996).

during the reign of George II (starting 1727). It continued into the twentieth century.

⁸ See North and Weingast (1989), pp. 823-824. The discussion on p. 823 suggests that with the issue of 3 percent bonds, Britain achieved a permanent decline in government borrowing rates.

⁹ Computed by Sinclair as the value of the coupon (£3), divided by the issue price.

¹⁰ None of these measures takes into account two factors that may have affected the actual cost of capital of the British government. The first is that debt maturity increased over time, until Consols were introduced in the middle of the century. Ignoring this feature may lead to an under-estimate of the decline in British interest rates. By contrast, large lenders to the British government were often the Bank of England or the East India Company, which were granted monopolies in exchanged for providing loans. Ignoring this form of repayment may lead to an under-estimate of the cost of British government debt; see Broz and Grossman (2004).

¹¹ Although precise data are not available, in the eighteenth century the Province of Holland accounted for about 60-70 percent of total Dutch debt, and its population, around 800,000, constituted about 40 percent of the total population in the Netherlands (based on private communication with W. Fritschy).

IV. Empirical Analysis and Results

Wars, Reforms, and Britain's Cost of Capital in the Eighteenth Century

Figure 1 displays three measures of the interest rate differential between British government debt and debt issued by the Province of Holland. One measure is based on the ratio of debt service to total debt; another on marginal interest rates drawn from Sinclair (1803); the third is based on annuity prices between 1731 and 1753 and daily market Consol yields thereafter.

Instead of a one-time drop or a steady decline in interest rates due to the institutional changes of the late seventeenth century, the picture that emerges is of high interest rates with considerable fluctuations in response to wars and instability. The interest rate gap between Britain and Holland rose until 1709, and then declined to a plateau that continued until about 1717. From then on, the “spread” (or risk premium) on British debt declined, reaching a minimum in the late 1750s. The initial years following the Glorious Revolution can therefore be characterized as a period of severe instability and a high cost of capital, rather than as the beginning of a new era of growth and a low interest rates. Moreover, turning points in the interest differential series closely correspond to outbreaks and conclusions of major wars. For example, interest rates rose sharply when Britain became involved in the War of the Spanish Succession (1701-1713). In 1715 Britain faced a Jacobite rebellion, and, for a short period, interest rates rose again. In 1717 Britain was again at war with Spain (the War of the Quadruple Alliance, 1717-1720), and interest rates increased, a trend which was reversed following Britain's decisive victories in 1718, when the Spanish fleet was destroyed.

Using Sinclair's interest rate series, we observe marginal rates of interest during major wars. Both this series and the Consol rates provide a similar picture for the second half of the eighteenth century. The interest rate differential between Britain and Holland increased during the Seven Year War, and even more sharply during the American War of Independence. Indeed, during the war in America the entire path of declining interest rates was reversed for several years, casting doubt on the sustainability of the effect of reforms on financial markets.

We now turn to a more formal search for structural breaks. Using interest rates calculated as the ratio of debt service to total debt and iterative estimation of Equation (2), we identify 1718, the year when the Spanish fleet is defeated, as the year in which the most significant long-term decline in the British interest rates took place. The result is similar if the interest rate differential between Britain and Holland is used instead. In addition to the victory over Spain, it is also possible that this break is due to a monetary reform that signaled the beginning of the Gold Standard in Britain.¹²

Both Figure 1 and the search for breaks suggest that interest rates in Britain remained high and fluctuated considerably, even after the completion of the institutional changes of the seventeenth century. Only after the end of domestic and international instability did rates go down to a long-term lower level. This result is in line with Sussman and Yafeh (2000), who find that in Meiji Japan too, institutional reforms did not generate an immediate response in the risk premium on government debt (traded abroad), and structural breaks were associated with other events, such as the victory over Russia.

¹² Although the adoption of a de-facto Gold Standard was not fully understood at the time, the move to increase the gold to silver price ratio in Britain initiated gold flows, which may have provided liquidity for the London financial market. This monetary reform would probably not have been possible without Britain's decisive military success.

These results are also consistent with Mauro, Sussman, and Yafeh (2002), Table V, which documents “sharp changes” in the cost of capital of nineteenth century emerging markets: none of the sharp changes is associated with institutional changes; many are due to wars, rebellions and instability. Finally (and somewhat indirectly), our reading of Britain’s cost of capital in the eighteenth century is in line with Rajan and Zingales (2003), who emphasize the impact of politics, not institutions, on financial markets.

Interest Rates and Debt Levels in Britain and Holland

The determinants of Britain’s cost of capital are examined more formally in Table 1, which displays co-integration estimates of Equation (3), where interest rates are measured as the ratio of debt service to debt.¹³ Much like modern “spreads,” the interest rate differential between Britain and Holland in the eighteenth century was related to Britain’s ability to pay, namely to debt per capita and exports, which may also proxy for economic development more generally. (Similar results are obtained when using exports per capita). It is unlikely that the growth of exports was closely related to the Glorious Revolution: Clark (2001) shows that the British economy and exports followed a trend that started as early as the sixteenth century (the upheaval of the seventeenth century may have slowed down this growth trend). But even if export growth can be attributed to the institutional changes of the seventeenth century, this is a significant departure from the original North and Weingast hypothesis, which viewed interest rates as the mechanism through which institutional changes bring about economic growth.¹⁴

¹³ The hypothesis that the series are unit root cannot be rejected for the entire sample, and we therefore use the Johansen co-integration procedure. The results in this and the subsequent tables remain unchanged when the interest rates series that excludes terminable loans is used.

¹⁴ Note that the coefficient on debt per capita in the right-hand-side column of Table 1, where non-fiscal

Another implication of the co-integration analysis of Table 1 is that it is possible to account for the unit root stochastic properties of the Britain-Holland interest differential (“spread”) series by economic variables that share similar stochastic properties. Recall that the effect of institutions is part of the unobservable error term. Because, after accounting for the other economic variables, the error term is stationary and independent of the other explanatory variables, anything included in that term could not have had a permanent effect on the spread. Therefore all political and military events that are not correlated with the other explanatory variables (with the exception of those that cause a structural break in the series) merely produce a transitory “white noise” effect. In other words, to the extent that an institutional change had an impact on British “spreads,” it was through a long and gradual process rather than through a one-time change.

As noted above, fiscal measures of Britain’s cost of capital may not be very sensitive to marginal changes, and therefore in Table 2 we measure British interest rates using annuity prices between 1731 and 1753, and Consol yields thereafter. We also include in this specification a dummy variable that equals one for all years in which Britain was involved in a war. (Engle-Granger co-integration is used here in order to estimate the coefficient of this dummy variable). The table supports the conclusions of Table 1, and, in addition, shows clearly that wars had a significant effect on the cost of capital of the British government.

In order to shed further light on Britain’s financial development, Figure 2 portrays government debt per capita in Britain and in the Province of Holland during the

measures of the cost of capital are used, is larger and more statistically significant than the coefficients reported in the other columns. This may be due to the fact that in the other columns debt is used in the denominator of the dependent variable as well as in the right-hand-side debt per capita variable.

eighteenth century. It is evident that the government of Holland could borrow relatively more than her British counterpart, even without major institutional changes. Conversely, despite the government's ability to borrow, no industrial revolution took place in Holland at the time. The effects of institutional changes on government debt appear not to have been dramatic before the onset of the industrial revolution.

Figure 3 portrays the cost of debt for the two governments, measured as the ratio of debt services to government expenditures; other measures of the cost of capital of the two governments portray a similar picture. Evidently, interest rates in the two countries moved together so that Britain did not embark onto a different "path" in the eighteenth century (see also Neal, 1990, on financial integration of the two countries starting in the eighteenth century). The fiscal cycles (debt service to government expenditures), which are apparent in Figure 3 were related to European wars, and seem to have been quite similar in the two countries, with British cycles being somewhat more volatile.

Finally, Table 3 displays the results of the VAR analysis, which suggest that the volume and cost of debt of the government of Holland affected the cost of debt of the British government. During the first half of the eighteenth century the effect of interest rates in Holland on the cost of British debt was particularly pronounced. British interest rates were very sensitive to Dutch interest rates, and a high volume of debt in Holland would raise the costs of borrowing in Britain. However, the financial relationship between the two countries changed in the second half of the eighteenth century, as the London capital market gradually grew in importance. After 1750 the two markets seem to have been equally important: the impact of interest rates in Amsterdam on London rates became lower, and, for the first time, British rates had some effect on Amsterdam rates as

well. (According to the VAR results of Table 3, prior to 1750 interest rates in Holland were not “caused” by interest rates in Britain).¹⁵

Taken together, the empirical evidence we present suggests that the fruits of the institutional reforms of the seventeenth century did not immediately affect the London financial market.¹⁶ Until at least 1750, the London capital market could not supply sufficient liquidity to meet the borrowing needs of the government, which relied heavily on capital inflows from Amsterdam. Had the institutional reforms created sufficient liquidity on the London market, interest rates in Britain would have probably declined much faster than they did. It appears that only with the gradual growth of the British economy (and of exports) did sufficient liquidity become available in London so that government borrowing rates in Britain were no longer subject to liquidity constraints imposed by foreign capital markets. (Nevertheless, on a per-capita basis Britain still remained behind Holland). The financial “ranking” of Britain and Holland was reversed only in the second half of the eighteenth century, after the onset of the industrial revolution, several significant British military victories, and about a century after the completion of the institutional reforms that followed the Glorious Revolution. It was not the Glorious Revolution that established the unambiguous supremacy of London’s financial markets over Amsterdam’s, but rather Napoleon’s conquest of the Low Countries and the flight of capital from the Continent to Britain.

Before concluding, we briefly address the fragmentary available evidence on the cost of borrowing of two other major European countries, Austria and France. Data on

¹⁵ There is some evidence that integration was hindered by the American War of Independence in which Britain and Holland took opposite sides.

¹⁶ This is consistent with Allen’s (2001) findings regarding the standards of living in London and on the Continent and with Clark (2001), who does not identify any “break” in British growth rates in the seventeenth century.

Austrian external borrowing rates (in Amsterdam), drawn from the European State Finance Database suggest that interest rates on Austrian debt were far lower than interest rate on British debt prior to 1720, and roughly comparable thereafter. In fact, the admittedly few data points available in the early eighteenth century suggest that Austria, an absolute monarchy, borrowed at rates which were similar to those of Holland and far lower than the cost of debt in unstable Britain (Kroner, 1995).¹⁷ As for France, Velde and Weir (1992) discuss interest rates in the second half of the eighteenth century, and show that in that period interest rates in France were usually higher than in Britain. This followed a string of unsuccessful wars (with Britain) that strained the French economy. Moreover, due to monetary instability and debasements, nominal interest rates must have reflected also inflation risk, on top of the various default risks discussed in Velde and Weir (1992). There is little in these figures to suggest that financial markets viewed Britain as different from other European countries.

IV. Concluding Remarks

The main conclusion that emerges from the present study is that financial markets do not “reward” countries for institutional reforms in the short run. While the “right” institutions may well be important for long run growth, the mechanism through which they make a difference is apparently not through an immediate reaction of financial markets and a reduction in the cost of capital. By contrast, financial markets do respond immediately to domestic instability and to major wars. This was the case in eighteenth century Britain, and this was the case a century and a half later in Meiji Japan. In both

¹⁷ Kroner (1995) shows that interest rates in Denmark and Switzerland in the second half of the eighteenth century were also comparable with those of Austria and Holland. Swiss rates were sometimes even lower. These countries also managed to borrow at long maturities.

cases, it was not a constitution that made a big impact on the cost of government debt. Instead, it was a decisive military victory (over the Spanish fleet in the case of Britain, and over a major European power, Russia, in the case of Japan), that brought about a “break” in the interest rate series. More specifically in relation to Britain and the institutional changes of the seventeenth century, our results suggest that it was not the institutional changes which lowered interest rates after the Glorious Revolution, but more likely the end of the instability that the Revolution had generated. And the government’s ability to borrow appears to have been as much affected by ability to tax and win wars (O’Brien, 2001) as by the protection of individual property rights.

The economic mechanism proposed by North and Weingast, where institutional change affects growth through interest rates, raises further questions: Standard macroeconomic theory suggests that government borrowing “crowds out” private investment. According to North and Weingast, government borrowing in Britain encouraged private investment by creating a liquid and secure market for government debt. Our empirical analysis suggests that higher government debt was associated with higher (government) borrowing rates; it is unlikely that it had the opposite effect on private rates. Moreover, since the British government issued debt almost exclusively to fight wars, the North and Weingast hypothesis implies a positive effect of wars on growth. Again, the data we present show that borrowing rates increased during wars and declined in their aftermath. And finally, the nineteenth century experience of belligerent regimes that did not advocate the rule of law such as Tsarist Russia or the Ottoman Empire, suggest that, contrary to the North and Weingast view, the absence of secure property rights was not much of a constraint when it came to foreign borrowing.

To conclude, we view Britain's ascendancy to a position of supremacy in Europe and in the world as a likely outcome of very long processes, perhaps related to the development of the legal system, science, and government tax collection. The evidence on the importance of the Glorious Revolution and the institutional changes of the seventeenth century as a turning point remains scarce.

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Table 1
The Long-term Determinants of the Britain's Cost of Capital:
Johansen Co-integration Analysis

Dependent variable	Britain-Holland interest rate differential 1699-1790	Britain-Holland interest rate differential 1699-1749	Britain-Holland interest rate differential 1750-1790	Britain-Holland interest rate differential based on Consol yields 1750-1790
British exports (million pounds)	-0.021 (0.008)	-0.060 (0.014)	-0.008 (0.002)	-0.027 (0.002)
British debt per capita	0.005 (0.005)	0.003 (0.009)	0.004 (0.001)	0.018 (0.002)
Constant	0.035	0.118	NA	NA
N	91	50	41	41
Likelihood ratio	44.5	51.6	31.9	53.6
1% critical value	35.65	41.0	29.8	29.8

Notes: Interest rates are measured as the ratio of debt service to debt, except the right-hand-side column where Consol yields are used (annuity prices before 1753). Dependent variables are in logs. Estimation includes a dummy variable for 1718, when a structural break is identified in the series (except for the period 1750-1790). Standard errors are in parentheses.

Table 2
The Long-term Determinants of the Britain's Cost of Capital:
Engle-Granger Co-integration Analysis

Dependent variable	Britain-Holland interest rate differential 1731-1790	Britain-Holland interest rate differential 1750-1790
British exports per capita (pounds)	-0.014 (0.003)	-0.012 (0.002)
British debt per capita	0.016 (0.003)	0.018 (0.005)
Dummy for wars	0.005 (0.001)	0.006 (0.001)
Constant	-0.050	-0.056
N	60	41
Adjusted R ²	0.75	0.75
ADF test statistic	-4.546	-3.74
1% critical value	-2.60	-2.60

Notes: British interest rates are based on annuity prices prior to 1753 and on Consol yields thereafter. Dependent variables are in logs. The war dummy equals one in every year in which Britain was involved in a war. Standard errors are in parentheses.

Table 3
Cross-effects of the London and Amsterdam Capital Markets:
VAR analysis

Period	1698-1790		1698-1749		1750-1790	
Dependent variable	British borrowing rate	Government of Holland borrowing rate	British borrowing rate	Government of Holland borrowing rate	British borrowing rate	Government of Holland borrowing rate
British borrowing rate(-1)	0.476 (0.076)	0.007 (0.011)	0.449 (0.104)	0.005 (0.013)	0.671 (0.110)	0.187 (0.062)
Government of Holland borrowing rate (-1)	0.722 (0.140)	0.992 (0.020)	0.675 (0.202)	0.993 (0.026)	0.300 (0.097)	0.832 (0.055)
Holland to Britain debt ratio	0.010 (0.003)	Insignificant	0.014 (0.005)	Insignificant	-0.003 (-0.002)	0.001 (0.001)
1718 dummy	-0.015 (-0.004)	Insignificant	-0.015 (-0.005)	Insignificant		
N	92	92	51	51	41	41
Adjusted R-square	0.92	0.86	0.88	0.71	0.30	0.37

Notes: Interest rates are measured as the ratio of debt service to debt. Standard errors are in parentheses.

Figure 1

Interest Rate Differential: Britain vs. the Province of Holland, 1692-1795

Sources: Mitchell (1988), Sinclair (1803) and the European State Finance Database

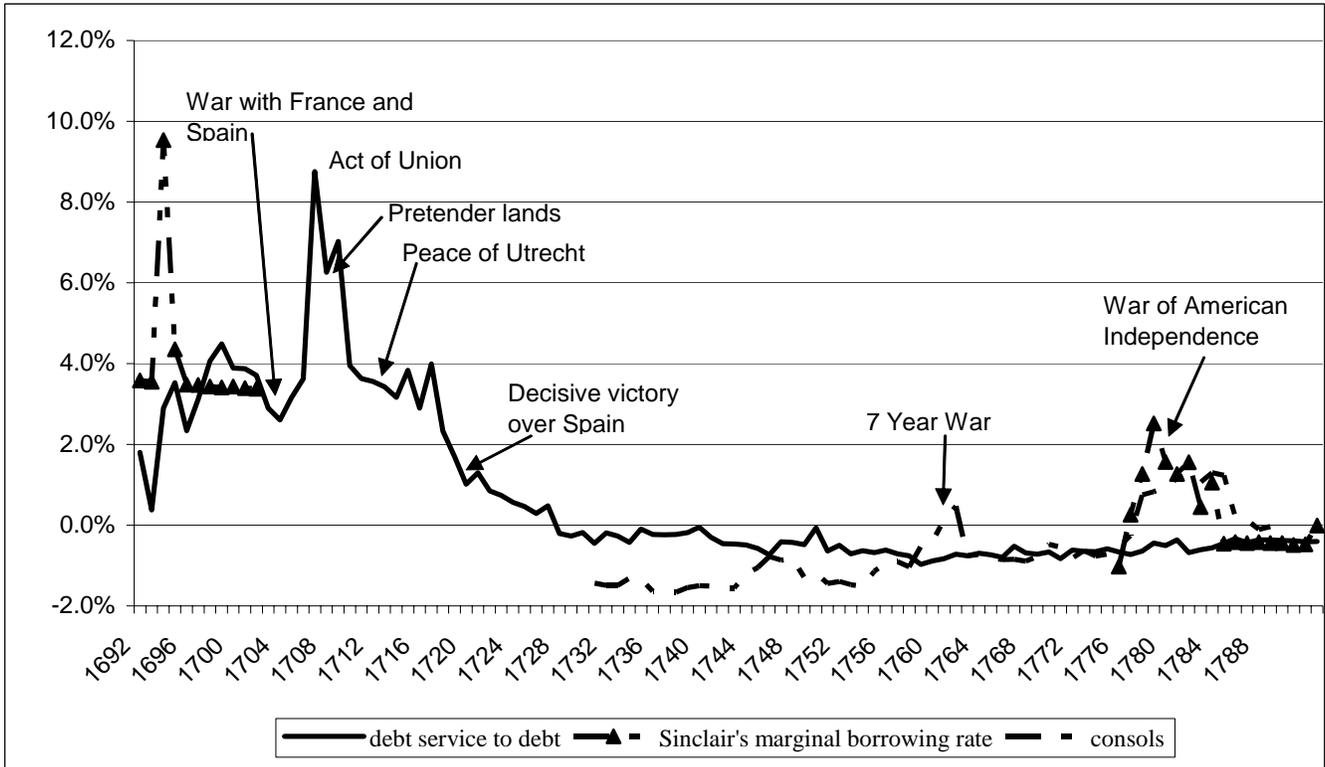


Figure 2

**Government Debt per Capita in Pounds:
Britain vs. the Province of Holland 1698-1795**
Sources: Mitchell (1988), de Vries and van der Woude (1996),
and the European State Finance Database

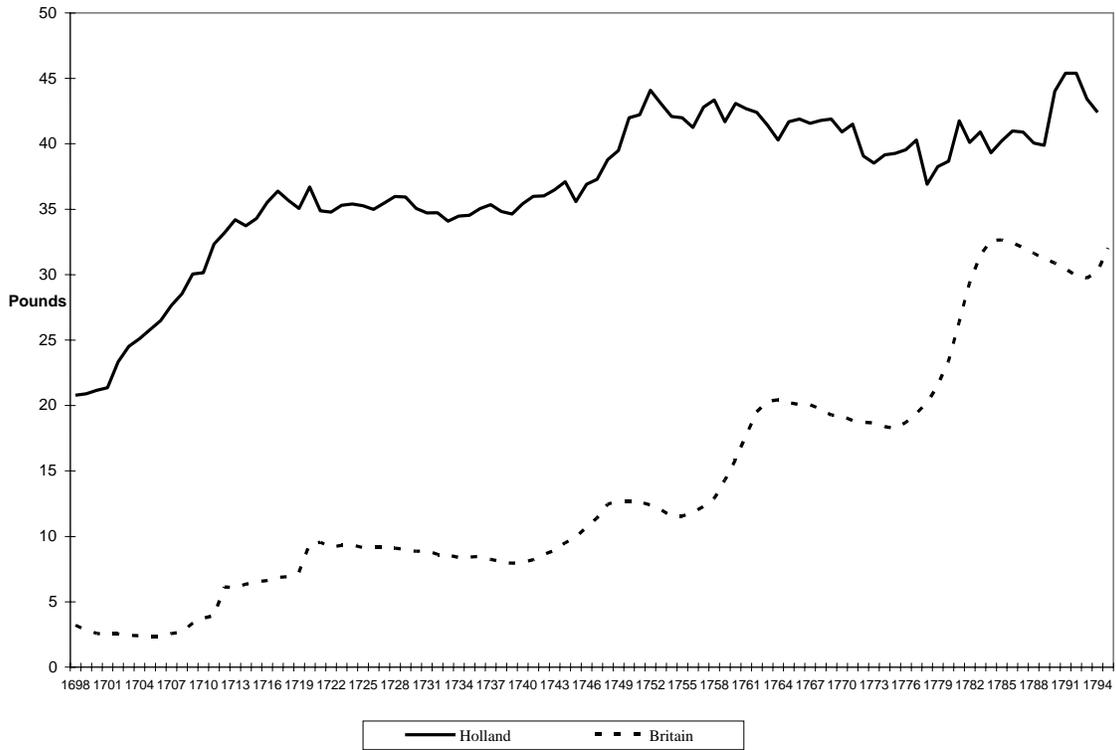


Figure 3
Government Debt Service to Expenditures:
Britain and the Province of Holland: 1692-1795
 Sources: Mitchell (1988) and the European State Finance Database

