# Increasing Returns, Institutions, and Capital Flows

Thomas Snyder
Florida International University
Department of Economics
11200 SW 8TH ST
Miami, FL 33199
Email: tsnyd001@fiu.edu
www.fiu.edu/~tsnyd001
PH: 305-389-9340

Version: April 2010

## *Abstract*

This paper empirically tests one prominent explanation for why capital has not flowed from the rich to the poor countries. I contrast my work to that of Alfraro, Kalemli-Ozcan, and Volosovych, (2008), who claim that initial capital does not affect capital inflows when controlling for institutional quality. Like them I find that institutional variables are a very important factor, but in contrast to their findings, I show that institutions do not account for the "Lucas Paradox." Evidence of increasing returns still exists, even when controlling for institutions and other variables. In addition, I find that poor countries may have different determinants of capital flows than rich countries, such as with government size and taxes, agricultural production, and initial capital. The evidence suggests that there could be a threshold income level, or set of conditions, where a country receives significantly more capital flows if it has a sufficiently high initial income.

JEL Classification: F21 F41 O1

Keywords: *Economic freedom, increasing returns, international capital flows, Lucas paradox.*

# 1. Introduction

Poor, capital scarce countries should attract more capital flows than rich, capital abundant countries under the assumption of diminishing marginal productivity of capital. However, the data clearly shows that capital predominantly flows to the rich countries. This phenomenon, which is sometimes referred to as the *Lucas Paradox* (Lucas 1990), has generated many theoretical explanations. Some studies have tried to explain this phenomenon by pointing to differences across countries that could affect the productivity of capital, such as differences in institutions and human capital, while other studies have focused on other factors that may restrict international capital flows, such as asymmetric information, sovereign risk, and transaction costs. While there are numerous theoretical explanations, there are a relatively few number of empirical studies of international capital flows and the macroeconomic fundamentals suggested by the theories.

Of particular interest in this paper, will be the role of initial capital and institutions in attracting capital flows. This paper will follow a similar procedure to that of Alfaro, Kalemli-Ozcan, and Volosovych (2008), but different variables will be used as a measure of institutional quality. As will be shown, institutions play a key role in attracting capital flows, but this finding does not resolve the *Lucas Paradox*, in contrast to the study by Alfaro, Kalemli-Ozcan, and Volosovych (referred to as AKV for the rest of the paper), which concludes that initial capital does not affect capital inflows. In fact, I show that initial capital is positively correlated with capital inflows, even when controlling for institutions and other factors that can influence capital inflows. In addition, and in contrast to AKV and other studies, I compare a sample of poor countries with a sample of rich countries, and I find that the main determinants of capital flows for poor countries may not be the same as the main determinants of capital flows for the rich countries.

To decide which variables to include as the fundamental determinants of capital flows, I follow AKV and look at the different theories of why the data doesn't support the standard models of economic growth. In a typical economic growth model, as in Solow (1956), if countries operate with the same technology with constant returns, with the individual marginal products of capital and labor diminishing, the countries with less capital (poor countries) will get a higher marginal return to capital. Following this logic, if individuals seek to get the highest return on their capital, they would invest in the poorest countries. Obviously, the data suggests there is something wrong with these models or assumptions, since capital has predominately flowed to rich, capital abundant countries. I will now briefly discuss a few of the possible remedies to the standard model suggested by the theories, and how I will incorporate them in my estimation.

One possible reason why capital has not flowed to the poor countries is differences in human capital. As discussed in the classic work by Lucas (1990), capital may not flow to poor countries if the labor force, for a given amount of capital, is less productive in the poor countries. In addition, human capital may be subject to externalities, where the productivity of one worker may influence the productivity of another worker. To account for differences in human capital, I include a measurement of schooling as an explanatory variable. Since I am including initial GDP also as an explanatory variable, which is highly

correlated with schooling, one would think that the coefficient on initial GDP would diminish, but as will be shown, the significance of initial GDP's impact on capital flows remains strong.

Poor institutions in developing countries may also deter capital flows. According to Douglass North (1994), "Institutions are the humanly devised constraints that structure human interaction. They are made up of formal constraints (e.g., rules, laws, constitutions), informal constraints (e.g., norms of behavior, conventions, self-imposed codes of conduct), and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies." As will be detailed later, I use numerous measures of institutional quality to account for different institutions across countries. Institutional quality is also highly correlated with initial GDP, which again one would expect to diminish the significance of initial GDP's impact on capital flows, but as we will see from the regression results, the significance of GDP is robust in the whole sample. I will also instrument for institutions using log European settler mortality, made famous by Acemoglu, Johnson, and Robinson (2001), but we will see that initial GDP remains significant.

Along with different institutions, international investment suffers from sovereign risk and asymmetric information. If investing internationally in a foreign country, a typical investor is not only less familiar with the foreign country's environment than with his own, including its rules and regulations, but he may not have a strong recourse if the sovereign nation defaults or refuses to follow through on a contract. In a classic textbook model of sovereign debt, as in Obstfeld and Rogoff (1996), a poor sovereign borrower may not be able to obtain enough loans to invest efficiently since it cannot commit to repay the loans. Reputation may also play a key role, and some investors may shy away from countries who have defaulted in the past (Tomz (2007), Reinhart and Rogoff (2004), Bulow and Rogoff (1989), and Eaton and Gersovitz (1981)). Theoretically, a poor country may not have an incentive to efficiently invest foreign loans in the domestic economy, but instead secretly buy risk-free securities (i.e., capital flight), default on the loans, and avoid the punishment by feigning bankruptcy, as described in Gertler and Rogoff (1990). Most of these explanations rely on weak contract enforcement, which is incorporated in the institutional composite variables used in this empirical investigation.

Geography and infrastructure may also help explain the lack of international capital flows to poor countries. The return on capital may be lower when accounting for the cost of transport (also see Obstfeld and Rogoff (2000), who relate transport and trade costs in goods to the lack of capital flows). Since infrastructure and geographical location may play a key role in productivity and capital flows, they will be included as explanatory variables in the regression. However, as with education and institutions, infrastructure is highly correlated with initial GDP, which one would think would diminish the significance of the impact of initial GDP on capital flows, but as we will see, the coefficient is still significant in the whole sample when including all of the above explanatory variables.

The above reasons may not sufficiently explain the lack of capital flows to poor countries. Including infrastructure, institutions, and education as explanatory variables may pick up some externalities associated with being developed, but it may not entirely pick up the source of increasing returns. Several studies suggest learning-by-doing and industrialization as a source of increasing returns, as in Romer (1986), Krugman (1987), and Matsuyama (1992). Controlling for education may not fully pick up

human capital differences and advantages of producing in a developed market. However, it may be possible to pick up the effect of industrialization, or moving out of an agricultural economy. To control for industrialization, I will include as an explanatory variable the percentage of GDP that comes from agriculture. The surprising result, as we will see, is that initial GDP still has a significant impact on capital flows in the whole sample, even when controlling industrialization and the previously mentioned variables.

The explanation for the persistence of increasing returns may be simple. Economies of scale may inherently exist in the most productive sectors, as I described in an earlier study (Snyder 2010). Countries with enough capital may invest in sectors with high fixed costs (or low initial returns), that may yield a better return than other sectors that only require a small investment. For example, investing in infrastructure or manufacturing may only be profitable if a large amount of capital is used, while agriculture or natural resource extraction may require less initial capital to be profitable. If sovereign risk and asymmetric information constrain capital flows, initial capital may play a key role in attracting foreign investment. A country with a high initial capital endowment may attract more capital flows than a country with a low initial capital, since the poor country would have to borrow too much (to be worth the risk) to invest in the productive sectors. To see this clearly, I will show that increasing returns may be explained away if we divide the sample and compare the rich countries with the poor countries. Within the poor group, there may be no increasing returns; within the rich group, there may be no increasing returns; but within the whole sample, increasing returns exists as countries move to more productive sectors with higher income levels.

In the next section, I show the estimates from Ordinary Least Squares (OLS). In Section 3, I discuss endogeneity, and I show the results from two-stage least squares. I summarize the results in Section 4, and I discuss the policy implications. Section 5 is an appendix that describes the data.

## 2. Data and Ordinary Least Squares

### *Capital Flows and initial GDP*

The dependent variable is capital inflows. For the measurement of capital inflows, I use foreign direct investment (FDI) and portfolio equity investment from the International Monetary Fund's *International Financial Statistics* (IFS). If a foreign investor purchases 10 percent or more of the firm's securities, it is considered foreign direct investment; otherwise, it is considered portfolio equity investment. I do not include debt flows since they may include government decisions, and they may not reflect market decisions. Similar to the procedure used by AKV, I take the annual average of FDI plus portfolio investment from 1970 to 2008 (or most recent year).

Figure 1 displays the relationship between capital inflows and initial GDP, without controlling for any other variables. As a measurement of initial capital, I use real GDP per capita from 1970 (Penn World Tables). The relationship is positive and significant. For a country that has 100 dollars more in initial income per capita (1996 base year), it receives on average 4.5 dollars more in annual capital inflows per

capita. Note that the levels of GDP are used, not log GDP, which was used in the study by AKV. Log GDP does not fit the data as well as the levels of GDP, which may be a contributing factor for why AKV found the coefficient on log GDP insignificant when controlling for institutional quality. Model 1A from Table 1 displays the results from the regression shown in Figure 1. Initial GDP is highly correlated with capital inflows, as shown by the adjusted R-squared of 0.64.

The relationship between initial GDP and capital inflows is not a simple linear relationship. We can see from Figure 1 that the variance increases as initial GDP increases until GDP nears $5000, and then the variance remains relatively stable.[1] Upon closer inspection, initial GDP and capital flows seem to be weakly correlated until initial GDP surpasses $2500, and then capital flows and initial GDP seem to be strongly correlated when initial GDP is greater than $2500. Conveniently, this break point occurs around the median initial income level, which allows enough observations on each side to compare each half with separate regressions.[2]

Figures 2A and 2B show the dramatic difference in the relationship between the initial income and capital inflows between the two groups. Table 1 shows the correlation between initial GDP and capital inflows for each group in Models 2A and 3A, before controlling for other variables that might affect capital inflows. 53 countries are in the poorest half and 54 countries are in the richest half. For the poorest half, the coefficient for initial GDP is positive and significant, but it is very weak. For every additional $100 in initial income, a "poor" country attracts an additional $0.94 in annual capital flows. Initial GDP does not explain much of the variation in capital inflows for the poor countries, as shown with an adjusted R-squared of 0.077.

For the richest half, the story is very different. With initial GDP as the only explanatory variable, it explains about half of the variation in the capital inflows. For every additional $100 in initial GDP, a "rich" country receives an additional $4.70 in capital inflows. A country in the rich group receives nearly five times more capital flows than a country in the poor group for every additional $100 in initial GDP. Figure 3 gives us another perspective on the difference between the two groups. For each group, a quadratic equation is estimated. From Figure 3, we can see the sharp distinction from the two groups. Note that the concave shapes do not represent diminishing marginal productivity of capital, since that would occur if the slopes were negative. However, we can see that the positive, or increasing returns, start to decline as initial GDP increases, especially for the poorest group.

## *Explaining Increasing Returns*

According to previous theories, increasing returns, or North to North capital flows, can be explained by controlling for other variables. In the study by AKV, they conclude that institutions can eliminate this paradox. As a measure of Institutions, I use the data set from the Economic Freedom of the World 2009 Report (Gwartney and Lawson 2009). In the study by AKV, they use a measurement of institutional

[1] Correcting for heteroskedasticity does not significantly change any of the estimates, so the uncorrected OLS estimates are shown for ease of replicability.

[2] Shifting the breakpoint a little doesn't make much difference, but a significant change would make the number of observations too low to compare each group, especially when introducing log settler mortality as an instrument.

quality for the years 1984 to 2000 from the International Country Risk Guide (ICRG), The PRS Group. I argue that the data from the Freedom Report has a few advantages over the ICRG. One advantage is that the Freedom Report dates back to 1970 instead of 1984. Another advantage is that each component, generally speaking, is a measurement of economic freedom (or lack of restrictions or interference from government), which is not necessarily derived from being a developed or rich country. Therefore, it may be possible to extract more independent effects from initial GDP and institutions. Measurements of risk or institutional quality from the ICRG may be partially derived from the development of the country, and it may be more difficult to separate the independent effects from initial GDP and institutions.

As a starting point, similar to AKV, I use a composite variable of institutions from 1970 to 2008 (or most recent year). Institutions are rated from 0 to 10, where 10 is the most free, least restrictive, or least interfered with by the government. The composite variable includes measures such as government size and taxes, property rights, inflation, tariffs, and regulations. The appendix lists the components of each institutional variable.[3] Table 2, Model 1B shows the regression with only initial GDP and institutions as the explanatory variables. The coefficient on initial GDP is significant at the 1% level, but the coefficient on institutions is not significant. Possibly, the insignificant coefficient on institutions could exist because of multicollinearity (which I also examine later), so in Model 2B I take out initial GDP and leave only institutions as the explanatory variable. Now, the coefficient on the institutions variable is significant at the 1% level, where an increase of 1 point on the 0-10 scale is associated with an increase of $151 of annual capital flows per capita. Using only the composite variable for institutions, we can see that it does not explain as much of the variation of capital inflows as with the regression with initial GDP as the only explanatory variable. Of course, it is possible that the exclusion of other explanatory variables has biased the results, so I will now include other variables suggested by the theory, and we will see that the coefficients on both institutions and initial GDP remain similar to the results in Model 1B.

As discussed in the theory, human capital may play a key role in increasing the marginal productivity of capital and attracting capital flows. To pick up some of the effects of human capital on capital flows, I include average years of total schooling for aged 25 and older from 1970 to 2000, obtained from Barro and Lee (2000). Infrastructure may also be essential to explaining increasing returns, since it may make capital more productive. To control for different infrastructure across countries, I use average annual percentage of roads that are paved from 1990 to 2008 (World Bank, World Development Indicators).[4] As an indicator of transportation costs (besides infrastructure), I borrow variables from Gallup and Sachs (1999), such as being landlocked (not in Europe) and air distance from the capital-goods-supplying regions: the U.S., Western Europe, and Japan (specifically, the distance from the country's capital city to New York, Rotterdam, or Tokyo). As mentioned earlier, the marginal productivity of capital can be higher in countries that are industrialized than in those countries that rely heavily on natural resources

[3] For a complete description of how each component was constructed, please see the appendix of the Economic Freedom of the World Report.

[4] Ideally, it would be better if the data on percentage of roads paved were available before 1990, but it is probably safe to assume that the relative differences across nations in infrastructure between 1990-2008 is approximately the same as it was 20 years prior.

or agriculture. Therefore, I include average agriculture production (% of GDP) from 1970 to 2008 as an explanatory variable (World Bank, World Development Indicators).

Table 2, Model 3B shows the regression results from including the explanatory variables suggested by the theory. The coefficient on initial GDP is positive and significant, and it has not significantly changed from Model 1B, which included institutions as the only other explanatory variable. An additional $100 in initial GDP is associated with an increase of $3.20 in capital inflows, even after controlling for the additional variables. The coefficient on institutions has remained nearly the same from Model 1B, and it remains insignificant. Besides initial GDP, the only other variable with a significant coefficient is *Distance*, which has the expected negative sign. It is possible that some of the other variables are important but correlated with other covariates, diminishing the significance of that variable. Multiple regressions can show that this is not a large problem. However, we can compare the adjusted R-squared in Model 1B or Model 1A to Model 3B to see that there is only an improvement of 0.04, which means that including all of the additional variables besides initial GDP explains only a small additional amount of the variation in capital flows.

## *Decomposition of Institutional Variables*

Using a composite index that includes all the institutional variables, as in the study by AKV, may not be the proper approach. Although most of the institution variables are correlated with each other, some institutional variables may have a different effect on capital flows than other institutional variables. If this is the case, as we will see that it is, a composite index that includes all of the institutional variables may be a misleading measurement of institutional quality. In Table 3, Model 1C, the regression includes initial GDP and the individual components (or smaller composites) of the general composite index of institutions. Initial GDP is still positive and significant at the 1% level. However, now we see that the variable labeled *Property Rights and Legal Structure* and the variable labeled *Government Size and Taxes* are significantly correlated with capital inflows. An increase in one point (0-10 scale) in *Property Rights and Legal Structure* is associated with $56.50 more annual capital inflows per capita. Surprisingly, an increase in one point in *Government Size and Taxes*, which means a smaller government and lower taxes, leads to $29.80 less capital inflows per capita.

In Model 2C from Table 3, the other explanatory variables are added to the regression.[5] Initial GDP remains positive and significant at the 1% level. The signs for the coefficients for *Property Rights and Legal* (positive) and *Government Size and Taxes (negative)* have the same sign as in Model 1C. When controlling for the other factors that affect capital flows, the coefficient on *Business Regulations* is also positive and significant. For every one point increase (0-10 scale) in *Business Regulations*, which means less regulations or less government interference, annual capital inflows per capita increases by $31.80. After controlling for the components of institutions, location still has a significant important impact on capital inflows, as we can see by the negative and significant coefficient on the *Distance* variable.

[5] I excluded schooling here because it is both insignificant and highly correlated with property rights, making the coefficient on property rights insignificant (barely). If replacing property rights with schooling, the coefficient on schooling is still insignificant. In order to prevent misleading results of the individual effects of the components of the institution composite variable, I exclude schooling in this model, but bring it back in the later regressions.

From Model 2C, we can see that all of the institutional variables have a positive coefficient, except for *Government Size and Taxes*. Since the institutional variables are also correlated with each other, in Model 3C I included only the variables with a significant coefficient from Model 2C. We can see in Model 3C that the coefficients are almost identical to those in Model 2C. The model explains most of the variation in capital inflows, as we can see from adjusted R-squared value of 0.775.

The purpose of these estimates has been to explain the phenomenon of increasing returns, or lack of capital flows to poor countries. However, the persistence of a positive and significant coefficient on initial GDP per capita shows that the standard theory and the leading remedies to the standard theory have not fully explained the paradox. Including institutional variables and location have improved the standard model, but in contrast to the study by AKV, the effect of initial GDP remains strong when controlling for these factors. On the other hand, we have seen earlier that it may be inappropriate to group both poor and rich countries together, since initial GDP and capital inflows may have a different relationship in each group. Therefore, I will now compare the determinants of capital flows for the "poor" countries and the "rich" countries in separate regressions.

## *"Rich" vs. "Poor" Countries*

We have seen in Figures 2 and 3 that there appears to be a break point around the median income level, where initial GDP and capital inflows go from having a weak relationship to a strong, positive relationship. If we separate the sample into two different regressions around the median income level, we can get an idea of the differences between the two groups. Table 4 compares the regression from whole sample to the regressions of the divided sample. Because of the smaller sample sizes, and to compare with two-stage least squares, I create a composite of institutions that includes all of the components except for *Government Size and Taxes.* From the previous table in Model 2C, we see that the coefficients of all of the institutional variables have a positive sign except for *Government Size and Taxes.* Therefore, I combine the variables with the same sign, and it will not suffer from the problem of the total composite variable, which has components that work in opposite direction.

In Model 1D from Table 4, initial GDP, institutions, government size and taxes, and distance significantly influence capital inflows in the whole sample. When we examine only those countries with initial GDP of less than $2500 in Model 1D, we see that the significant determinants of capital inflows are not all the same as the significant determinants of capital inflows in the whole sample. For the "poor" countries, initial GDP does not significantly affect capital inflows. Institutions do have a significant and positive relationship with capital inflows in the poor group. An increase of one point in institutions (not including government size and taxes) is associated with an increase in $7.21 of annual capital inflows per capita. For the poor group, agriculture production as a percentage of GDP is negatively and significantly correlated with capital inflows. Government size and taxes does not significantly affect capital inflows in the poor group, unlike in the whole sample. Distance, or remoteness, has the predicted negative sign, just as in the whole sample. In a somewhat surprising result, being landlocked significantly increases capital inflows per capita in the poor group, controlling for the other explanatory variables. Of course, given such a small sample size, and controlling for income, schooling, infrastructure, and remoteness, one or two observations may significantly affect the coefficient of the landlocked dummy variable.

In Model 3D from Table 4, I examine the determinants of capital inflows for those countries with initial GDP of greater than $2500. In the "rich" group, initial GDP does not significantly affect capital inflows, just as the case with the "poor" group. For the rich countries, institutions (excluding government size and taxes) are positively and significantly correlated with capital inflows. An increase in one point (0-10 scale) in institutional quality (or freedom) increases annual capital inflows per capita by almost $100. For the rich countries, an increase in government size and taxes is associated with an increase in capital inflows. For example, an increase of one point in government size and taxes (which means less government or lower taxes), brings down average annual capital flows by $89.60. Remoteness or distance does not affect capital inflows for the rich countries, controlling for other factors.

We can see significant differences and similarities comparing determinants of capital inflows in the "poor" group with the determinants of capital inflows in the "rich" group. Within each group, initial GDP does not significantly influence capital inflows, controlling for other factors. In other words, we do not see increasing returns or the *Lucas Paradox* within each group; we only see increasing returns when looking at the entire sample. The poor countries receive less capital inflows if they produce more agriculture (% of GDP), while capital inflows in the rich countries are not significantly influenced by the amount of agriculture. Capital inflows in the poor countries are not significantly influenced by government size and taxes, but smaller government and lower taxes in the rich countries is negatively correlated with capital inflows. Both the rich countries and the poor countries benefit strongly from institutional quality or freedom. Remoteness is a significant factor for the poor countries, but it is not significant for the rich countries.

### *Multicollinearity*

Institutions and initial GDP are strongly correlated. A regression shows, for instance, that the variation in initial GDP explains over half the variation in institutional quality (excluding government size and taxes). In the study by AKV, they find that initial GDP does not significantly affect capital inflows after controlling for institutions, and they argue that it does not because of multicollinearity. In their study, the composite institutional variable comes from the International Country Risk Guide (ICRG), which I argue is more dependent on initial GDP than a measurement of economic "freedom." In fact, we have seen that an increase in economic freedom regarding government size and taxes significantly decreases capital flows. The fact that there is multicollinearity should diminish the significance of the coefficient of initial GDP and/or institutions, but we see that in the entire sample, the coefficients for both variables remain significant.

To illustrate my point of the independent effects of initial GDP and institutions, and to compare my study to that of AKV, I graph the independent effects of initial GDP and institutions in Figures 4A and 4B. In Figure 4A, I take the residuals from the regression of capital flows on institutions against the residuals from the regression of initial GDP on institutions. The Frisch-Waugh Theorem says that the coefficient from this regression equals the coefficient for initial GDP in a regression with initial GDP and institutions as the explanatory variables, which equals 0.035. We can easily see from Figure 4a that there is a

positive relationship between initial GDP and capital inflows per capita, even when controlling for institutions. While the variance does increase some, the sign of the coefficient is not driven by a few observations. In Figure 4B, in a similar procedure, I graph the effect of institutions on capital inflows per capita, controlling for initial GDP. Institutions are also positively and significantly correlated with capital inflows, with a coefficient of 51.12, when controlling for initial GDP. However, this result is very different from that of AKV. Initial GDP appears to have a strong independent effect, unlike the result from AKV, and the independent effect of institutions shown in Figure 4B seems more sensitive to outlier observations than the coefficient on initial GDP.

### *Robustness*

The purpose of this study has been to examine increasing returns and identify the possible reasons for the lack of capital flows to poor countries. Throughout all the regressions using the entire sample, the coefficient on initial GDP has remained significant. Introducing nearly every imaginable variable that may affect capital flows, such as controlling for diseases or tropics, does not significantly change the coefficient on initial GDP. However, one may argue that GDP in 1970 picks up too many unobservable conditions that affect capital flows near that year. One way of testing the robustness of initial GDP is to only look at capital flows from 1990 to 2008. This procedure would leave a 20-year gap between the initial GDP and where capital inflows begin to be measured. In Table 5, I run the same regressions as in Table 4, except I use average annual capital inflows per capita from 1990 to 2008 instead of from 1970 to 2008. The results from Table 5 are very similar to the results from Table 4.

In Model 1E from Table 5, we can see that the coefficient on initial GDP is positive and significant. In fact, all of the variables that were significant in Model 1D from Table 4 are also significant in Model 1E from Table 5. The coefficients are larger in Table 5, which is expected given the increase in capital flows throughout the years. Models 2E and 3E from Table 5 also yields similar results as Models 2D and 3D from Table 4. These results suggest that there is a strong case for increasing returns throughout the entire sample, but we do not see evidence of increasing returns if we only focus on the poor or on the rich countries. As will be discussed later, this may suggest that there is a threshold or set of conditions that countries must possess in order to attract high levels of capital flows.

## 3. IV Estimates

In this section, as in the study by AKV, I look at the possibility of a reverse causality, where capital inflows may influence institutional quality. I argue that the data from the Economic Freedom Report may be subjected to less endogeneity than the dataset used by AKV (International Country Risk Guide). The data from the Economic Freedom Report measures the amount of economic freedom in each variable, while the ICRG measures risk. While these measures may be similar, if constructing a dataset of institutions based on risk, one may naturally be inclined to assign better values to those countries that are attracting a high level of capital inflows. While it is possible that a dataset based on economic

freedom may suffer from the same problem, the intuition for such a problem does not seem as strong as it does with the ICRG data.

However, to be sure that endogeneity is not a problem, I instrument institutions (not including government size or taxes) with log European settler mortality, as in Acemoglu, Johnson, and Robinson (2001). The argument for settler mortality as an instrument is that if European colonists could safely settle in a particular location, they setup better institutions with an emphasis on property rights and checks against government power, such as in Australia, New Zealand, Canada, and the U.S. If settlement was difficult or dangerous, such as in places with a high rate of disease, the colonists were more likely to set up an extractive state with less emphasis on property rights. In Acemoglu, Johnson, and Robinson (2001), they use log European settler mortality to see the effects of institutions on economic growth, but I will use it to see the effects of institutions on capital inflows.

First, I test to see if log European settler mortality is a valid instrument for my regressions. In order for the variable to be a valid instrument, it must be significantly correlated with institutions, but it should not independently be correlated with capital inflows. Because of the small sample size, only initial GDP, institutions (not including government size and taxes), and government size and taxes are included as explanatory variables. In Model 1F from Table 6, we see that log settler mortality is not correlated with capital inflows when controlling for initial GDP and the institutional variables in the whole sample. In Model 2F, we see that log European setter mortality is correlated with institutions, when controlling for initial GDP and government size and taxes. Therefore, log settler European mortality is a valid instrument for the whole sample case. When we look at the "poor" sample and the "rich" sample, we can see that log European settler mortality also meets the conditions to be a valid instrument.

In Table 7, two-stage least squares is performed replacing institutions with its estimate derived from using log settler mortality as an instrument. In Model 1G, which is the entire available sample, we see similar results as before; initial GDP, institutions, and government size and taxes are all significant factors that influence capital inflows. The adjusted R-squared of .827 shows that the variables explain nearly all of the variation in the capital inflows. Two-stage least square do lead to different results for the poor group. In Model 2G, we see that institutions do not play a significant role in attracting capital inflows for the poor countries, but initial GDP is a significant factor. For the poor countries, the model does not explain the variation in capital inflows as well as the model for the rich sample or the whole sample. For the rich group, institutions and government size and taxes are significant factors as they were in the OLS results. However, with the IV estimation, initial GDP is also a significant factor for the rich group. In the OLS estimation, initial GDP was near the significance threshold for the rich group, so the two-stage least squares estimates are not very different than the OLS results. Overall, the IV estimates do not significantly differ from the OLS estimates. If anything, it has confirmed the results that initial GDP and institutions matter for capital inflows.

# 4. Summary and Conclusions

The purpose of this study has been to test the prevailing theories that attempt to explain the lack of capital flows to poor countries. In particular, this study has served as a contrast to that of Alfaro, Kalemli-Ozcan, and Volosovych (2008), who concluded that different institutions solved the *Lucas Paradox*. Without any doubt, institutions play a key role in attracting capital flows; however, it does not eliminate the existence of increasing returns. Not only are the results by AKV sensitive to the institutional dataset, but also their choice to use the logarithm of GDP instead of the levels may have played a role in its insignificance. Nevertheless, this paper attempts to provide an explanation for increasing returns by including institutional variables and other factors that affect capital inflows.

Surprisingly, even when incorporating additional factors that may influence capital flows, such as human capital, infrastructure, and geography, the paradox of increasing returns remains. I then took a simple approach, in contrast to previous studies, and I separated the sample to see if we can explain increasing returns by comparing the "poor" countries with the "rich" countries. Graphically, from Figures 2 and 3, we have seen that there is a break point around the initial GDP level of $2500. Conveniently, this break was around the median income level, which allowed us to divide the sample in half and have enough observations on each side to compare regressions. When comparing the "poor" countries to the "rich" countries, we have seen that the variables affect capital inflows differently in each group. For instance, agriculture production is negatively correlated with capital inflows for the poor group, but agricultural production is not a significant factor in the rich group. However, another surprise was that the coefficient on initial GDP was not significant within each group.

These results may help provide another explanation for the *Lucas Paradox*. Poor countries may find it difficult to compete for capital flows until they reach a certain threshold income level. Once they achieve such a threshold, or when they join the "rich" group, they will receive significantly more capital flows than what a country receives in the "poor" group. However, when a country is in the "rich" group, an increase in capital alone will not induce more capital flows. The significance of the agriculture variable in the poor group may suggest that this relates to industrialization. These results may support the poverty trap or "big push" theories (for instance, see Azariadis, Costas, and Stachurski (2004), and Murphy, et. al. (1989)). This may also give empirical support to the movement towards a bimodal world income distribution (Quah 1996), where rich, industrialized countries may attract more capital flows than poor countries.

Policymakers can certainly derive from these results the benefits of quality property rights, regulations, and legal structure. The impact of foreign aid, however, is not so clear. If the aid is big enough, so that the country becomes industrialized, the country may receive significantly more capital flows. If the aid is not large, then the receiving country may not receive additional capital flows. Remoteness also seems

to play a key role in deterring capital flows, but how a policy can improve remoteness is beyond the scope of this paper.

Lastly, this paper may have created more questions than it answered. For instance, one surprising and robust result is that countries with a large government and high income tax rate, attract more capital flows than countries with a smaller government and lower taxes. This may be further explored in future research. The most pressing issue, however, is to empirically identify the source of increasing returns. This paper shows that increasing returns cannot easily be explained away, but it cannot specify with certainty the reason why increasing returns exists.

# 5. Appendix

## *Data Description and Sources*

*Capital Inflows*: Average annual per capita values of Foreign Direct Investment (FDI) and Portfolio Investment from 1970 to 2008. The data is obtained from the International Monetary Fund's (IMF) International Financial Statistics (IFS). As a measure of FDI, I use *Foreign direct investment in reporting economy, n.i.e.* (IFS line 78bed). Direct investment includes equity capital, reinvested earnings, other capital, and financial derivatives associated with various intercompany transactions between affiliated enterprises measured in current U.S. dollars. As a measure of portfolio investment, I use *Equity securities liabilities* (IFS line 78bmd), which includes flows of shares, stock participations, and similar documents that denote ownership of equity measured in current U.S. dollars. (The IMF classifies direct investment as involving ownership of at least 10 percent of the local firm's equity. Other equity purchases are included in this category.) I express the inflows in constant 1996 U.S. dollars, and to convert to per capita measures I divide by the population in each year.

*Population*: 1970-2008. Total population from World Bank, World Development Indicators, 2009.

*Consumer Price Index (CPI)*: U.S. CPI with base year 1996 = 1. CPI with a base year of 2005 was obtained from World Bank, World Development Indicators, but it was adjusted to 1996.

*Real GDP Per Capita:* Gross Domestic Product (GDP) per capita in 1970 in constant 1996 dollars obtained from Penn World Tables version 6.1.

*Institutional variables:* For the institutional variables, I take advantage of the dataset compiled in the *Economic Freedom of the World 2009 Annual Report* (which can be found at www.freetheworld.com). Each variable is given a value from 0 to 10. Generally speaking, a higher number represents more freedom or less restriction. I take the average of each variable from 1970 to 2005, where equal weight is put on each five-year interval. The following provides the components of each institutional variable, but for a detailed description of each variable, please see the appendix of the *Economic Freedom* report.

- *Institutions*: A composite variable, which is the average of all the other institutional variables.

- *Institutions (not including government size and taxes)*: A composite variable, which is the average of all the other institutional variables, except *Size of Government: Expenditures, Taxes, and Enterprises.*
- *Size of Government: Expenditures, Taxes, and Enterprises (*I labeled as *Government Size and Taxes*): A composite variable, which is the average of the following variables:
    - *General government consumption spending as a percentage of total consumption*
    - *Transfers and subsidies as a percentage of GDP*
    - *Government enterprises and investment*
    - *Top marginal tax rate*
        - *Top marginal income tax rate*
        - *Top marginal income and payroll tax rates*
- *Legal Structure and Security of Property Rights (*I labeled as *Property Rights and Legal Structure):* A composite variable, which is the average of the following variables
    - *Judicial independence*
    - *Impartial courts*
    - *Protection of property rights*
    - *Military interference in rule of law and the political process*
    - *Integrity of the legal system*
    - *Legal enforcement of contracts*
    - *Regulatory restrictions on the sale of real property*
- *Access to Sound Money* (I labeled as *Sound Money*): A composite variable that is the average of the following variables:
    - *Money growth*
    - *Standard deviation of inflation*
    - *Inflation: Most recent year*
    - *Freedom to own foreign currency bank accounts*
- *Freedom to Trade Internationally* (I labeled as *Trade Freedom*): A composite variable that is the average of the following variables:
    - *Taxes on international trade*
        - *Revenues from trade taxes (% of trade sector)*
        - *Mean tariff rate*
        - *Standard deviation of tariff rates*
    - *Regulatory Trade Barriers*
        - *Non-tariff trade barriers*
        - *Compliance cost of importing and exporting*
    - *Size of the trade sector relative to expected*
    - *Black-market exchange rates*
    - *International capital market controls*
        - *Foreign ownership / investment restrictions*
        - *Capital controls*

- *Regulation of Credit, Labor, and Business* (I labeled as *Business Regulation*): A composite variable that is the average of the following variables:
    - *Credit market regulations*
        - *Ownership of banks*
        - *Foreign bank competition*
        - *Private sector credit*
        - *Interest rate controls / negative real interest rates*
    - *Labor market regulations*
        - *Minimum wage*
        - *Hiring and firing regulations*
        - *Centralized collective bargaining*
        - *Mandated cost of hiring*
        - *Mandated cost of worker dismissal*
        - *Conscription*
    - *Business Regulations*
        - *Price controls*
        - *Administrative requirements*
        - *Bureaucracy costs*
        - *Starting a business*
        - *Extra payments / bribes*
        - *Licensing restrictions*
        - *Cost of tax compliance*

*Schooling*: Average years of total schooling for age 25 and older from years 1970, 1975, 1980, 1985, 1990, 1995, and 2000. Data from Barro, Robert J. and Jong-Wha Lee (2000), "International Data on Educational Attainment: Updates and Implications," Center for International Development at Harvard University (CID) Working Paper No. 42, April 2000.

*Roads Paved (%)*: Percentage of total roads that are paved, average from 1990-2008. Data from World Bank, World Development Indicators.

*Agriculture*: Agriculture value added, percentage of GDP. Average from 1970-2008. World Bank, World Development Indicators.

*Landlocked, not in Europe*: Indicator for landlocked country, excluding countries in Western and Central Europe (Austria, the Czech Republic, Hungary, the Former Yugoslav Republic of Macedonia, Slovakia, and Switzerland). Includes Eastern European countries of Belarus and Moldova. Data obtained from Gallup, John L. and Jeffrey D. Sachs, with Andrew Mellinger, "Geography and Economic Development" (CID Working Paper No. 1, March 1999).

*Distance*: Air distance in kilometers to one of the three capital-goods-supplying regions: the U.S., Western Europe, and Japan, specifically measured as distance from the country's capital city to New

York, Rotterdam, or Tokyo. Data obtained from Gallup, John L. and Jeffrey D. Sachs, with Andrew Mellinger, "Geography and Economic Development" (CID Working Paper No. 1, March 1999)

*Log European Settler Mortality:* The logarithm of the historical European settler's mortality rates from Acemoglu, Johnson, and Robinson (2001). Mortality rates are deaths per annum per 1000.

List of countries from selected tables. The list shows the fullest sample in each table. Some countries fall out of other regressions because of data availability

| Table 1 (107 Countries) | | Table 2 (131) | | | Table 6 (61) |
|---|---|---|---|---|---|
| Algeria | Malaysia | Albania | Jamaica | Uganda | Algeria |
| Angola | Mali | Algeria | Japan | Ukraine | Angola |
| Argentina | Mauritania | Angola | Jordan | United Kingdom | Argentina |
| Australia | Mauritius | Argentina | Kazakhstan | United States | Australia |
| Austria | Mexico | Armenia | Kenya | Uruguay | Bangladesh |
| | | | | Venezuela, Rep. | |
| Bangladesh | Morocco | Australia | Korea, Rep. | Bol. | Barbados |
| Barbados | Mozambique | Austria | Kuwait | Vietnam | Benin |
| | | | Kyrgyz | | |
| Benin | Namibia | Azerbaijan, Rep. | Republic | Zambia | Bolivia |
| Bolivia | Nepal | Bahamas, The | Latvia | Zimbabwe | Brazil |
| Botswana | Netherlands | Bahrain, King. | Lesotho | | Burkina Faso |
| Brazil | New Zealand | Bangladesh | Lithuania | | Burundi |
| | | | Macedonia, | | |
| Burkina Faso | Nicaragua | Barbados | FYR | | Cameroon |
| Burundi | Niger | Belize | Madagascar | | Canada |
| | | | | | Central Afr. |
| Cameroon | Nigeria | Benin | Malawi | | Rep. |
| Canada | Norway | Bolivia | Malaysia | | Chad |
| Cape Verde | Pakistan | Bosnia & Herz. | Mali | | Chile |
| Central Afr. | | | | | |
| Rep. | Panama | Botswana | Malta | | Costa Rica |
| Chad | Papua N.G. | Brazil | Mauritania | | Côte d'Ivoire |
| | | | | | Dominican |
| Chile | Paraguay | Bulgaria | Mauritius | | Rep. |
| China | | | | | |
| (Mainland) | Peru | Burkina Faso | Mexico | | Ecuador |
| Comoros | Philippines | Burundi | Moldova | | Egypt |
| Congo, Rep. | Poland | Cameroon | Mongolia | | El Salvador |
| Costa Rica | Portugal | Canada | Morocco | | Ethiopia |
| Côte d'Ivoire | Romania | Central Afr. Rep. | Mozambique | | Fiji |
| Cyprus | Rwanda | Chad | Myanmar | | Gabon |
| Denmark | Senegal | Chile | Namibia | | Ghana |

| | | | | |
|---|---|---|---|---|
| | | China | | |
| Dom.Republic | Seychelles | (Mainland) | Nepal | Guatemala |
| Ecuador | Sierra Leone | Colombia | Netherlands | Guyana |
| Egypt | South Africa | Congo, Rep. | New Zealand | Haiti |
| El Salvador | Spain | Costa Rica | Nicaragua | Honduras |
| Equat. Guinea | Sri Lanka | Côte d'Ivoire | Niger | India |
| Ethiopia | Sweden | Croatia | Nigeria | Indonesia |
| | Syrian Arab | | | |
| Fiji | Rep. | Cyprus | Norway | Jamaica |
| Finland | Tanzania | Czech Republic | Oman | Kenya |
| France | Thailand | Denmark | Pakistan | Madagascar |
| Gabon | Togo | Dom. Rep | Panama | Malaysia |
| | Trin.and | | | |
| Gambia, The | Tobago | Ecuador | Papua N. G. | Mali |
| Germany | Tunisia | Egypt | Paraguay | Mauritania |
| Ghana | Turkey | El Salvador | Peru | Mauritius |
| Greece | Uganda | Estonia | Philippines | Mexico |
| | United | | | |
| Guatemala | Kingdom | Ethiopia | Poland | Morocco |
| | | | | New |
| Guinea | United States | Fiji | Portugal | Zealand |
| Guinea-Bissau | Uruguay | Finland | Romania | Nicaragua |
| | Venezuela, | | | |
| Guyana | Rep. | France | Russian Fed. | Niger |
| Haiti | Zambia | Gabon | Rwanda | Nigeria |
| Honduras | Zimbabwe | Georgia | Senegal | Pakistan |
| Hungary | | Germany | Serbia, Rep. | Panama |
| Iceland | | Ghana | Sierra Leone | Papua N.G. |
| | | | Slovak | |
| India | | Greece | Republic | Paraguay |
| Indonesia | | Guatemala | Slovenia | Peru |
| Iran, I.R. of | | Guinea-Bissau | South Africa | Rwanda |
| Israel | | Guyana | Spain | Senegal |
| Italy | | Haiti | Sri Lanka | Sierra Leone |
| Jamaica | | Honduras | Sweden | South Africa |
| | | | Syrian Arab, | |
| Japan | | Hungary | Rep. | Sri Lanka |
| Jordan | | Iceland | Tanzania | Tanzania |
| | | | | Trin. and |
| Kenya | | India | Thailand | Tobago |
| Korea, Rep. | | Indonesia | Togo | Tunisia |
| | | | Trin.and | |
| Lesotho | | Iran, I.R. of | Tobago | Uganda |
| | | | | United |
| Madagascar | | Israel | Tunisia | States |
| | | | | Venezuela, |
| Malawi | | Italy | Turkey | Rep. |

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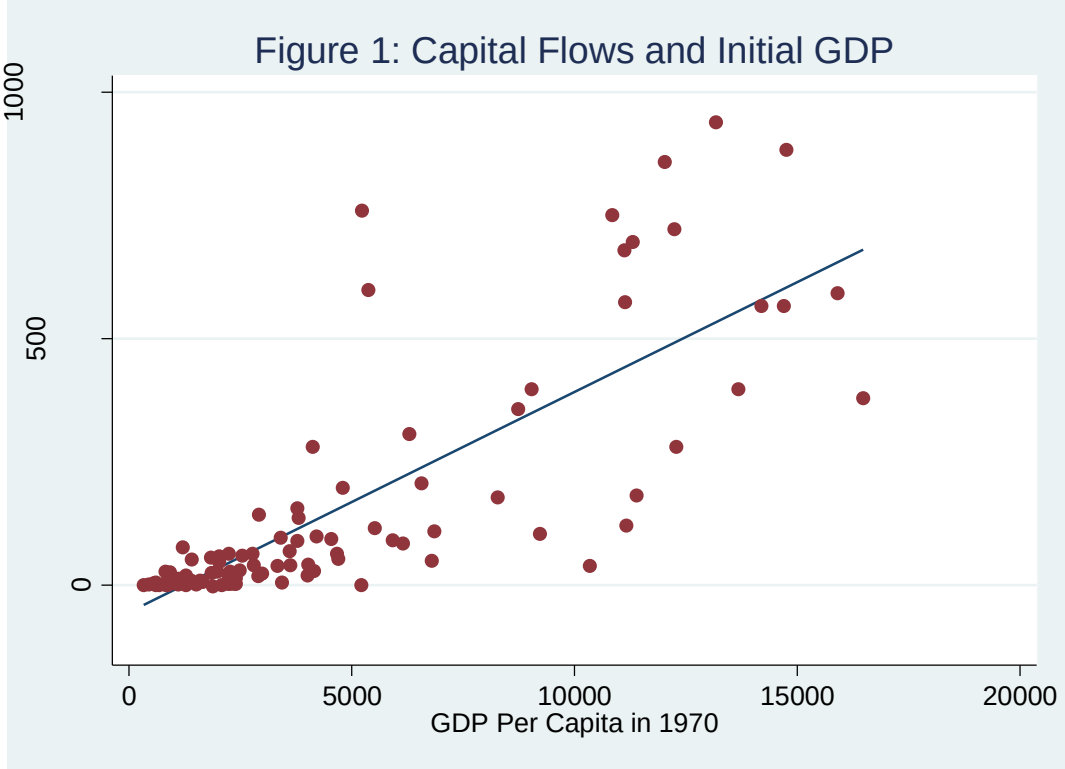
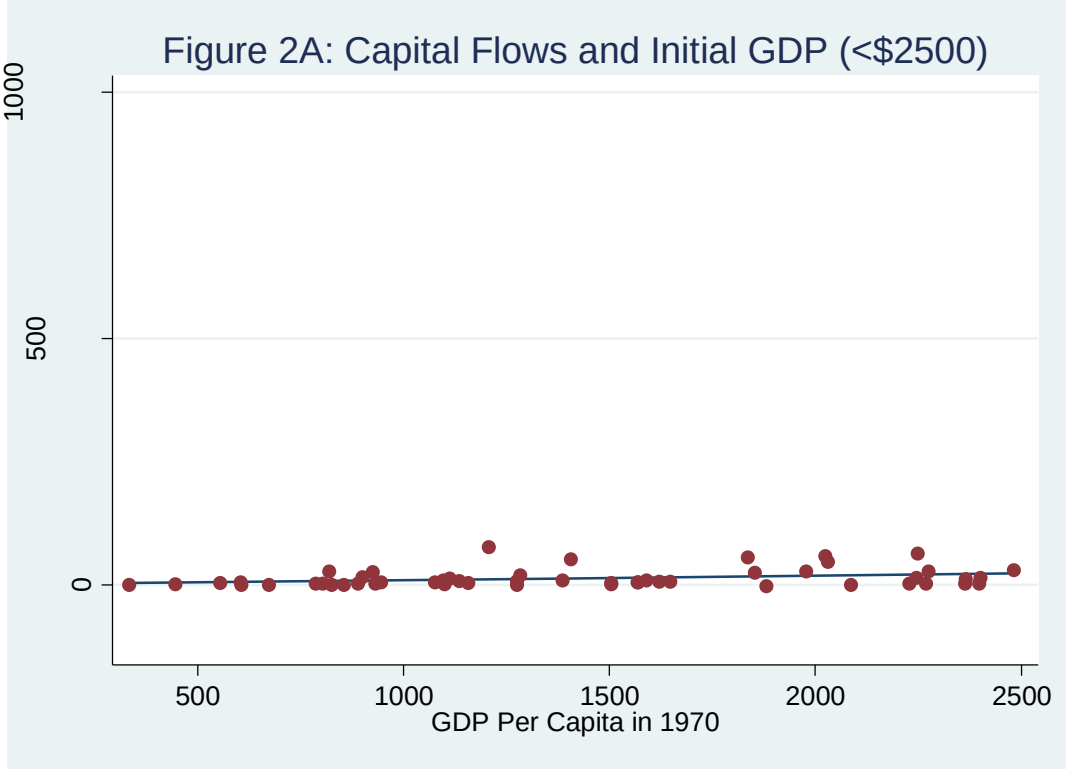
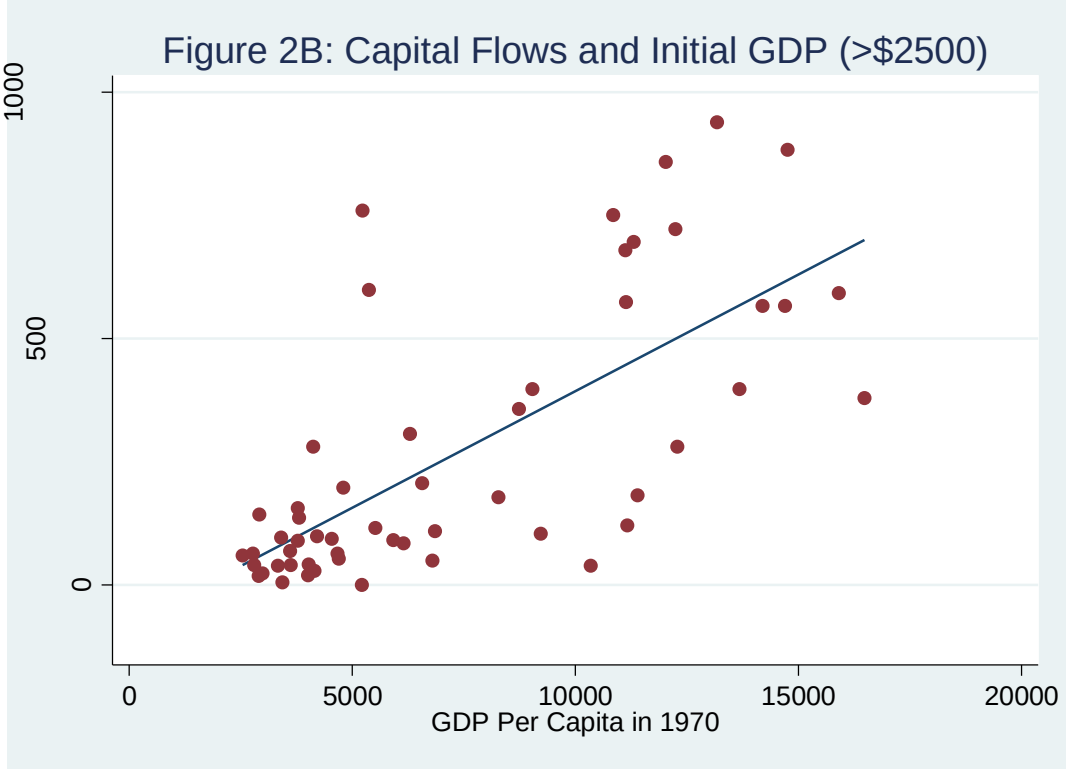


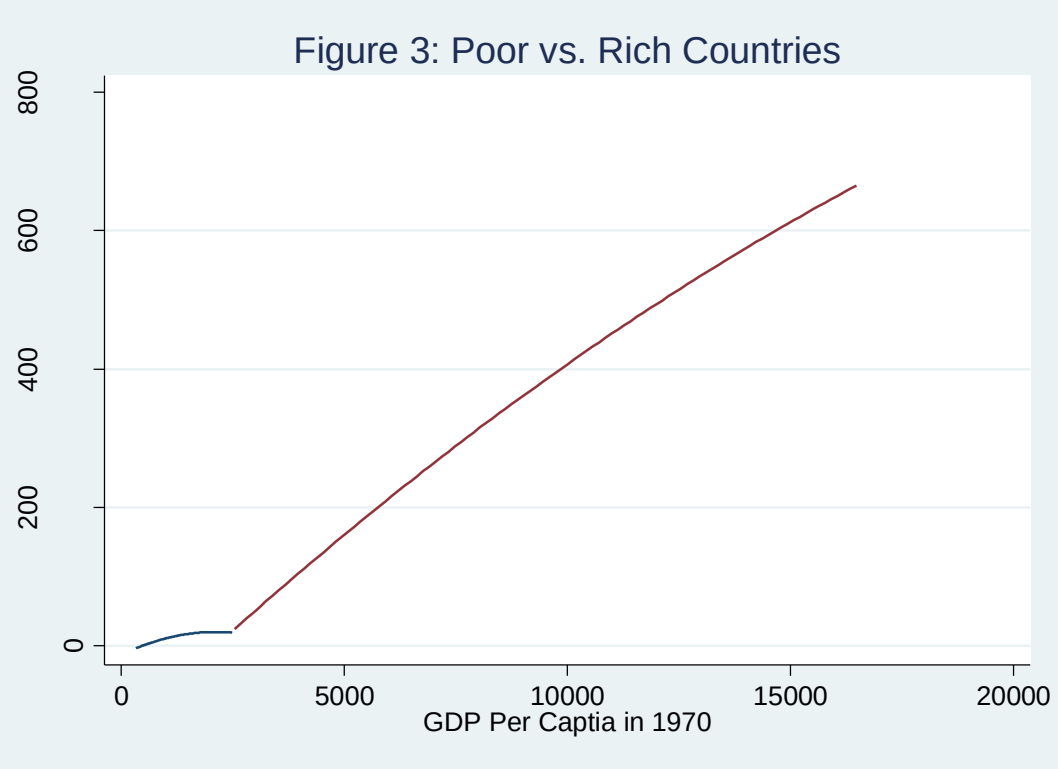

*Notes:* Figure 1 graphs the regression of capital inflows on GDP per capita in 1970. Capital Inflows are measured as average annual per capita values of Foreign Direct Investment (FDI) plus Portfolio Investment from 1970 to 2008. The data is obtained from the International Monetary Fund's (IMF) *International Financial Statistics* (IFS). GDP in 1970 is obtained from Penn World Tables version 6.1. All values are in constant 1996 dollars. See the appendix for more details on the data.



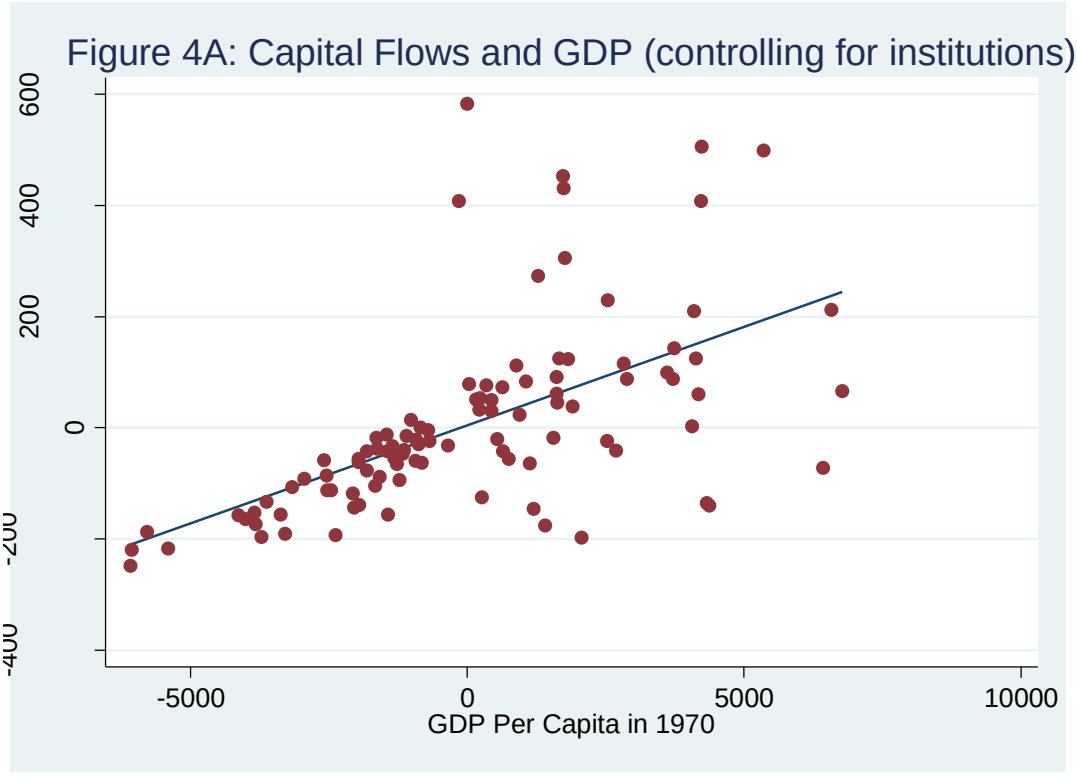

*Notes:* Figure 2A graphs the regression of capital inflows on GDP per capita in 1970 for only those countries with GDP of less than $2500. Capital Inflows are measured as average annual per capita values of Foreign Direct Investment (FDI) plus Portfolio Investment from 1970 to 2008. The data is obtained from the International Monetary Fund's (IMF) *International Financial Statistics* (IFS). GDP in 1970 is obtained from Penn World Tables version 6.1. All values are in constant 1996 dollars. See the appendix for more details on the data.



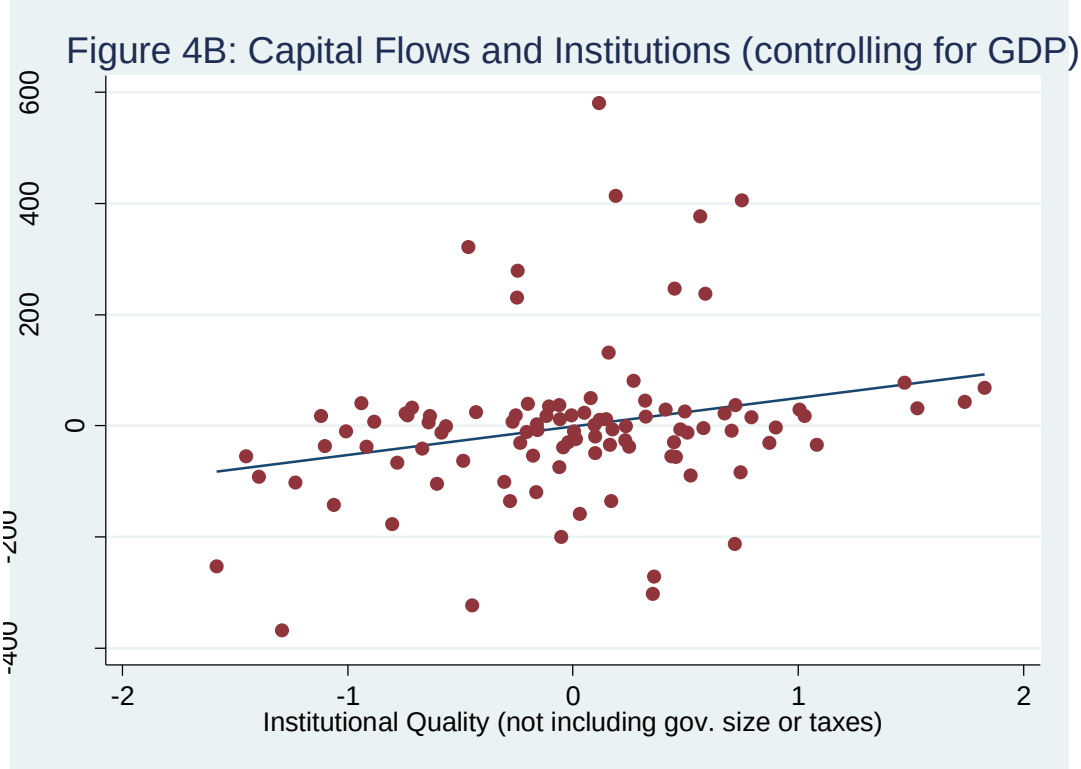

*Notes:* Figure 2B graphs the regression of capital inflows on GDP per capita in 1970, for only those countries with a GDP greater than $2500. Capital Inflows are measured as average annual per capita values of Foreign Direct Investment (FDI) plus Portfolio Investment from 1970 to 2008. The data is obtained from the International Monetary Fund's (IMF) *International Financial Statistics* (IFS). GDP in 1970 is obtained from Penn World Tables version 6.1. All values are in constant 1996 dollars. See the appendix for more details on the data.




*Notes:* Figure 3 graphs a quadratic regression fit of capital inflows on GDP per capita in 1970. The sample is divided where GDP equals $2500, and a quadratic regression is fitted for both sides of the threshold. Capital Inflows are measured as average annual per capita values of Foreign Direct Investment (FDI) plus Portfolio Investment from 1970 to 2008. The data is obtained from the International Monetary Fund's (IMF) *International Financial Statistics* (IFS). GDP in 1970 is obtained from Penn World Tables version 6.1. All values are in constant 1996 dollars. See the appendix for more details on the data.




*Notes:* In Figure 4A, I take the residuals from the regression of capital inflows on institutions (not including government size and taxes) against the residuals from the regression of initial GDP on institutions. The Frisch-Waugh theorem says the coefficient from this regression equals the coefficient for initial GDP in a regression with initial GDP and institutions as the explanatory variables, which equals 0.035. The purpose of this graph is to observe the effect of initial GDP on capital inflows, controlling for institutional quality. For a description of the institutional variables, please see the appendix.




*Notes:* In Figure 4B, I take the residuals from the regression of capital inflows on initial GDP against the residuals from the regression of institutions on initial GDP. The Frisch-Waugh theorem says the coefficient from this regression equals the coefficient for institutions in a regression with initial GDP and institutions as the explanatory variables, which equals 51.12. The purpose of this graph is to observe the effect of institutional quality on capital inflows, controlling for institutional quality. For a description of the institutional variables, please see the index.

# Table 1: Capital Inflows and Initial GDP

| Dependent Variable is Average Annual Capital Inflows Per Capita 1970-2008 | | | |
|---|---|---|---|
| Variable | Model 1A | Model 2A | Model 3A |
| GDP Per Capita in 1970 (Entire Sample) | 0.0447*** | | |
| | (0.0032) | | |
| GDP Per Capita in 1970 (Poorest Half) | | 0.00936** | |
| | | (0.0041) | |
| GDP Per Capita in 1970 (Richest Half) | | | 0.0474*** |
| | | | (0.0065) |
| Constant | -55.4*** | 0.451 | -80.6 |
| | (19.6) | (6.27) | (54.7) |
| Adjusted R-Squared | 0.643 | 0.0769 | 0.495 |
| Countries | 107 | 53 | 54 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.

## Table 2: Determinants of Capital Inflows (Whole Sample)

| Dependent Variable is Average Annual Capital Inflows Per Capita 1970-2008 | | | |
|---|---|---|---|
| Variable | Model 1B | Model 2B | Model 3B |
| GDP Per Capita in 1970 (Entire Sample) | 0.0403*** | | 0.0319*** |
| | (0.0044) | | (0.0062) |
| Institutions | 34.1 | 151*** | 36.6 |
| | (22.6) | (20.6) | (25.5) |
| Schooling | | | 10.5 |
| | | | (9.71) |
| Roads Paved (%) | | | 0.494 |
| | | | (0.619) |
| Distance | | | -0.0155** |
| | | | (0.0069) |
| Landlocked (not in Europe) | | | 51.7 |
| | | | (47.5) |
| Agriculture (% of GDP) | | | 1.45 |
| | | | (1.76) |
| Constant | -235** | -735*** | -261* |
| | (120) | (122) | (152) |
| Adjusted R-Squared | 0.647 | 0.289 | 0.687 |
| Countries | 101 | 131 | 84 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.

# Table 3: Capital Inflows and Institutions (Whole Sample)

| Dependent Variable is Average Annual Capital Inflows Per Capita 1970-2008 | | | |
|---|---|---|---|
| Variable | Model 1C | Model 2C | Model 3C |
| GDP Per Capita in 1970 (Entire Sample) | .0248*** | .0234*** | .0229*** |
| | (.0053) | (.0053) | (.0044) |
| Property Rights and Legal Structure | 56.5*** | 36.3** | 36.6*** |
| | (16) | (15.4) | (13.4) |
| Government Size and Taxes | -29.8** | -38.4*** | -37.5*** |
| | (12.8) | (11.9) | (10.7) |
| Trade Freedom | -11.3 | 4.61 | |
| | (16.9) | (16.5) | |
| Sound Money | 9.2 | 6.77 | |
| | (10.4) | (9.77) | |
| Business Regulations | 15.4 | 31.8* | 36.6** |
| | (19) | (18.2) | (16.7) |
| Roads Paved (%) | | -.183 | |
| | | (.554) | |
| Distance | | -.0146*** | -.0132*** |
| | | (.0057) | (.0048) |
| Landlocked (not in Europe) | | 19.6 | |
| | | (35.9) | |
| Agriculture (% of GDP) | | .795 | |
| | | (1.36) | |
| Constant | -170 | -136 | -91.7 |
| | (118) | (128) | (92.7) |
| Adjusted R-Squared | .707 | .756 | .775 |
| Countries | 101 | 94 | 96 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.

## Table 4: Developed vs. Developing Capital Flow Determinants

| Dependent Variable is Average Annual Capital Inflows Per Capita 1970-2008 | | | |
|---|---|---|---|
| Variable | Model 1D | Model 2D | Model 3D |
| GDP Per Capita in 1970 (Entire Sample) | 0.0241*** | | |
| | (0.0058) | | |
| GDP Per Capital in 1970 (Poorest Half) | | 0.0003 | |
| | | (0.0045) | |
| GDP Per Capital in 1970 (Richest Half) | | | 0.0156 |
| | | | (0.0109) |
| Institutions (not incl. Gov. size/taxes) | 66*** | 7.21** | 99.4*** |
| | (20) | (3.55) | (39.1) |
| Schooling | 6.08 | 1.33 | 0.698 |
| | (8.68) | (1.36) | (18.8) |
| Agriculture (% of GDP) | 0.95 | -0.784*** | -0.947 |
| | (1.58) | (0.235) | (5.68) |
| Roads Paved (%) | -0.354 | 0.147 | -0.74 |
| | (0.58) | (0.105) | (1.05) |
| Government Size and Taxes | -50.4*** | -2.87 | -89.6*** |
| | (12.6) | (2.24) | (26.2) |
| Landlocked (not in Europe) | 18.6 | 14.4*** | 171 |
| | (42.8) | (5.29) | (189) |
| Distance | -0.0111* | -0.00258* | -0.00582 |
| | (0.0062) | (0.0014) | (0.0105) |
| Constant | -51.5 | 17 | 73.4 |
| | (137) | (27) | (249) |
| Adjusted R-Squared | 0.752 | 0.601 | 0.682 |
| Countries | 84 | 41 | 43 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.

## Table 5: Robustness of Initial GDP

| Dependent Variable is Average Annual Capital Inflows Per Capita 1990-2008 | | | |
|---|---|---|---|
| Variable | Model 1E | Model 2E | Model 3E |
| GDP Per Capita in 1970 (Entire Sample) | 0.041*** | | |
| | (0.0104) | | |
| GDP Per Capita in 1970(Poorest Half) | | 0.00048 | |
| | | (0.0075) | |
| GDP Per Capita in 1970 (Richest Half) | | | 0.0315 |
| | | | (0.0189) |
| Institutions (not incl. Gov. size/taxes) | 116*** | 6.8 | 171*** |
| | (36.4) | (6.16) | (67.9) |
| Schooling | 5.68 | 3.81* | -9.19 |
| | (15.4) | (2.26) | (32.7) |
| Agriculture (% of GDP) | 1.12 | -0.883** | -2.4 |
| | (2.97) | (0.41) | (9.88) |
| Roads Paved (%) | -0.666 | 0.353** | -1.36 |
| | (1.02) | (0.175) | (1.82) |
| Government Size and Taxes | -92.6*** | 1.31 | -161*** |
| | (22.9) | (3.87) | (45.6) |
| Landlocked (not in Europe) | 49.5 | 20.2** | 348 |
| | (78.6) | (9.05) | (328) |
| Distance | -0.0181* | -0.00452* | -0.00889 |
| | (0.011) | (0.0023) | (0.0182) |
| Constant | -53.9 | -1.18 | 177 |
| | (242) | (44.8) | (433) |
| Adjusted R-Squared | 0.74 | 0.545 | 0.68 |
| Countries | 83 | 40 | 43 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.

# Table 6: Testing for Validity of Instrumental Variable

For Models 1F, 3F, and 5F the dependent variable is average annual capital inflows. For Models 2F, 4F, and 6F, the dependent variable is Institutions (excluding government size/taxes)

| Dependent Variable: | Capital Inflows | Institutions | Capital Inflows | Institutions | Capital Inflows | Institutions |
|---|---|---|---|---|---|---|
| Variable | Model 1F | Model 2F | Model 3F | Model 4F | Model 5F | Model 6F |
| GDP Per Capita in 1970 (Entire Sample) | .0216*** | .00013*** | | | | |
| | (.0026) | (.00003) | | | | |
| GDP Per Capita in 1970(Poorest Half) | | | .00914*** | 0.00031* | | |
| | | | (.0029) | (0.00017) | | |
| GDP Per Capita in 1970 (Richest Half) | | | | | 0.0192*** | 0.00011** |
| | | | | | (0.0043) | (0.000049) |
| Institutions (not incl. Gov. size/taxes) | 46.6*** | | 1.81 | | 62.6*** | |
| | (10.2) | | (3.31) | | (16.4) | |
| Government Size and Taxes | -15.4** | .17** | 2.77 | 0.163 | -25.1** | 0.154 |
| | (6.35) | (.0822) | (1.86) | (0.113) | (10.5) | (0.127) |
| Log Settler Mortality | 3.23 | -.271*** | -.761 | -0.178* | -8.7 | -0.46** |
| | (7.27) | (.0907) | (1.59) | (0.0937) | (17.6) | (0.199) |
| Constant | -188** | 5.23*** | -25.9 | 4.56*** | -167 | 6.22*** |
| | (76.1) | (.726) | (20.8) | (0.874) | (150) | (1.38) |
| Adjusted R-Squared | .824 | .534 | .305 | 0.19 | 0.814 | 0.469 |
| Countries | 61 | 62 | 33 | 34 | 28 | 28 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.

# Table 7: Two-Stage Least Squares

Dependent Variable is Average Annual Capital Inflows Per Capita 1970-2008.
Institutions (not incl. Gov. size/taxes) is instrumented with Log Settler Mortality

| Variable | Model 1G | Model 2G | Model 3G |
|---|---|---|---|
| GDP Per Capita in 1970 (Entire Sample) | 0.0213*** | | |
| | (0.0025) | | |
| GDP Per Capita in 1970(Poorest Half) | | 0.00926*** | |
| | | (0.0028) | |
| GDP Per Capita in 1970 (Richest Half) | | | 0.0199*** |
| | | | (0.004) |
| Institutions (not incl. Gov. size/taxes) | 44.9*** | 2.38277 | 66.04*** |
| | (9.41) | (3.04) | (14.58) |
| Government Size and Taxes | -15.3** | 2.64 | -25** |
| | (6.3) | (1.81) | (10.3) |
| Constant | -164*** | -32.2** | -228*** |
| | (51.5) | (15.9) | (84.7) |
| Adjusted R-Squared | 0.827 | 0.323 | 0.82 |
| Countries | 61 | 33 | 28 |

Standard errors are in parentheses. ***1%, **5%, *10%. See the appendix for a description of the variables.