Markets and Growth in Latin America

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1 Introduction

The purpose of this paper is to explore the role of distortions to capital accumulation in explaining the development experience of Latin America (LA) between 1960 and 1997. These distortions affect the relative price of capital and its opportunity cost.

Following Chari, Kehoe and McGrattan (1997) and Restuccia and Urrutia (1999) we attribute differences in the relative price of capital across countries and across time to government policies. These prices reflect a broad range of policies such as import tariffs and quotas on capital goods and other disincentives to invest such as corruption, and bureaucratic obstacles. We attribute differences in interest rates across countries, country risk spreads, to distortions such as the lack of legal certainty and the inability of governments to commit not to tax future capital income.

We use a neoclassical growth model (Solow, 1956) and a growth model with vintage capital (Solow, 1960 and Jovanovic and Rob, 1998) to evaluate the effects of these distortions on LA development. Variations in the relative price of capital and its opportunity cost can explain much of the income differences across countries as well as economic miracles and disasters.

The empirical regularities we address are extracted from a sample of all the LA countries with a population of over a million in 1960. We focus on three key features of LA development: (i) there is a development gap between LA and the United States and income disparity within LA. The average income in LA was one sixth of US income and the ratio of income between the richest and the poorest LA countries was between 3 and 4. (ii) LA grew at the same rate as the US over the period, with the exception of the 1980’s. In the 1980’s the average income of LA relative to the US fell 25%. (iii) During these forty years there have been periods in which countries underwent economic miracles and disasters.

The data on distortions that affect the relative price of capital stems from two sources: data on the price of investment goods over consumption goods is
obtained from the Penn World Tables Mark 5.6 (PWT) for the period 1960-1990, and data on the relative price of non-residential capital goods for the year 1980 is from (Jones, 1994). The PWT data reveals that (i) the relative price of capital varies across countries and over time within countries, (ii) growth rates of relative prices are not persistent over time, (iii) the average relative price of capital in LA increased 30% in the 1980’s.

Reliable data on ex-ante real interest rate is harder to obtain. We used panel data from the World Bank’s Global Development Finance (1999) for the 1970-1997 period, data on indexed bank deposits in Chile after 1977, and data from Argentine sovereign bonds denominated in US Dollars after 1982. The key features of the data are: (i) the average LA real interest increased from 1.6% per year between 1970 and 1981 to 5.6% per year between 1982 and 1990, (ii) real interest rates in Chile fell from over 15% per year in 1977 to an average of 6.6% per year after 1988, (iii) real interest rates in Argentina increased from 10.6% per year in 1982 to 14.7% per year in 1989, and fell to 6.25% per year in the 1990’s.

The elasticity of relative per capita income with respect to the relative price of capital and with respect to the interest rates depend crucially on the share of capital, $\beta$, in the production function. This is true both in the neoclassical growth model and in the vintage capital model. In the Solow (1956) model both elasticities can be easily calculated and are $\dot{y}_p = i \frac{\beta}{1+\delta}$ and $\dot{y}_r = i \frac{\beta}{1+\delta} \frac{r}{1+\delta}$, respectively, where $r$ is the real interest rate and $\delta$ is the rate of depreciation. In the vintage capital model there is no closed form solution for these elasticities and they have to be evaluated by numerical computations.

The right magnitude for $\beta$ depends on the interpretation of the model and the distortion that is being considered. Jovanovic and Rob (1999) look at distortions that affect the relative price of machines and, using the share of this capital good in the United States, conclude that $\beta = 0.08$. At the other end, Chari, Kehoe and McGrattan (1997) look at a broader measure of capital and use $\beta = 2=3$. De Gregorio and Lee (1999) use a capital share of $\beta = 0.6$ in their growth decomposition. Larger shares of capital are appropriate for calculating the elasticity of income with respect to interest rates since changes in interest rates affect the incentives to accumulate business capital, residential capital and human capital.

Unlike in the Solow (1956) model, in the Jovanovic and Rob model the elasticity of output with respect to the relative price of capital is an increasing function of the interest rate and of the relative price of capital. Keeping $\beta = 0.08$, it ranges from $\dot{y}_p = i 0.2$ with interest rates of 6.5% per year and a relative price of capital is equal to its US value to $\dot{y}_p = i 2$ when the interest rate is 20% per year and the relative price of capital is twice the US value.
2 Data Analysis

In this section we present some basic empirical regularities. Section 2.1 presents an account of the development experience during the period 1960-1997. Section 2.2 presents data on the relative price of capital and its correlation with income and investment. Section 2.3 looks at real interest rates and their relation to income.

2.1 Latin American Development: 1960-1997

We consider LA countries that in 1960 had a population of more than one million. Several facts emerge from the data\(^1\) for the 1960-1997 period. (i) There is a substantial gap between the income of Latin American countries and the one for United States and income disparity within LA. (ii) During the 1960's and 1970's the distribution of income of LA countries (relative to the United States) was stable; on average LA countries grew at the same rate as the US. This distribution shifted to the left in the 1980's and mildly recovered in the 1990's. (iii) There has been substantial mobility in the distribution of Latin American income in the last 40 years. The decline of the relative income of the richest countries in 1960 reduced the variance of LA incomes in the 1980's.

We detrend per capita income for all countries by dividing them by US income, i.e. we look at the properties of the distribution of

\[
y_{it} = \frac{\text{per capita income of country } i \text{ in year } t}{\text{per capita income of the US in year } t}
\]

over time and across countries. The following table shows some summary statistics on the distribution of \(y_{it}\).

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Median</th>
<th>Mean 5 richest</th>
<th>Mean 5 poorest</th>
<th>Ratio rich/poor</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>22%</td>
<td>17%</td>
<td>44%</td>
<td>11%</td>
<td>4</td>
<td>0.14</td>
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<tr>
<td>1970</td>
<td>22%</td>
<td>19%</td>
<td>38%</td>
<td>10%</td>
<td>3.8</td>
<td>0.13</td>
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<td>1980</td>
<td>23%</td>
<td>19%</td>
<td>41%</td>
<td>11%</td>
<td>3.7</td>
<td>0.11</td>
</tr>
<tr>
<td>1990</td>
<td>17%</td>
<td>15%</td>
<td>30%</td>
<td>10%</td>
<td>3</td>
<td>0.08</td>
</tr>
<tr>
<td>1997</td>
<td>19%</td>
<td>15%</td>
<td>32%</td>
<td>10%</td>
<td>3.2</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Table I: Distribution of LA Income per Capita Relative to US.

Table I shows (unweighted) summary statistics for the distribution of income in LA in the years 1960, 1970, 1980, 1990, and 1997. The mean relative income of the five richest and poorest countries is the simple average income of the countries that each year qualify as the five richest and five poorest in LA.

The average LA country has an income per capita that is roughly one \(\frac{1}{5}\)th of the US per capita income level. Income differences between rich and poor

\(^1\)Data from the Penn World Tables Mark 5.6a for the 1960-1990 period was complemented with data from the World Bank's Global Development Indicators 1999 for the 1990-1997 period.
countries in LA are also significant, falling from a factor of four in 1960 to a factor of three in 1997. See Figure 1.

The average LA country grew at the same rate as the US in the 1960's and 1970's, but fell by 25% relative to the US in the 1980's. Countries at the bottom of the distribution grew at the same rate as the US over the 40 years, while the income of the countries at the top of the distribution fell by 30% between 1960 and 1997, with 83% of the fall occurring in the 1980's. Thus, the fall in income differences between the rich and the poor is due to the relative decline of the richest countries. Figure 4 shows the poor growth performance of LA vis a vis the United States in the 1980's.

The distribution of income in LA displays considerable mobility over time. See Figure 2. The change in relative wealth between 1960 and 1997 ranges from -66% to 25%. During the 40 year period 47% of LA countries experienced an increase in relative income while 53% experienced a decline. The top quartile had a rate of increase 20% or higher; the low quartile exhibited a decline of over 35%.

Table II. Changes in income relative to US: 1960-1997

<table>
<thead>
<tr>
<th>Density</th>
<th>-60%</th>
<th>-50%</th>
<th>-40%</th>
<th>-30%</th>
<th>-20%</th>
<th>-10%</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>5%</td>
<td>11%</td>
<td>0%</td>
<td>16%</td>
<td>21%</td>
<td>0%</td>
<td>11%</td>
<td>11%</td>
<td>21%</td>
<td>5%</td>
</tr>
</tbody>
</table>

This can also be seen in Figures 3 and 4 that show the performance of all the countries in the sample between 1960 and 1997 and between 1980 and 1990.

2.2 The Relative Price of Capital

The Penn World Tables Mark 5.6 (PWT) contain data on the price of investment goods relative to consumption goods. Urrutia and Restuccia (1999) and Chari, Kehoe and McGrattan (1997) look at this data set for the 1960-1985 period to explain income disparity in the world. Jones (1994) constructs a data set based on the benchmark surveys from which the Penn World Tables are derived to measure the relative price of capital for the year 1980. He computes the relative price of capital using data on non-residential construction and the prices of producer durables (transportation equipment, electrical machinery and non-electrical machinery).
Table III: Relative Price of Capital in LA (US =1)  
Residential and Non-Residential Investment (PWT 5.6)  

<table>
<thead>
<tr>
<th>Year</th>
<th>Min 10%</th>
<th>Max 10%</th>
<th>Ratio</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>0.75</td>
<td>4.09</td>
<td>5.49</td>
<td>1.75</td>
</tr>
<tr>
<td>1970</td>
<td>0.91</td>
<td>2.90</td>
<td>3.19</td>
<td>1.58</td>
</tr>
<tr>
<td>1980</td>
<td>0.85</td>
<td>2.09</td>
<td>2.46</td>
<td>1.46</td>
</tr>
<tr>
<td>1990</td>
<td>1.12</td>
<td>2.83</td>
<td>2.53</td>
<td>1.81</td>
</tr>
</tbody>
</table>

Non Residential Investment (Jones, 1994)  

<table>
<thead>
<tr>
<th>Year</th>
<th>Min 10%</th>
<th>Max 10%</th>
<th>Ratio</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>1.65</td>
<td>3.21</td>
<td>1.95</td>
<td>2.34</td>
</tr>
</tbody>
</table>

\[2\] The Jones data set shows that the relative price of (non-residential) investment goods varies across countries and is on average 2.34 larger than in the US.

The Penn World Table data confirms this finding and also shows that relative prices are persistent over time, but growth rates are not. (Figures 5 and 6). Another aspect of the PWT data is that the relative price of investment falls between 1960 and 1980 and increases 24% from 1980 to 1990.

Figures 7 and 8 show a scatter plot of the relative price of capital from Jones (1994) against relative income and relative investment in 1980. Ignoring outliers (Peru, Colombia and Jamaica) there is a strong negative correlation between these variables.

2.3 Real Interest Rates

The relevant price for making investment decisions is the ex-ante real interest rate. Credit market regulations and high and volatile inflation rates make measuring real interest rates in LA an extremely difficult task. For example, ex-post real interest rates in the World Bank's World Development Indicators (1999) data set are negative for a large number of observations for many countries. We obtained real interest rate data from three different sources: the World Bank's Global Development Finance (1999) dataset, the Banco de Chile, and secondary market prices of Argentina Dollar denominated sovereign debt.

The broader measure of real interest rates for the region is from the World Bank's Global Development Finance (1999) database. These database contains the average interest rate on outstanding long term (maturity of more than one year) debt held by the private sector. A problem with this interest rate data is that it reflects the contractual terms on old debt, not the interest rate at which a country could borrow at a specific point in time. This difference is very important in the 1980's when net financial flows to LA countries were very small and LA bonds were traded at deep discounts. Real interest rates where calculated by subtracting actual US GDP deflator inflation from nominal US

\[2\] Relative price of investment refers to the price of investment over consumption relative to the same ratio in the US from PWT5.6. Min 10% and Max 10% refer to the average 10% of the countries (2 countries in this sample) with the lowest and highest relative price respectively. Ratio refers to Max 10% over Min 10%.
Dollar interest rates. Figure 9 shows that the (unweighted) average real interest rate for LA significantly increased in the 1980's. The average interest rate was 1.6% per year between 1970 and 1981, and 5.59% per year between 1982 and 1990.

For Chile and Argentina relatively good measures of real interest rates are available. In order to look at the long run relation between income levels and real interest rates exact we extracted the long term trend from the data using the Hodrick-Prescott filter.

Chilean data on real interest rates is from bank loans and deposits indexed to the price level. The data spans the period 1977-1999. Deposit real interest rates in Chile fell from over 15% per year in 1977 to an average of 6.6% per year after 1988. This fall in interest rates was followed by the second largest 5-year growth spur in our sample. See Figure 10.

Argentine real interest rate data is from secondary market prices of government bonds denominated in US Dollars for the period 1982-1999. We used the data on bond prices to calculate the nominal interest rate implicit in these bonds and then calculated the real rate using the actual US inflation from the GDP deflator. Our measure of interest rates increases from 10.6% per year in 1982 to 14.7% per year in 1989. During this period the HP trend in Argentine GDP fell from 37% to 27% of US income. In the 1990's interest rates fell to 6.25% per year and income increased to 32% of US income. See Figure 11.

2.4 Development, Interest Rates and the Price of Capital

In this section we present a simple development accounting framework based on Solow's 1956 and 1960 growth models. Our analysis parallels Jovanovic and Rob (1999).

The starting point for the analysis is the standard neoclassical production function

$$y_i = \bar{o}_t A_i k_i^{\bar{\beta}} h_i^{\bar{\gamma}};$$  \hspace{1cm} (1)

where $\bar{o}_t$ is a common technology parameter, $A_i$ is a productivity parameter for country $i$ (country $i$'s residual), $k_i$ and $h_i$ are the corresponding physical and human capital. The development accounting literature uses this production function as an accounting framework to decompose country differences in output per capita.

For an open economy facing an interest rate $r$, the accumulation of physical capital satisfies the condition:

$$\bar{o}_t A_i k_i^{\bar{\beta}} h_i^{\bar{\gamma}} = (r + \pi) p_i;$$ \hspace{1cm} (2)

This approximation of ex-ante real rates in Argentina has a measurement error stemming from differences between expected and realized US inflation and from deviations from purchasing power parity.
where $\pm$ is the depreciation rate and $p_i$ the relative price of physical capital in country $i$. Using equations (1) and (2) it follows that:

$$y_i = C_t A^\frac{1}{\xi} (r + \delta)^{\frac{1}{\mu}} p_i^{\frac{1}{\rho}} h_i$$  \hspace{1cm} (3)

where

$$C_t = \frac{\delta^{\frac{1}{\mu}} A^{\frac{1}{\xi}}}{\mu^{\frac{1}{\mu}}}.$$

From equation (3) we can compute the elasticity of output with respect to the relative price of capital:

$$\frac{\partial y}{\partial p} = i \frac{\delta}{\mu} \frac{1}{1 + \delta}.$$

and with respect to the interest rate:

$$\frac{\partial y}{\partial r} = i \frac{\delta}{\mu} \frac{1}{1 + \delta} \frac{1 - \delta}{1 + \delta}.$$

The strength of this elasticity obviously depends on $\delta$, the share of capital. It is easy to generalize the above to a setup with multiple capital goods with a Cobb-Douglas production function. In that case, to compute the relevant elasticity of output with respect to the price of a given type of capital good, we take $\delta$ to be its corresponding share of GNP. Hence there is a range of possible values for $\delta$ depending on the type of distortion considered. For instance, to consider the effect of changes in tariffs for capital good imports, we should consider $\delta$ to represent the share of imports of capital goods. On the other hand, if we wish to evaluate the effect of distortions that affect the cost of all investment (or its return), then $\delta$ should represent the share of all physical capital and even perhaps some forms of human capital.

Determining the correct elasticity is obviously an important issue to evaluate the effect of possible reforms. Jovanovic and Rob (1999) focus on the price of machinery. Using the share of this capital good for the US, they conclude that $\delta = 0.08$; implying a very modest elasticity of less than -10%. At the other extreme, Chari, Kehoe, McGrattan (1997) argue for a much broader range of distortions to investment, including human capital, suggesting the relevant value of $\delta$ is 2-3; which implies an elasticity of -2. An intermediate value of $\delta = 1 (\text{and } \frac{\partial y}{\partial p} = i \frac{1}{1 + \delta})$, would correspond to distortions that affect investments in physical capital only as well as one third of the disparity within the region.

Ignoring exceptional cases, the range of values of relative price of capital (normalized by the relative price in the US) go between 2 and 2.5, representing 20 to 25 percentage points. Depending on the values of $\delta$ this could account for output per capita differences ranging from 2% to 50%. Our data corresponds to differences in the price of all capital goods, so using an elasticity of 1/2 these distortions account for around 10% of output per capita disparity within the region and imply an average 75% ratio to US values. This would explain approximately one third of the average development gap between Latin American economies and the US.
Real interest rates in LA increased by a factor of 3.5 in the 1980’s. Using a capital share of output of \( \frac{1}{3} \) and a depreciation rate of 10\%, and an initial interest rate of 1.6\%, the elasticity of income with respect to real interest rates is \( \gamma_{yr} = \frac{0.07}{0.1} \); this would predict a fall in LA income in the 1980’s of 24\%.

Using the same parameters to examine the experience of Chile and Argentina we obtain the following results. Chilean and Argentine interest rates fell 56\% in the late 1980’s and early 1990’s, respectively. At an initial value of 15\%, the relevant elasticity is \( \gamma_{yr} = 0.3 \); which implies a predicted increase in income of 15\%. In the case of Chile, the increase in income was \( x \% \), while in the case of Argentina it was 19\%. For Argentina there is additional data on the increase in interest rates in the 1980’s. Argentine interest rates increased by 40\% in the 1980’s from a starting value of 10.6\%. The relevant elasticity for this case is \( \gamma_{yr} = \frac{0.26}{0.1} \) and the predicted fall in income is 10\%, which is two thirds of the 15\% actual decline.

As interest rates affect the incentives to accumulate human and physical capital, it is reasonable to consider a larger income share of capital to calculate the elasticity of per capita income with respect to the real interest rate. This broader measure of capital is consistent with an \( \frac{1}{3} \) (see Mankiw, Romer, and Weil, 1992, Kleenow and Rodriguez-Clare 1997) and would imply an elasticity of \( \gamma_{yr} = \frac{0.28}{0.1} \); this elasticity would have predicted a fall in income of 70\% in the 1980’s, which is not as unreasonable as it seems if it may take a very long time to reach the new steady state.

2.5 Vintage capital

This section considers an alternative model as a framework to evaluate the effect of differences in the relative price of capital and interest rates. We follow Jovanovic and Rob’s (1999) account of Solow’s (1960) vintage capital model. The use of vintage capital model is justified on two grounds: 1) It can help explain some empirical regularities, such as the faster growth rates exhibited by late developers (see Prescott and Parente, 1993); 2) It provides for an interaction between the interest rates and the elasticity of output per capita with respect to the price of capital, which is absent in the previous model.

The model is described in detail in Jovanovic and Rob (1999). Technological change is embodied in newer capital goods. Countries grow as the existing firms replace old capital by newer vintages and new firms are created. Investment is irreversible (displaced capital has no value), so replacement of old capital takes place at discrete times. The cost of new capital and the interest rate affect the age at which capital is replaced. As interest rates rise or the price of new capital increases, the replacement age increases. In a steady growth path, the age distribution of capital (relative to the frontier) remains unchanged. Higher interest rates and a higher price of new capital, shift correspondingly the age distribution and thus lower productivity and output per capita.

In contrast to the model described in the previous section, this one has no closed form solution to derive elasticities from, so we resort to numerical computations. These computations follow Jovanovic and Rob (1999) and assume
the share of the distorted capital is 8%.

Table IV.a shows the effect of interest rates and prices of capital on steady state output per capita. For a typical scenario (r=12% and price of capital = 2) the model accounts for a 15% drop in output per capita, roughly 20% of the gap. The table also indicates the interaction between the two distortions. This can be seen better in table IV.b, which gives the elasticities of output per capita with respect to the price of capital. These elasticities range from -0.2 to almost -2.

Table V provides estimates of the potential role of capital price distortions in accounting for the development gap. The calibration of the vintage model follows the procedure described in Jovanovic and Rob (1999). The first column gives the output ratio. The second column indicates the percentage of the gap explained by differences in human capital. This appears by far to be the most important explanatory variable, accounting for almost 65% of the development gap. Three estimates are provided for the effect of capital price distortions, with varying shares of capital. According to these results, these distortions account for 7% to 35% of the development gap.

Overall, these results are consistent with findings by Mankiw, Romer and Weil, that attribute 78% of the gap to human and physical capital. It is important to acknowledge that the procedure used by Jovanovic and Rob (1999) to measure human capital assumes implicitly constant rates of return to schooling as a function of school years. Kleenow and Rodriguez-Clare (1997) argue that this procedure overstates cross-country differences in human capital. The result of this bias is an overstatement of the role of human capital, swamping the role of idiosyncratic differences in productivity.

2.6 Conclusions

In a study of the sources of economic growth in LA De Gregorio and Lee (1999) prepared for the Global Development Network conclude that "economic policy and institutional factors, such as macroeconomic stability and the degree of openness" explain the bulk of the differences between the growth of LA and East Asia. These factors swamped the effects of investment in their growth regressions.

This paper describes market forces that are explained by these findings. Economic policy and institutional factors have a profound effect on development because they distort the incentives to accumulate capital, through their impact on the relative price of capital and real interest rates.

These are measured by using differences in schooling and applying rates of return to schooling to convert into human capital.
3 References

References


Table IV: Numerical Computations for the Vintage Capital Model

**a. Output per Capita, interest rate and price of capital**

<table>
<thead>
<tr>
<th>Interest rate</th>
<th>1</th>
<th>1,5</th>
<th>2</th>
<th>2,5</th>
<th>3</th>
<th>3,5</th>
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<tr>
<td>0.065</td>
<td>100.0</td>
<td>94.1</td>
<td>88.9</td>
<td>84.2</td>
<td>79.8</td>
<td>75.6</td>
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<tr>
<td>0.08</td>
<td>99.6</td>
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<td>88.0</td>
<td>83.0</td>
<td>78.3</td>
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<td>0.1</td>
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<td>79.4</td>
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<td>0.14</td>
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<td>83.9</td>
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**b. Elasticity of GNP ratio with respect to Pk**

<table>
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<tr>
<th>Interest rate</th>
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<th>1,5</th>
<th>2</th>
<th>2,5</th>
<th>3</th>
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<td>-0.65</td>
<td>-1.01</td>
<td>-1.87</td>
</tr>
</tbody>
</table>

**c. Elasticity of GNP ratio with respect to interest rate**

<table>
<thead>
<tr>
<th>Interest rate</th>
<th>1</th>
<th>1,5</th>
<th>2</th>
<th>2,5</th>
<th>3</th>
<th>3,5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.065</td>
<td>-0.02</td>
<td>-0.04</td>
<td>-0.05</td>
<td>-0.08</td>
<td>-0.10</td>
<td>-0.14</td>
</tr>
<tr>
<td>0.08</td>
<td>-0.03</td>
<td>-0.05</td>
<td>-0.07</td>
<td>-0.11</td>
<td>-0.15</td>
<td>-0.20</td>
</tr>
<tr>
<td>0.1</td>
<td>-0.03</td>
<td>-0.06</td>
<td>-0.10</td>
<td>-0.14</td>
<td>-0.20</td>
<td>-0.29</td>
</tr>
<tr>
<td>0.12</td>
<td>-0.04</td>
<td>-0.08</td>
<td>-0.12</td>
<td>-0.19</td>
<td>-0.28</td>
<td>-0.42</td>
</tr>
<tr>
<td>0.14</td>
<td>-0.05</td>
<td>-0.09</td>
<td>-0.16</td>
<td>-0.25</td>
<td>-0.38</td>
<td>-0.61</td>
</tr>
<tr>
<td>0.16</td>
<td>-0.06</td>
<td>-0.12</td>
<td>-0.20</td>
<td>-0.32</td>
<td>-0.52</td>
<td>-0.91</td>
</tr>
<tr>
<td>0.18</td>
<td>-0.07</td>
<td>-0.14</td>
<td>-0.24</td>
<td>-0.41</td>
<td>-0.72</td>
<td>-1.46</td>
</tr>
</tbody>
</table>
\textbf{Table V}. Development gap decomposition using vintage capital model

\begin{center}
\begin{tabular}{lcccccc}
 & \multicolumn{2}{c}{\% of gap explained by HK} & \multicolumn{2}{c}{\% gap explained by HK} & \multicolumn{2}{c}{\% gap explained by HK} \\
& GDP ratio & labor share=0.75 & labor share=0.75 & labor share=2/3 & labor share=0.75 & labor share=2/3 \\
 \hline
CRI & 0.24 & 62.3\% & 6.2\% & 13.6\% & 34.3\% \\
DOM & 0.15 & 61.6\% & 6.3\% & 13.9\% & 30.7\% \\
SLV & 0.13 & 62.2\% & 7.0\% & 15.7\% & 31.0\% \\
GTM & 0.17 & 69.4\% & 7.0\% & 15.7\% & 30.1\% \\
HND & 0.10 & 62.6\% & 5.8\% & 12.9\% & 27.2\% \\
JAM & 0.15 & 62.3\% & 4.1\% & 9.0\% & 24.9\% \\
MEX & 0.40 & 87.8\% & 8.0\% & 17.8\% & 41.0\% \\
PAN & 0.22 & 53.1\% & 5.3\% & 11.6\% & 32.9\% \\
ARG & 0.43 & 65.8\% & 7.3\% & 16.0\% & 46.2\% \\
BOL & 0.13 & 58.7\% & 7.0\% & 15.7\% & 32.1\% \\
BRA & 0.28 & 76.9\% & 6.9\% & 15.3\% & 33.8\% \\
CHL & 0.25 & 55.4\% & 7.3\% & 16.1\% & 39.5\% \\
COL & 0.19 & 61.8\% & 8.2\% & 18.4\% & 36.3\% \\
ECU & 0.21 & 56.2\% & 7.2\% & 15.9\% & 37.0\% \\
PRY & 0.17 & 57.6\% & 6.9\% & 15.2\% & 33.8\% \\
PER & 0.19 & 54.3\% & 9.3\% & 21.0\% & 40.6\% \\
URY & 0.33 & 63.4\% & 5.6\% & 12.2\% & 36.0\% \\
VEN & 0.48 & 90.3\% & 8.1\% & 17.7\% & 47.6\% \\
\hline
Average & 23.5\% & 64.5\% & 6.9\% & 15.2\% & 35.3\% \\
(unweighted) & & & & & \\
\end{tabular}
\end{center}
Figure 1: GDP per capita / GDP per capita of the US for the 5 richest and 5 poorest countries in Latin America

Source: Penn World Table and World Development Indicators

5 richest and poorest countries in GDP per capita (PPP) in Latin America, weighed by population in each year.
Figure 2: Distribution of Change in Wealth Relative to US: 1960-1997
Figure 3: Latin American Development: 1960-1997

Change in Income Relative to US
Figure 4: Latin American development: 1980-1990

Change in Income Relative to US

- COLOMBIA
- CHILE
- JAMAICA
- MEXICO
- COSTA RICA
- BRAZIL
- DOMINICAN REP.
- HONDURAS
- EL SALVADOR
- URUGUAY
- PANAMA
- ECUADOR
- PARAGUAY
- GUATEMALA
- VENEZUELA
- HAITI
- PERU
- ARGENTINA
- NICARAGUA
Figure 9: Average Real Interest Rate on External Private Debt for Latin American Countries

Note: Average US Dollar Interest rate on Outstanding External Private Debt Deflated by US GDP Deflator. Sources: Global Development Finance and World Development Indicators.
Figure 5: Persistence of changes in relative prices

Source: Penn World Table, Restuccia and Urrutia

Correlation: 0.24
Figure 6: Persistence of relative Prices Levels

Correlation: 0.84

Source: Penn World Table, Urrutia and Restuccia
Figure 7: Relative Price of Capital and Relative Income
(Latin American Countries - 1980)

Sources: Relative price of capital is the price of non-residential construction and producer durables relative to consumption from Jones 1994 (based on the Penn World Tables Mark 5.6). Income data is from Penn World Tables Mark 5.6.
Sources: Relative price of capital is the price of non-residential construction and producer durables relative to consumption from Jones 1994 (based on the Penn World Tables Mark 5.6). Investment data is from Penn World Tables Mark 5.6.
Figure 9: Average Real Interest Rate on External Private Debt for Latin American Countries

Note: Average US Dollar Interest rate on Outstanding External Private Debt Deflated by US GDP Deflator. Sources: Global Development Finance and World Development Indicators.
Figure 10: Chile 1977-1999
Bank Real Interest Rate and GDP Relative to US
(Hodrick-Prescott trend)
Figure 11: Argentina 1982-1997
External Real Interest Rate and GDP Relative to US (Hodrick-Prescott trend)

Argentina GDP relative to US
Real Deposit Interest Rate
Proportion of US GDP per Capita
"Disasters"

Per capita GDP relative to US, for 3 countries with largest positive change factor (per capita GDP relative to US in 1997 / per capita GDP relative to US in 1960)

Source: Penn World Table and World Development Indicators
"Miracles"
Per capita Gdp relative to US, for 3 countries with largest positive change factor (per capita GDP relative to US in 1960 / per capita GDP relative to US in 1997)

Source: Penn World Table and World Development Indicators