Economic Reforms and Growth in Developing Countries*

Tolga Aksoy†

September, 2012

Abstract

This paper investigates the effects of various types of reforms on real per capita GDP in the short and long-run by employing Pooled Mean Group (PMG) approach of Pesaran et al. (1999). The PMG methodology allows short-run coefficients, speeds of adjustment and error variances to differ across groups, while constraining long-run coefficients to be homogenous over cross-sectional units. I find that during the period 1973-2006, there is a positive long-run relationship between international trade reform, financial (capital account, and domestic finance) reforms and real per capita GDP. My results also indicate that in the short-run, financially more open economies suffer more from international trade and domestic financial reforms. More importantly, the adverse effects of reforms in the short-run can be mitigated by improving property rights and contract enforcement. Therefore, promoting institutional quality is a prerequisite to successfully implement the reforms.

Keywords: Growth, Structural Reforms - Current Account, Trade, Capital Account, Domestic Finance -, Pooled Mean Group Estimator.

JEL Classification Numbers: C23, O16, O24, O38, O40.

*I would like to thank my supervisor Paolo Manasse for his guidance and support. I would also like to thank Chris Papageorgiou for sharing his data, and participants at 9^{th} International Conference Developments in Economic Theory and Policy, Bilbao 2012 for their helpful feedback. All remaining errors are mine.

†Department of Economics, Bocconi University, via Rontgen 1, 20136, Milan, Italy. E-mail Address: *tolga.aksoy@phd.unibocconi.it*.

1 Introduction

The last quarter of twentieth century has witnessed a dramatic decrease of restrictions in a number of areas such as international trade, capital account, and domestic financial sector in developing countries. Growth impacts of these liberalizations at large on the economy have long been investigated. Since the research to date focuses on the long-run impacts of reforms, much less is known about their short-run effects. Yet, this issue is important since possible short-run losses due to the adjustment costs may trigger dispute about the implementation of reforms.

Is there any difference between short-run and long-run effects of reforms? Are reforms harmful in the short-run? What are the policy implications to alleviate the short-run costs of the reforms? In order to answer these questions, this paper employs Pooled Mean Group (PMG) estimator developed by Pesaran et al. (1999). PMG estimator takes into consideration the cross-country heterogeneity and allows obtaining both the short-run and the long-run parameters of the model within the same estimation framework. Despite the short-run coefficients differ across groups, PMG estimator constrains the long-run coefficients to be homogenous over cross countries. This feature of the estimator is crucial for the research question of the paper since short-run adjustment to the reforms might depend on country-specific characteristics such as policy regimes and market imperfections. On the other hand, I expect that the long-run relationship between economic reforms and growth is homogeneous across countries.

In this paper, I make a number of contributions to the empirical literature. First of all, I analyze various types of liberalizations on growth. Hence it is possible to detect which reforms work in which direction. Second, in contrast to most of the previous studies, I distinguish the effects of reforms in the short and the long-run. Third, by using the short-run coefficients, I investigate the determinants of growth effects of liberalizations. Considering the possible adjustment costs of reforms, it is crucial to examine what are the policy implications to mitigate the detrimental effects of liberalizations in the short-run.

The main findings can be summarized as follows. In the long-run, international trade, capital account, and domestic financial reforms are positively related to real per capita GDP. Moreover the positive long-run relationship between reforms and growth is robust to inclusion of *de facto* measures of reforms and quality of democracy variable. Having identified the long-run relationship, I take the short-run coefficients of the reforms for each country and analyze their determinants. Results indicate that, stimulating institutions preceding reforms is a prerequisite in order to mitigate the adverse short-run impacts. It is also worth noting that, countries gain from international trade reform already in the short-run provided that

they are financially more closed. Therefore, the second part of the paper sheds some light on the optimal sequencing of reforms issue.

The paper is organized as follows. Section 2 gives a brief review of the relevant literature, while section 3 describes the data set used and the econometric methodology applied following the descriptive analysis. In section 4, I initially discuss the long-run impacts of liberalizations. Then I make use of the country-specific short-run effects of liberalizations on growth and analyze their determinants. Finally, section 5 offers some concluding remarks.

2 Related Literature

I am certainly not the first to investigate the relationship between liberalization and economic growth[1]. Most closely related in motivation to our paper are Kaminsky and Schmukler (2008) and Bussire and Fratzscher (2008). Kaminsky and Schmukler (2008) construct a new data set of financial liberalization for twenty-eight countries, which captures deregulation of the domestic banking industry, removal of controls on international capital flows, and the liberalization of the domestic stock market. They find that although larger booms follow liberalization in both emerging and mature economies, financial crashes are severe only for the former ones. In both groups, financial liberalization is associated to more stable financial markets in the long-run. Furthermore, institutional quality improves following the liberalization, which is argued by the authors as the reason for long-run gain from liberalization.

Bussire and Fratzscher (2008) examine short and long-run impacts of capital account liberalization for forty-five emerging and developed economies. They find evidence that countries grow more rapidly immediately after liberalization thanks to the increase in portfolio investments and debt inflows. On the contrary, growth rate returns to or even below its pre-liberalization rate in the long-run.

My paper differs from these two contributions in several important respects. First, I examine the effects of a broad set of liberalizations; current account liberalization, capital account liberalization and domestic financial liberalization instead of concentrating only one of them. Second my data set has higher dimensions in terms of both country and year. Though Kaminsky and Schmukler (2008)'s data set has some informational advantages, it is available only for a small set of countries. Therefore it is difficult to draw a broad conclusion. Bussire and Fratzscher (2008) on the other hand, analyze only the time period from 1980 to 2002 for forty-five countries. A possible drawback in their analysis is that, while

[1]See, for instance, Levine (1997) and Henry (2007) for an extensive survey of the finance-growth nexus and macroeconomic impacts of capital account liberalization.

many developing countries deregulated their capital accounts after the second half of 1980s, developed countries had already started in 1970s. Thus, their results are likely to suffer from low time dimension of the data. Third, while their methodology makes it possible to differentiate the short and long-run impacts, it does not allow one to go further. Instead, by employing PMG estimator, I obtain the short-run effects of liberalization for each country and then investigate how to mitigate the adverse of effects of liberalization in the short-run. In this way, the empirical results provide policy implications for governments in order to prevent economic contraction following liberalization.

Looking at wider literature, Slaughter (2001) applies difference-in-differences approach to study the relationship between trade liberalization and per capita income convergence. He considers four different liberalization events: formation of the European Economic Community (EEC); formation of the European Free-Trade Area (EFTA), liberalization between the EEC and EFTA, and the Kennedy round of the General Agreement on Tariffs and Trade (GATT). He finds no systematic convergence between liberalization and per capita income, instead, he suggests that trade liberalization diverges incomes among the liberalized countries. Wacziarg and Welch (2008) update the economic liberalization indicator by Sachs and Warner (1995) and analyze the relationship between trade liberalization and growth. Their within-country estimates suggest that over the 1950-1998 term, countries experienced average annual growth rate about 1.5 percentage points, investment rates 1.5-2.0 percentage points, and openness ratio about 5 percentage points higher in the post liberalization period.

Dejong and Ripoll (2006) provide evidence of the favorable effects of trade liberalization on economic growth only among the rich countries. Poor countries, however, take advantages of higher trade barriers. According to their results, a 10 percentage point rise in tariff rates induces 1.6 percentage point decrease and 1.3 percentage point increase in per capita growth rate, among the countries in the top and bottom quarter of world's income distribution respectively. Due to the heterogeneous effects, they argue that underdeveloped countries should consider different economic policies than the developed ones. A recent study by Billmeier and Nannicini (2012), on the other hand, points out the weaknesses of the existent empirical evidences for the trade liberalization-growth relationship and apply the synthetic control method, which uses the linear combination of comparison units to the treated economy as counterfactual. Employing the binary indicator of Wacziarg and Welch (2003, 2008) over the period 1963-2000, they show that liberalization led to higher income per capita for many countries. However, many African countries which had liberalization in the 1990s did not benefit from these reforms.

Regarding the relationship between capital account liberalization and growth, Quinn and Toyoda (2008) argue that the inconsistent results of the earlier studies stem from the

measurement error or the time periods examined. The main premise of the study is that, their new de jure variable - extended version of Quinn (1997) - has informational advantages over the IMF's binary 0, 1 indicator. The latter treats completely closed (open) or substantially closed (open) countries in the same way, whereas the former takes into account the existence (absence) of restrictions, and the severity or magnitude of those restrictions as well. They point out that capital account liberalization has positive and significant relationship with growth, including different country groups and sub periods. Bekaert et al., (2005) argue that equity market liberalization leads to an approximate 1 percent increase in annual real per capita GDP growth. The positive and significant effect of equity market liberalization is robust to inclusion of usual control variables in economic growth regressions, and capital account openness. Moreover, exploiting Quinn's capital account measure, they suggest that capital account liberalization is also significantly and positively associated with per capita GDP growth.

Prati et. al. (2012) study the relationship between different types of structural reforms and growth. By analyzing trade, capital account, and domestic financial reform over the period 1973-2006, they find that reforms are on average positively associated with growth. Moreover, they remark the heterogeneity of the results depending on the distance to the technological frontier and the level of institutional structure. They conclude that reforms are more effective when markets and institutions are not at their infancy but at a somewhat more advanced stage in the process of development.

Bonfiglioli (2008) takes a different approach and draws attentions to the channels through which international financial integration effects economic growth. Applying system GMM estimation, she concludes that financial liberalization has positive and significant relationship with total factor productivity (TFP), whereas it does not have any significant effect on capital accumulation. Thus she suggests that, the former is the driving factor of the cross-country differences in economic growth rather than the latter. Stiglitz (2000), on the other hand, casts doubts on the common wisdom that capital account liberalization leads to higher output and greater efficiency. He argues that capital markets are essentially different from goods and services markets. Since the main function of the former is information gathering, information imperfections causes different results in the case of capital market liberalization. Moreover, Stiglitz (2000) points out that capital market liberalization is detrimental to economic growth as it causes higher volatility and higher frequency of crises, which makes investments less attractive.

In this paper, I investigate the short and long-run impacts of liberalization in a unified econometric framework. While the PMG methodology that I employ has been used in a number of studies, no previous study has used this methodology to determine the effects of

liberalization(s).

3 Data and Econometric Methodology

In this section, I describe the data set used in the estimations and spell out the methodological strategy following the descriptive analysis.

3.1 Data

The paper employs a rich *de jure* data set of reforms including real and financial sectors, which consist of yearly observations for 33 developing countries during the period 1973-2006 and other important determinants of growth such as government consumption, and lack of price stability[2]. The first reform I consider is international trade, which is measured by average tariff rates and restrictions on current account transactions.

There are two financial sector reforms; domestic financial reform and capital account reform. The domestic financial reform index is derived from Abiad, Detragiache and Tressel (2008). The index is constructed as the average of six sub-indices: (i) credit controls, such as subsidized lending and directed credit; (ii) interest rate controls, such as floors, ceilings or interest rate bands; (iii) entry barriers, such as restrictions on the participation of foreign banks, and restrictions on the scope of the banks' activities; (iv) the degree of state ownership in the banking sector; (v) the quality of banking supervision and regulation, such as risk-based capital adequacy ratios based on the Basle I capital accord, and independent banking supervisory agency; (vi) securities market policy, which includes the auctioning of government securities, establishment of debt and equity markets, and policies to encourage development of these markets, such as tax incentives or development of depository and settlement systems. The capital account reform index measures a broad set of restrictions on financial transactions for residents and non residents, as well as the use of multiple exchange rates.

Each reform variable is a continuous variable between 0 and 1, with a higher values indicating greater degree of liberalization and expected to have a positive relationship with growth. In the econometric analysis, I do not generate a broad index by taking the simple average of different indices since giving the same weight to the all reforms would be misleading. On the other hand, giving different weights also could cause problems as all countries would be weighted in the same way for the each reform. Finally, having indices instead

[2]Government consumption variable is used as ratio to GDP, and lack of price stability is defined as log(1 + Δ CPI) as Aghion et al. (2009), and Cavalcanti, T. T. et al. (2012).

of binary dummy variable makes the study more convenient since the indices are able to capture the intensity of liberalizations and they are much better measure for the timing and magnitude of policy changes.

3.2 Descriptive Statistics

Figure 1 depicts how structural reform indices have changed over time. In the last thirty years, developing countries have chosen to eliminate rigidities in all four areas. Thanks to the gradual lifting of restrictions, indices of liberalization in current account, trade, capital account, and domestic financial market increased from initial values of 0.45, 0.43, 0.43, and 0.10 to 0.74, 0.80, 0.65 and 0.72 respectively. It is also worth noting that developing countries experienced reform reversals in the beginning of 1980s in almost all areas of reforms, but the liberalization attempts proceeded from the late 1980s.

Figure 2 displays the structural reform indices in the beginning and end of the sample period. By the mid of the 2000, most countries have fully open current and capital accounts. Despite there are still some restrictions in international trade and domestic financial market, they are much less comparing the initial years.

The cases of reform and reversal, which are defined as the difference of indices, are depicted in figure 3. There are many reform failures in current account, trade and capital account- as we have seen before. In 1980s, developing countries re-introduced restrictions in the aftermath of 1982 debt crisis (Kaminsky and Schmukler, 2008), but these controls were temporary and eliminated from the end of 1980s. On the other hand, reform reversals in domestic financial sector are much less than the others and limited only to some least developed countries.

Table 1 shows the summary statistics of the variables analyzed in the empirical section. The per capita GDP growth rate equals 1 percent annually over the sample period. Current account, trade and capital account reforms have very similar mean, however domestic finance is less than the formers.

We observe in table 2 that real per capita GDP growth is positively and significantly correlated with the three indices of structural reforms, in particular the current account reform, capital account reform and domestic financial reform. On the other hand, the correlation with trade reform is negative. Furthermore, reform variables are highly correlated among each other; suggesting the less restriction in one area is related with less restriction on other areas as well.

3.3 Empirical Specification

Most of the studies in the literature employ five or ten year averaging in order to examine the long-run effect of structural reforms on growth[3]. Though using non-overlapping five-ten year intervals has been a common practice in the literature, one should consider that it causes a loss of information, and it is not obvious that averaging over fixed-length intervals effectively eliminates business cycle fluctuations (Loayza and Ranciere, 2006).

Instead of the common practice, in this study I make use of auto-regressive distributed lag model (ARDL), which can be defined in the following way:

$$y_{it} = \mu_i + \sum_{j=1}^{p} \lambda_{ij} y_{t-j} + \sum_{j=0}^{q} \xi'_{ij} X_{it-j} + \varepsilon_{it}, \tag{1}$$

where $i = 1, 2, ..., N$ indicates the cross-sections (groups); $t = 1, 2, ..., T$ the time periods, X_{it} is $kx1$ vector of explanatory variables for group i, μ_i represents the fixed effects; the coefficients of the lagged dependent variables λ_{ij}, are scalars and ξ'_{ij} are $kx1$ coefficient vectors.

By re-parametrization, equation (1) can be written as:

$$\Delta y_{it} = \mu_i + \varphi_i y_{it-1} + \beta'_i X_{it} + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{it-j} + \sum_{j=0}^{q-1} \xi^{*'}_{ij} \Delta X_{it-j} + \varepsilon_{it}, \tag{2}$$

where $\varphi_i = -(1 - \sum_{j=1}^{p} \lambda_{ij})$; $\beta_i = \sum_{j=0}^{q} \xi_{ij}$;
$\lambda^*_{ij} = -\sum_{m=j+1}^{p} \lambda_{im}, j = 1, 2, ..., p-1$, and
$\xi^*_{ij} = -\sum_{m=j+1}^{p} \xi_{im}, j = 1, 2, ..., q-1$.

Finally, error correction parametrization of the equation (2) is:

$$\Delta y_{it} = \mu_i + \varphi_i (y_{it-1} - \theta'_i X_{it}) + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{it-j} + \sum_{j=0}^{q-1} \xi^{*'}_{ij} \Delta X_{it-j} + \varepsilon_{it}, \tag{3}$$

where $\theta_i = -(\beta_i/\varphi_i)$ defines the long-run equilibrium relationship between y_{it} and X_{it}. Whereas, λ^*_{ij} and $\xi^{*'}_{ij}$ are the short-run coefficients relating growth to its past values and other determinants X_{it}. φ_i represents the speed of adjustment coefficient which measures the speed at which the values of y_{it} and X_{it} come back to equilibrium levels, once they violate the long-run equilibrium relationship. A negative and significant φ_i confirms that there exits

[3]See, for example Bekaert et al. (2005), Bonfiglioli (2008), Dejong and Ripoll (2006), and Quinn and Toyoda (2008) among others.

a long run relationship between y_{it} and X_{it}, which is the evidence of cointegration between these variables. It also asserts that if y_{it} had previously been larger than X_{it}, then that causes y_{it} to be lower for any given values of the other explanatory variables. The larger the value of φ_i the stronger is the response of the variable to the previous period's deviation from long-run equilibrium. On the contrary, in the case of low adjustment coefficient, any deviation from long-run equilibrium of the value of y_{it} and X_{it} requires a much longer time for the equilibrium to get restored. Finally, the long run coefficients on X_{it}, defined by $\theta_i = -(\beta_i/\varphi_i)$ above, are restricted to be the same across countries. The long-run homogeneity restriction can be tested:

$$H_0 : \theta_i = -(\frac{\beta_i}{\varphi_i}) = \theta. \tag{4}$$

using the Hausman statistic.

Lag selection in the ARDL model can be performed with different methods such as Schwarz-Bayesian Criterion (SIC) or Akaike Information Criterion (AIC). However, as we are also interested in analyzing short run parameters of the model, it is recommended to employ common lag structure across countries chosen in accordance to the model and data limitations (Loayza and Ranciere, 2006). Following this suggestion, this paper sets $p = 2$ and $q = 1$ and therefore has the following error correction equation[4]:

$$\Delta y_{it} = \mu_i + \varphi_i(y_{it-1} - \theta_i' X_{it}) + \gamma_1 \Delta y_{it-1} + \xi_1' \Delta X_{it} + \varepsilon_{it}, \tag{5}$$

where Δy_{it} is the annual growth rate of real GDP per capita for country i and year t, X_{it} is the vector of explanatory variables, namely current account reform, trade reform, capital account reform, domestic financial reform and the control variables.

There are various methods to estimate the above model. Dynamic fixed effects (DFE) specification, for instance, can be estimated by least-squares dummy variable (LSDV), instrumental variables or generalized methods of moments (GMM). DFE specification typically imposes all slope coefficients to be equal across countries but allows for different country intercepts. Namely, DFE imposes $(N-1)(2k+2)$ restrictions on the unrestricted model in equation (5), i.e. k long-run coefficients, k short-run coefficients plus the convergence coefficient and the common variance. However, Pesaran et al. (1999) point out that DFE estimators can produce inconsistent, and potentially misleading estimates of the average values of the parameters in dynamic panel data models unless the slope coefficients are exactly identical.

An alternative strategy would be to adopt mean group (MG) estimator introduced by

[4]More important, other lags are found to be insignificant, and therefore they only cause to loss of degrees of freedom.

Pesaran and Smith (1995), which imposes no cross-country parameter restrictions. MG estimator runs ARDL equations separately and calculates the mean of the short and long-run parameters across groups by the simple arithmetic average of the country specific coefficients. Though MG estimator can provide consistent estimates, it depends on quite strong assumptions and does not take into account that certain parameters may be the same across groups.

In this study I make use of Pooled Mean Group (PMG) estimation developed by Pesaran et al. (1999). It is an intermediate path between DFE and MG estimators since it includes both pooling and averaging. PMG is a maximum likelihood based approach and it allows the intercepts, short-run coefficients, and the error variances to differ across groups, but constrains the long-run coefficients to be homogenous over the cross sectional units. In other words, the PMG imposes $(N-1)k$ restrictions on the unrestricted model shown in equation 5. Furthermore, PMG estimator produces consistent estimates of the short-run coefficients across countries by taking the simple average of individual country coefficients. This feature of the estimator is crucial for the research question of the paper since short-run adjustment to the reforms might depend on country specific characteristics such as policy regimes and market imperfections. On the other hand, I expect that the long-run relationship between economic reforms and growth is homogenous across countries.

As put forth in Catao and Solomou (2005), the main benefit of working with PMG structure is that of mitigating the contemporaneous feedback and reverse causality running from the dependent variable to the independent variables. Moreover, this approach allows for heterogeneity in the adjustment dynamics across countries, since the parameters in the above equation are not constrained to be the same across countries. Most important, PMG estimator does not require pre-testing for the presence of unit roots in the variables. Pesaran et al. (1999) derive the asymptotic distributions of the stationary and nonstationary variables, and show consistency of the PMG estimator under each case. PMG estimation provides consistent and efficient estimates of parameters between stationary and integrated variables, provided that there is a unique vector defining the long run relationship among the variables involved (Catao and Solomou, 2005).

It is worth noting that obtaining consistent and efficient PMG estimator requires several conditions to be satisfied. First, the time dimension has to be long enough for the estimation of the model for each cross-sections separately. To this end, I include only countries for which I have at least 30 consecutive observations. Second, the lag order must be chosen to ensure that the residuals of the error correction model are serially uncorrelated, but it should not cause loss of degrees of freedom as well. Taking into consideration the latter point, this paper sets $p = 2$ and $q = 1$ as mentioned above.

Third, PMG assumes cross-sectional independence of the regression residuals ε_{it}. Arising from omitted common effects (e.g. time-specific effects or common global shocks affecting countries), cross-sectional dependence influences the countries ARDL process and causes misspecification. Pesaran et. al. (1999) offer either to use cross-sectional means of the existent regressors as additional regressors[5] or include all of the variables as deviations from their respective cross-sectional means in each period. In this paper, I chose to follow the second procedure to eliminate the common factors.

The fourth condition is the existence of long-run relationship between the variables and it requires a negative and significant error correction term (φ_i). Finally, PMG estimator is both consistent and efficient if and only if the long-run parameters are homogenous across countries.

4 Empirical Results

I report PMG, MG and DFE estimates as well as the Hausman test statistic which applied to the difference between PMG and MG estimators in order to test the long-run homogeneity restrictions. The MG estimator is consistent, albeit inefficient if the restrictions are valid. In this case, PMG estimator outperforms MG estimator in terms of efficiency since it exploits the common economic features across countries. On the other hand, the PMG estimator will be inconsistent when the true long-run parameters are heterogenous. Under the null hypothesis that cross-section parameters are homogenous in the long-run, Hausman test statistic must have high p-value in order to confirm the superiority of the PMG estimator over MG estimator.

Table 3 presents the estimation results of current account liberalization. In all the three estimates, the error correction terms fall into the dynamically stable range. This ensures that there exists strong evidence for cointegration between the explanatory variables and per capita GDP. Long run coefficients are insignificant in MG estimation due to the high standard errors. The current account coefficient of DFE estimation is significant, and close to the PMG estimation coefficient as magnitude. Furthermore, the long run homogeneity restriction cannot be rejected at conventional levels by the Hausman statistic. Therefore we focus on the results obtained by using the PMG estimation.

According to the results of PMG estimation, the speed of adjustment from the deviation in the long run relationship between current account liberalization and per capita GDP is -0.124. The model implies high adjustment inertia; it converges to the equilibrium, with a 12.5 percent of discrepancy corrected in each period.

[5]See Cavalcanti, T. T. et al., (2012) for this approach.

I find that current account reform is positively and significantly linked to real per capita GDP in the long-run. A one standard deviation rise in current account index is associated with an estimated increase of the per capita GDP by almost 26 percent for a developing country[6]. Finally, inflation is found to be insignificant; however, government consumption is, as expected, adversely related to the GDP per capita in the long-run.

The short-run coefficient of current account reform is positive and significant, suggesting that on average, eliminating the restrictions on current account transactions stimulate the economic growth also in the short-run. A one standard deviation increase in the current account variable leads to 0.1 percentage point increase in real per capita GDP growth rate on impact.

Table 4 reports the estimations of the impact of trade liberalization on real per capita GDP. As in the case of current account reform, error correction coefficients are significantly negative and therefore there exists a long-run relationship. The DFE estimate of trade is very close to the PMG estimate, despite it is insignificant owing to high standard error. Since the long-run homogeneity restriction is not rejected by Hausman test, once again I concentrate on PMG estimation results.

In the long-run, a one standard deviation increase in the trade index leads to 7 percent increase in GDP per capita. The control variables are expected negative signs but only inflation is significantly related to real GDP per capita in the long run.

Regarding the short-run, the trade reform has positive and significant effect on impact. A one standard deviation rise in trade index raises real per capita GDP by 0.05 percent. As in the case of current account liberalization, government consumption raises the growth rate in the short-run.

The estimation results of capital account liberalization are reported in table 5. The error correction coefficients are significantly negative and within the unit circle, implying that there exists a long-run equilibrium relationship for PMG, MG and DFE estimates. On the basis of the Hausman test it is not possible to reject the hypothesis of that the PMG estimators are consistent and more efficient than the MG ones. The findings indicate that there is a positive and significant relationship between capital account liberalization and real GDP per capita both in the short and long-run. Considering the latter case, a one standard deviation increase in capital account index leads to 10 percent increase in real GDP per capita.

Table 6 displays the estimation results of domestic financial liberalization. The error correction terms are negative and significant; hence the null hypothesis of no long-run re-

[6]In order to interpret the effects of current account, and later trade, capital account and domestic financial reform, I multiply each coefficient with standard deviations shown in table 1.

lationship is rejected. Furthermore, Hausman test indicates that the PMG estimators are consistent and more efficient than the MG ones. The results suggest that a one standard deviation increase in domestic finance index leads to 11 percent increase in real GDP per capita in the long-run. The long-run coefficients of the control variables have expected signs, however only inflation has significant effect. Finally, domestic financial reform has also positive effect on growth rate of real GDP per capita in the short-run.

As I stated before, one of the conditions for consistent and efficient PMG is serially uncorrelated residuals, which requires appropriate lag selection. To test whether choosing the ARDL model by an optimal information criteria rather than imposing specific lag lengths significantly changes previous results, I estimate the baseline regressions in which lags are chosen on the basis of SIC and are allowed to vary across countries. Table 7 provides the PMG estimation output. The estimates for short-run coefficients are not reported for brevity. Results indicate that in all of the estimations, the error correction terms are negative and significant, suggesting that there is a long-run relationship between real GDP per capita and its determinants; structural reforms as well as the control variables. As in the previous tables, reforms have the expected positive on real GDP per capita. All of the reform variables are highly statistically significant and correctly signed despite the magnitudes of current account and domestic financial reform coefficients are almost halved.

Second, I probe whether structural reform variables survive inclusion of institutional quality and other indicators of liberalization. Strictly speaking, there are two approaches to measure liberalizations in the literature: by using *de jure* or *de facto* variables. The former has the advantage of reflecting policy levers, and thus results based on them may have clearer policy implications for reforms that a government might consider. On the other hand, they may capture quite poorly the actual degree of financial integration, either because the true nature of legal restrictions is mismeasured, or because these restrictions are imperfectly enforced (Levchenko et. al., 2009). The latter instead, provides the actual level of liberalization of country at a given point of time. The logic to use a *de facto* variable is that a country might have much different level of openness from the *de jure* variable implies. Although my primary interest is using *de jure* variables, I also introduce *de facto* ones in order to check whether *de jure* variables capture the policy changes controlling the actual degree of openness. Furthermore, I want to isolate the effect of democracy on growth from that of structural reforms[7]. This way I can avert concerns that what structural reforms may

[7]I employ trade openness (sum of exports and imports as a share of GDP), the share of the gross capital flows and, private domestic credits to GDP as *de facto* variables for international trade reform, capital account reform and domestic financial reform respectively. The democratic quality of political regimes is measured by the polity2 indicator of quality of democracy from the Polity IV project (See Teorell, Charron, Samanni, Holmberg, and Rothstein (2011)).

actually capture is the quality of democracy.

I examine this issues by including democracy as well as the corresponding *de facto* liberalization variables to the equation 5. The PMG estimation results, which are hosted in table 8, confirm the previous findings. In all of the estimations, the error correction coefficients are negative and statistically different from zero, which indicates the long-run relationship. All *de jure* and *de facto* reform variables are positive and statistically significant, which suggest that *de jure* and *de facto* reform variables capture different parts of liberalization possibly because the former reflects the policy changes, whereas the latter echoes the tangible developments of openness in different areas. The democracy variable is positively and significantly associated with real per capita GDP in the long-run in column 3 and 4; in the cases of financial reforms only. Finally the control variables inflation has always negative sign and negatively related to real per capita GDP in all estimations except one. Government consumption, on the other hand is negatively linked to real per capita GDP in the long-run, whenever it is significant.

4.1 Analysis of Short-Run Coefficients

As mentioned above, the short-run coefficients are estimated by the unweighted average of individual country coefficients, and therefore they are not restricted to be the same across countries. In this section, I investigate the short-run effects in a more detailed way. To this end, I regress the short-run coefficients of reforms on *de facto* liberalization variables and two institutional variables; property rights and time required to enforce a contract [8]. Then I plot the fitted values against those variables (only the significant ones), which are defined as the mean values in the sample period.

Figure 4 and 5 plot, respectively, the determinants of the effects of current account and trade reform on growth. According to the figures, being financially more open exacerbates the short-run adverse effects. One can explain this result with the optimal sequence of reform framework. If a country is already financially open (internationally) when it carries out the trade liberalization, the growth rate can be hampered in the short-run due to the increase the degree of vulnerability to external crises (See Edwards (2008)). Moreover, Bhattacharya (1999) states that a higher probability of trade reform causes to lower investment in the importable sector while increasing investment in the exportable sector. Conversely domestic financial liberalization leads to higher investment in the importable sector, with the impact

[8]The former ((hf-prights) derived from Teorell (2012)) measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. The latter is derived from World Development Indicators, and measures the number of calendar days from the filing of the lawsuit in court until the final determination and, in appropriate cases, payment.

on investment in the exportable sector ambiguous. Since financial liberalization increases domestic capital formation, under the assumption of unchanged relative prices importable sector expands and exportable sector contracts by Rybczynski theorem. As a result, financial market reforms should not precede trade liberalization.

In countries where property rights are better protected, the gain from international trade liberalization is higher. Furthermore, contract enforcement is negatively related to short-run growth impacts of trade reform. Therefore countries where these institutions are more developed, allocation of resources can adjust more quickly, and the incumbent firms compete with the foreign firms easily, that makes the short-run losses disappear. For instance, Colombia and South Africa which performs poorly in institutional dimensions, has negative growth rates after trade reform. Turkey and Mexico, on the other hand, can benefit from trade liberalization already in the short-run.

Figure 6 show evidence on how growth deteriorates more in financially more open economies following capital account liberalization. Trade openness, on the other hand, is positively linked to the short-run impacts of capital account reform. Countries which are more open to international trade benefit more from capital account liberalization which is consistent with the empirical framework of Edwards (2008).

Finally, figure 7 depicts the determinants of short-run growth effects of domestic financial liberalization. As in the previous cases, countries which are more financially open benefits less from the domestic financial liberalization. This negative relationship can be explained by two reasons. First, owing to the negative marginal returns, countries which are financially less open gain more than the financially more open. Second possible explanation is if financial liberalization brings about financial instability in the short run, countries which are financially more open suffer more in the short-run[9].

To sum up, it can be argued that financial openness exacerbates the short-run negative effects international trade reform, since financial reforms should follow trade reform rather than preceding it. Second, lack of institutional quality may generate dispute about the implementation of reforms, since it jeopardizes the adverse effects of all reforms in the short-run. Therefore fostering institutions is a prerequisite for successfully implementing the reforms.

[9]Unfortunately I could not find any significant relationship between the number of crises occurred in the sample period and short-run impacts of domestic financial liberalization. Hence I cannot motivate any of the possible explanations.

5 Concluding Remarks

Given the increasing trend in liberalization in real and financial sectors over the past decades, a large body of research has studied their growth effects. However, the empirical literature is mostly limited to developed countries and fails to address the short-run effects of reforms. Motivated by such facts, this paper examines the relationship between international trade, capital account, and domestic financial reform and real GDP per capita in the short and long-run. I make use of PMG estimator which accounts the cross-country heterogeneity and allows to capture the time varying relationship. I hypothesize that there might a be tradeoff between the initial and ultimate effects of reforms on growth. My hypothesis is shown to be extensively validated by the PMG estimator, suggesting the importance of optimal sequencing issue and institutions for complementing reforms.

I find that there exists a positive relationship between reforms and real GDP per capita in the long run. Specifically, a one standard deviation increase in current account, trade, capital account, and domestic finance variables leads to 26, 7, 13, and 11 percent increase in real per capita GDP in the long-run. However, short-run coefficients on growth tell a different story. Although the short-run effects are positive on average, there is a substantial heterogeneity among countries. Countries with better property rights and better contract enforcement enjoy the positive impacts of reforms already in the short-run. Poor institutional quality exacerbates the adverse impacts of reforms though. Furthermore, implementing international trade reform preceding financial reforms help countries mitigate the short-run adverse effects.

Finally, I present evidence that the results are not driven by *de facto* liberalization variables and quality of democracy. Therefore, reform variables reflect the economic policy changes conditional on actual degree of openness and institutional structure.

References

Abiad, Abdul, E. Detragiache, and T. Tressel (2008). A New Database of Financial Reforms. *IMF Staff Papers* 57(2): 281-302.

Aghion, P., P. Bacchetta, R. Rancire, and K. Rogoff (2009). Exchange Rate Volatility and Productivity Growth: The Role of Financial Development. *Journal of Monetary Economics* 56(4): 494-513.

Bekaert, Geert, C. R. Harvey, and C. Lundblad (2005). Does Financial Liberalization Spur Growth? *Journal of Financial Economics* 77: 3-55.

Bhattacharya, Rina (1999). Political economy Aspects of Trade and Financial Liberalization: Implications for Sequencing. *IMF Working Paper* 99/159, International Monetary Fund, Washington D.C.

Bonfiglioli, Alessandra (2008). Financial Integration, Productivity and Capital Accumulation. *Journal of International Economics* 76: 337-355.

Bussire, Matthieu, and M. Fratzscher (2008). Financial Openness and Growth: Short-run Gain, Long-run Pain? *Review of International Economics* 16(1):69-95.

Catao, Luis, and S. Solomou (2005). Effective Exchange Rates and the Classical Gold Standard Adjustment. *American Economic Review* 95(4): 1259-1275.

Cavalcanti, Tiago D. de V., K. Mohaddes, and M. Raissi (2011). Commodity Price Volatility and the Sources of Growth. *Cambridge Working Papers in Economics* 1112.

DeJong, David N., and M. Ripoll (2006). Tariffs and Growth: An Empirical Exploration of Contingent Relationships. *Review of Economics and Statistics* 88(4): 625-640.

Dincecco, Mark (2010). The Political Economy of Fiscal Prudence in Historical Perspective. *Economics Politics* 22(1): 1-36.

Edwards, Sebastian (2009). Sequencing of Reforms, Financial Globalization, and Macroeconomic Vulnerability. NBER Chapters, in: Financial Globalization, 20th Anniversary Conference, NBER-TCER-CEPR National Bureau of Economic Research, Inc.

Hausman, Jerry, and D. Mcfadden (1984). TSpecification Tests for the Multinomial Logit Model. *Econometrica* 52(5): 1219-1240.

Kaminsky, Graciela Laura, and S. L. Schmukler (2008). Short-Run Pain, Long-Run Gain: Financial Liberalization and Stock Market Cycles. *Review of Finance* 12: 253-292.

Levchenko, Andrei A., R. Rancire, and M. Thoenig (2009). Growth and Risk at the Industry Level: The Real Effects of Financial Liberalization. *Journal of Development Economics* 89: 210-222.

Loayza, Norman, and R. Ranciere (2006). Financial Development, Financial Fragility and Growth. *Journal of Money, Credit, and Banking* 38(4): 1051-1076.

Nannicini, Tommaso, and A. Billmeier (2012). Assessing Economic Liberalization Episodes: A Synthetic Control Approach. *Review of Economics and Statistics. Forthcoming.*

Papageorgiou, Chris, A. Prati, and M., G., Onorato (2012). Which Reforms Work and under What Institutional Environment:Evidence from a New Dataset on Structural Reforms. *Review of Economics and Statistics. Review of Economics and Statistics. Forthcoming.*

Pesaran, Hashem, and R. Smith (1995). Estimating Long-run Relationships from Dynamic Heterogeneous Panels. *Journal of Econometrics* 68(1): 79-113.

Pesaran, Hashem, Y. Shin, and R. Smith (1999). Pooled Mean Group Estimation of Dynamic Heterogenous Panels. *Journal of American Statistical Association* 94(446): 621-634.

Prati, Alessandro, M. Onarato, and C. Papageorgiou (2012). Which Reforms Work and under What Institutional Environment: Evidence from a New Dataset on Structural Reforms *Review of Economics and Statistics. Forthcoming.*

Quinn D. P. (1997). The Correlates of Changes in International Financial Regulation *American Political Science Review* 91: 531-551.

Quinn D. P., and A. M. Toyoda (2008). Does Capital Account Liberalization Lead to Growth? *Review of Financial Studies* 21(3): 1403-1449.

Sach, J. D., and A. Warner (1995). Economic Reform and the Process of Global Integration. Brookings Paper on Economic Activity 1: 1-118.

Slaughter, M. J. (2001). Trade Liberalization and Per Capita Income Convergence: A Difference in Difference Analysis. *Journal of International Economics* 55(1): 203-228.

Stiglitz, Joseph E. (2000). Capital Market Liberalization, Economic Growth, and Instability. *World Development* 28(6): 1075-1086.

Teorell, J., N. Charron, M. Samanni, S. Holmberg, and B. Rothstein (2011). The Quality of Government Dataset, version 6Apr11, University of Gothenburg.

Wacziarg, R., and K. H. Welch (2003). Trade Liberalization and Growth: New Evidence. NBER Working Paper 10152 (Cambridge: National Bureau of Economic Research).

Wacziarg, R., and K. H. Welch (2008). Trade Liberalization and Growth: New Evidence. *World Bank Economic Review* 22: 187-231.

World Bank (2012). World Development Indicators, Washington DC.

A Appendix: Tables and figures

Figure 1: Structural Reform Indices

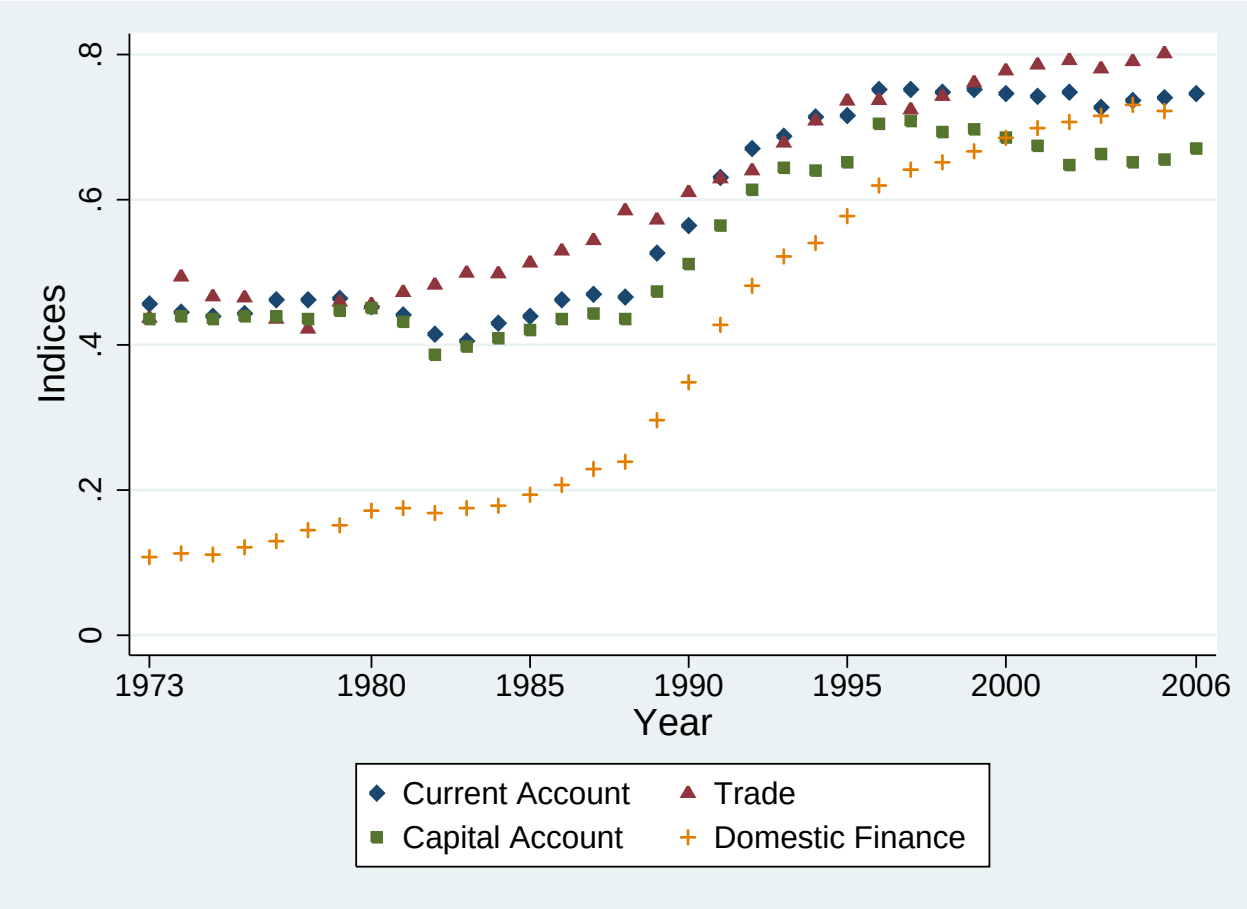

Figure 2: Structural Reform Indices

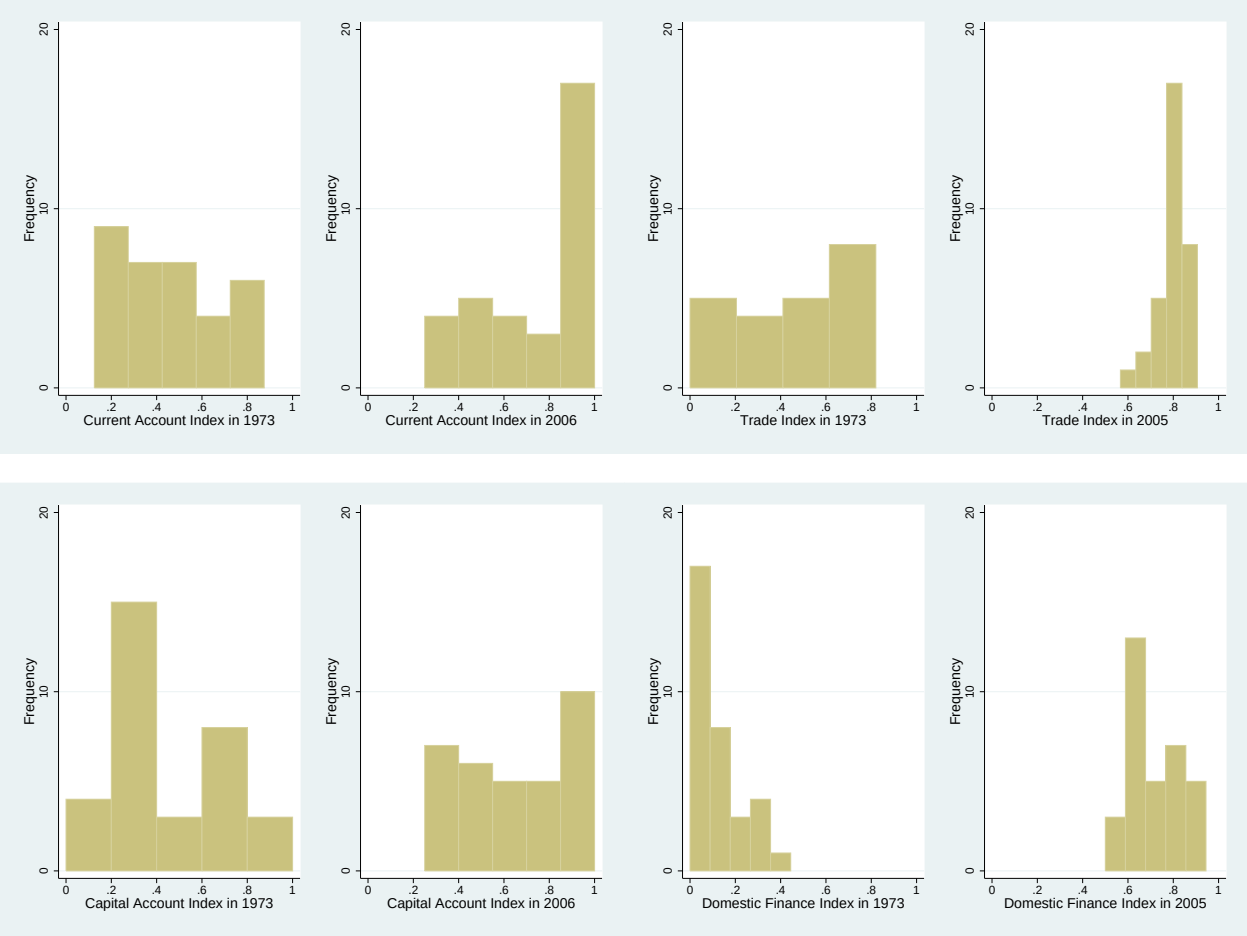

Figure 3: Structural Reforms and Reversals

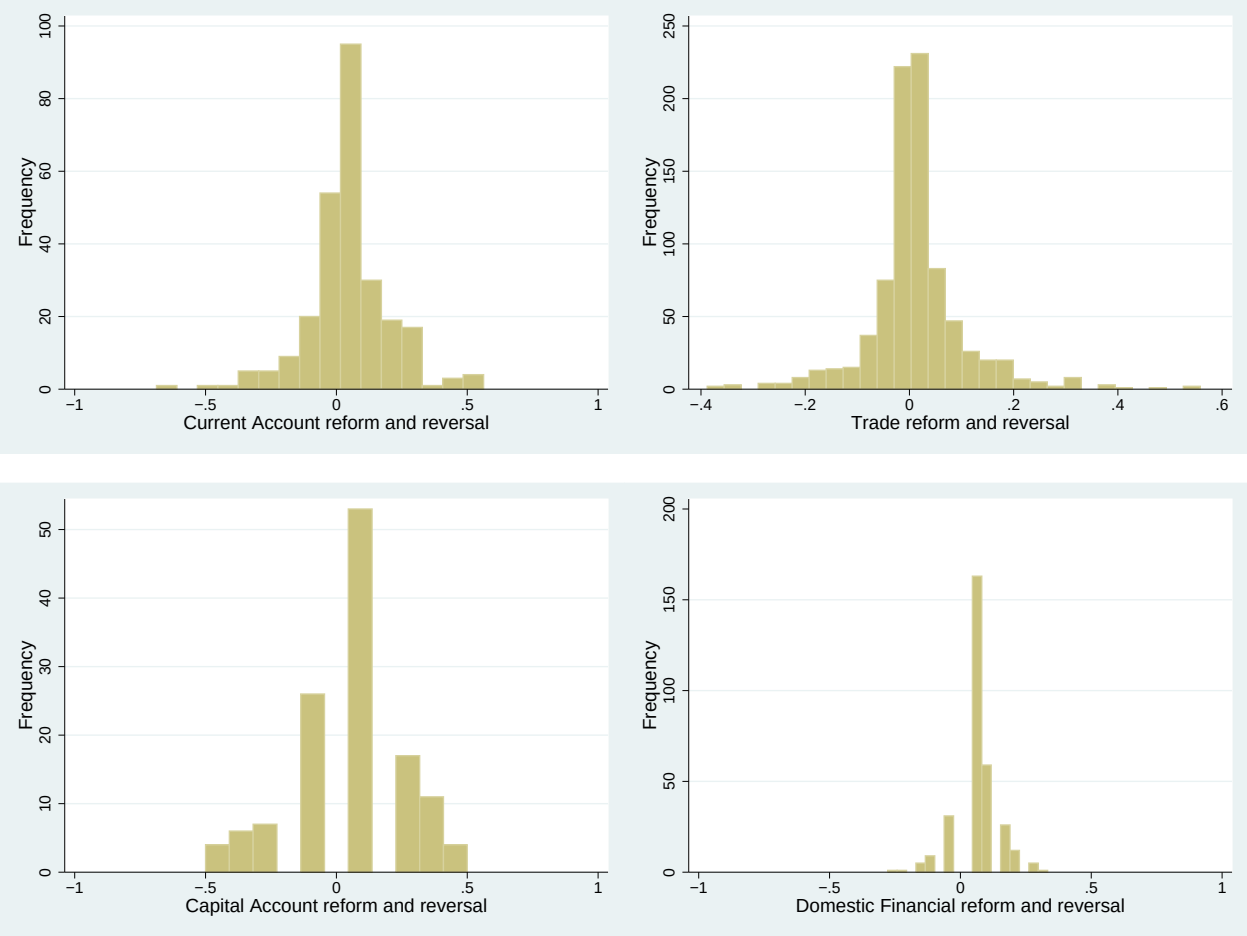

Table 1: Summary statistics

Variables	**Observation**	**Mean**	**Std. Dev.**	**Min**	**Max**
Real per capita GDP growth	1122	0.01	0.04	-0.19	0.20
Current Account	1122	0.58	0.26	0.125	1
Trade	1027	0.61	0.24	0	0.94
Capital Account	1122	0.54	0.25	0	1
Domestic Finance	1089	0.38	0.27	0	0.94
Inflation	1082	4.63	0.34	4.57	4.88
log (Government Consumption/GDP)	1111	2.47	0.35	1.09	3.54

Table 2: Bivariate correlations

Correlations	Growth	Current Account	Trade	Capital Account	Domestic Finance	Inflation	log (Government Consumption/GDP)
Growth	1						
Current Account	0.07	1					
	(0.01)						
Trade	-0.09	0.47	1				
	(0.00)	(0.00)					
Capital Account	0.05	0.79	0.38	1			
	(0.07)	(0.00)	(0.00)				
Domestic Finance	0.03	0.55	0.54	0.44	1		
	(0.30)	(0.00)	(0.00)	(0.00)			
Inflation	-0.00	0.30	0.31	0.26	0.43	1	
	(0.87)	(0.00)	(0.00)	(0.00)	(0.00)		
log (Government Consumption/GDP)	-0.06	-0.19	-0.02	-0.12	0.05	-0.06	1
	(0.02)	(0.00)	(0.42)	(0.00)	(0.06)	(0.03)	

Note: p-values are in parentheses.

Table 3: Current Account Liberalization and Growth

	(1) PMG	(2) MG	(3) DFE
Long Run Coefficients			
Current Account	1.032***	0.514	1.021***
	(0.09)	(1.291)	(0.25)
Inflation	0.246	16.916	-1.738
	(0.301)	(13.780)	(1.09)
Government Consumption	-0.134***	0.049	0.152
	(0.056)	(0.789)	(0.190)
Error Correction Coefficient	-0.124***	-0.302***	-0.157***
	(0.025)	(0.038)	(0.04)
Short Run Coefficients			
Growth (-1)	0.014	0.015	0.038*
	(0.490)	(0.026)	(0.02)
Δ Current Account	0.439*	0.351**	0.493***
	(0.223)	(0.177)	(0.138)
Δ Inflation	0.199	0.249	0.213
	(0.332)	(0.351)	(0.213)
Δ Government Consumption	0.125*	0.221***	0.16
	(0.109)	(0.085)	(0.123)
Observations	1006	1006	1006
Joint Hausman Test		6.29	
		[0.10]	

Notes: The dependent variable is real GDP per capita. All regressions include a constant. Standard errors in parentheses. The p-value is presented next to the corresponding h-test in square-brackets.
Source: Author's estimations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Trade Liberalization and Growth

	(1) PMG	(2) MG	(3) DFE
Long Run Coefficients			
Trade	0.277***	-0.270	0.2661
	(0.04)	(0.899)	(0.385)
Inflation	-0.58***	0.146	1.2958
	(0.224)	(1.772)	(1.472)
Government Consumption	-0.007	-1.009	0.1817
	(0.27)	(0.911)	(0.237)
Error Correction Coefficient	-0.165***	-0.347***	0.145***
	(0.036)	(0.044)	(0.043)
Short Run Coefficients			
Growth (-1)	0.022	-0.017	0.0406***
	(0.031)	(0.03)	(0.0175)
Δ Trade	0.224**	0.146*	0.4364***
	(0.105)	(0.068)	(0.153)
Δ Inflation	0.489	0.373	0.179
	(0.406)	(0.361)	(0.337)
Δ Government Consumption	0.200*	0.099	0.1303
	(0.111)	(0.092)	(0.123)
Observations	896	896	896
Joint Hausman Test		3.08	
		[0.38]	

Notes: The dependent variable is real GDP per capita. All regressions include a constant. Standard errors in parentheses. The p-value is presented next to the corresponding h-test in square-brackets.
Source: Author's estimations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Capital Account Liberalization and Growth

	(1) PMG	(2) MG	(3) DFE
Long Run Coefficients			
Capital Account	0.432***	0.593	0.9016***
	(0.074)	(0.460)	(0.266)
Inflation	-0.226	-1.280	-1.361
	(0.203)	(1.286)	(1.142)
Government Consumption	0.033	-0.056	0.087
	(0.034)	(0.236)	(0.20)
Error Correction Coefficient	-0.12***	-0.36***	-0.14***
	(0.027)	(0.056)	(0.04)
Short Run Coefficients			
Growth (-1)	0.034	0.034	0.044
	(0.024)	(0.025)	(0.021)
Δ Capital Account	0.547***	0.404***	0.47***
	(0.188)	(0.352)	(0.16)
Δ Inflation	0.203	0.333	0.38*
	(0.288)	(0.293)	(0.23)
Δ Government Consumption	0.183*	0.157**	0.16
	(0.10)	(0.092)	(0.12)
Observations	973	973	973
Joint Hausman Test		1.58	
		[0.66]	

Notes: The dependent variable is real GDP per capita. All regressions include a constant. Standard errors in parentheses. The p-value is presented next to the corresponding h-test in square-brackets.
Source: Author's estimations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Domestic Financial Liberalization and Growth

	(1) PMG	(2) MG	(3) DFE
Long Run Coefficients			
Domestic Finance	0.404***	0.399	0.6021***
	(0.057)	(0.447)	(0.215)
Inflation	-0.941***	-3.920	-1.2038
	(0.333)	(4.632)	(1.63)
Government Consumption	-0.046	0.297	0.17
	(0.04)	(0.314)	(0.25)
Error Correction Coefficient	-0.12***	-0.303***	-0.14***
	(0.03)	(0.047)	(0.04)
Short Run Coefficients			
Growth (-1)	-0.005	-0.004	0.0358***
	(0.022)	(0.027)	(0.015)
Δ Domestic Finance	0.359**	0.304	0.543***
	(0.177)	(0.352)	(0.16)
Δ Inflation	-0.017	-0.051	-0.224
	(0.184)	(0.186)	(0.37)
Δ Government Consumption	0.082	0.098	0.08
	(0.06)	(0.092)	(0.127)
Observations	941	941	941
Joint Hausman Test		2.67	
		[0.44]	

Notes: The dependent variable is real GDP per capita. All regressions include a constant. Standard errors in parentheses. The p-value is presented next to the corresponding h-test in square-brackets.
Source: Author's estimations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Liberalizations and Growth

	(1)	(2)	(3)	(4)
Long Run Coefficients				
Current Account	0.656***			
	(0.099)			
Trade		0.275***		
		(0.032)		
Capital Account			0.402***	
			(0.062)	
Domestic Finance				0.776***
				(0.037)
Inflation	0.095	-0.482***	-0.852***	-0.182
	(0.367)	(0.149)	(0.342)	(0.162)
Government Consumption	-0.576***	-0.023	0.075	-0.270***
	(0.078)	(0.024)	(0.045)	(0.029)
Error Correction Coefficient	-0.175***	-0.311***	-0.161***	-0.217***
	(0.043)	(0.062)	(0.042)	(0.054)
Observations	1006	1006	1006	1006
Joint Hausman Test	6.02	1.03	0.48	10.51
	[0.11]	[0.77]	[0.92]	[0.01]

Notes: The dependent variable is real GDP per capita. All regressions include a constant. Standard errors in parentheses. The p-value is presented next to the corresponding h-test in square-brackets. Lag selection is carried out according to SBI criterion. All specifications are estimated by PMG. Source: Author's estimations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Economic Liberalizations and Growth with Additional Controls

	(1)	(2)	(3)	(4)
De Facto Liberalization:	**Trade Openness**	**Trade Openness**	**INTFIN Openness**	**FIN Openness**
Long Run Coefficients				
Current Account	0.457***			
	(0.08)			
Trade		0.271***		
		(0.047)		
Capital Account			0.769***	
			(0.065)	
Domestic Finance				0.584***
				(0.066)
De Facto Liberalization	0.321***	0.178***	0.016***	0.257***
	(0.062)	(0.041)	(0.004)	(0.031)
Democracy	-0.001	-0.005	0.084***	0.061***
	(0.06)	(0.004)	(0.005)	(0.005)
Inflation	-0.744***	-0.348	-0.316***	-0.766***
	(0.360)	(0.236)	(0.142)	(0.372)
Government Consumption	0.092	0.044	-0.305***	-0.088***
	(0.06)	(0.031)	(0.025)	(0.044)
Error Correction Coefficient	-0.127***	-0.17***	-0.15***	-0.127***
	(0.022)	(0.032)	(0.037)	(0.028)
Observations	935	860	858	895
Joint Hausman Test	7.82	6.80	[a]	2.59
	[0.17]	[0.24]		[0.76]

Notes: ARDL(2,1,1,0,0,0). The dependent variable is the growth rate of real GDP per capita. All regressions include a constant. Standard errors in parentheses. The p-value is presented next to the corresponding h-test in square-brackets. INTFIN Openness is the share of gross capital flows to GDP. FIN Openness is the sahre of private domestic credits to GDP.

Source: Author's estimations. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[a] The joint hausman test statistic is negative, which is interpreted as strong evidence of failure to reject the null hypothesis that the PMG estimator is consistent and efficient by Hausman and McFadden (1984). See also Dincecco (2010).

Figure 4: The Effects of Current Account Reform on Growth

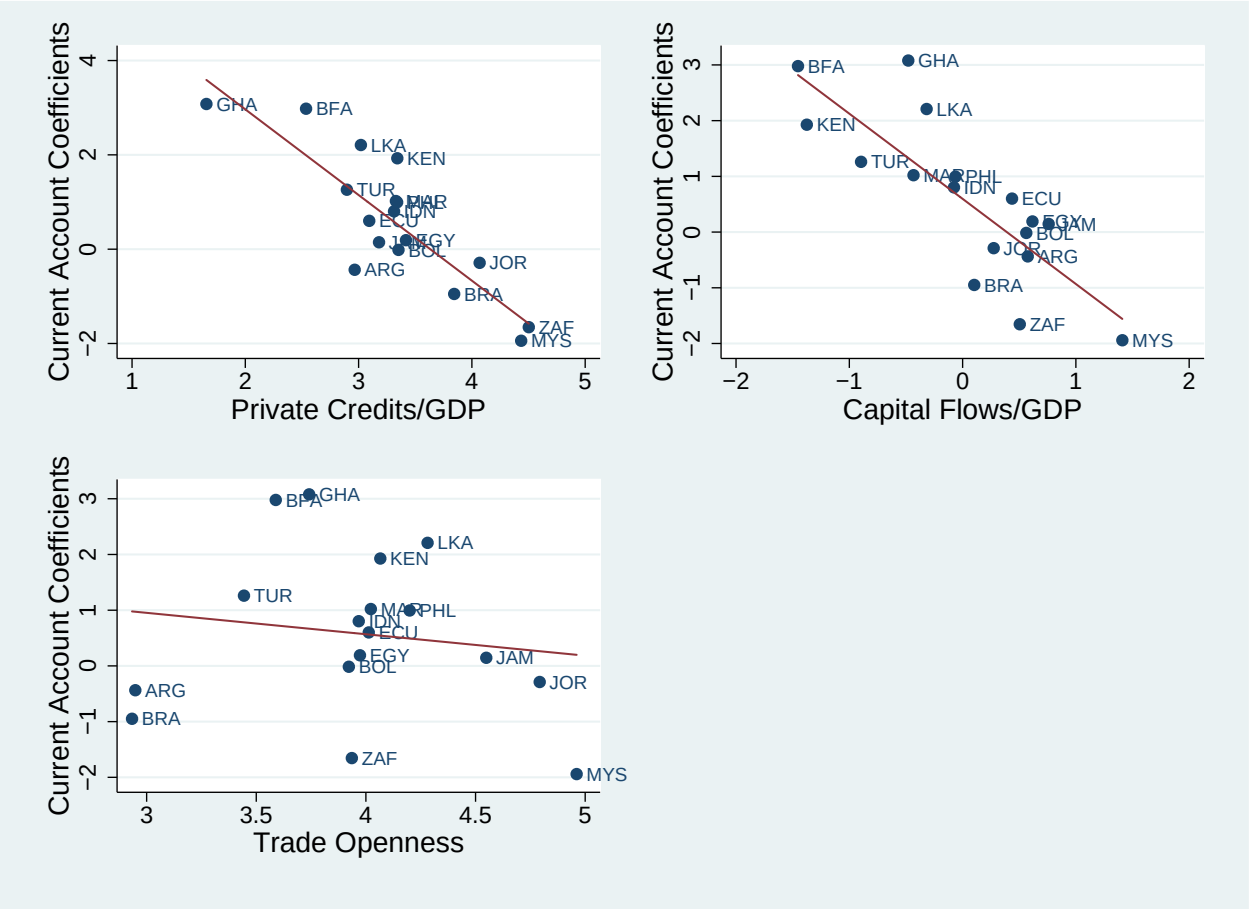

Figure 5: The Effects of Trade Reform on Growth

Figure 6: The Effects of Capital Account Reform on Growth

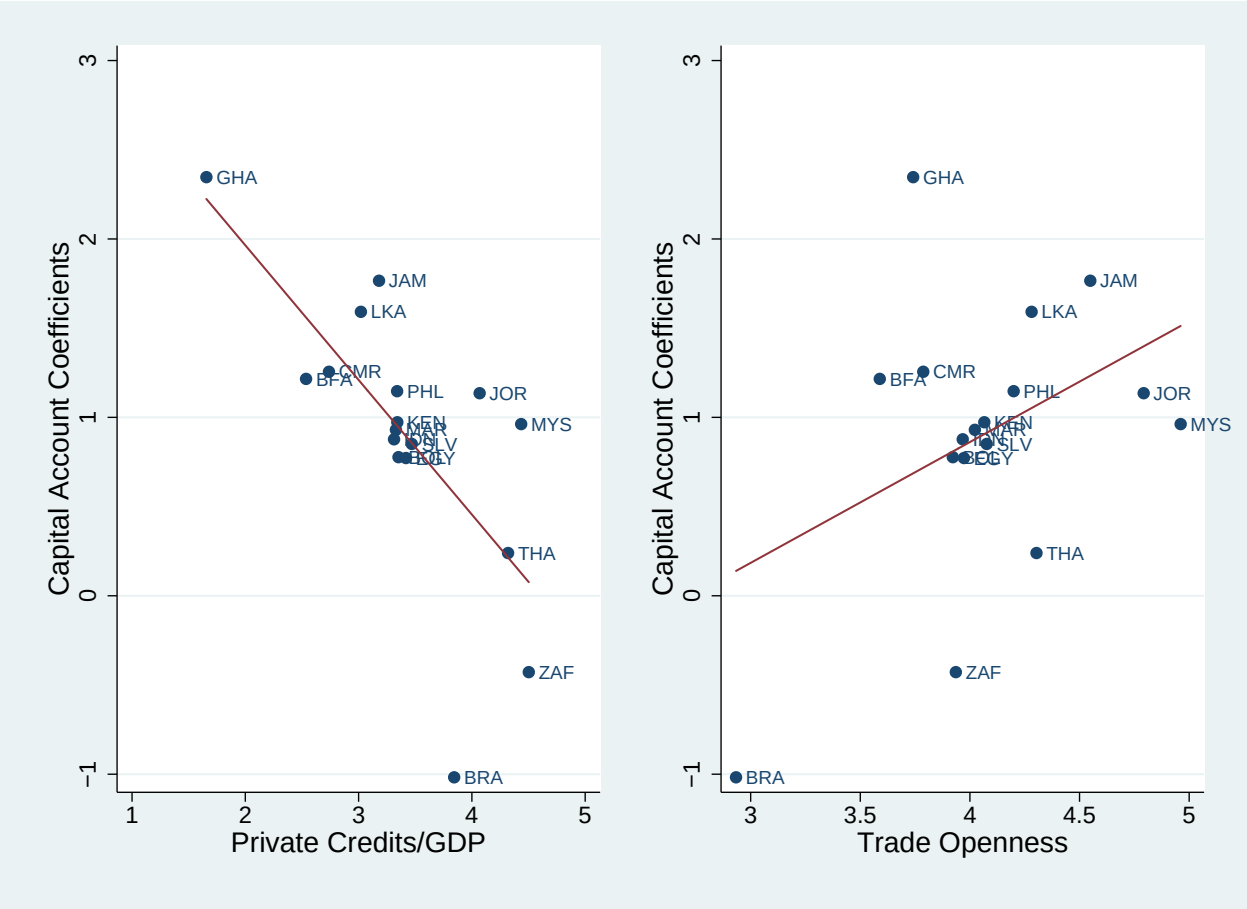

Figure 7: The Effects of Domestic Financial Reform on Growth