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Comparing good and bad borrowing

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Abstract:

Some LDCs borrow abroad and experience *good* growth (above 2%), while others borrow and has *bad* growth (below 1%). We analyze the 443 available observations of borrowing for one 5-year period and average growth rates for the following 10 year period. The relation between borrowing and growth is negative, but explains little of the variations in the growth rate. Further, we select a sub-set of 59 *twins* of LDCs with matching borrowing over the same period, where one has good and the other bad growth. The two sets are compared over a total of 11 main indicators from different fields. The good cases occur in countries with more economic and political freedom; also they are somewhat more developed, and they have fewer natural resources. While this pattern is strong between samples, it is weak within samples.

Keywords: International borrowing, development

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1. Introduction

The purpose of this paper is to study the effect of international borrowing by LDCs (less developed countries) in a medium term perspective. We consider only public and publicly guaranteed debt. The borrower is thus the *ruler* of the borrowing country. It is well known that the relationship between official borrowing and future growth is negative: Not strongly, but significantly, see section 3. This is a problematic finding in the light of standard theory.

Economic theory deals with rational agents, also in the public sphere. On type of such agents occurs in theory mainly: The *wise and benevolent* ruler, who borrows in order to improve the welfare of the economy in the longer run. Consequently, he borrows and invests wisely. Thus, one would expect that the more countries borrow the more they will grow.

The negative relationship found may be due to a different rationality. Rulers are faced with strong short-run constraints and incentives, which are fairly independent of long run economic welfare. They are typically *myopic and selfish*. Below we use the abbreviations WB (wise and benevolent) and MS (myopic and selfish) to designate the two extreme forms of governments, even when most governments are surely a mixture of the two. Section 2 is a brief discussion of the theory of international borrowing.

Our data consists of cases extending 15 years, with two observations: The borrowing in one 5-year period and the average growth in the following decade. The *full sample* consists of 443 such cases. The analysis in section 3 considers the full sample. It nicely replicates recent results from the literature.[3]

From the full sample we select the *twin* sample of 59 matching cases. The selection process first divide the observations in cases of *good growth* above 2%, and *bad growth* below 1%, also all cases where borrowing is below 5% of GDP is disregarded.[4] The twins are then selected as pairs of good/bad cases where the period is the same and the relative borrowing match as well as possible. Our search of the data gave 59 twins with a good match. This reduces the data analyzed to 26%, but it allows us to control for the relative size of the borrowing (and time).

Section 4 presents a set of 12 potential explanatory variables that characterize the economic development and the institutions of the countries. We then develop a set of predictions of the expected results for the twins. We distinguish between two types of results:

3. When we refer to recent literature, we think of Kumar and Woo (2010) and Reinhart and Rogoff (2010). We take their surveys of the previous literature and their own empirical findings to be the state of art.
4. This paper uses the words “good” and “bad” only in this way. The reasons for the choice of the two growth rates are explained in section 3.

Between groups and *within* groups. The between group analysis disregards the actual borrowing as it is the same pairwise – thus we study if each explanatory variable has a significantly different average in the good and the bad cases. The within group analysis study if each explanatory variable is correlated to the borrowing.

The comparison of the 59 pairs of good and bad cases is done in section 5 that consider 12 variables (with altogether 18 variants) that characterize economic development and the economic and political system.

The between country results are rather strong, but has a problem. It is possible that the good and bad cases are so for reasons that have nothing to do with the borrowing. This possibility is termed *independence* in the paper. The within group results are weaker and actually points to independence, though not to full independence.

A main pattern found is: Good cases occur more often in countries that are relatively liberal and democratic.[5] Also they are somewhat more developed and have fewer resources. Thus more dictatorial and regulation prone countries who rely more on resources are more likely to go through bad debt.

Consequently, section 2 is the theory section, while section 3 presents the data and our choice of the 59 pairs of cases. Section 4 formulates a set of hypotheses about the likely outcomes in the good and the bad cases. Section 5 is the systematic comparison of the case-pairs. Finally, section 6 concludes.

5. The word "liberal", is used relative to economic freedom. More liberal means fewer restrictions on business.

2. A positive theory of official foreign debt

The theory of foreign borrowing see borrowing as a method of expanding the choice set of rulers: Some of the extra choice possibilities are better for people in the longer run and some are not.

2.1 The contribution of public debt to growth in theory

Economic growth has been frequently analyzed empirically in the literature. Growth theory has identified human capital, investment into physical capital and population growth as the main causes for growth. Institutional economics adds the role of governance and institutions for economic developments. Institutions constraining the policymakers, so the hypothesis, allow higher growth. Finally, the role public debt for growth is theorized. One empirically backed strand of the literature holds that official debt is detrimental for growth. The channels for a growth reduction are decreasing capital accumulation, higher future taxes, rising interest rates and increasing inflation. In addition, the level of uncertainty about policies is increasing with rising official debt (Kumar and Woo 2010, p 5f). In other words, increasing public debt is decreasing growth mainly via a crowding-out effect. This view is well documented and empirically tested (see 3 below). If debt is too high in developing countries, a debt overhang problem may occur which reduces the growth prospects further (Freytag and Pehnelt 2009).

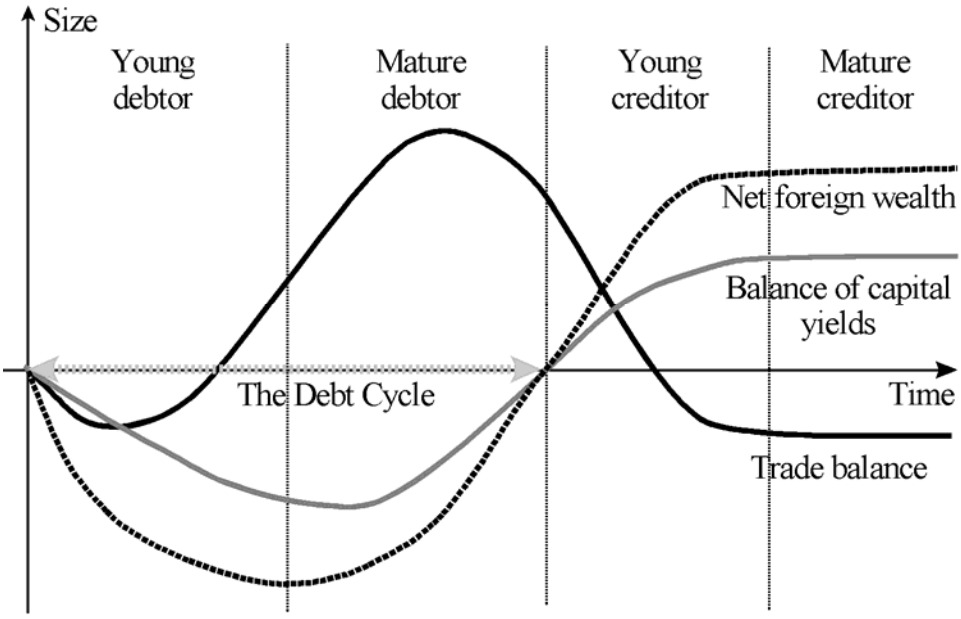
An alternative view suggests that rational governments would choose a level of public debt which is likely to increase the welfare in the economy in the long run. This can be illustrated with the theory of the debt cycle.[6] It is based on the intertemporal approach to the balance of payments, implying that the capital account is driven by saving-investment decision. As an aggregate result of individual as well as official foreign borrowing or lending a current account balance occurs (Obstfeld and Rogoff 1994). In the longer run, countries may undergo a debt cycle (Kindleberger 1963, pp. 458-461, Siebert 1987 and 1989). The theory of the debt cycle distinguishes several stages of development on the basis of the net foreign wealth position and thereby links development to the balance of payments. The country (or its individuals and firms) borrows from abroad. This leads to capital inflows that are (fully or partly) invested into yield achieving entrepreneurial activities. Thus, the financial budget

6. Note that this theory does not distinguish between public and private borrowing. It is rather based on national accounting.

constraint is shifted outwards.[7] If successful, these activities lead to future sales abroad, with which the country repays the debt.

During the debt cycle, a country goes through four stages with respect to its net foreign position (Figure 1).[8] First, the country builds up a negative foreign wealth position (phase I and II). As young debtor country (phase I), the country runs a net capital inflow, a trade deficit and a deficit in the balance of capital yields (i.e. a current account deficit) because foreigners demand a return on their net assets. The capital inflows are invested, so that the country is able to increase future sales abroad and to finance further investment from own savings.

Figure 1. The debt cycle in theory



Source: Kindleberger (1963, p. 460), own modifications.

Government debt does not earn a profit but can be well invested to enable tax-paying firms to achieve yields. Examples for such public investment are roads, ports, airports, hospitals, schools and the like. The capacity built up with private investment is used to produce internationally competitive goods and services. Then the country becomes a mature debtor

7. This is one reason for concentrating on foreign debt and neglecting domestic loans to the government. The other is that foreign borrowing may reduce constraints for the government to follow their political targets.
8. Kindleberger (1963, p. 460) distinguishes six phases by adding one phase for the debtor country and one for the creditor country respectively. The additional information of this extension, however, is limited.

country, running a trade surplus to diminish its liabilities. During this phase (II), the country already exports capital. Once, the net wealth position is positive, the country becomes a young (III) and later a matured creditor (IV) country. In the last phase, the country does no longer export or import capital, but runs a trade deficit, financed by capital income inflows.

2.2 The path of the economy over the loan cycle: The concept of a good development

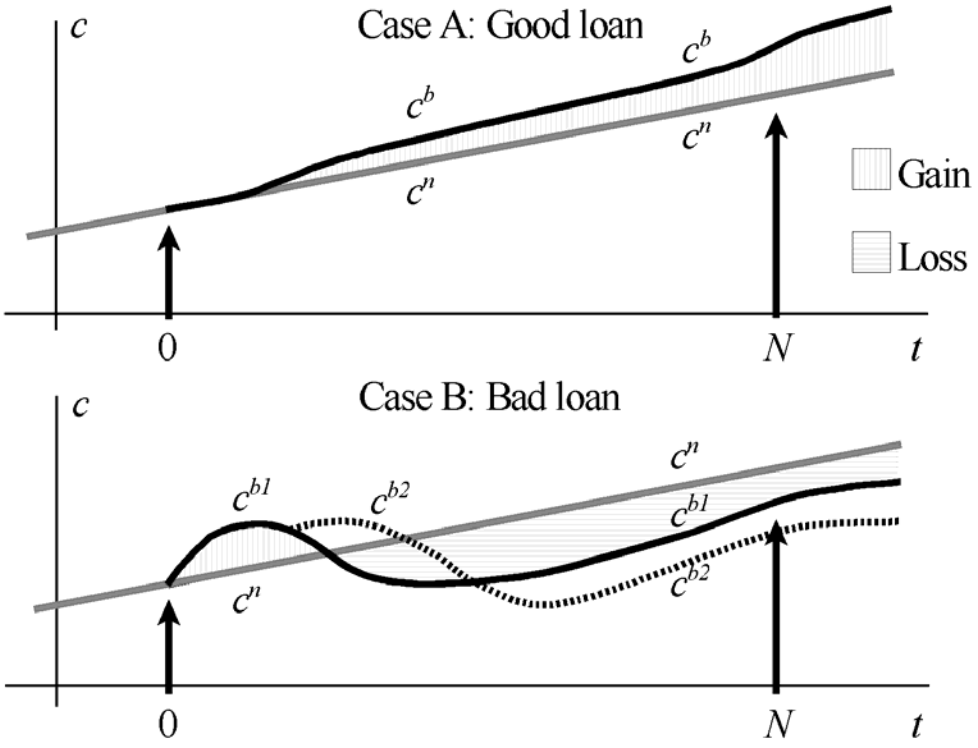
How does this foreign debt cycle translate into higher growth? Consider an economy with no borrowing has a consumption path with a constant (low) growth rate δ: $c_t^n = c_0 e^{\delta t}$. Thanks to public or publicly granted borrowing the consumption path becomes: c_t^b. We define the excess consumption as $\eta_t = c_t^b - c_t^n$. The welfare effect of the debt is thus:

$w = \int_0^\infty \eta_t e^{-\rho t} dt$, where ρ is the discount rate.

As long as $\eta_t = c_t^b - c_t^n > 0$, welfare increases net of debt repayment and interest. Thus the path of consumption corresponding to Figure 1 is likely to look as Case A on Figure 2. In the beginning while the investments into infrastructure are made, there is no gain in consumption, but it does not fall, as the savings financing the investments is from external sources. Then production increases – and it does so with more than the servicing of the debt, so consumption is higher, though not by much. However, when the debt is paid at time *N,* consumption jumps upward. In this case the consumption path is always as good as or better than the no borrowing path – the whole area between the two paths is a gain: $\eta_t = c_t^b - c_t^n > 0$.

Case B appears to be more common – here the loan is squandered, so that the path of c^b falls permanently below the c^n-path from some point. However, not least because the loans add to purchasing power in the country, it is almost inevitable that there is a period of consumption above the c^n-path in the beginning while the borrowed funds are squandered, so we have to weight the gain and the loss together. In the analysis of welfare we take it that the weights that ought to apply to the welfare weighting with a small rate of discount, so that in case B it is clearly a bad outcome. The Figure for case B, has a second loan included as a dotted line. It illustrates how one bad loan may necessitate another, till a real debt crisis results.

Figure 2. The path of consumption with no borrowing and with borrowing



2.3. Drivers of growth: empirical evidence

We now take a quick look at the empirical picture about the determinants of growth, with a special view on debt. Recent studies of public (domestic and foreign) debt and economic show that a) public debt is negatively correlated with subsequent economic long-term growth and that b) higher debt is stronger reducing growth. The focus of the studies is on long-term growth, which of course is different to our debt-cycle approach. There, we would expect some positive medium-term effects of debt – if proper invested – on growth. On the other hand, the accumulation of debt may create debt overhang. We will discuss these opposing hypotheses after the next section.

However, as debt is not the main driver of economic growth, we take a short look at other determinants of economic growth in the empirical literature. Sala-I-Martin et al. (2004) analyse 67 in the literature most prominently used long-term growth determining variables with a Bayesian approach (BACE). Of these, 18 variables show a robust and significant correlation with growth. These variables comprise three regional dummies (not much theory behind them), Spanish colony dummy, three religion fractions, six state variables at the beginning of the 1960s (primary schooling, population density at coasts, life expectancy, Malaria prevalence, GDP 1960 and government consumption share 1960s) investment price,

tropical land share, mining share in GDP (interestingly positive), ethno-linguistic fractionalization and the number of years the country is open. The main institutional variables they use (political rights, civil liberties, socialist and capitalist dummies) are not significant. In their study, Glaeser et al. (2004) discuss the role of institutions for economic growth. They show that a) institutional measures only rarely measure institutions but rather policies (an observation we do not discuss here), that b) the causal link from good institutions (policies) to higher growth is not clear and may well be just reverse, that c) there is a correlation between good institutions and growth and that d) education is important for economic growth, something confirmed by Sala-I-Martin et al. (2004).

The first upshot of this evidence is that public debt indeed is on average growth adverse, but not for all countries, as there are good debt cases (GDs), which require an explanation. The second relevant observation here is that institutions or policies constraining governments are growth enhancing. Taken together, these two aspects lead to the main question of this paper. Under which conditions are developing countries able to generate growth with the help of public debt? To approach an answer, we next discuss the political economy of public debt.

2.4 Political economy considerations: the cost of the loan at time t = 0

Assume that country *B* has the option to borrow $ *L* on the international market at the annual real rate of interest, *r*. We assume that the loan is fully fungible, so it provides the government B_G with the amount *L* to use, as it pleases. To simplify, assume that the loan runs *T* years, and then it has to be paid in full. We take it that the rate of exchange is adjusted, so that also B has the same inflation rate as the world and we set it at zero, so that everything is real. The decision on the loan is taken, at time $t = 0$, by the government of B, G_B. It has the rate of discount ρ, which differs from the real rate of interest: $\rho \neq r$. This is precisely where time inconsistency enters. Calculated at the time the loan is signed, $t = 0$, the cost of the loan, for the government, G_B, per $ is:

$$\beta = e^{-\rho T} + r\int_0^T e^{-\rho t} dt.$$

The first term is the cost of repayment and the second is the costs of the interest to be paid. A simple calculation shows:

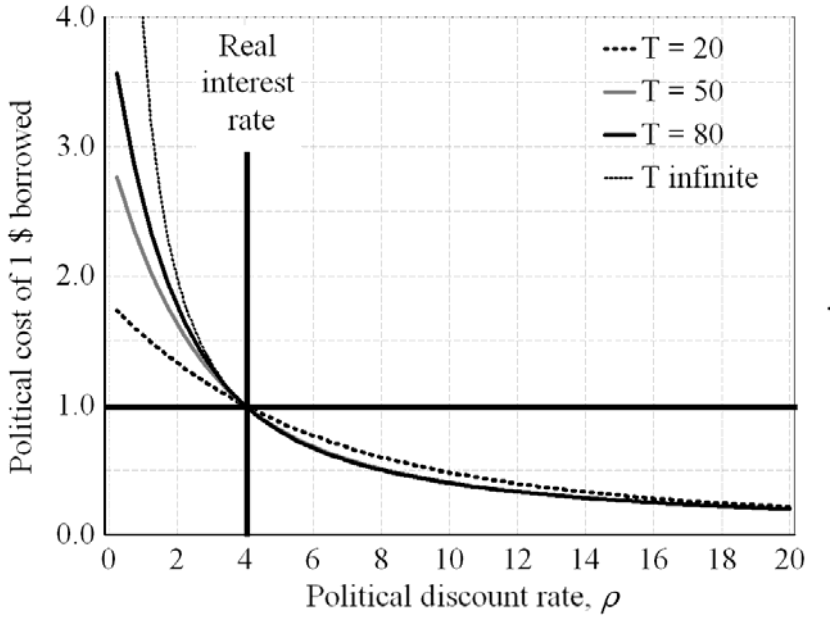
(1) $$\beta = e^{-\rho T} + r\left[\frac{e^{-\rho t}}{-\rho}\right]_0^T = e^{-\rho T} + \frac{r}{\rho} - \frac{r}{\rho}e^{-\rho T} = z + (1-z)e^{-\rho T}, \text{ where } z = r/\rho$$

The values of β for a range of z's are shown on Figure 3. Note that $\beta > 1$, if $z < 1$; $\beta = 1$, if $z = 1$; and $\beta < 1$, if $z > 1$. It is also obvious from formula (1).

Note furthermore from the formula that when T rises the second term quickly vanishes. It does not matter how long the loan runs if the politicians are myopic anyhow. This is also illustrated on Figure 3, as the line for T infinite, where $\beta = z$.

Many studies of political decision processes show that they are myopic.[9] Political pressures are big and power uncertain. Thus we can assume that ρ is substantial. It is important that this predicts that $\rho > r$, and thus that $z < 1$.

Figure 3. The political cost per $ of a loan, at time $t = 0$



Notes: The curves are calculated from $\beta = z + (1-z)e^{-\rho T}$, using the interest rate $r = 0.04$. For $T = \infty, \beta = z$.

The key observation is that when the political system is myopic the cost ß of a $ borrowed is smaller than a $, because the cost of repayment has to be borne far into the future. Consequently, the interesting part of the figure is the right hand side, where G_B is myopic.

9. This is a main result, both from the literature on vote and popularity functions, and on political business cycles, see e.g. Paldam (1997) and Paldam (2003) for surveys.

Already for the political discount rate, of $\rho = 10\%$ the cost of borrowing one \$ is 50 cents for a loan, with $T = 20$, and for more realistic rates such as $\rho = 20\%$ the cost is 25 cents, and it barely matters if T is 20, 50 or 80 years.[10] For really myopic rates such as 40 or 50% we are down to cost estimates of 15 to 10 cents.

Let us then imagine that the political costs of a loan is \$ 0.25 per \$ borrowed. Thus the borrowing government has a surplus of \$ 0.75 for each \$ borrowed. Borrowed money is cheap money for the government. Contrast this with the political costs of a tax revenue that has to be squeezed out of people.

People should control governments so that they act wisely. However, we know that people are as politically myopic as governments, and they are not likely to take much notice of an international loan, as taxes remain constant and the borrowing does not refer to domestic savings. They are content if they get welfare enhancing public consumption for some part, α, of the amount. Thus the government "profit" from each \$ borrowed is:

(2) $\gamma = 1 - (\alpha + \beta) > 0$

When the government borrows \$ L it thus has a profit of \$ γL. The reader may contemplate what the government will do with that profit. It obviously depends upon the government. We distinguish two prototypes of government, which we call MS government and WB government.

An MS (myopic and selfish) government may simply pocket the money. If the government behaves as a roving bandit, it wants to put as much of the money in a safe heaven, so that it will provide a nice pension, when it has to leave the country. Apart from pocketing the money it may also be used for items of conspicuous consumption, such as a new road to the airport, a couple of fighter planes or even castles at the Loire, etc. It is also possible that the government is faced with strong political pressures from groups that can be bought off, for instance huge urban parts of the population which are in need for social spending. Thus the profit comes handy, and the government will feel that the money is spent well. And, of course, it might well be that the government is able to survive due to these payments, which do not change the long-run growth path. Thus, it is likely that little extra development results from the loan. And when it has to be paid back it hinders growth. In cases where the loans are paid back gradually, it will appear as an annual debt service payment that eats taxes, and hence undermines the budget. Thus, αL may increase C_t, but does

10. If governments can roll over loans, T has to be taken as infinite.

not increase the growth path of consumption with growth rate δ. Rather it decreases. As a consequence, debt finally decreases consumption possibilities as $\eta_t = c_t^d - c_t^{old} < 0$. Society is worse off due to debt. For this to happen, it is important to notice that the people are myopic, too. Otherwise they may be able to force government to become a WB government.

Now assume a non-myopic public and a WB government. Then the debt may be used in a way to increase the long run consumption rate δ. The distinction between an MS government and a WB government can be made when looking at the political discount rate and the real interest rate again. A WB government will try to meet the condition $r > \rho$, leading to $z > 1$. In this case, the government is interested in investing into projects, with long-run returns exceeding the exogenously given *r*. In other words, there is an inverse relation between the political discount rate ρ and the return of investments. A WB government with long-term orientation is looking for investments with high benefit/cost-ratios, which in the long-run will increase the growth rate of consumption δ.

However; this benevolence cannot be expected without according restrictions for the government. Why should a government be benevolent? On the same token: Why should the public be non-myopic? If the government is able to keep the public uninformed about the true economic long-run cost of myopic and selfish behavior, i.e. if it exploits asymmetric information, or if it is able to oppress the public, it has high incentives to behave as an MS-government. If however, the public is able to learn, the government rather can act as a WB-government. The latter reduces the political discount rate ρ. Thus, the discount rate is driven by restrictions for politicians.

3. A look at all cases: A weak negative relation

The data used are all public and publicly guaranteed debt as a share of GNI from 1970 to 2004, from the WDI. The real growth rates are from the Maddison data set. We consider all countries designated as a LDC in the WDI. In these data we have found 443 *cases* of two data: The borrowing in one (non-overlapping) five year period and of economic growth in the next decade.[11] The periods and the number of cases found are listed in Table 1.

3.1 All 443 observations and two division

The cases found are divided by period and within each period in two ways, which are used in the rest of the paper:

By growth, g: It is *good* ($g > 2\%$), *intermediate* ($2\% \geq g \geq 1\%$) and *bad* ($g < 1\%$).
By borrowing, b: *all* and *pos*itive ($b > 5\%$).

Note that borrowing is calculated as the difference between the debt burden at the last year of the period and the year before the period. Some countries have falling GDP and thus debt burdens rise, but by setting b > 5% all cases counted as *pos* are actual cases of borrowing.

Figure 4 show the scatter of the two data in the 443 cases. The average growth rate at zero debt is very close to 1½%. Hence the chose 1% and 2% as our cut off points: The two horizontal dotted lines on the figure show the selection by growth, and the vertical dotted line show the cut-off point for the pos-debt cases.

Table 1. Counts of all 443 observations and the 263 cases with borrowing

	P1		P2		P3		P4		P5		All		In %	
Borrowing, b_{-1}	1971/75		1976/80		1981/85		1986/90		1991/95					
Growth, g	1975/84		1980/89		1985/94		1990/99		1995/04					
	All	Pos	All	Pos	All	Pos	All	Pos	All	Pos	All	Pos	All	Pos
Good growth	25	8	15	9	24	20	38	18	49	19	151	74	34.1	28.1
Intermediate	11	4	13	11	17	16	12	7	24	7	77	45	17.4	17.1
Bad growth	40	20	50	43	46	40	47	28	32	13	215	144	48.5	54.8
All cases	76	32	78	63	87	76	97	53	105	39	443	263	100	100

Note: see text.

11. The borrowing periods are non-overlapping, but each growth decades overlaps with 50% to the next period. We expect to be able to add one more period before this paper is published

Figure 4. A scatter of the 443 cases, and the choice of good and bad cases

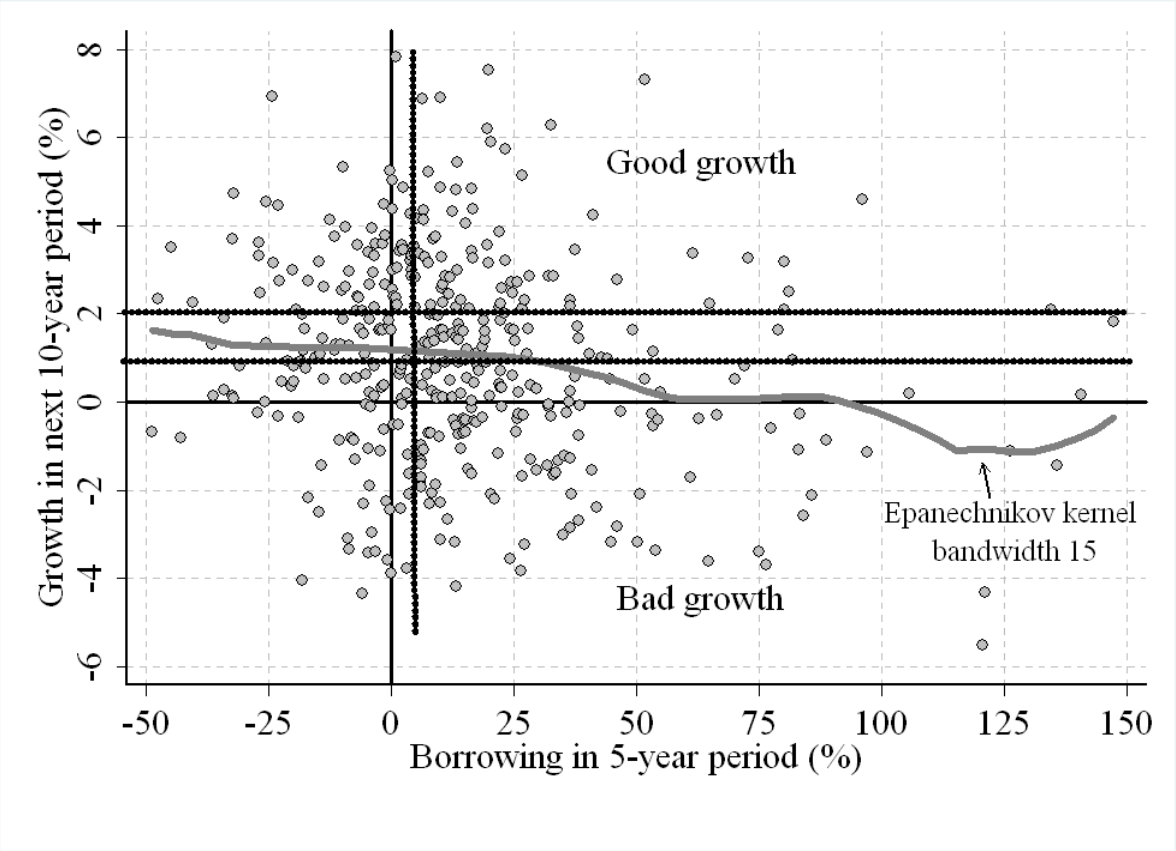


Figure 4 includes a kernel-regression (with the properties indicated). It shows the best continuous moving average curve with a fixed bandwidth. The curve appears to be fairly linear throughout the full range with a downward slope of about -0.1 to -0.15 per 10 pp borrowing. It might have some movements around the line for very high *b*-values, but here it is supported by very few observations, so these movements are not reliable. However, it does seem that the curve has a smaller slope for $b < 25\%$.

Several authors – notably Reinhart and Rogoff (2010) – identify a vertical part from zero borrowing to some point X, before the curve turns down. We may say that Figure 4 show that $X \approx 0.25$, so that it matters little for growth to increase debt by 25% in the next 5-year period, but it is not obvious if the flat section is significantly different from the simple linear trend. The fluctuations in the kernel-curve for borrowings above 50% is supported by so few observations that they are certain to be insignificant. If the observations above 50% borrowings are disregarded the slope is smaller – clearly below -0.1.

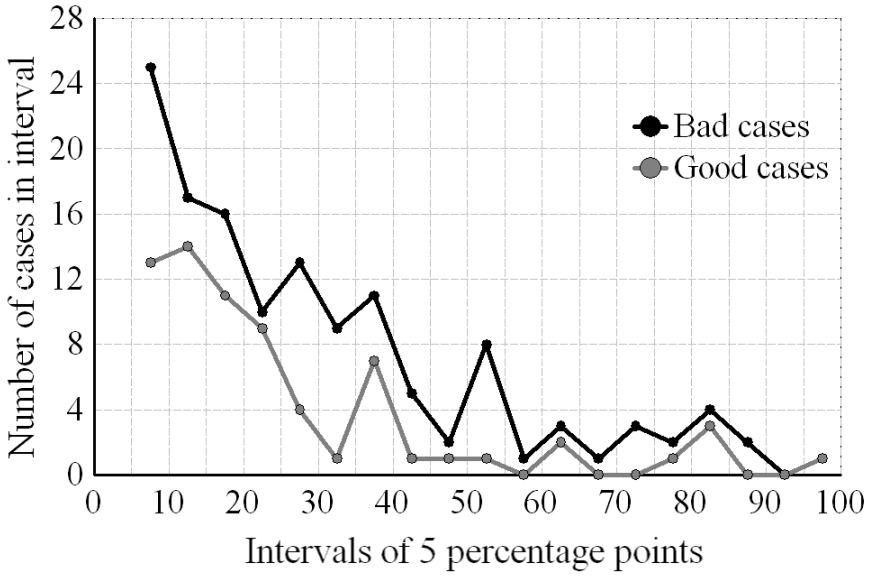
3.2 Do the frequencies of good and bad borrowing differ by the size of borrowing?

Table 1 show that there are twice as many bad as good cases. Figure 5 show the frequency distribution of good and bad debt increases. For borrowings between 5% and 10% we find 25

bad and 13 good cases. From 10% to 55% are 17 bad and 11 good cases, etc. The strange observation from Figure 5 is that the relation between and the bad and the good cases are fairly constant throughout the range.

One of the ideas we had when we stated this project was that optimal debt acquisition existed, so that it paid to borrow up to a point – but if too much debt was incurred it would create trouble in the longer run. One may imagine that debt could overwhelm the decision process and run away. So we expected to find two very different curves where the bad cases peaked much later than the good debt cases. However, the lines are virtually proportional. We have tested this property by estimating a slope in the relative ratio. It is not significant.

Figure 5. The frequencies of borrowings from 5% and up, in 20 intervals



3.3 Some linear regressions generating orders of magnitudes: All observations

Table 2 shows the results of a set of regression between debt and growth. Table 3 gives estimates of relation (1) for the good and the bad growth cases

The panel consists of 443 observations for i = 108 countries and t = 5 periods. Two equations are estimated:

(1) $g_{it}^{10} = \alpha + \beta_1 d_{it-1}^{5} + u_{it}$ or

(2) $g_{it}^{10} = \alpha + \beta_2 d_{it-1}^{5} + \gamma g_{it-1}^{5} + v_{it}$, where $\beta_1 \approx \beta_2 / (1-\gamma)$

Here g^n is the average real growth rate per capita for a period of n = 5, 10 years, and, d^5 is the debt share increase over a 5-year period. Model (2) is the dynamic version of model (1) that gives a check of the estimated effect β_1. Due to the lags in (2) we can use only 435 observations in the regressions.

Table 2. The growth effect of 10% borrowing

T-ratios based upon	OLS	GLS RE	FE	FE time
Robust standard errors	(1)	(2)	(3)	(4)
		Estimates of equation (1)		
Growth effect: $10\cdot\beta_1$	**-0.050**	**-0.043**	-0.013	**-0.040**
t-ratio	(-2.6)	(-2.4)	(-0.7)	(-2.2)
R^2 within	-	0.006	0.002	0.006
R^2 between	-	0.270	0.051	0.270
R^2 overall	0.010	0.010	0.010	0.010
N	443	443	443	443
Nr of random/fixed effects		5	108	5
	(5)	(6)	(7)	(8)
		Estimates of equation (2)		
Growth effect: $10\cdot\beta_2$	***-0.023***	***-0.019***	-0.015	-0.013
t-ratio	(-1.7)	(-1.8)	(-0.9)	(-1.0)
Growth in same period as debt	**0.296**	0.064	-0.027	**0.318**
t-ratio	(5.3)	(1.3)	(-0.6)	(5.5)
Long-run effect, $10\cdot\beta_2/(1-\gamma)$	**-0.033**	***-0.020***	-0.015	***-0.019***
R^2 within	-	0.000	0.003	0.088
R^2 between	-	0.200	0.052	0.014
R^2 overall	0.080	0.071	0.013	0.080
N	435	435	435	435
Nr of random/fixed effects		5	108	5

Note: OLS is ordinary least square, GLS is generalized least square, RE and FE are random and fixed effects. Regressions (2), (3) and (4) use the panel structure, while it is disregarded in (1). The loss of 1.8% of the observation between the upper and the lower panel has no effect on three first digits of the estimates as reported.

The regressions in Table 2 are simple, but they already tell a story. As expected from Figure 4 and in accordance with the literature there is a negative, but not always significant relation between debt accumulation in one five year period and the subsequent growth in the coming decade. The (numerically) largest coefficient found on debt is -0.05. This is only 1/3 of the effect assessed from Figure 4 – the difference is due to the concentration of observations between borrowings -5% and 30% where the kernel-curve does have a rather flat slope.

This imply that even if debt goes up by 100% of GDP it will still only cause a loss of average growth in the next decade of 0.5 pp per year. Once the equation contains fixed effects for countries it vanishes, and it falls if the lagged endogenous is included. Also, we note that the R^2-score is only 0.010. The variation in borrowing is not a major factor explaining the growth rate.

The only really strong result in Table 2 is that the sign to the debt burden is negative in all 8 regressions. So, in line with the recent literature we conclude that the effect of debt acquisition is negative, but rather small. This is might be due to the many relief packages received by the borrowers. While we can calculate the dire effects of high indebtedness – the world is not so gruesome as to actually enforce these effects.

3.4 A division in good and bad cases

Table 3 is calculated from the data of Figure 4, so that we consider the cases with growth rates over 2% and under 1% are analyzed separately, and in the bottom part of the table we look only at the pos cases with borrowing b > 5%. The first observation is the R^2-scores are still very low. The second observation is that all eight estimates are negative, but only one passes the usual criteria for statistical significance. The bad or good cases do not differ systematically.

Table 3. Regression (1) from Table 2 for good and bad cases

T-ratios are based upon	Good growth > 2%		Bad growth < 1%	
Robust standard errors	OLS, all	OLS, -3	OLS, all	OLS, -2
	(1)	(2)	(3)	(4)
	For all values of borrowing			
Growth effect, $10 \cdot \beta_1$	***-0.050***	-0.026	-0.024	**-0.075**
t-ratio	(-1.8)	(-1.2)	(-1.1)	(-2.5)
R^2	0.003	0.007	0.011	0.030
N	151	148	215	213
	(5)	(6)	(7)	(8)
	For borrowing b > 5%			
Growth effect, $10 \cdot \beta_1$	-0.71	-0.040	-0.013	-0.63
t-ratio	(-1.6)	(-1.4)	(-0.8)	(-1.4)
R^2	0.008	0.015	0.004	0.017
N	74	73	144	142

Note: See Table 2 – only the debt effect reported.

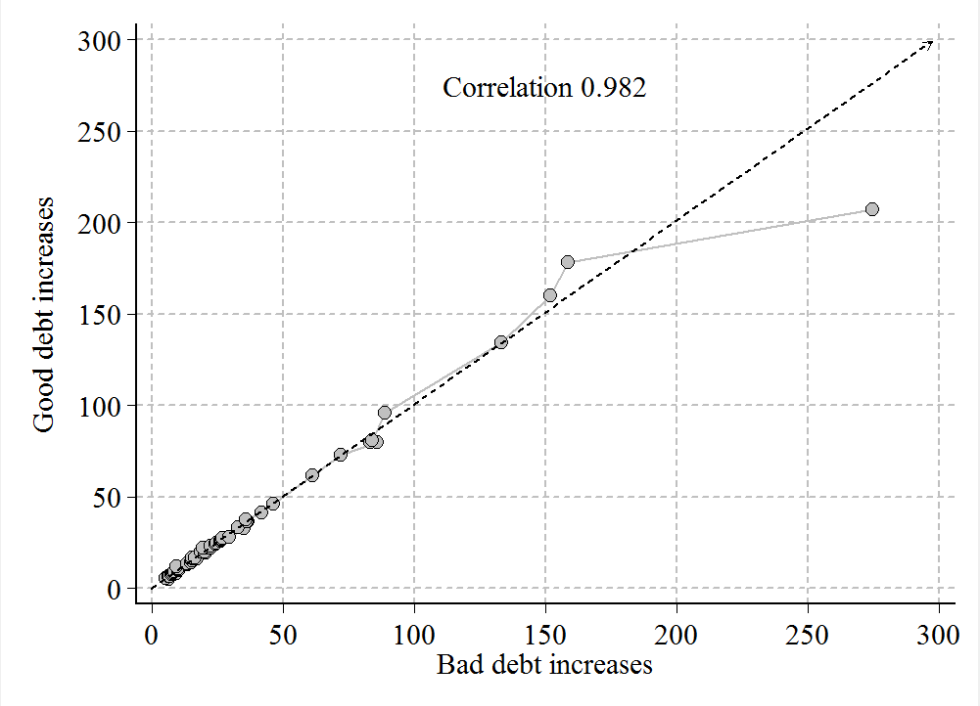
3.6 The choice of the 59 pairs of twins

The data holds 74 good cases. For each of these cases we want to choose a twin. We demand that it fulfills two criteria: (i) It is for the same period; and (ii) the debt share increase is the closest one, which is still within 30%. Over most of the range the difference between the two cases is just a couple of percentage points, but to get pairs of cases with borrowing above 100% we have accepted twins with a difference up to 30%.

Table 4. Count of countries for the 59 twins

Countries with	All cases	All good	All bad	Mixed
1 case	39	22	17	
2 cases	23	7	11	5
3 cases	11	5	4	2
Number countries	73	34	32	7

Figure 6. The scatter of borrowings in the 59 matching pairs



By criteria (i) we lose six good cases and by (ii) we lose nine cases, so we end up with 59 twins. As will be demonstrated in section 5 the selection gives very much the same average. Figure 6 shows the scatter of the pairs of borrowing in the two cases. Most of tests use the

logarithms to borrowing, which makes the scatter around the average line look even better, and also the correlation increases to 0.997. The appendix lists the 59 pairs.

The 59 twins are 118 cases. As seen in Table 4 the cases are from 73 countries. Of these countries 39 have one case only 23 have 2 of which 5 are one good and one bad. In 11 countries there are 3 cases, of which 2 have both bad and good cases.

4. A set of hypotheses

The empirical strategy is made to use the difference between the between group variation and the within groups variation. This is used to analyze the causality of the relations, vs independence. By independence we mean that the variation found is independent of the borrowing.

4.2 Two key dimensions in the empirical strategy

The between group test are easy to do as the groups are controlled for borrowing, as each pair has the same borrowing relatively. They are also controlled for period as each pair is from the same period. However, measured by the growth rate one group is successful and the other unsuccessful. We do find a clear pattern of between group differences. They might have two explanations: (1) The good group puts the loans taken to a good use, and the bad group squander the loans. (2) The difference between the groups are independent of loans taken.

The tests for the between groups differences are done by classical methods of statistics on each indicator – the results are presented in Tables 7 and 8. Also, everything is controlled by distribution free tests. Also we document the size of the effects – the strong pattern is not just statistically significant, but has a substantial size.

The analysis of dependence/independence is done on the within group variations. The idea is that if borrowing is important for the pattern of the between-group variation then surely the size of the borrowing will matter. That is, if we correlate the outcome within the group with the size of the borrowing it should *increase* the effect found in the between group analysis.

Table 5 divide the indicators analyzed in three groups H1, economic development, H2, institutions, and H3, miscellaneous. The next two subsections consider these groups.

4.3 Borrowing and H1 economic development and H3 miscellaneous variables

We consider both borrowing dependence and independence. As regards economic development the case is clear: Since the choice of the groups is based on a growth difference we know that development is better for all growth related variables in the good than in the bad group: Thus we expect the investment share to differ.

Also we expect income to be higher – hopefully the difference in income is small, but it appears inevitable that income is higher in the successful countries. Given that income is higher we also expect that urbanization is higher.

Table 5. The effect on growth, between groups and within groups

Indicators variable see Appendix for exact definition and sources	Between groups	Within good	Within bad
H1 Economic development	+	+	−
H1.1 Income, logarithm (natural) to GDP per capita	+	+	−
H1.2 Investment share of GDP (in %)	+	+	−
H1.3 The degree of urbanization (in %)	+	+	−
H1.4 The degree of openness (X + M)/Y (in %)	+	+	−
H2 Economic and political institutions	+	+	+
H2.1 Economic Freedom Index from Fraser Institute: 3 variables Rising index is more freedom (scale 1 to 10)	+	+	+
H2.2 The Political Rights indicator from the Gastil democracy index Falling index is more rights (scale 1 to 7)	−	−	−
H2.3 The Civil Liberties indicator from the Gastil democracy index Falling index is more rights (scale 1 to 7)	−	−	−
H2.4 The Polity index. Rising index is more democracy (scale −10 to +10)	+	+	+
H3.5 The Ethnic Fractionalization index	−	−	−
H3 Miscellaneous			
H3.1 Population. No expected effect	0	0	0
H3.2 Latitude, i.e., distance from equator	+	+	+
H3.3 Resource richness. Binary. Expectation resource curse	−	−	−

We know that more open countries grow more, so we expect that openness is higher in the good cases. Also Part of the borrowing may have been to alleviate the short run costs of adjustment, such as the borrowing related to structural adjustment. That should cause the openness to be higher in the good cases.

When we consider the within group variation, we expect that the more the good countries borrow the better it goes, and the more the bad countries borrow the worse it goes. If there is independence, there should be no within group variation. So the correlations between borrowing and the four development indicators should be zero.

The three indicators in the miscellaneous group are population, latitude and a dummy for resource richness. As regards population we know that there is no relation between economic growth and the size of the population, so we expect to find no effect here.

Latitude is a simple measure of distance from the equator. In line with many studies, such as Gallup et al (1999), we assume that countries closer to equator have a development disadvantage. Finally we take the evidence support the resource curse theory, whereby countries with resources to develop less well.

Both for the latitude and the resource variable we expect the within group variation to be the same as the between group variation.

4.4 Borrowing and H2 economic and political institutions

The general idea is that the countries with "good" institutions develop faster and use the funds it borrows better.

In connection with financial crises such as the Asian 1997-99, and the recent one 2008-10, many have called for more regulation, so perhaps we should expect that the higher economic freedom would appear in the bad cases. However, most of what we know let us to expect the opposite result: Thus for the economic freedom index we expect that the more liberal (in the European sense) the countries are the faster they develop. Countries mired in regulation are also much more likely to us borrowed money as a stopgap measure to delay reforms, to finance SOEs (state owned enterprises) that eats money, etc. This is also the likely effect within groups.

As regards the first difference to the economic freedom index we expect that countries may borrow to help overcoming the short-run social costs of liberalizations. Thus if

It is more interesting to analyze the effect is of political institutions; we study effect using the standard democracy indices. We know that these indices are independent of the growth rate, see Doucouliagos and Ulubasoglu (2008). However, as the good countries are richer and that will make them a little more democratic, but at the income level of the countries analyzed the effect should be low, see Gundlach and Paldam (2009, 2011).

The main reason to expect a connection to democracy in the between results is that democratic systems are more transparent and it is more likely that rulers will come to answer for their act, including the use of funds borrowed. Thus we expect that the good cases have more democracy: That is, we expect the first difference series to be more positive in the good cases than in the bad ones.

Finally we expect the ethnic fractionalization index to be higher in the bad cases, as it is a factor making good economic policies more difficult to implement.

5. Comparing the 59 twins

The statistical analysis is reported in three tables: Table 6 gives some descriptive statistics based on the two groups. Table 7 analyzes the differences between groups, and finally Table 8 looks at the correlations between borrowing and the variables within the two groups.

Columns (1) to (3) are the same in all three tables (1) is series number, where the two D-series are the ones defining the groups, while the 13 H-series are the case characteristics that may differ. When a series has a non-normal distribution it is put in []-brackets and a logarithmic version is added. Note from column (3) that some of series misses observations. However, all calculation are made for so many observations as are available,

5.1 The cross-group descriptive statistics

Table 6 contains some descriptive statistics based on the two groups.

Colum (4) is a summary of the analysis of the normality of the distribution in Freytag and Paldam (2010). This analysis is rather bulky as each line summarizes 3 tests and a graph for each of the two series.[12] The tests done in columns (4) and (5) in Table 6 demands normality to be valid, but they are not very sensitive. If the test results are not very close to the test limits the tests can be trusted even in the cases where the normality is dubious.

Colums (5) and (6) give the averages and the standard errors for the good and the bad cases. The differences between the pairs are given in column (7). We first note that the difference for the two D-series are as they should be. The two averages calculated for borrowing and the log to borrowing are almost the same, while the growth rates differ very much. They are chosen to differ by more than 1 pp (percentage point) and they actually differ by 4.6 pp.

For the remaining variable Table 5 predict the sign of all differences except population, and in all these cases the sign is precisely as predicted. For population the difference seems large, but then when we take the log, to make the distribution normal – and it does – the difference become tiny. Thus, the size of the population does not matter.

We would also have liked income to be irrelevant, but as argued in section 4 this was unlikely to happen, and it did not. From the various averages the incomes are about 50% higher in the countries of good group than in the bad group.

12. The normality tests are (i) the skewness/kurtosis, (ii) the Shapiro-Wilk W and (iii) the Shapiro-Francia W'. They disagree quite often, and we have also looked at the probit diagrams. Perfect normality by all tests are quite rare, but in most cases we get a reasonably normal looking probit curve either for the series itself or after a logarithmic transformation as indicated.

Table 6. Descriptive statistics for the variables

(1)	(2) Variable	(3) N	(4) Distribution Is normal	(5) Good cases Average (s.e.)	(6) Bad cases Average (s.e.)	(7) Difference Diff (s.e.)
			D: Selection of cases: Results are check of selection			
[D1]	Borrowing	59	No	35.42 (5.55)	36.00 (6.07)	-0.58 (4.10)
D1	Ln borrowing	59	OK	3.108 (0.12)	3.103 (0.12)	0.006 (0.084)
D2	Growth	59	Dubious	3.56 (0.17)	-1.08 (0.22)	**4.64** (0.25)
			H1: Economic development indicators			
[H1.1]	GDP per capita	59	No	2845 (277)	1982 (301)	**863** (208)
H1.1	Income (ln GDP/ca)	59	Dubious	7.668 (0.104)	7.171 (0.109)	**0.497** (0.079)
H1.2	Investment share	59	Dubious	22.03 (1.65)	13.84 (1.12)	**8.18** (1.062)
[H1.3]	Urbanization	59	Dubious	34.86 (2.24)	33.08 (2.68)	1.77 (1.74)
H1.3	Ln urbanization	59	OK	3.428 (0.067)	3.304 (0.086)	**0.125** (0.055)
[H1.4]	Openness	59	Dubious	74.96 (5.35)	58.52 (4.04)	**16.44** (3.42)
H1.4	Ln openness	59	OK	4.140 (0.084)	3.946 (0.065)	**0.194** (0.054)
			H2: Economic and political institutions			
H2.1.1	Econ Free 5	36	OK	5.53 (0.16)	4.86 (0.16)	**0.67** (0.12)
H2.1.2	Econ Free 10	36	OK	5.95 (0.16)	4.87 (0.14)	**1.07** (0.21)
H2.1.3	ΔEco free	36	Dubious	0.42 (0.13)	0.02 (0.20)	**0.40** (0.12)
H2.2	Gastil PR	56	No	3.97 (0.24)	5.09 (0.21)	**-1.12** (0.17)
H2.3	Gastil CL	56	OK	4.15 (0.21)	4.97 (0.17)	**-0.82** (0.15)
[H2.3]	Polity	46	No	-0.72 (0.90)	-3.96 (0.81)	**3.24** (0.62)
H2.4	Ethnic fractionalization	48	Dubious	49.4 (4.24)	51.1 (5.17)	-1.69 (3.33)
			H3: Miscellaneous			
[H3.1]	Population (in mio)	59	No	63.98 (25.74)	12.50 (2.52)	**51.48** (13.09)
H3.1	Ln populations	59	OK	8.658 (0.316)	8.536 (0.18)	0.122 (0.183)
H3.2	Latitude	59	OK	17.37 (1.47)	10.75 (0.86)	**6.62** (0.90)
H3.3	Natural resources [a)]	59	Binary	Y 21 N 38	Y 38 N 21	**-17** 17

Note: The t-ratios use the combined s.e. The tests in Table 7 used the one for all observations. (a) For the binary variable H3.3 the numbers are the marginal counts. The bolded differences in column (7) are more than twice the standard error (s.e.).

The test in column (7) is significant in most cases, but the test is perhaps too good, in the sense that the s.e. used is too small.

6.2 The between group tests

Table 7 gives the more appropriate tests. They are reported in columns (6) and (7). Column (6) is the classical t-test, while (7) is a distribution-free binominal test. For the t-test to be valid the variance has to be the same in the two groups and to be normally distributed.

Table 7. Test for differences between group (e.i., homogeneity rejected)

(1)	(2) Variable	(3) N	(4) Expected Table 3	(5) Variances equal	(6) Pairwise means equal T-test	(7) Binominal	(8) Hypothesis confirmed
			D: Selection of cases: Results are check of selection				
[D1]	Borrowing	59	Zero	49.69	[31.8]	11.7 (2s)	[Yes]
D1	Ln borrowing	59	Zero	92.78	27.5		Yes
D2	Growth	59	+	7.39	**0.00**	**0.00** (1s)	Yes
			H1: Economic development indicators				
[H1.1]	GDP per capita	59	+	53.85	[2.64]	**0.00** (1s)	[Yes]
H1.1	Income (ln GDP/cap)	59	+	73.19	**0.14**		Yes
H1.2	Investment share	59	+	**0.42**	**0.01**	**0.08** (1s)	Yes
[H1.3]	Urbanization	59	+	17.25	[30.36]	17.91	No
H1.3	Ln urbanization	59	+	6.04	11.71		[Weak]
[H1.3]	Openness	59	+	**3.44**	[**0.53**]	14.88	[Weak]
H1.4	Ln openness	59	+	5.77	**3.66**		Maybe
			H2: Economic and political institutions				
H2.1.1	Econ Free 5	36	+	94.09	**0.19**	**0.84** (1s)	Yes
H2.1.2	Econ Free 10	36	+	42.83	**0.00**	**0.00** (1s)	Yes
H2.1.3	ΔEco free	36	+	**1.76**	**2.93**	8.77 (1s)	Maybe
H2.2	Gastil PR	56	−	23.08	**0.02**	**0.55** (1)	Yes
H2.3	Gastil CL	56	−	7.61	**0.18**	6.32 (1)	Yes
[H2.3]	Polity	46	+	46.89	**0.24**	14.00 (1)	Maybe
H2.4	Ethnic fractionalization	48	−	22.87	38.3	7.19 (1)	No
			H3: Miscellaneous				
[H3.1]	Population	59	0	**0**	[**2.62**]	79.5 (2s)	-
H3.1	Ln populations	59	0	**0.01**	37.4		Maybe
H3.2	Latitude	59	−	**0.01**	**0.01**	**2.40** (1)	Yes
H3.3	Natural resources	59	−	-	**0.16** [a)]	**0.08** (1) [b)]	Yes

Notes: (a) Standard $\chi^2(1)$-test on a (2*x*2)-table. (b) Binominal test of finding a difference in 17 of 59 cases.

The normality assumption is analyzed in Table 6 while the classical F-test for variance homogeneity is reported in column (5). It is rejected in the 5 rows where the results are bolded. The binomial test counts the number of confirmations of the hypotheses, and calculate the probability that the skewness found or something more skew, would occur by chance if the probability for confirmation is 50% in each case.

Column (8) is our assessment of the results of the test. "Yes" means that the hypothesis is confirmed. [Yes] means that it is confirmed, but the results of the classical tests are unreliable as the conditions for the test are not met. "Maybe" is where the results are just not strong enough.

6.3 The within groups tests

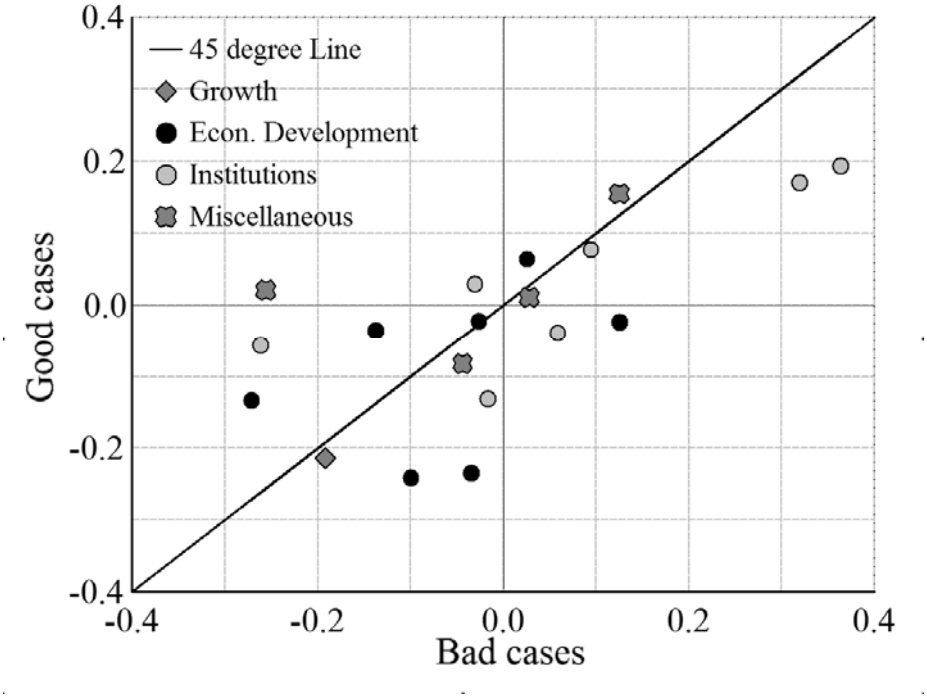
Columns (5) and (7) in Table 8 looks at the correlation between each of the indicators and the ln to borrowing. Columns (4) and (6) are the predictions from Table 5. The results are rather weak. The most interesting finding is that there is no clear difference between the correlations in column (5) and (7). Figure 7 compare the correlations from D2 to H3.3.

Table 8. Correlations

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Correlation between each indicator and ln borrowing				Correlation
			Within the good group		Within the bad group		Between
	Variable		Expected	Correlation	Expected	Correlation	Good and bad
				D: Variables used in selection of cases			
[D1]	Borrowing	59	+	[**0.882**]	+	[**0.859**]	[**0.982**]
D1	Ln borrowing	59	1	1	1	1	**0.997**
D2	Growth	59	+	-0.192	−	**-0.214**	0.058
				H1: Economic development indicators			
[H1.1]	GDP per capita	59	+	[-0.035]	−	[**-0.234**]	[-0.138]
H1.1	Income (ln GDP/cap)	59	+	-0.100	−	**-0.241**	-0.112
H1.2	Investment share	59	+	**-0.272**	−	-0.133	-0.085
[H1.3]	Urbanization	59	+	[0.125]	−	[-0.023]	[0.033]
H1.3	Ln urbanization	59	+	0.025	−	0.065	0.093
[H1.4]	Openness	59	+	[-0.138]	−	[-0.035]	[0.143]
H1.4	Ln Openness	59	+	-0.027	−	-0.022	-0.000
				H2: Economic and political institutions			
H2.1.1	Econ Free 5	36	+	-0.017	+	-0.131	0.073
H2.1.2	Econ Free 10	36	+	0.058	+	-0.038	0.144
H2.1.3	ΔEco free	36	+	0.094	+	0.078	**0.262**
H2.2	Gastil PR	56	−	**0.363**	−	0.194	0.131
H2.3	Gastil CL	56	−	**0.319**	−	0.171	0.028
[H2.3]	Polity	46	+	**-0.262**	+	-0.056	0.182
H2.4	Ethnic fractionalization	48	−	-0.031	−	0.030	**0.291**
				H3: Miscellaneous			
[H3.1]	Population	59	0	[**-0.256**]	0	[0.021]	[-0.058]
H3.1	Ln populations	59	0	0.028	0	0.011	-0.071
H3.2	Latitude	59	+	-0.044	+	-0.082	0.083
H3.3	Natural resources	59	−	0.125	−	0.155	0.109

Note: All correlations above the 5% level of 0.211 are bolded. If the distribution of the series is non-normal the coefficient is placed in []-brackets.

Figure 7. Comparing the correlations from columns (5) and (7) in Table 8



We are thus unable to confirm that the rulers in the good borrowing cases behave differently (within) the group than does the rulers in the bad borrowing cases.

6 Conclusions

The possibility to borrow abroad does increase the intertemporal choice set of rulers. The choices may include growth-enhancing policies, so that borrowing may cause a faster development. We confirm the well-known result that the average relation between borrowing and growth is negative, so that in average the borrowing choices made does decrease growth in the future. Fortunately the effect is very small.

It is possible that countries mainly borrow when they are in trouble, and that hence the causal relation between borrowing and growth is due to causality from low growth to borrowing. We have tried to control for this possibility by considering borrowing in one 5-year period and growth in the following 10-year period, but maybe we are dealing with trouble of long duration.

The innovation in the paper has been to compare a set of 59 good and bad twins. Each pair borrows the same, but where the good twin grew above average, while the bad twin grew below average. We have also controlled for the time period.

The main finding is that the countries in the good twin group are a bit more developed and had better institutions: In particular it had more economic and political freedom. Also we fund that the resource curse applied to that the good twins had less resources than the bad twins. Thus we find no evidence to support the popular notion that countries with more regulation handle their relations with the international capital markets better.

Also we found that the good twins were significantly more democratic than the bad ones.

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Appendix table A1a. The first 35 of the 59 pairs of debt cases

Nr	Per	The good cases			The bad cases		
		Country	Borrowing	Growth	Country	Borrowing	Growth
1	P4	Lesotho	5.06	4.17	Rwanda	6.25	0.39
2	P2	Malaysia	5.56	3.37	Ghana	5.30	-1.22
3	P1	Jordan	6.30	6.86	El Salvador	6.11	-1.41
4	P3	St. Vincent &	6.58	4.14	Sudan	6.08	-0.99
5	P3	India	6.76	3.30	Trinidad &	6.62	-1.09
6	P2	St. Vincent &	7.51	5.22	Kenya	7.37	0.64
7	P5	Belize	7.53	3.16	Djibouti	7.94	-2.56
8	P3	Bangladesh	8.01	2.20	Vanuatu	9.26	0.67
9	P4	Grenada	8.13	2.94	CAR	7.62	-0.69
10	P4	India	8.62	3.69	Venezuela	8.27	0.24
11	P4	St. Lucia	9.03	3.76	Oman	8.48	0.98
12	P1	Malaysia	9.88	4.86	Gabon	10.08	-3.12
13	P4	China	10.09	6.91	Chad	9.84	-0.79
14	P1	Algeria	10.31	3.29	Kenya	10.53	0.11
15	P2	Chad	10.98	2.86	Peru	9.88	-2.28
16	P3	Turkey	11.80	2.44	Guatemala	9.31	0.16
17	P2	Barbados	13.16	2.15	Sierra Leone	13.17	-0.55
18	P2	Thailand	13.32	5.44	Bangladesh	13.60	0.91
19	P3	Sri Lanka	13.41	2.98	Haiti	13.26	-4.19
20	P5	St. Vincent &	14.05	2.31	Niger	14.69	-0.39
21	P4	Sri Lanka	15.08	4.04	Kenya	15.24	-0.42
22	P2	Turkey	15.99	2.13	Zambia	16.39	-1.64
23	P3	Indonesia	16.37	4.84	CAR	15.71	-1.51
24	P5	Romania	16.43	3.42	Comoros	16.95	0.44
25	P1	Equatorial Guinea	16.61	4.38	Sudan	15.23	0.94
26	P1	Pakistan	16.72	3.27	Sierra Leone	16.34	0.02
27	P4	Indonesia	19.63	3.56	Cameroon	20.31	-2.10
28	P5	Mali	19.69	3.15	Madagascar	18.59	-0.37
29	P3	Thailand	19.92	7.52	Venezuela	19.93	0.13
30	P3	Botswana	21.97	3.87	Malawi	21.71	-1.17
31	P3	Colombia	22.03	2.15	Burundi	22.24	0.32
32	P5	Ghana	22.20	2.24	Mexico	19.38	0.91
33	P3	Mauritius	23.31	5.72	Swaziland	22.47	-0.12
34	P3	Lesotho	23.31	3.19	Swaziland	22.47	-0.12
35	P2	Sri Lanka	24.39	2.72	Niger	24.11	-3.56

Appendix table A1b. The last 24 of the 59 pairs of debt cases

Nr	Per	The good cases			The bad cases		
		Country	Borrowing	Growth	Country	Borrowing	Growth
36	P3	Solomon Islands	24.69	2.46	Mexico	24.67	0.60
37	P4	Uganda	25.60	2.70	Congo, Ki	26.23	-8.25
38	P3	Belize	26.59	5.12	Togo	26.57	-1.69
39	P1	Panama	26.68	2.13	Nicaragua	26.42	-3.83
40	P5	Thailand	27.23	2.30	Gabon	26.92	-0.30
41	P2	Belize	28.09	2.86	Malawi	29.58	-1.56
42	P5	Chad	32.57	6.27	Zimbabwe	34.87	-3.02
43	P4	Trinidad &	33.13	2.84	Madagascar	32.95	-1.67
44	P5	Yemen	36.47	2.32	Burundi	36.43	-1.28
45	P5	Algeria	36.54	2.18	Togo	36.54	0.24
46	P3	Dominica	36.55	4.03	Philippines	36.11	-0.01
47	P4	Panama	37.47	3.44	Gabon	35.68	-0.23
48	P3	Malaysia	41.15	4.24	Sierra Leone	41.88	-2.40
49	P2	Egypt	45.98	2.77	Gambia	46.04	-2.83
50	P3	Papua New Guinea	61.55	3.36	Madagascar	60.99	-1.72
51	P3	Uruguay	72.70	3.25	Mali	71.95	0.80
52	P4	Syria	80.07	3.17	Somalia	85.76	-2.12
53	P3	Liberia	80.10	2.10	Comoros	83.02	-1.10
54	P5	Malawi	81.02	2.50	Guinea-Bissau	84.07	-2.57
55	P3	Chile	96.01	4.60	Somalia	88.66	-0.87
56	P4	Mozambique	134.50	2.09	Liberia	133.08	0.40
57	P5	Mozambique	160.16	5.15	Congo, Ki	151.88	-3.06
58	P4	Laos	178.12	3.19	Tanzania	158.48	-0.16
59	P5	Angola	207.26	2.69	Congo, Br	274.74	-3.53