Institutions, economic structure and economic policy: What lies beneath inflation in Latin America?

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Institutions, economic structure and economic policy: What lies beneath inflation in Latin America?

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Abstract

In this paper we examine the importance of institutional arrangements and factors related to the economic structure to explain inflation outcomes in Latin America. We perform a dynamic panel data analysis with an ample set of variables that allowed us to consider the temporal dimension of the data, and to control for endogeneity. Results lead us to believe that institutional arrangements – other than central bank independence – have played an important role in terms of inflation outcomes in Latin America. Variables that may affect inflation via time consistency problems seem somewhat more relevant than those suggested by optimal tax considerations. In particular, the negative correlation between political constraints to changes in public policies and inflation in Latin America is quite suggestive. We find that less flexible exchange rate regimes, advances in structural policies, and better government institutions have contributed to the reduction in inflation rates in the region. Faster growing countries exhibited lower inflation rates. Openness to trade seems to be positively correlated with inflation, suggesting that more open economies are more exposed to external shocks, allowing countries to benefit in terms of importing lower international inflation rates in recent years. Other variables did not prove to be significant.

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1. Introduction

After a decade of double digit rates and hyper-inflation episodes, inflation experienced a remarkable decline in Latin America throughout the nineties. A widely accepted claim is that different fiscal and monetary regimes across countries are the culprits of cross-country variations of inflation dynamics. Yet it seems natural to inquire what factors actually determine the choice of such policies. In this paper we address that question through an empirical analysis encompassing an ample set of structural and institutional variables that may be affecting the policy-making process that underlies inflation outcomes in Latin America.

How can institutional arrangements and the structure of the economy affect inflation? In mainstream literature we find two mechanisms to canalize their effects. On the one hand, factors such as market imperfections, lack of central bank independence, political instability, poor institutions, and redistributional pressures, among others, may elicit the *dynamic inconsistency problem* and create an inflation bias (Kydland and Prescott, 1977, and Barro and Gordon, 1983) [4]. On the other hand, in the presence of tax evasion or high costs to tax certain sectors, fiscal authorities could resort to seignorage more extensively, as a form of *optimal taxation* (Kimbrough, 1986). Thus, by means of dynamic inconsistency or optimal taxation, factors related to the economic structure and institutions may cause the monetary authority to admit larger inflation rates.

The role of central bank independence has captured a lot of attention in the literature concerned with the link between dynamic inconsistency, institutional arrangements and inflation. Cukierman (1992) developed a widely used quantitative measure of central bank independence to empirically assess its effects on inflation. Campillo and Mirón (1997),

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[4] The argument here is as follows. Suppose policy makers wanted to commit to a certain inflation path (e.g., an optimal path). If they sequentially chose inflation rates, they will have incentives to deviate from that path each period in order to attain higher growth. Instead, if for all periods policy is conducted according to a state-contingent rule, deviations from the path are less likely to take place. Hence, inflation rates are higher under discretionary policy than under rules. We can think of the variables we consider in this paper affect inflation by enhancing the incentives for policy makers to deviate from the optimal path.

Fuhrer (1997), Cukierman, Miller, and Neyapti (2002), Jácome and Vázquez (2005), among others, also contributed to this line of research. Although there are theoretical grounds to expect that an independent central bank would less easily compromise its inflation goal due to undue political pressure, the empirical evidence supporting that different degrees of central bank independence lead to different inflation outcomes is not robust. This is especially true for developing economies when other economic and institutional determinants are controlled for, as is the case with structural reforms in Latin America (see Jácome and Vázquez, 2005).

Factors underlying the structure of the economy that may affect dynamic inconsistency and inflation bias have received less attention though. For instance, market imperfections translate into lower than social optimum levels of output and the larger the distortion, the more incentives the monetary authority has to generate monetary surprises in an effort to push output closer to efficiency levels, at the cost of aggravating the inflation bias. In this line of thought, Lane (1997) studies the effect of trade openness on inflation in the presence of monopolistic competition and price rigidities in the non-traded sector. As the economy is more open to trade, the importance of the distortion in the non-traded sector decreases, and there are fewer incentives for the monetary authority to deviate from the optimal inflation rate. For a cross-section of countries, Lane finds that trade openness is associated with smaller inflation rates, consistent with results in Romer (1993).

In a similar vein, Neiss (2001) studies the impact on inflation of the degree of monopolistic competition in the economy, approximated by the size of the markup. She finds that higher markups are associated with larger inflation rates in OECD countries. A skewed income distribution may also affect the inflation bias. Based on previous cross-country evidence suggesting that inflation and income inequality are positively correlated, Albanesi (2000) models this correlation as the result of a distributional conflict underlying the determination of fiscal policy through a bargaining game where the more inequality, the higher the inflation rate.

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Inflation aversion by certain sectors of the economy may also affect price stability. Posen (1995) argues that financial sector opposition to inflation actually puts pressure on the central bank to consistently pursue counterinflationary policies. Thus, the presence of large and developed financial sector may result in lower inflation rates.

Regarding optimal tax considerations, Cavalcanti and Villamil (2003) show that the optimal inflation tax is positive if structural frictions, such as the informal sector, are present. Since the government is not capable of observing or taxing labor income, consumption or financial transactions in the underground economy, the optimal inflation tax will be positive to compensate for the loss in the formal tax base. Koreshkova (2003) reports a positive correlation between average inflation rates and the size of the informal sector, and also models this relationship as an optimal taxation problem in the presence of distortions in the labor and production markets.

Other studies have focused on the impact of political variables on inflation. The idea developed in this literature is that political instability may lead to frequent cabinet changes, shortening the horizon of policy makers. This in turn may aggravate the dynamic inconsistency problem, creating incentives for policy makers to concentrate more on short-term objectives which may imply frequent macroeconomic policy changes that finally translate into higher and more unstable inflation rates. Edwards and Tabellini (1991) results suggest that political instability and polarization can explain differences in inflation across countries, while the optimal taxation view of inflation does not seem be that important in developing nations. Cukierman, Edwards and Tabellini (1992) find that political instability yields higher seignorage and inflation rates for a larger sample of countries. More recently, Aisen and Veiga (2003) find that political instability is not only associated to higher inflation rates but also to higher volatility.

But not only political instability affects policy outcomes. Polity variables and institutions behind the policy-making process may well have an impact on the resulting quality of public policies and policy outcomes (see Spiller et al., 2003). For instance, frequent cabinet changes translate into unstable public policies as long as the institutional framework of

checks and balances allows it. Henizs (2002) builds an index to capture the probability of change in public policies given the effective veto power of political agents in the system, other than the executive, and the alignment and fragmentation of agents with veto power. The index can be regarded as a measure of the limits to discretionality in public policies. Henisz finds that the fewer the political constraints to discretionality, the more unstable public policies become. The link between the probability of change in public policies approximated by this index and inflation has not been empirically examined yet, and we may expect that fewer political limits to discretionality to entail higher inflation rates.

Our paper focuses in Latin America and its contribution of is to include a wider set of determinants of inflation amongst factors underlying the structure of the economy and institutions –income distribution, informality, trade openness, market imperfections, output composition, political limits to discretionality, central bank independence, competition regulation, structural reforms and government institutions– some of which have not been considered before or jointly tested for the region[5]. Previous studies mostly employed averages of a cross section of countries[6], whereas we consider the temporal dimension of the data working with dynamic panel techniques (Arellano and Bond, 1991 and Arellano and Bover, 1995) to account for inflation inertia and control for the possible endogeneity of many of the regressors.

Our results suggest that less flexible exchange rate regimes contributed to inflation reduction since the late eighties and over the nineties. More political limits to discretionality, advances in market oriented structural reforms, and better government institutions had a significant negative correlation with inflation rates in Latin America, particularly in the nineties. Openness to trade seems to be positively correlated with inflation, suggesting that more open economies are more exposed to external shocks, rather than the negative effect correlation expected from optimal tax considerations. The results are robust to different specifications of the instruments, although the coefficients on

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[5] Even if we rationalize the effects of this variables on inflation within the framework of dynamic inconsistency and optimal taxation, there may be alternative explanations. Hence, our results can be interpreted independently of those arguments.
[6] More recently, Aisen and Veiga (2000) and Jácome and Vázquez (2005) consider the temporal dimension of the data, but neither control for some of the variables we include in our approach.

government institutions and limits to discretionality measures are less robust, possibly due to the high correlation between them. The paper is structured as follows: the next section explains the variables use in the analysis, the third section presents the econometric results and the last section contains some final considerations.

2. The data

The dataset contains annual information of 18 Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. The period spans from 1980 to 2004, although not all variables are available for the entire period.

It is worth mentioning that our focus here is to investigate the effect of institutional arrangements and structural variables on inflation, behind fiscal and monetary policy. We thus decided to exclude these variables from our analysis[7].

Tables 1 through 7 present country averages per decade and display countries ranked according to their performance in each case. Figures 1 through 7 contain yearly averages over countries for each variable, to account for the regional dynamics throughout the sample period.. The sources of the data are: IMF's International Financial Statistics (CPI, GDP, imports, exports,), Cepal's Statistical Yearbook National Accounts data (GDP, GDP by economic sectors, compensation of employees and income distribution by quintiles), International Labor Organization (informal employment), Rienhart and Roggoff (2002) (de facto exchange rate regime classification), Jácome and Vázquez (2005) (central bank independence index), Government Institutions (International Country Risk Guide), World Bank's Development Indicators (market capitalization of listed companies), Lora (2001)

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[7] Aisen and Veiga (2000) follow a similar approach. In fact, it appears that the empirical literature fails to find a significant relationship between fiscal deficits (measured as a percentage of GDP) and inflation, and Jácome and Vázquez (2005) find this to be true as well for Latin America. For a recent work that examines the role of fiscal deficits on inflation and finds a significant relationship between them, see Catao and Terrones (2005).

(index of structural reforms), Henizs (2002) (Political limits to discretionality in public policies), countries' competition laws (competition regulation index), Osiris (industry concentration) and Bankscope (bank concentration).

Inflation. As shown in Figure 1, the average inflation rate in Latin America experienced a dramatic drop in the nineties, compared to the high rates exhibited in the eighties. Table 1 displays average inflation rates over the eighties and nineties for each country and ranks their performance. It highlights that most countries –except for Peru, Ecuador and Venezuela– cut back inflation by half, and that there is a great dispersion in the data, not only over time, but across countries. For our econometric analysis we measure inflation by the ratio $\pi/1+\pi$, where π is the percentage variation of annual CPI. This rescaling of inflation somewhat diminishes potential problems of heterocedasticity as it assigns less weight to high inflation episodes. As Jácome and Vázquez (2005), we exclude hyperinflation episodes[8].

Variables related to the Structure of the Economy

Growth. Latin America exhibited a poor performance in terms of economic growth over the last decades. As seen in Table 2 and Figure 2, most countries exhibited negative per capita GDP growth rates during the eighties, while in the nineties most countries improved their economic growth performance. Several authors have found a negative correlation between inflation and growth; particularly high inflation episodes causing growth to drop sharply (see Bruno and Easterly, 1998, and Khan and Senhadji, 2001). We then expect growth to have a negative sign, and treat it as an endogenous variable.

Openness to trade. Romer (1993) and Lane (1995) associate greater openness to lower inflation, since openness reduces economic distortions leading to rely on inflation tax. On the other hand, more open economies are exposed to external shocks to a larger extent,

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[8] We omitted observations were annual inflation rate was above 200%. This accounted for a total of 30 observations: 20 between 1980 and 1989, and 10 between 1990 and 2002. Using a higher threshold as 1000% does not alter the econometric results much, particularly in the nineties. The countries that experienced such inflation episodes were: Argentina (1983-1985and 1988-1990) Brazil (1985, 1987-1994), Nicaragua (1985-1991) and Peru (1988-1991).

implying a positive correlation between these variables. Therefore, the effect of openness on inflation depends on which effect is stronger (Aisen and Veiga, 2000). The degree of openness in the region has moderately increased since 1980, but there is a great dispersion across countries. Central American countries tend to be very open, whereas in Brazil and Argentina trade barely represents about 20% of GDP.

Income distribution. A skewed income distribution can exert redistributional pressures that can cause dynamic inconsistency problems, or as in Albanesi (2000) bring about public finance conflicts so that higher inflation rates are accepted. Thus, we should expect higher inflation rates the more skewed the income distribution. Then again, inflation also has a negative impact on income distribution. Therefore, we treat this variable as endogenous. We measured income distribution by the ratio of Q5/Q1, which reports how large the income of the richest quintile compares to that of the poorest quintile[9]. It is widely known that Latin America is a very unequal region. The average income distribution in the region has not changed much over the period, yet there are variations across countries[10].

Industrial composition. The relative importance of certain economic sectors to GDP has been related to inflation via optimal tax considerations. The presence of economic sectors which are costly to tax may induce the fiscal authorities to rely more heavily on seignorage to finance their budget. Therefore, a larger share of the agricultural sector to GDP should be positively correlated with inflation. (Cuckierman, Edwards and Tabellini, 1992) By the same token, the correlation between inflation with easier to tax sectors (manufacture, mining and service[11]) should be negative. In addition to these considerations, larger industrial and service sectors may also be an indication of development and in consequence of a more effective tax system, further reducing the need for seignorage. The service sector is predominant in Latin America, yet its participation varies across countries. The

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[9] We resorted to this measure since we could not find a consistent data base for the Gini coefficient for Latin American countries during our sample period. The Gini coefficient provides more information than Q5/Q1, but in terms of cross-country variations and dynamics, they should provide similar information. Thus, this measure is perfectly suitable for our purposes in this paper.

[10] According to this measure, some countries have improved their income distribution, (Uruguay, Panamá, Nicaragua), others have worsened it (Venezuela, Ecuador, Argentina, Costa Rica), and others remained virtually the same (Chile, Brazil, Mexico).

[11] Service sector includes: utilities; construction; wholesale and retail trading; transportation, storage and communications; and community, social, personal and government services.

importance of the manufacture, mining or agricultural sectors is also heterogeneous across the sample.

Informal employment. Koreshkova (2003) finds a positive correlation between the size of the underground economy and inflation. She rationalizes this result as the outcome of an optimal taxation problem, where seignorage is an optimal tax in the presence of a tax evading sector, i.e., the informal sector. As a proxy of the size of the underground economy, we use the fraction of informal employment to total employment, using OIT information. There are methods to measure the size of the informal economy[12], but those are beyond the scope of this paper. Informal employment should move in tandem with the size of the underground economy and that suffices for the purpose of our empirical analysis. The average informal employment has increased in the region over the nineties, but the size of the sector varies a lot across countries, ranging from Uruguay with 34% of informal employment, to Panama with 55%.

Monopolistic competition. The larger the degree of monopolistic competition, the more full employment output deviates from its social optimum. This can exacerbate the inflation bias as the monetary authority could increase its efforts to raise output via monetary surprises (Neiss, 2001). Therefore, the degree of monopolistic competition should be positively correlated with inflation. We use two cross country comparable economy-wide measures to approximate the degree of monopolistic competition: a measure of the markup of price over marginal cost and an index of industrial concentration. We follow the approach in Neiss (2001) to compute the markup, which is based on Gali (1995)[13]. With the exception of Ecuador, which is an outlier in the sample, the there does not seem to be large variations across countries. We treat the markup as an endogenous variable, since it could be argued

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[12] See Schneider and Enste (2000) for the DYMIMIC approach to measure the size of the underground economy.

[13] Departing from the firm's profit-maximization condition, the markup is derived as the ratio of the elasticity of output with respect to labor over the share of labor of total income. Assuming that the elasticity of output with respect to labor is equal across countries (same technology), the markup is then the inverse of the ratio of compensation of employees to GDP.

that the markup is affected by the average rate of inflation as well[14]. Following Dutz and Hayri (1999) we proxy de degree of overall industrial concentration with alternative measures of concentration (C5, C10 and the Hirshman-Herfindahl index) based on information of the publicly listed firms for each country[15]. We constructed similar measures to assess the concentration in the banking sector. The regional average for the markup is around 3%, and it has not varied much throughout the period.

Financial development. Posen (1995) argues that the presence of a large and developed financial sector averse to inflation sets pressures on the central bank to commit to low inflation rates. Thus, we should expect a negative correlation between financial development and inflation. Our indicator for financial development is the market capitalization of publicly listed companies as a percentage of GDP, which gives an idea of the importance of the stock market[16]. The market capitalization has increased in most countries, particularly over the nineties, but the size of the stock market relative to GDP varies substantially across countries, ranging from Chile with an average ratio of 85 to Dominican Republic with less than 1.

Idebtedness. For optimal tax considerations, countries with high ratios of debt total debt to GDP should be expected to use more heavily inflation tax in the future. We observe that indebtedness in the region has a lot of dispersion, with outliers as Nicaragua, where debt is 3.9 times larger than GDP. Over the nineties, the regional average shows a decline in the degree of indebtedness, but that is not the case for all countries[17]. After 2000, countries seem to have started their debt again.

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[14] In high inflation economies, the information contained in prices is less reliable, since firms can more easily disguise real price increases with nominal increases. This reduces competition among firms and increases the markup (Neiss, 2001).

[15] We used sales information from the firm database Osiris produced by Bureau van Dijk, which contains balance sheet information of over 22,000 firms in 90 countries.

[16] Most commonly used measures of financial development involve the ratio of some monetary variable to GDP (M2 or Credit), but we resorted to this indicator.

[17] Argentina and Colombia, have experienced an increase in their Debt to GDP ratios,

Institutional Variables

Exchange rate regimes. Fixed exchange rate regimes have been widely used in the region to anchor inflation. Reinhart and Roggoff (2004) classify de facto exchange rate regimes and include dual or multiple rates regimes and parallel markets. They find that countries with multiple exchange rates and market-determined parallel rates exhibit higher inflation rates than countries with unified rates and less flexible regimes. The regime indicator associates lower values to fixed regimes and higher values to more flexible regimes, where dual/parallel markets are conceived as flexible regimes. We should then expect a negative correlation between this indicator and inflation. By examining the data in table 3 and Figure 3, we notice that during the eighties dual/parallel markets and floating regimes were common throughout the region, whereas over the nineties there is a convergence to unified rates and less flexible regimes.

Competition regulation. According to the arguments stated before, laws that promote competition should reduce market distortions and thereby diminish the inflation bias. We construct a *de jure* index that captures the following dimensions from the competition regulations across countries: i) forbidden practices, ii) types of sanctions, iii) the existence of a regulating entity and iv) controls over industrial concentration. The index takes higher values the more the existing regulation promotes competition by sanctions or prohibition of monopolistic practices. Table A1 shows that only a few countries had competition regulations in the eighties, whereas in the nineties more countries created entities for surveillance and regulation of industrial practices. We explain the construction of this indicator in more detail in the Appendix. As with every other *de jure* measure, we must keep in mind that the legal stance may not actually reflect the actual enforcement of the law.

Central bank independence. The seminal works of Kydland and Prescott (1977) and Barro and Gordon (1983) settled the theoretical grounds for the creation of independent central banks from political pressures to lessen the inflation bias. To empirically assess whether differences in central bank independence actually explain cross-country variations of

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inflation rates, one needs an index to measure the degree of independence of central banks. In this paper we use the modified *de jure* Cukierman index constructed by Jácome and Vázquez (2005). The index takes higher values as the law contemplates more independence for the central bank from the executive in terms of the determination of inflation goals, the design and execution of monetary policy, guarantees political independence, limits direct funding of the executive, and compels more transparency. Table 4 and Figure 4 suggest that all countries in the region did an effort to legally confer more independence to their central banks. We treat central bank independence as an endogenous variable, since legal reform may be a response to the large inflation rates experienced in previous years.

Market oriented structural reforms. Starting in the mid-eighties there has been a continuous process of structural reform in Latin America, conceived to eliminate policy distortions that limit functioning of the markets or generate transaction costs for producers (see Table 5 and Figure 5). Reforms were designed to attain policy neutrality in order to obtain efficiency gains in resource allocation. Lora (2001) builds a structural policy index to measure the degree of progress in trade, financial, tax, and labor reforms and in privatization[18]. The index just quantifies the degree of neutrality of structural policies and does not measure distributive features or their quality in other aspects. The index takes values between 0 and 1, associating higher values to more neutral and market oriented policies. As these structural policies are designed to increase efficiency, reduce distortions and increase output, one should expect a negative correlation between the index and inflation. Structural reforms were not a random event: they responded to weak macroeconomic performance in the years previous to their implementation. Thus, we treat this variable as endogenous.

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[18] The index covers the following reforms (see Lora (2001) for more details):
Trade policy: average tariffs and tariff dispersion
Financial policy: reserve requirement, interest rate freedom, and quality of regulation of capital requirements
Tax policy: maximum marginal income tax rate on companies, maximum marginal income tax rate on persons, productivity of taxes on income, basic rate of the value-added tax, and productivity of the value-added tax.
Privatization: accumulated value of privatizations as a percentage of GDP
Labor policy: ease of hiring (temporary contracts), ease of layoff (cost of layoff in terms of months of pay, flexibility of work day, and social security contributions as a percentage of wages.

Political constraints to changes in public policies. Instead of examining the role of political instability on inflation, which has been already examined in previous studies, we opted to investigate the effect of institutional limits to discretional changes in public policies. We should obviously expect fewer limits to discretionality to result in higher inflation rates.

Henizs (2002) builds a measure of political constraints to estimate the feasibility of change in public policies, and captures how likely a change in preferences of any political actor translates into a change in the status quo public policy. To construct the index for countries in time, Henizs draws information from political science datasets. First, the author identifies the number of political agents in the system (executive branches, legislative chambers, judiciary and federal powers where applies) with veto power over changes in public policies. The more actors with veto power, the less likely a change in status quo policy will take place.

The index also takes into account political alignment across government branches, since alignment among government branches reduces the probability that any agent will veto policy changes, thereby increasing the feasibility of policy change. Finally, the measure is adjusted to incorporate the degree of heterogeneity of the preferences and fractionalization of the legislature and court. Fractionalization increases (decreases) decision costs to veto policy changes in aligned branches (opposed) with the executive[19]. The index takes values between 0 and 1, where 0 indicates fewer political constraints to changes in public policies and thus more scope for discretionality[20]. Looking at Figure 6 we notice a tendency in the region towards increasing political limits to policy change. Yet in Table 6 we observe that this tendency varies a lot across countries. Since macroeconomic results may affect the political status, we also treated this variable as endogenous.

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[19] See Henizs (2002) for further details.
[20] The index we use here is a recent update by the author of the previously published one in Henizs (2002).

Government Institutions. The quality of government institutions in terms of the stance of the rule of law, democratic accountability, corruption and bureaucracy quality may well have an impact on resulting public policies. Better government institutions should lead to more stable and sound public policies and that should translate into lower inflation rates. The International Country Risk Guide (ICRG) political risk rating index is constructed to assess political stability in the set of countries analyzed[21]. We use components of the ICRG political risk index to build a measure of government institutions. Higher values of the index can be associated with better institutions, so we may expect a negative correlation between the index and inflation. Table 7 and Figure 7 suggest that there has been an improvement in terms of the stability that sensible institutions may provide; yet again there is a large dispersion across countries. We treat this variable as endogenous.

3. Econometric Specification and Results

We use the following panel specification to assess the impact on inflation of our set of variables:

$$Y_{it} = \alpha Y_{i,t-1} + X'_{it}\, \beta + W'_{it}\, \delta + v_i + \varepsilon_{it} \qquad i = 1,....,N \quad t = 1,...,T_i \tag{1}$$

Where $Y = \dfrac{\pi}{1+\pi}$ and π is the percentage variation of CPI, X is a vector of strictly exogenous regressors, W is a vector of endogenous regressors, v_i are country effects, ε is the error term, i stands for the ith country and t for the each period. OLS estimation of equation (1) leads to biased and inconsistent estimators since the lagged values of the dependent variables are correlated with the individual effects.

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[21] The index includes the following components: government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religion in politics, law and order, ethnic tensions, democratic accountability and bureaucracy quality. The index is computed on the basis of political information that is converted into points for each component. The political risk assessment is based on subjective analysis of available information.

Different operators, such as first differences and orthogonal deviations, can be used to eliminate the country effects in (1)[22], leading to

$$\Gamma Y_{it} = \alpha \Gamma Y_{i,t-1} + \Gamma X'_{it} \beta + \Gamma W'_{it} \delta + \Gamma \varepsilon_{it} \qquad (2)$$

Where Γ is the operator to eliminate individual effects. We use orthogonal deviations to eliminate country effects. Equation (2) is suitable to efficient GMM estimation using the method developed by Arellano and Bond (1991), exploiting a different set of instruments each period. We use the following instruments: Lags of the levels of the dependent variable (from the 2nd lag up to the 5th lag); levels of the variables lagged 2 periods or more for endogenous regressors; and untransformed orthogonal deviations for strictly exogenous variables. We use the 2-step GMM estimator (White period instrument weighting matrix) to control for heteroskedasticity. We worked with an unbalanced panel, since the periodic availability of the variables is not homogeneous over countries. Our approach in each case is to depart from a full set of variables and work towards a parsimonious model, progressively including and excluding variables to check for robustness. Tables 8 to 10 display our main findings. In all cases the Sargan tests suggested the validity of the instruments.

In Table 8 we begin by examining the relation between inflation and institutional arrangements including political limits to discretionality, structural reforms, exchange rate regimes, government institutions, competition regulation and central bank independence. The exchange rate regime turned out to be a very significant and robust variable, suggesting that unique and less flexible exchange rate regimes helped to reduce inflation rates over the nineties in Latin America, as may be expected. Using the extended or reduced classification in Reinhart and Roggoff (2004) did not alter the results. Consistent with the findings in Jácome and Vázquez (2005), once we include the measure of structural reforms and control for endogeneity, central bank independence fails to be significant. We also employed the

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[22] Arellano and Bond (1991) use first differences and Arellano and Bover (1995) propose orthogonal deviations. In the latter case, each observation is the deviation from the average of future observations in the sample, weighted to standardize the variance. Arellano and Bover (1995) suggest that the filtering method is irrelevant.

Cukierman index and a modification of the Jácome and Vázquez index[23], but the results remain unchanged.

Structural reforms are then negative and significantly correlated with inflation. Unfortunately, the index of the stance of structural reforms is only available for the period 1985-1999 which prevented us from including more recent observations. We further tested the different components of the Lora index for structural reforms, but none of the components by itself explained more inflation than the total index[24]. Structural reform seemed them to have aided the reduction of inflation rates in the region over the past few years, while the evidence does not suggest an important role for central bank independence. We must keep in mind though that we work with a *de jure* measure that does not necessarily reflect actual central bank independence which is a caveat for this type of analysis.

Political constraints to changes in public policies was also significant and with the expected sign, thus suggesting that the lower the feasibility of change in public policies, the lower the resulting inflation rates[25]. We think this is an interesting and sensible result, for it can be conceived as a test of the effect of the scope for policy discretionality on inflation. As political constraints on discretionality increased in the region over time, this may have reduced the dynamic inconsistency problem and thus helped to diminish the inflation bias. The quality of government institutions was also significant although the coefficient was not very robust, possibly due to the high correlation between this variable and the political constraints index[26]. Competition regulation was not significant in any case. So far, these

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[23] We modified the Jácome and Vázquez index by assigning different weights to the components, according to the frequencies observed in the sample of countries. This was achieved by the method of multiple correspondences. This method is similar to that of principal components, but it applies the χ^2 distance instead of the Euclidean distance. The three measures of central bank independence – Cukierman, Jácome and Vázquez and our modified version of the Jácome and Vázquez – were highly correlated.

[24] Of these components, trade reforms, tax reforms and financial reforms were the most significant, while labor reform was weakly significant, and privatization was not significant at all. We do not present these results here, but they are available upon request to the author.

[25] Henizs (2002) computes two versions of the index: one that includes only the executive and legislative branches of government (pol3), and an extended one that includes the court and federal branches (pol5). We used the extended version of the index, although either one leads to the same results.

[26] See Table 15.

results highlight the important role that institutional arrangements have played in Latin America in the process of controlling inflation.

Table 9 presents the results of different models where we examine the impact of several variables that reflect the underlying structure of the economy. The variables include per capita GDP growth, informal employment, size of the service sector, openness to trade market capitalization, income distribution and the degree of monopolistic competition (markup). The evidence suggests that growth, the size of the service sector and openness to trade are the most significant and robust of this set of variables. Countries that have grown faster have had less inflation. Openness to trade is positively correlated with inflation, suggesting that more open economies are more exposed to external shocks which directly affect inflation. This result holds even when we control for international inflation in the nineties (not shown)[27]. As international inflation observed a reduction in the nineties, more open economies probably benefited from lower inflation in imported goods to a larger extent.

To measure the effect of the industrial structure on GDP on inflation, we tested the fractions of the different economic sectors to GDP, and the size of the service sector resulted to be the most robust of these shares. There is a negative correlation between the size of the service sector and inflation, which may be consistent with optimal taxation argument. But the contrary occurs with informal employment, which seems to be negatively correlated with inflation. According to Cavalcanti and Villamil (2003) and Koreshkova (2003) this is the opposite of what we should expect. Informal employment though, may not be the best proxi for the contribution to GDP of the informal sector, which is what theory links to inflation.

The degree of distortion created by monopolistic competition, captured through the markup, does not seem to play a role on inflation in Latin America, while a similar measure is positively and significantly correlated with inflation in OECD countries (see Neiss,

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[27] We use percentage variations of US CPI as a proxy for international inflation by. As we take the sample further back into the eighties, international inflation stops being significant.

2001). The markup is positively correlated with inflation, but its significance is disappears when we control for other variables. Since our measure of markup may pose some problems because it is based on national accounts averages, we also tried to an alternative measure of the degree of monopolistic competition that tries to capture the economy-wide industrial concentration (see Dutz and Hayri, 1999). Unfortunately, firm level data was only available after 1996 and for a limited number of countries and the same happens with bank-level data, available since 1999. This reduces considerably in some cases the number of observations does not allow to jointly consider these variables with the rest. Nonetheless, we used alternative measures of concentration, economy-wide and for the banking sector. Even though the sample size is a caveat, these results do not suggest either that more concentration is related to more inflation in Latin America. Yet again, in the case of economy-wide measures, a concentration measure drawn from listed firms may not be very representative in countries with very underdeveloped capital markets, which is also a caveat for our results.

Other variables, the development of financial markets (market capitalization) and income distribution were not significant either. The degree of indebtedness is also positively correlated with inflation, but the significance of the coefficient is not very robust. Notice anyhow, that the sample of countries changes when we include the markup and informality, since that information is not available for all countries. Nevertheless, that does not seem to affect the significance of openness, size of the service sector or of growth.

In Table 10 we present the results of models that combine institutional and structural variables that were significant in previous exercises[28]. Looking at the results from the different models, one may suspect the presence of some colinearity problems, probably stemming from the correlation between informality, government institutions, size of the service sector and structural reforms[29]. This problem is a caveat for the robustness of our analysis at this stage, although we tested several models and present those which appear to

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[28] Actually, we also tested for variables that were not significant in the previous exercise, such as the markup and the degree of indebtedness, etc., but for presentation purposes we opted to just include models with variables that were significant in Table 1 and Table 2.
[29] See Table 15.

be less sensitive to changes in specification. This process led us to exclude informality (Model 3 and Model 4), which proved the least robust of the variables. This may have to do with the reduction in the sample this variable imposes. Although the problem seems to diminish, the robustness of political constraints to discretionality and government institutions may still remain affected by their own correlation; although each variable is robust we tested separately with the rest of the variables.

These exercises suggest that institutional arrangements are important determinants of inflation in Latin America, but so are some structural economic variables, such as the degree of openness and growth, which is consistent with findings in Aisen and Veiga (2000). The results are also in tune with those in Edwards and Tabellini (1991) in the sense that evidence to support optimal taxation motivations for inflation in developing countries is rather weak. Instead, variables that may affect the dynamic inconsistency problem for policy makers – other than central bank independence – seem to have a more important role, which is consistent also with findings in Capillo and Mirón (1997).

Additionally, based on the previous results we conducted a cluster analysis for the purpose of visualizing where do countries stand in terms of inflation and the variables that proved to be its most significant and robust determinants (exchange rate regime, political limits to discretionality, government institutions, growth, structural reform and openness to trade). Cluster analysis allows sorting countries into homogenous groups according to similarities between the selected variables in the sample.

The method departs from a Principal Components Analysis of the data matrix, finding linear combinations of the variables – e.i., principal components – to represent the data in space of a smaller dimension. Next, the most significant components are selected (those with eigenvalues > 1) and countries are sorted by means of the hierarchic pattern classification algorithm (Peña, 2001).

The Principal Components Analysis results are summarized in Table 11, which presents the eigenvalues to each principal component and their correlation with each variable. When

selecting eigenvalues greater than one, we notice that the first, second and third factors explain 33%, 24% and 20% of the total variance respectively. Therefore, a representation of these three components in a three dimensional factorial space is able to explain 76.41% of the total information embedded in the variables. This proves very convenient to simultaneously classify the six variables and the seventeen countries in order to interpret the results.

Examining the correlation of each variable with the first and second principal components, we observe that the first component is highly correlated with the political constraints to discretionality, the quality of government institutions and economic growth, which is why this component separates the countries with low and high values of these variables. Moreover, the second principal component is highly correlated with the exchange rate regime and structural reform indicators, so this combination allows ranking the countries in the sample according to their degree of flexibility in the exchange regime and of advances in structural reforms.

Figure 8 presents the results of the hierarchic algorithm in the dendogram, which suggests that there are four significant groups to classify the countries into. Figure 9 displays these results in a biplot showing countries and directionality vectors for each variable[30]. The direction of the vector indicates higher values of each variable. In addition, we included inflation for illustration purposes, using the dimensional space defined by the principal components analysis. The following groups result:

   i)   the group of countries with greater exchange rate flexibility and less advance in structural reforms (Brazil, Ecuador, Venezuela, Uruguay) that in average showed the highest average inflation rates (32%),

   ii)   the group of countries with worse government institutions and fewer political constraints to changes in public policies (Mexico, Colombia, Paraguay, Honduras, Peru and Guatemala) that in average reaches inflation rates of 16%,

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[30] Openness is not depicted in the biplot, since it is well represented only by the third principal component, and the biplot only considers the first and second principal components. Nevertheless, openness to trade was considered for the purposes of the hierarchic classification algorithm leading to the 4 group classification.

iii)   the group of countries with more advances in structural reforms and less flexible exchange regimes (Nicaragua, Argentina, El Salvador and Bolivia), where average inflation rates reached 14%; and finally,

iv)   the group of countries with the better quality of government institutions, more political constraints to changes in public policies, and better growth performance (Dominican Republic, Chile and Costa Rica), corresponding to the group with lower average inflation rates (11%).

This exercise we think is very illustrative. First, the group with lowest average inflation (Group 4) can be typified by having a better performance in terms of economic growth, better government institutions and more constraints to discretionality. In fact, the stance of these countries in terms of these variables is what separates them from the rest of the countries. Second, the group with higher average inflation rates (Group 1) is characterized by more flexible exchange rate regimes and few advances in terms of structural policies, while showing average values in terms of government institutions, political constraints and growth.

4. Final Remarks

In this paper we attempt to examine the extent to which variables related to the economic structure and institutional arrangements explain inflation dynamics in Latin America in recent decades. We perform a dynamic panel data analysis that allowed us to consider the temporal dimension of the data, and to control for endogeneity of certain variables. Results lead us to believe that institutional arrangements – other than central bank independence – have played an important role in terms of inflation outcomes in Latin America. Variables that may affect inflation via time consistency problems seem somewhat more relevant than those suggested by optimal tax considerations. In particular, the negative correlations between inflation, political constraints to changes in public policies and better government institutions in Latin America are quite suggestive.

We find that unique and less flexible exchange rate regimes, contributed to the reduction in inflation rates in Latin America over the past years. A caveat to these results stems from the availability of the data, which restricts the sample to the end of the nineties. Consistent with our results, the stabilization process that took place during that decade was largely influenced by the adoption of unique and predetermined exchange rate regimes. Nevertheless, in recent years many countries have adopted floats and use an inflation target to anchor price expectations. Due to the sample limitations, this new regime is not covered in our study.

Advances in structural policies, contributed also to the reduction on inflation rates. This may suggest that the mitigation of certain distortions in the economy contributed to diminish inflation. Faster growing countries exhibited lower inflation rates. Openness to trade seems to be positively correlated with inflation, suggesting that more open economies are more exposed to external shocks, allowing countries to benefit in terms of importing lower international inflation rates in recent years.

The degree of informality seems to be negatively related to inflation, but result is not very robust. The degree of indebtedness is positively correlated with inflation, but the effect does not appear to be very robust either. The signs of openness and informality are actually contrary to what should be expected according to optimal taxation motives. The degree of monopolistic competition, income distribution, financial development, and competition regulation did not prove to be significant. Results are robust to a large extent, but we suspect that colinearity may be affecting the robustness of some coefficients.

On the other hand, one can always find better proxies for many of the variables here – e.g., a de facto measure of central bank independence, a better indicator of the markup not based on national accounts data, a better proxy of the contribution of the informal sector to GDP, etc. – but that remains for future studies.

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Table 1
Inflation rate (%)
(Country averages over sub-samples)

Country	1980-1989		Country	1990-2004
Nicaragua	1693.8%		Nicaragua	959.0%
Bolivia	1383.2%		Brazil	767.3%
Argentina	565.7%		Peru	734.8%
Peru	481.3%		Argentina	229.8%
Brazil	354.5%		Uruguay	44.9%
Mexico	69.0%		Venezuela	44.6%
Uruguay	57.6%		Ecuador	44.2%
Ecuador	34.0%		Colombia	21.0%
Costa Rica	27.1%		Mexico	19.4%
Colombia	23.5%		Honduras	18.9%
Venezuela	23.0%		Costa Rica	16.3%
Chile	21.4%		Paraguay	15.7%
Dominicana	20.9%		Dominicana	14.6%
Paraguay	20.2%		Guatemala	14.0%
El Salvador	18.5%		Chile	11.0%
Guatemala	12.1%		Bolivia	9.9%
Honduras	7.4%		El Salvador	9.9%
Panamá	3.1%		Panamá	1.1%
Average	**267.6%**		**Average**	**165.4%**

Figure 1
Inflation rate (%)
(Latin America Average: 1980-2004)
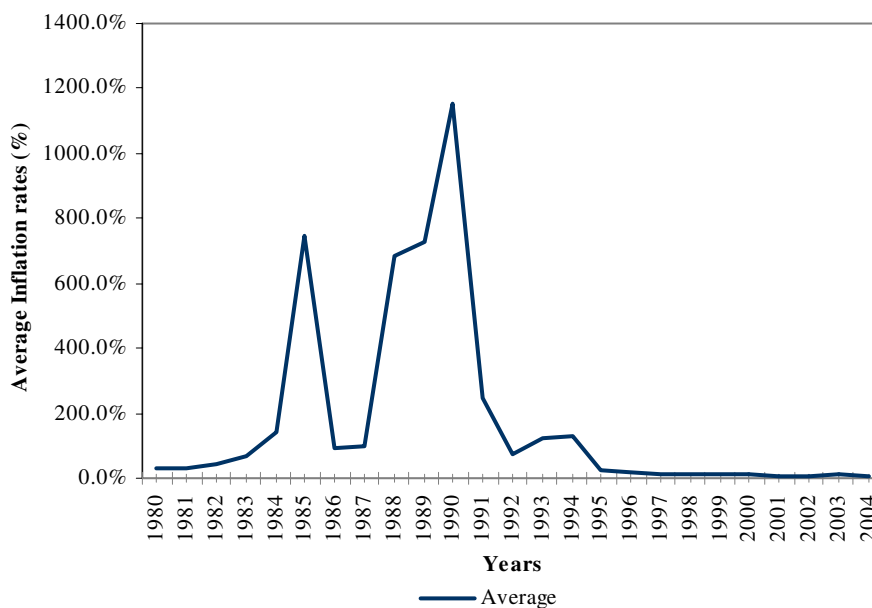
Source: International Financial Statistics

Table 2
Per capita Gross Domestics Product Growth
at constant market prices in dolars
(Country averages over sub-samples)

Country	1980-1989	Country	1990-2002
Colombia	1.6%	Chile	3.7%
Chile	1.3%	Dominicana	2.8%
Dominicana	1.0%	Panamá	2.1%
Brazil	0.2%	El Salvador	2.0%
Paraguay	0.0%	Costa Rica	1.9%
Honduras	-0.5%	Mexico	1.4%
Mexico	-0.6%	Peru	1.2%
Uruguay	-0.7%	Bolivia	1.2%
Costa Rica	-0.8%	Guatemala	1.1%
Ecuador	-1.0%	Colombia	0.6%
Panamá	-1.4%	Ecuador	0.5%
Guatemala	-1.9%	Argentina	0.5%
El Salvador	-2.0%	Brazil	0.4%
Argentina	-2.2%	Uruguay	0.3%
Bolivia	-2.4%	Nicaragua	0.1%
Peru	-2.9%	Honduras	0.0%
Venezuela	-4.1%	Venezuela	-0.3%
Nicaragua	-4.4%	Paraguay	-1.1%
Average	**-1.1%**	**Average**	**1.0%**

Figure 2
Per capita Gross Domestics Product Growth
at constant market prices in dolars
(Latin America Average: 1981-2002)
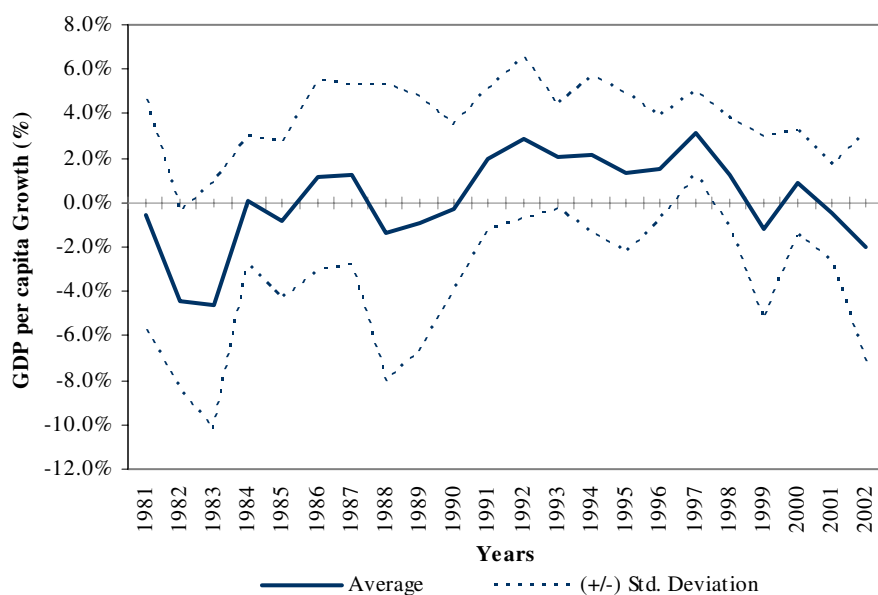
Source: CEPAL Database

Table 3
Exchange rate regimes
Reinhart and Rogoff classification
(Country averages over sub-samples)

Country	1980-1989		Country	1990-2001
Peru	5.0		Brazil	3.7
Brazil	5.0		Ecuador	3.6
Nicaragua	4.7		Uruguay	3.3
Argentina	4.3		Venezuela	3.3
Bolivia	4.2		Chile	3.0
Uruguay	4.1		Colombia	3.0
Mexico	4.0		Honduras	2.9
Dominicana	3.8		Peru	2.8
Ecuador	3.6		Mexico	2.7
Costa Rica	3.4		Dominicana	2.6
Paraguay	3.4		Paraguay	2.5
Venezuela	3.0		Guatemala	2.3
Chile	2.8		Nicaragua	2.1
El Salvador	2.7		Costa Rica	2.1
Guatemala	2.6		Bolivia	2.0
Colombia	2.6		Argentina	1.3
Honduras	2.0		El Salvador	1.0
Panamá	1.0		Panamá	1.0
Average	**3.5**		**Average**	**2.5**

Figure 3
Exchange rate regimes
Reinhart and Rogoff classification
(Latin America Average: 1980-2001)
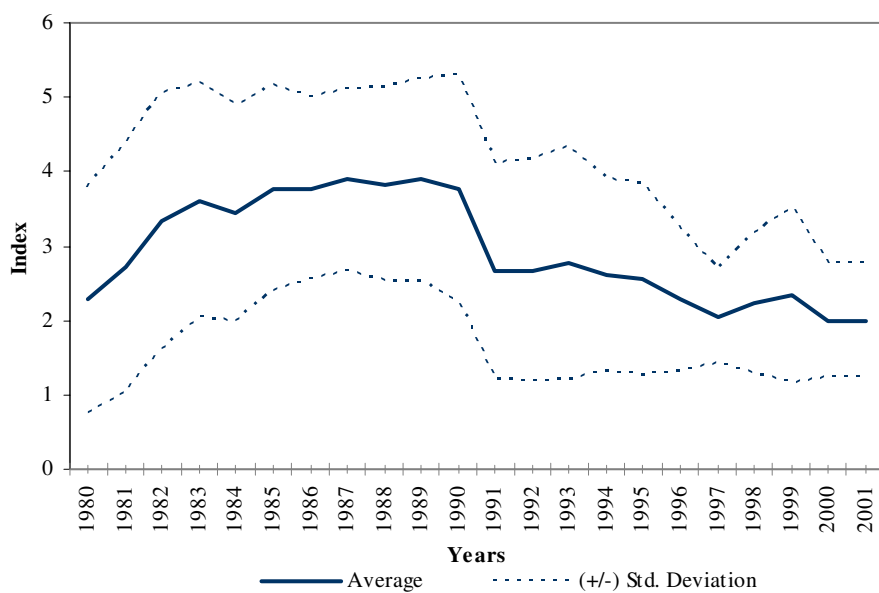
Source: Reinhart and Rogoff (2002)

Table 4
Central Bank Independence
Modified Cukierman Index
(Country averages over sub-samples)

Country	1980-1989	Country	1990-2004
Nicaragua	0.59	Chile	0.85
Guatemala	0.57	Peru	0.79
Costa Rica	0.51	Argentina	0.76
Peru	0.50	Colombia	0.76
Chile	0.48	Mexico	0.72
Dominicana	0.44	El Salvador	0.72
Uruguay	0.44	Nicaragua	0.71
Venezuela	0.40	Venezuela	0.68
El Salvador	0.39	Costa Rica	0.66
Mexico	0.39	Bolivia	0.66
Honduras	0.39	Ecuador	0.60
Paraguay	0.37	Uruguay	0.59
Ecuador	0.36	Paraguay	0.59
Bolivia	0.33	Guatemala	0.57
Argentina	0.31	Honduras	0.56
Colombia	0.29	Brazil	0.50
Brazil	0.24	Dominicana	0.44
Panamá	0.18	Panamá	0.18
Average	**0.40**	**Average**	**0.63**

Figure 4
Central Bank Independence
Modified Cukierman Index
(Latin America Average: 1980-2004)
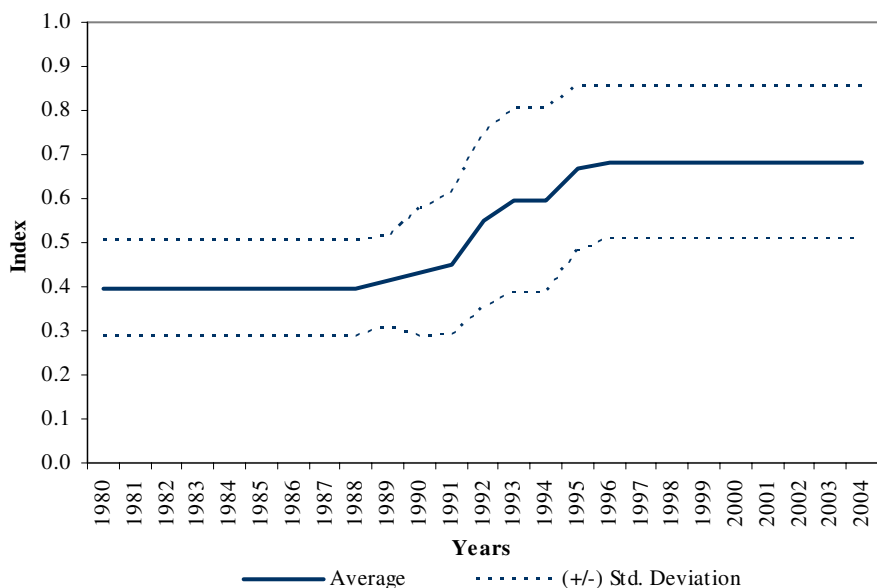

Source: Jácome and Vásquez (2005)

Table 5
Market oriented structural reform
Lora's index
(Country averages over sub-samples)

Country	1980-1989		Country	1990-1999
Chile	0.53		Nicaragua	0.59
Guatemala	0.39		Argentina	0.58
Costa Rica	0.39		Bolivia	0.58
Bolivia	0.37		Chile	0.58
Colombia	0.37		Peru	0.55
Uruguay	0.36		Paraguay	0.54
Paraguay	0.36		Colombia	0.52
Honduras	0.35		Honduras	0.51
El Salvador	0.35		Brazil	0.51
Mexico	0.35		Guatemala	0.50
Argentina	0.33		Mexico	0.49
Brazil	0.33		Costa Rica	0.49
Ecuador	0.32		Ecuador	0.49
Peru	0.30		El Salvador	0.48
Venezuela	0.28		Venezuela	0.46
Dominicana	NA		Dominicana	0.45
Nicaragua	NA		Uruguay	0.44
Panamá	NA		Panamá	NA
Average	**0.36**		**Average**	**0.51**

Figure 5
Market oriented structural reform
Lora's index
(Latin America Average: 1980-1999)
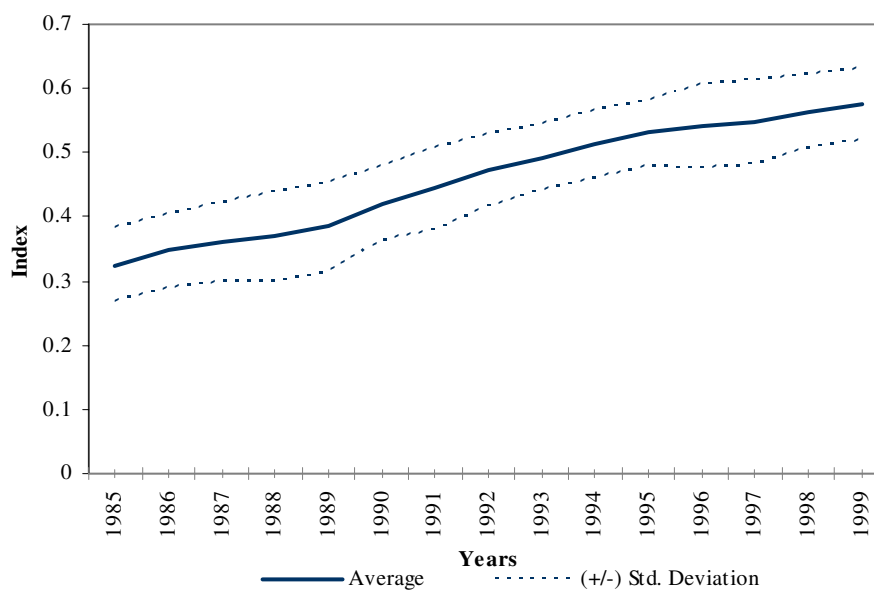
Source: Lora (2001)

Table 6
Political constriants to discretionality
in public policies
(Country averages over sub-samples)

Country	1980-1989	Country	1990-2004
Costa Rica	0.38	Brazil	0.67
Ecuador	0.34	Uruguay	0.53
Venezuela	0.40	Chile	0.50
Brazil	0.24	Panamá	0.49
Colombia	0.42	Bolivia	0.48
Dominicana	0.42	Argentina	0.46
Peru	0.39	Paraguay	0.44
Bolivia	0.34	Peru	0.43
Guatemala	0.29	Dominicana	0.40
Honduras	0.28	Colombia	0.39
Uruguay	0.26	El Salvador	0.38
Nicaragua	0.25	Nicaragua	0.37
Argentina	0.23	Costa Rica	0.36
Mexico	0.19	Mexico	0.35
El Salvador	0.24	Honduras	0.34
Panamá	0.19	Venezuela	0.33
Paraguay	0.03	Guatemala	0.29
Chile	0.00	Ecuador	0.25
Average	**0.27**	**Average**	**0.42**

Figure 6
Political constraints to discretionality
in public policies
(Latin America Average: 1980-2004)
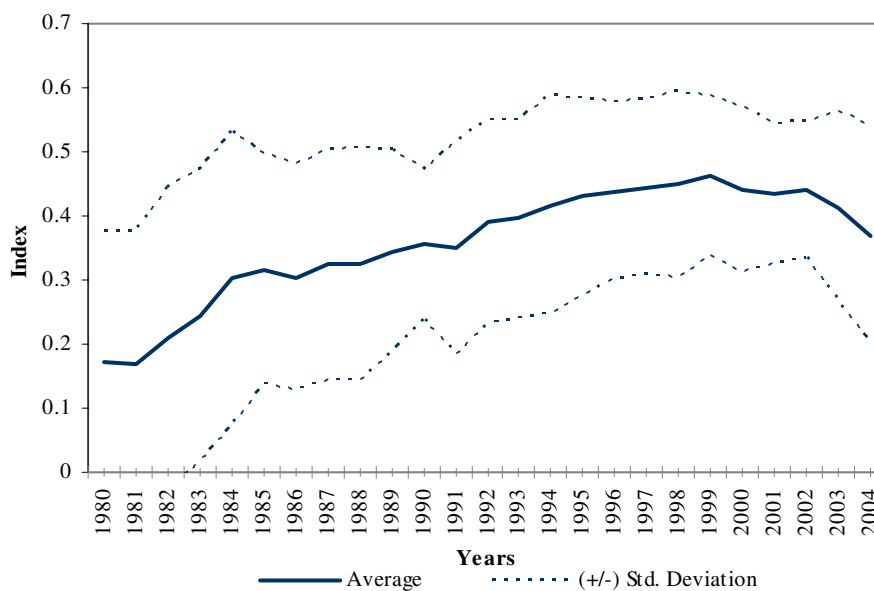
Source: Henisz (2002)

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Table 7
Government Institutions Index
(Country averages over sub-samples)

Country	1980-1989		Country	1990-2004
Costa Rica	20.94		Costa Rica	23.62
Brazil	20.13		Chile	23.56
Venezuela	19.00		Mexico	20.96
Ecuador	17.53		Uruguay	20.51
Mexico	17.15		Argentina	20.21
Colombia	17.14		Dominicana	19.71
Argentina	16.75		Nicaragua	18.64
Chile	16.65		Brazil	18.39
Uruguay	16.50		Ecuador	18.16
Dominicana	15.63		Bolivia	18.07
Nicaragua	13.22		Panamá	17.84
Peru	12.19		Venezuela	17.72
Honduras	11.19		Guatemala	17.06
Panamá	10.46		El Salvador	16.85
Paraguay	9.78		Peru	16.72
Guatemala	9.54		Paraguay	16.66
Bolivia	8.64		Colombia	16.32
El Salvador	8.57		Honduras	16.32
Average	**14.50**		**Average**	**18.74**

Figure 7
Government Institutions Index
(Latin America Average: 1984-2004)
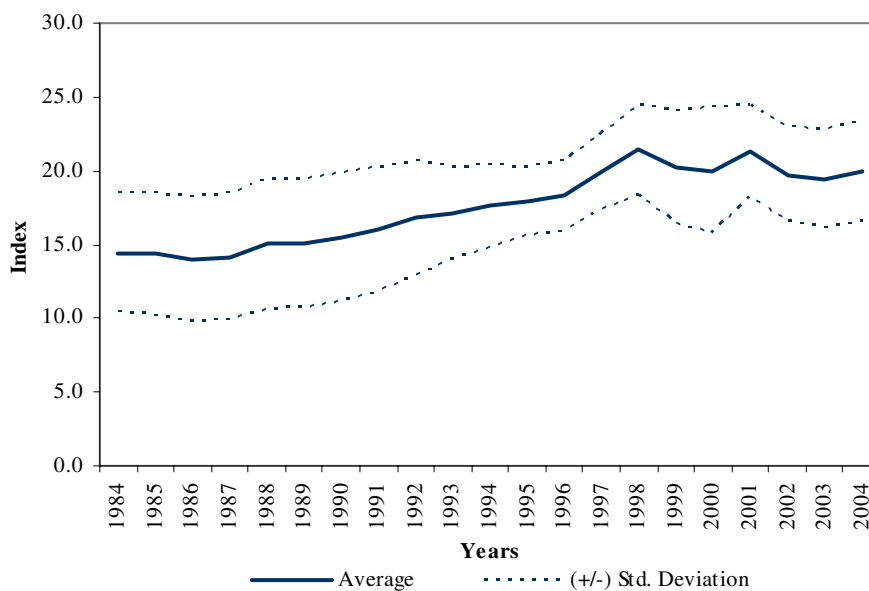
Source: International Country Risk Guide

Table 8
Inflation and Institutional arrangements
Method: Panel Generalized Method of Moments

VARIABLE	MODEL 1		MODEL 2		MODEL 3		MODEL 4	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Inflation t-1	0.332 [-0.038]	0.000	0.343 [-0.026]	0.000	0.377 [-0.015]	0.000	0.367 [-0.026]	0.000
Political limits to discretionality	-0.081 [0.042]	0.055	-0.073 [0.036]	0.042	-0.037 [0.014]	0.008	-0.017 [0.009]	0.065
Structural reforms	-0.196 [0.128]	0.129	-0.159 [0.069]	0.023	-0.216 [0.043]	0.000	-0.220 [0.031]	0.000
Exchange rate regime	0.027 [0.004]	0.000	0.027 [0.004]	0.000	0.031 [0.002]	0.000	0.031 [0.002]	0.000
Government Institutions	-0.001 [0.003]	0.606	-0.002 [0.002]	0.145			-0.005 [0.001]	0.001
Competition Regulation	-0.013 [0.014]	0.343	-0.014 [0.014]	0.337				
Central Banks Independence	0.010 [0.041]	0.802			-0.024 [0.020]	0.233		
Sargan Test Prob.	**0.555**		**0.626**		**0.357**		**0.377**	
Sample	**1989-1999**		**1989-1999**		**1989-1999**		**1989-1999**	
Countries	**17**		**17**		**17**		**17**	
Observations	**147**		**147**		**147**		**147**	

Arellano and Bond 2-step dynamic panel estimations with orthogonal deviations to eliminate individual effects. White period instrument weighting matrix. Instruments: Lags of the levels of the dependent variable (2nd lag up to 5th lag); levels of the variables lagged 2 periods or more (up to 4) for endogenous regressors; and for exogenous variables the untransformed orthogonal deviations. Standard errors in parenthesis

Table 9
Inflation and underlying economic structural variables
Method: Panel Generalized Method of Moments

VARIABLE	MODEL 1		MODEL 2		MODEL 3		MODEL 4		MODEL 5		MODEL 6	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Inflation t-1	0.652 [0.176]	0.005	0.469 [0.160]	0.004	0.601 [0.118]	0.000	0.731 [0.013]	0.000	0.790 [0.084]	0.000	0.767 [0.012]	0.000
Per Capita GDP growth	-0.742 [0.3163]	0.023	-1.290 [0.3200]	0.001	-1.076 [0.095]	0.000	-0.615 [0.025]	0.000	-0.477 [0.114]	0.000	-0.883 [0.044]	0.000
Informality	-0.006 [0.004]	0.093	-	-	-	-	-	-	-	-	-	-
Size of the Service Sector	-2.080 [1.241]	0.099	-0.412 [0.162]	0.013	-0.827 [0.321]	0.011	-0.799 [0.248]	0.000	-0.817 [0.033]	0.000	-0.970 [0.167]	0.000
Openness to Trade	0.413 [0.231]	0.079	0.022 [0.066]	0.740	0.171 [0.057]	0.003	0.128 [0.045]	0.005	0.134 [0.074]	0.072	0.161 [0.055]	0.004
Indebtedness	0.182 [0.103]	0.084	0.046 [0.095]	0.631	0.150 [0.039]	0.002	0.003 [0.005]	0.452	0.013 [0.012]	0.275	-	-
Market Capitalization	0.003 [0.002]	0.095	-0.003 [0.002]	0.149	-0.001 [0.001]	0.593	-	0.000	-	-	-	-
Income distribution (q5/q1)	0.028 [0.003]	0.401	-0.490 [0.063]	0.445	-	-	-0.001 [0.003]	0.850	-	-	-	-
Markup	0.876 [14.030]	0.951	3.374 [5.958]	0.533	-	-	-	-	-	-	-	-
Sargan Test Prob.	**0.608**		**0.364**		**0.386**		**0.794**		**0.491**		**0.421**	
Sample	**1993-2000**		**1989-2001**		**1985-2001**		**1985-2001**		**1985-2001**		**1985-2001**	
Countries	**10**		**11**		**16**		**16**		**17**		**18**	
Observations	**59**		**88**		**163**		**163**		**182**		**281**	

Arellano and Bond 2-step dynamic panel estimations with orthogonal deviations to eliminate individual effects. White period instrument weighting matrix. Instruments: Lags of the levels of the dependent variable (2nd lag up to 5th lag); levels of the variables lagged 2 periods or more (up to 4) for endogenous regressors; and for exogenous variables the untransformed orthogonal deviations. Standard errors in parenthesis

Table 10
Inflation, institutional arrangements and underlying economic structural variables
**Method: Panel Generalized Method of Moments**

VARIABLE	MODEL 1		MODEL 2		MODEL 3		MODEL 4		MODEL 5	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Inflation t-1	0.540 [0.074]	0.000	0.540 [0.086]	0.000	0.430 [0.037]	0.000	0.473 [0.047]	0.000	0.414 [0.035]	0.000
Exchange rate regime	0.021 [0.007]	0.006	0.026 [0.009]	0.009	0.016 [0.011]	0.131	0.036 [0.009]	0.000	0.026 [0.004]	0.000
Political limits to discretionality	0.054 [0.265]	0.044	0.033 [0.203]	0.869	-0.083 [0.045]	0.069	-0.088 [0.104]	0.401	-0.048 [0.024]	0.046
Government Institutions	-0.027 [0.011]	0.014	-0.004 [0.005]	0.429	-0.005 [0.002]	0.025	0.007 [0.009]	0.445	-0.006 [0.001]	0.000
Per capita GDP growth	0.820 [0.529]	0.125	-0.076 [0.109]	0.490	-0.309 [0.091]	0.001	-0.788 [0.216]	0.000	-0.227 [0.085]	0.008
Structural Reforms	0.262 [0.147]	0.079	-0.216 [0.318]	0.500	-0.210 [0.177]	0.238	-0.214 [0.059]	0.000	-0.224 [0.043]	0.000
Openness to Trade	0.073 [0.108]	0.500	0.257 [0.270]	0.346	0.286 [0.132]	0.032	0.188 [0.094]	0.048	0.227 [0.089]	0.012
Informality	0.006 [0.008]	0.433	0.002 [0.004]	0.539						
Size of the Service Sector	0.069 [0.356]	0.846			-0.229 [0.337]	0.499	-0.877 [0.418]	0.038		
Sargan Test Prob.	**0.340**		**0.203**		**0.282**		**0.128**		**0.238**	
Sample	**1993-1999**		**1993-1999**		**1989-1999**		**1987-1999**		**1989-1999**	
Countries	**13**		**13**		**17**		**17**		**17**	
Observations	**68**		**68**		**147**		**182**		**147**	

Arellano and Bond 2-step dynamic panel estimations with orthogonal deviations to eliminate individual effects. White period instrument weighting matrix. Instruments: Lags of the levels of the dependent variable (2nd lag up to 5th lag); levels of the variables lagged 2 periods or more (up to 4) for endogenous regressors; and for exogenous variables the untransformed orthogonal deviations. Standard errors in parenthesis

Table 11
Principal Component Analysis
Countries: 17 Latin-Americans countries
Sample: 1989-1999

Principal components	Eigenvalue	Variance (%)	Correlation: Variables - Components						
			Inflation	FX Regime	Limits Discrecionality	Gvt. Institution	Growth	Reforms	Openness
First	1.9685	32.81	-0.13	-0.10	**-0.84**	**-0.94**	**-0.60**	0.06	-0.08
Second	1.4147	23.58	**0.64**	**0.88**	0.19	-0.05	-0.41	**-0.65**	0.00
Third	1.2013	20.02	-0.56	-0.20	-0.30	-0.03	0.34	-0.57	**0.80**
Fourth	0.8011	13.35	0.01	-0.01	0.27	0.06	-0.50	0.38	0.58
Fifth	0.4262	7.1	0.17	-0.41	0.14	0.11	-0.31	-0.33	-0.14

Figure 8
Hierarchic classification dendogram
Sample: 17 Latin American countries
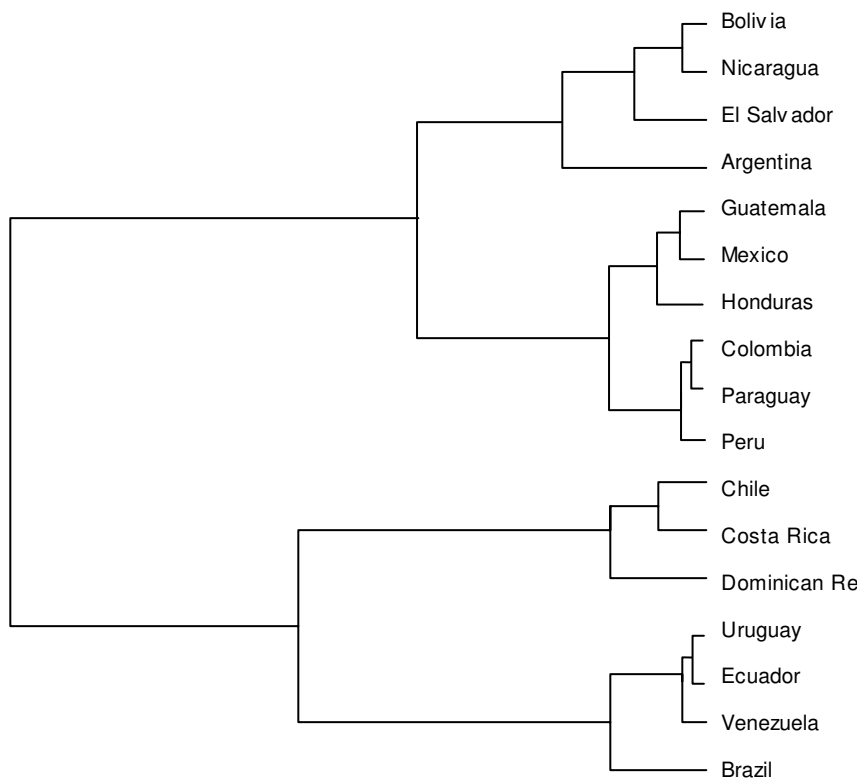
Figure 9

Principal Components Analysis biplot

Sample: 17 countries of Latin America and five variables
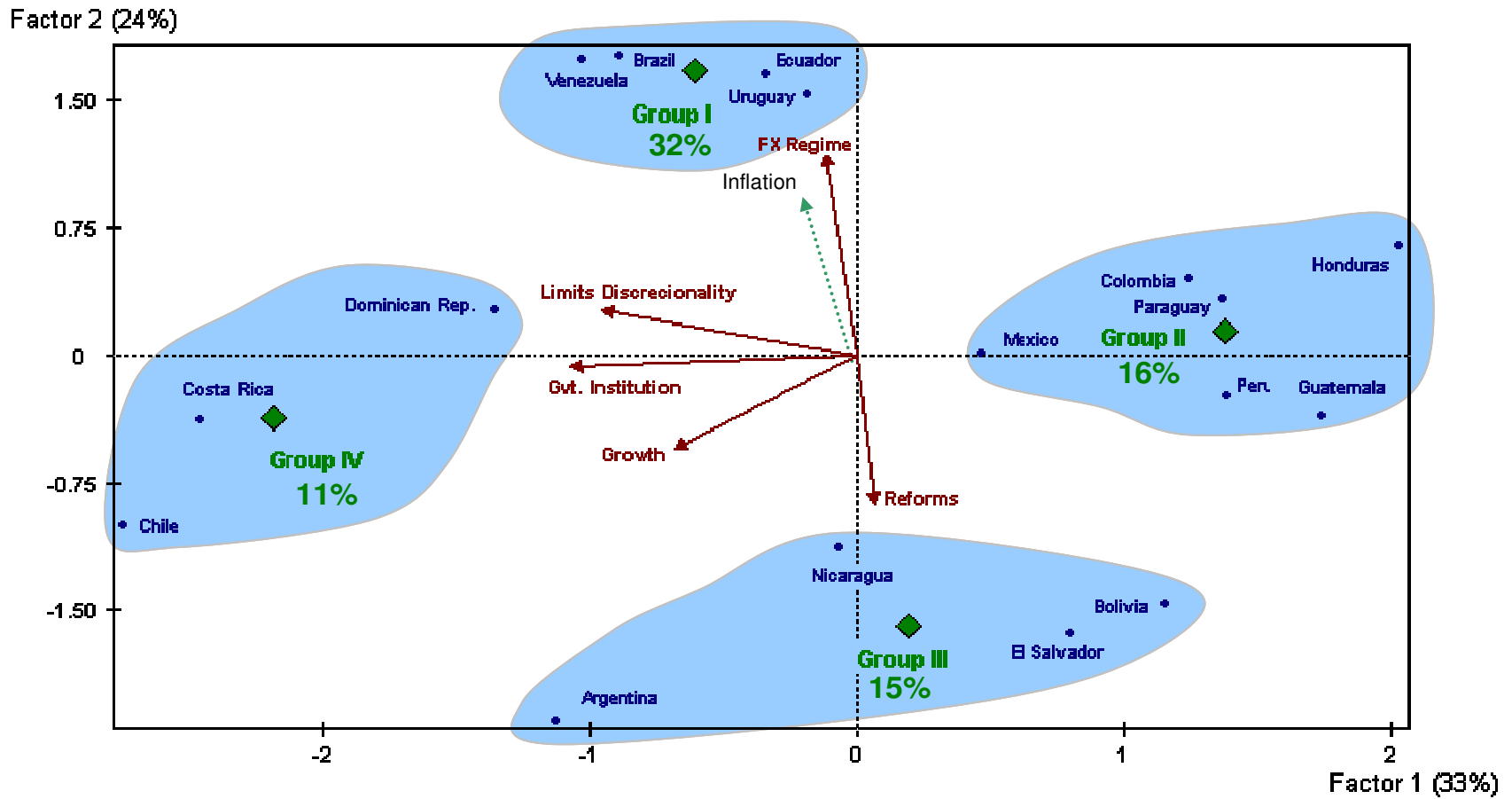
Appendix
Competition Regulation Index

The Competition Regulation Index is a measure of the degree of competition promotion through laws and procedures. The index covers the 18 countries of the sample between years 1980 and 2004. This indicator was elaborated considering the following four dimensions: i) forbidden practices, ii) types of sanctions, iii) existence of a regulating entity, and iv) controls over industrial concentration. Each category has values ranging from 0 to 1, where 1 indicates presence of the dimension. The non-weighed sum of these components is the competition regulation index that ranges between zero and four. Values near four indicate higher levels of promotion of competition, and values near zero suggest absence of competition regulation, which may allow for non-competitive practices.

Table A1
Competition regulation index
(Latin America countries)

Country	1980-1984	1985-1989	1990-1994	1995-1999	2000-2005
Argentina	2.9	2.9	2.9	3.1	3.9
Bolivia	0.0	0.0	0.5	2.4	2.4
Brazil	3.3	3.3	3.3	3.3	3.3
Chile	2.9	2.9	2.9	2.9	2.9
Colombia	3.3	3.3	3.3	3.3	3.3
Costa Rica	0.0	0.0	0.7	3.3	3.3
Dominicana	0.0	0.0	0.0	0.2	0.2
Ecuador	0.0	0.0	0.0	0.0	0.0
El Salvador	0.1	0.4	0.4	0.4	0.4
Guatemala	0.0	0.0	0.1	0.2	0.2
Honduras	0.0	0.0	0.0	0.0	0.0
Mexico	3.3	3.3	3.3	3.3	3.3
Nicaragua	0.0	0.0	0.1	0.1	0.1
Panamá	0.0	0.0	0.0	2.7	3.4
Paraguay	0.0	0.0	0.0	0.0	0.0
Peru	0.0	0.0	2.0	2.6	2.6
Uruguay	0.0	0.0	0.0	0.0	0.7
Venezuela	0.0	0.0	2.5	3.2	3.2
Average	**0.9**	**0.9**	**1.2**	**1.7**	**1.8**
Country laws	**6**	**6**	**12**	**14**	**15**

Source: Author's calculation

The dimensions of the index can be described as follows:

i) **Forbidden practices**: this dimension covers the extent to which legislators try to eliminate market distortions that hinder competition by means of the prohibition of certain practices. The prohibitions we consider are drawn from the listing prepared by the Tripartite Committee of the Organization of American States (2002), which include: price fixing and other sales conditioning, barriers of entrance, collusion tenders, production or sale cuts through the fixation or the distribution of quotas, agreements on refusals of products acquisition, the distribution of market, discriminatory and predatory agreements, subordinated contracts, exclusive agreements, abuses of dominion position or monopoly, and boycotts.

ii) **Types of sanction**s: an element that allows assessing the scope of the competition laws is the establishment of legal sanctions to non-observance. In this sense, the existence of sanctions of administrative or penal nature is reviewed in each law,

iii) **Enforcement entities**: Generally, the competition laws are better enforced by independent bodies or agencies in the form of a commission or superintendence. This body is in charge of surveillance and regulation of cases of forbidden practices, and in some cases solves and sanctions anti-competitive practices, ensuring law implementation.

iv) **Industrial concentration:** this last element considers the existence of legal dispositions that prohibit or limit the fusion, merging, acquisition or establishment of companies in the market, considering that these practices can disrupt competition.

Table A1 shows that during the eighties, only six countries in Latin America (Argentina, Brazil, Chile, Colombia and Mexico), had a competition legal framework. Along with the process of structural reforms during the nineties, the incorporation of competition regulation spread throughout the region. By 2000 fifteen had already established competition laws.