Do Fixers Perform Worse than Non-Fixers during Global Recessions and Recoveries?

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Abstract

There is an important debate about how economies with different exchange rate regimes performed during the Great Recession and its ensuing recovery. While economic theory suggests that economies with fixed exchange rates are more affected and recover more slowly from global shocks than economies with non-fixed exchange rates, the empirical evidence on the most recent global recession has been mixed. This paper examines the exchange rate and economic growth nexus and assesses how this relationship is affected by the four global recessions and recoveries the world economy has experienced post-Bretton Woods. While there is no robust long-term relationship between exchange rate regimes and growth, there is evidence that fixers recover from global recessions at a weaker pace than non-fixers.

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Keywords: Cycles; international cycles; global recessions and recoveries; exchange rates; economic growth of open economies.

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I. Introduction

Over the past ten years, economists have been debating the nature of the relationship between a country's nominal exchange rate regime and its economic performance during and after the most recent global recession, dubbed the Great Recession because it was the most severe global recession since the Great Depression. This debate has been fueled in part by the diverse growth experiences of the Scandinavian economies. There is suggestive evidence that the Scandinavian economies with fixed exchange rate regimes (Finland and Denmark) experienced deeper output drops during the Great Recession and weaker economic growth during the recovery from this recession than countries with floating exchange rate regimes (Norway and Sweden) (Corsetti, Kuster & Muelleret, 2017).

Do economies with fixed exchange rate regimes perform worse than economies with non-fixed exchange rates during global recessions and their ensuing recoveries? This study answers this question by reexamining the relationship between exchange rate regimes and economic growth and assessing how this relationship is affected by global recessions and their recoveries. Global recessions are episodes of world per capita output contractions that coincide with the deterioration in other measures of global economic activity (Kose and Terrones, 2015). The world has experienced four global recessions since 1960—the recessions of 1975, 1982, 1991, and 2009. The effects from these episodes on domestic economies varied substantially across countries depending on a host of factors, including the nature and severity of the global shock, intensity of trade and financial integration, the extent of financial sector disruptions, and policy responses, among others. Global recovery is the period, typically the first three years, following a global recession, characterized by a rebound in world per capita output and a pickup in other indicators of global economic activity. Recoveries in domestic economies differ in their strength, reflecting in part the nature and severity of the global recession, domestic and global policy responses, etc. Little is known, however, about how the responses of a domestic economy to a global recession and a global recovery are affected by a country's exchange rate regime selection.

The relationship between an exchange rate regime and growth has long been studied. In the early open macroeconomic models with price stickiness, for instance, fixers could face lower volatility and grow at a faster pace than floaters if the economy mostly faced nominal shocks, reflecting the fact that the money demand and/or supply will adjust to offset these shocks. A

floating exchange regime is, however, preferable if the economy faces a preponderance of real shocks—that is, external demand/supply shocks, terms of trade shocks, and productivity shocks. This reflects lower output volatility and faster growth as the nominal exchange rate moves to offset changes in the relative price of tradable to nontradable goods, reducing the need for adjustments in production.[1]

Some have argued that a fixed exchange rate regime fosters economic growth by increasing private investment and international trade. The implementation of a fixed exchange rate could bring about lower country risk and more stable terms of trade, which in turn help investment and bilateral trade. A fixed exchange rate regime could also be used for promoting export-led growth by generating an undervalued real exchange rate (Rodrik, 2008). Fixed exchange rate regimes are, however, subject to instability and financial crises primarily due to unsustainable fiscal policies (Tornell and Velasco, 2000). Interest rates would be higher and investment and economic growth weaker.

Given these different theoretical implications, the nature of the long-term relationship between exchange rate regimes and growth is an empirical matter. Indeed, there is no evidence of a robust relationship between long-term growth and exchange rate regimes. This result reflects in part the difficulties in classifying de facto exchange rate regimes. In the empirical literature, there are four, often different, exchange rate classifications that have commonly been used: the IMF, Reinhart and Rogoff, Levy-Yeyati and Sturzenegger, and Shambaugh regimes.[2] For instance, Rose (2011) reports that fixers enjoy stronger growth than some categories of non-fixers when using the Reinhart and Rogoff (managed) and the Levy-Yeyati and Sturzenegger (intermediate) exchange rate classifications.[3] Fixers, however, grow at a slower pace than non-fixers (crawlers) when using the IMF classification.[4] Rose also finds no significant growth

[1] The negative link between economic growth and volatility was documented by Ramey and Ramey (1995).
[2] A fifth de facto exchange rate classification has been recently developed by Bleaney and Tian (2017a). I use this new exchange rate classification in the empirical section of this paper.
[3] Rose excludes from his analysis China, the Euro-zone, Japan, the United Kingdom, and the United States. Ghosh, Ostry and Tsangarides (2013) find that when using the IMF de facto exchange rate classification, fixers enjoyed stronger growth than floaters particularly if they avoid an exchange rate overvaluation. However, they also find that intermediate exchange rate regimes grow faster than fixers or floaters.
[4] Husain, Mody and Rogoff (2005) using the Reinhart and Rogoff classification, find that advanced economy floaters grow faster than advanced economy fixers. Similarly, Levy-Yeyati and Sturzenegger (2003) using the Levy-Yeyati and Sturzenegger exchange rate classification, document that emerging and developing economies with floating rates grow faster than fixers.

differences between fixers and non-fixers (floaters), regardless of the exchange regime classification.[5] A similar result is reported by Klein and Shambaugh (2010) who utilize as their benchmark the Shambaugh exchange rate classification.

The link between exchange rate regimes and growth is for some economists more meaningful in the short term than in the long term, particularly when an economy faces large external shocks. Corsetti, Kuster, and Muelleret (2017) for instance, show that flexible exchange rates are better external shock absorbers than fixed exchange rates, as a currency depreciation stabilizes the demand for domestically produced goods and contains deflationary pressures coming from the rest of the world. When the global economy is close to the zero lower bound (ZLB) on interest rates, exchange rate flexibility and fiscal policy can play a crucial role in facilitating the process of economic recovery.[6] As a result, output growth for fixers should be weaker than that for non-fixers in the aftermath of a global recession.[7]

The question of which exchange rate regime best accelerates global economic recoveries is certainly not new and has been examined in the past. For instance, Eichengreen and Sachs (1985) in their analysis of the recovery from the Great Depression argue that a currency depreciation was helpful for the depreciating countries and that this policy could not be thought of as beggar-thy-neighbor policy.

In this paper, I provide a comprehensive analysis of the relationship between exchange rate regimes and per capita output growth and assess how this relationship is affected by global recessions and ensuing recoveries. Towards this objective, I use a panel dataset for 114 economies during the post-Bretton Woods period. The dataset includes various classifications of de facto exchange rate regimes, which allows for verification of the robustness of the results. I categorize economies as fixers (i.e., those without a currency, members of a currency board, or with currency pegs) or as non-fixers (i.e., those with intermediate regimes and floaters). I also distinguish between the years of global recessions (1975, 1982, 1991, and 2009), the years of global recoveries (1976-1978, 1983-1985, 1992-1994, and 2010-2012), and the years of late global expansion (all remaining years). In concordance with previous studies, I find no robust

[5] In a related paper Rose (2014) find no growth difference between fixers and inflation targeters.
[6] Cook and Devereux (2016), however, argue that countries with fixed exchange rates and that are exposed to the risk of the liquidity trap would perform better than non-fixers when adjusting to a domestic demand shock.
[7] Terrones, Scott and Kanaan (2009) find evidence that recessions associated with financial crises are unusually severe and that recoveries from such recessions are slow.

long-term relationship between exchange rate regimes and growth when distinguishing between fixers and non-fixer countries. When introducing the timing of global recessions and global recoveries and their interaction with fixed exchange rates as additional explanatory variables, the evidence suggests that there is no significant growth difference between fixers and non-fixers during a global recession and that fixers recover from a global recession at a slower pace than non-fixers. These findings are robust across exchange rate classifications, country groups, and to the inclusion of other explanatory variables, including trade and financial openness. These striking results raise questions about the empirical neutrality of an exchange rate regime concerning the cyclical characteristics of an economy.

This paper is related to Rose (2014) and Tsangaridis (2012), who examine the link between exchange rate regimes and growth during and after the Great Recession.[8] While the former finds no significant growth differences between fixers and non-fixers during the Great Recession and its aftermath, the latter finds that emerging market economies with fixed exchange rate regimes recovered at a slower pace than non-fixer emerging market economies during the recovery from the global crisis. In contrast with these studies that focus only on the 2009 global recession and its recovery, in this paper, I include the four global recessions that have affected the world economy post-Bretton Woods and their recoveries. Also, I use a yearly panel data growth model with lag dependent variable and country fixed effects.[9]The model specification allows for the possibility that an exchange rate regime could have long-term implications over economic growth and differentiated effects during global recessions and recoveries. I find robust evidence that fixers recover from global recessions at a weaker pace than non-fixers. In the empirical literature, it has been documented that countries with more flexible exchange rates are less affected than countries with fixed exchange rates by a term of trade deterioration (Edwards and Levy-Yeyati, 2005) and natural disasters (Ramcharan 2007).

The paper is organized as follows. In the next section, I present the methodology and main features of the data set used in the analysis. An essential feature of the data set, which

[8] Hegarty and Wilson (2017) examine the link between exchange rate regimes, trade, and economic recovery. They find no significant relationship between these variables.

[9] Note that Rose (2014) employs a yearly panel fixed-effect growth regression model for a sample comprising over 170 small countries from 2007 to 2012. Tsangarides (2012) uses two cross-section growth regression models for the emerging market economies: one for the Great Recession, with growth differences (2008-09 relative to 2003-07) as the dependent variable; and another for the recovery, with cumulative growth for 2010-11 as the dependent variable. The framework I use is closer to the one utilized by Rose (2014).

covers the post-Bretton Woods period, is that it includes a comprehensive set of de facto exchange rate regime classifications. Then I study the relationship between exchange rate regimes and growth using various empirical specifications and how endogeneity issues are addressed. In Section IV, I report a variety of robustness checks of the main findings. I consider including other control variables, representing the trade and financial channels linking an economy with the rest of the world. Lastly, I conclude by summarizing the main findings and implications in Section V.

II. Methodology and Database

In this section, I briefly introduce the methodology and database used in this study. I utilize a dynamic panel growth regression framework with yearly data. Most of the data, including the de facto exchange rate classifications, are obtained from publicly available sources.

A. Methodology

In this paper, I use a yearly dynamic panel growth regression framework. This regression model is flexible enough to allow for an exploration of the long- and short-run growth effects of an exchange rate regime. A similar model was utilized by Bond, Leblebicioglu, and Schiantarelli (2010) to examine the relationship between investment and economic growth and by Kose, Loungani, and Terrones (2013) to assess the linkages between the global cycle and national cycles. The use of high-frequency data permits me to assess whether an exchange rate regime has a long-term effect on growth and/or a differentiated effect associated with global recessions and recoveries.[10]

For simplicity, I assume that the long-run per capita growth regression follows a simple linear lag regression model with fixed effects. This model, which belongs to the extended AK family (Bond, Leblebicioglu, & Schiantarelli, 2010), is a generalization of the growth regression models commonly used in the literature to examine the growth effects of exchange rate regimes.

[10] Bohl, Michaelis, and Siklos (2016) use a related model to examine how an exchange rate regime affects the link between economic growth and financial crisis for 47 countries during the period 1980-2010.

If $g_{y_{it-j}}$ is the per capita output growth in country *i* and period *t-j*, where *j*≥0 is an integer, then the contemporaneous value of this variable follows the following process:[11]

$$g_{y_{it}} = \alpha_i + \rho \times g_{y_{it-1}} + \beta \times FX_{it-1} + \gamma_t + \varepsilon_{it} \qquad i = 1,2,...,N; t = 1,2,...,T \tag{1}$$

Where FX_{it-1} is the fixed exchange rate binary variable in country *i* and period *t-1*. γ_t are global factors, beyond global cycles, that could affect domestic growth. These factors include the growth rate of the rest of the world and the interest rate in the anchoring country. ε_{it} is a mean zero growth innovation. The introduction of fixed effects captures cross-country differences in a variety of dimensions, including institutions, initial conditions, etc. Importantly, the reference category in this specification is the non-fixed exchange rate regime. This implies that the long-run mean growth difference between fixers and non-fixers is $\beta/(1-\rho)$. Long-run growth is not affected by a country's exchange rate regime if β is zero.

This framework is then amended to account for the effects of global cycles. Towards this objective, the episodes of global recession, R_t, and global recovery, U_t, are modeled here using binary variables that take on the value of 1 if the world economy is in a global recession (global recovery) and 0 otherwise. These two variables are then interacted with the fixed exchange rate regime variable to assess whether economic growth in fixer countries is affected differently than that of non-fixer countries during global recession and global recovery episodes. The regression specification also controls for other exogenous global factors, γ_t.

The equation to be estimated is then given by

$$g_{y_{it}} = \alpha_i + \rho \times g_{y_{it-1}} + \beta \times FX_{it-1} + \theta \times R_t + \varsigma \times FX_{it-1} \times R_t + \varphi \times U_t + \upsilon \times FX_{it-1} \times U_t + \gamma_t + \varepsilon_{it} \qquad i = 1,2,...,N; \quad t = 1,2,...,T \tag{2}$$

Typically, N > T. The reference categories in this specification are non-fixed exchange rate regimes and late global expansion years.[12] The effect of a global recession (global recovery) on domestic growth for a non-fixer country is θ (φ) above or below the average growth of non-fixers

[11] Bond, Leblebicioglu, and Schiantarelli (2010), in their analysis of the effects of capital accumulation on growth, develop in detail this family of panel regression models.

[12] Note the term late global expansion years refers to the global expansion years excluding the global recovery years—see more below.

during expansion years. Likewise, the effect of a global recession (global recovery) on domestic growth for a fixer country is $\theta+\zeta$ ($\varphi+\upsilon$) above or below the average growth of non-fixers during the late global expansion years.

This framework can be generalized to include other controls that have the potential to affect per capita growth. For instance, one would like to determine if the main results obtained from estimating (2) are robust to the inclusion of proxies for trade openness, financial openness, domestic investment, government expenditure, and international reserves. These variables are often included in the empirical growth literature. Also, one could explore if including more lagged dependent variables as regressors makes an important difference.

B. Database

I use a comprehensive annual database that combines information from several sources. Macroeconomic data, including real GDP and population, are primarily from the IMF's *World Economic Outlook* which is supplemented with information from the World Bank's *World Development Indicators*. Data on the de facto exchange rate regime classifications are taken from several sources as discussed below. The database comprises data from 1973 to 2016, the post-Bretton Woods period, for 114 countries. These countries, which account for more than 95 percent of the global output, have been selected based on data availability and on the condition that their real per capita GDP has recovered the levels observed before previous downturns. In terms of their functional composition, there are 22 advanced countries and 92 emerging market and developing countries. Appendix 1 lists the members of each of these country groups.

The global business cycle is defined by the evolution of the annual growth rate of world real GDP per capita—the difference between the purchasing power parity–weighted real GDP of the countries in the world and world population growth (IMF, 2002). The dates of global recessions and recoveries have been taken from IMF (2009) and Kose and Terrones (2015). The latter utilizes two methods to identify the turning points of the global cycle: (1) a statistical method, which applies an algorithm to identify local maxima (peak) and local minima (trough), which meet given censoring rules, over a period; (2) a judgmental method, whereby the entity performing the dating of the global cycles examines the evolution of several key indicators of global economic activity—world real GDP per capita, world industrial production, world unemployment, world trade, capital flows, and world energy consumption—and concludes

whether there is a global recession (recovery) or not. Once the turning points are identified, the global cycle is characterized as comprising a *global recession* phase (which goes from peak to trough) and *global expansion* phase (which goes from trough to peak). The *global recovery phase*, which is commonly used in the literature, corresponds to the early part of the expansion phase—typically the first three years following the trough. The application of these two methods leads to the identification of four episodes of global recessions (1975, 1982, 1991, and 2009) and global recoveries (1976-1978, 1983-1985, 1992-1994, and 2010-2012) during the 1960-2016 period.

Global recessions have been important landmarks for the world economy. These recessions were triggered by one or more global shocks, which include oil price shocks, contractionary monetary policy shocks in the advanced economies, and financial and banking shocks in the advanced economies. As a result, global economic activity contracted, trade and financial flows fell sharply, financial markets collapsed, and global unemployment rose significantly (Kose and Terrones, 2015). Global recessions differ in their severity and synchronicity. The number of countries in recession during a global recession has been rising over time, reflecting the process of globalization experienced by most economies.

Global recoveries, or the early phase of global expansions, typically involve a rebound in global economic activity accompanied by a pickup in industrial production, trade and capital flows, and revival of financial markets. Labor markets, however, remain weak, and the high rates of unemployment are slow to recede. Global recoveries differ in their strength, as measured by the average growth in the three years following the recession—for instance, the recovery from the 1975 recession was the strongest, while the recovery from the 1991 recession was the weakest (Kose and Terrones, 2015).[13] The late global expansion period thus refers to the global expansion phase excluding the global recovery years.

As documented by Kose and Terrones (2015), global recessions and global recoveries have their own differentiated characteristics. The average growth in world output per capita is -0.7 percent during recessions and 2.3 percent during recoveries. Moreover, advanced economies are typically more affected by a global recession than emerging and developing countries, so advanced economies experience weaker recoveries. Lastly, the fraction of countries that

[13] Terrones, Scott and Kanaan (2009) find evidence that recessions associated with financial crises are unusually severe and that recoveries from such recessions are slow.

experience a recession rises to 0.6 during a global recession from 0.25 during normal times. These stylized facts suggest that the growth implications of these events vary across countries and that one can take advantage of this variation to identify the effects of an exchange rate regime on growth during global recessions and recoveries.

There are four de facto exchange rate classifications that I employ in this study.[14] These classifications are constructed based on actual exchange rate behavior and are more reliable than the de jure classifications, which are based on officially announced arrangements. The first de facto exchange rate regime is the Itlzetzki, Reinhart, and Rogoff (2017) (IRR) classification.[15] To gauge the degree of exchange rate flexibility, a two-step procedure is applied. First, the anchor currency for each country is identified with the help of algorithms based on exchange rate volatility. Second, a measure of exchange rate flexibility is produced using information on the parallel exchange market or the unified exchange rate market. Provided that the inflation rate is less than 40 percent, exchange rates are classified based on the probability the parallel (unified) exchange rate is outside a threshold within a five-year window.

A second de facto exchange rate classification is the one elaborated by the IMF. This database is generated by the IMF staff using the following rules: (1) countries are classified in line with their de jure arrangements whenever the observed policies and outcomes coincide with the announced ones; (2) countries are then classified as either non-floating or floating (or market determined) arrangements when observed and announced policies and outcomes do not coincide. Then the IMF staff utilizes specific quantitative and qualitative criteria to further refine these arrangements (Habermeier et al., 2009). The de facto exchange rates data are published in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER) since the year 2000. In the empirical analysis, I utilize an updated version of the database used by Ghosh, Ostry, and Qureshi (2015).[16]

The third measure of de facto exchange rate arrangement is the one proposed by Bleaney and Tian (2017a) (BT). They generate this measure using regression methods. The BT measure

[14] These classifications are based on actual exchange rate behavior and, therefore, do not make use of information about other variables. Because of this, I exclude the Levy-Yeyati and Sturzenegger (2015) classification from the analysis. Another problem with this dataset is the large number of missing observations in several countries.
[15] This is a modified and updated version of the Reinhart and Rogoff's (2004) classification.
[16] Ghosh, Ostry, and Qureshi (2015) extended back the data reported in the AREAERs using information from Bubula and Otker-Robe (2003) and Anderson (2008) to create a database spanning the period 1980-2011. I have updated this database until 2016 with information from the published AREAERs. The IMF revised its de facto classification in 2009, complicating the matching of some sub-arrangements.

is based on the root mean square residual (RMSE) from a regression of the change in the logarithm of the "peso" to "numeraire currency" exchange rate, the change in the logarithm of the US dollar to "numeraire currency" exchange rate, and the change in the logarithm of the euro to "numeraire currency" exchange rate, where "peso" refers to the currency of country *i* and the "numeraire currency" refers to the Swiss franc.[17] After controlling for the possibility of realignment in a given month with a dummy variable, the exchange rate regime is classified as peg (float) if the RMSE is less (more) than a given threshold. In their calculations, Bleaney and Tian set this threshold at 0.01.

The fourth measure of de facto exchange rates is the one developed by Jay Shambaugh (2004) (S). This is a bivariate classification, and exchange rates are categorized as either pegged or non-pegged on an annual basis. The exchange rate is classified as pegged if the official exchange rate peso/base currency is within a |2| percent band, where peso is the relevant country currency and base currency is the currency to which a country pegs. No information on the parallel market or exchange rate restrictions is used in this exchange rate classification.

These exchange rate measures have little in common, often disagree, and differ in their country-time coverage.[18] For purposes of this study, I collapse the different exchange rate subcategories of each exchange rate measure into two classes: (1) fixed exchange rates, which include regimes without a currency, members of a currency board, or currency pegs; and (2) non-fixed exchange rates, which include all other intermediate regimes and floaters. Figure 1 shows the evolution of the proportion of fixer countries for the 1973-2015 period. The BT measure identifies many more fixers than the other three exchange rate measures. Moreover, the time trends differ across the four exchange rate measures, with the IRR and S presenting somewhat similar patterns.

Table 1 reports the correlation coefficients between the different exchange rate measures utilized in this study for the whole sample period. There is a positive (and in some cases strong) correlation among all the measures of exchange rate regimes. In particular, the strong pairwise correlation between the IRR and S, the IRR and IMF, and the S and IMF are noticeable. Figure 2

[17] For the annual measure of exchange rate flexibility, the Japanese Yen and British pound are also considered numeraire currencies. However, results are robust to the choice of the numeraire currency.

[18] See, for instance, Klein and Shambaugh (2010), Rose (2011), Eichengreen and Razo-Garcia (2011), and Bleaney et al. (2017b). Because of these problems, caution must be exercised when examining the link between exchange rate regimes and financial development, financial openness, among others (Eichengreen and Razo-Garcia, 2011).

shows the evolution of these correlation coefficients over time. Most remarkably, these coefficients have increased significantly across the board since the 1990s.

In the regression analysis, I include two variables that capture global real and financial conditions—the rest of the world per capita growth and the interest rate in anchor countries. For each country *i*, the rest of the world per capita growth is just the purchasing power parity–weighted output growth for all the countries in the sample excluding country *i* minus their population growth (see, for instance, Kose, Loungani, & Terrones, 2015). Likewise, for each country *i*, the interest rate in anchor countries is just the short-term interest rates (either money market or treasury bill rates) in its anchor country as determined by IRR (a related proxy is used in di Giovanni and Shambaugh, 2008).

I also include a variable to proxy for macroeconomic turbulence in the domestic economy. This is a binary variable—it takes on the value of 1 if a country experienced annual inflation in excess of 40 percent and 0 otherwise—that matches the freely falling category in IRR. The literature has identified a negative relationship between economic growth and high inflation (defined by annual inflation rates of 40 percent or more) and no relationship for other inflation rates.[19] This finding justifies its inclusion in the regression analysis.

Next, to assess the robustness of the main results, I use the standard measures of a country's trade and financial openness. The former is proxied by the ratio of the sum of exports and imports of goods and services to GDP. This indicator measures a country's exposure to international trade—including changes in commodity prices. On the other hand, financial openness is proxied by the de jure Chinn-Ito (2006) index of financial openness. This indicator, which measures the extent of a country's capital account openness, is constructed using information on cross-border financial transactions restrictions as reported by the IMF's AREAER.

Other variables utilized in the robustness analysis include the share of total investment to GDP and the share of government consumption to GDP. These two expenditure variables are obtained from the PWT 9.0 and are measured in constant price international. I follow Bond, Leblebicioglu, and Schiantarelli (2010), and include the annual changes in these variables to control for their cyclical movement. The annual change in the share of government consumption

[19] The exclusion of this variable from the regression analysis, however, does not alter the main findings of this study in a significative way.

to GDP can be thought of as a proxy for fiscal policy. However, as noted by Kaminsky, Reinhart, and Vegh (2005), caution is in order when interpreting the fiscal policy cyclicality regression results.

Lastly, the ratio of international reserves to GDP is included in the regression analysis to capture the possibility that a central bank could intervene in the exchange rate market. In many emerging and developing countries, central banks have intervened in the exchange rate markets with the objective of strengthening their external position against the possibility of a sudden stop or increased volatility in the international financial markets. In some countries, these interventions have not been adequately sterilized, resulting in an expansion in central bank balance sheets. The annual change in this ratio is also included in the regression analysis to assess whether the extent of reserve accumulation affects the main findings.

III. Main Results

In this section, I examine the relationship between exchange rate regimes and economic growth and report the main findings from this empirical analysis. To characterize the unconditional relationship between exchange rate regimes and growth, I utilize both a static panel growth model and a dynamic panel growth model. Then, the interaction terms between the exchange rate regime and the global recession dummy and between the exchange rate regime and the global recovery dummy are introduced as regressors to assess how the exchange rate and economic growth nexus is affected by the global cycle.[20]

III.1. Static panel growth regression analysis

Following the literature, I initially postulate a linear static panel relationship between economic growth and fixed exchange rate regime. This relationship is estimated for the different exchange rate regime classifications for which data is not missing in the inner years, namely, the IRR, IMF, BT, and S classifications. The sample includes 114 countries for the period 1973-2016; however, the BT classification includes data for 112 countries, and the IMF classification only covers the period 1980-2016.

Table 2 reports the panel fixed effects (FE) regression results for economic growth on a fixed exchange rate dummy, which was constructed by collapsing information on several sub-

[20] The years that are not identified as belonging to a global recession or global recovery event

regimes in each of the different exchange rate classifications.[21] The results from these regressions are not clear-cut. On the one hand, the IRR and S classifications suggest that fixers do not grow significantly differently from non-fixers. On the other hand, while the BT classification indicates that countries with fixed exchange rate regimes grow significantly faster than countries with other exchange regimes, the IMF classification indicates just the opposite. Similar results are obtained when controlling for external conditions and a proxy for domestic turmoil (see Table 2, columns 3,7, 11, and 15). These findings confirm the widely reported fact that there is no robust long-run relationship between exchange rates and economic growth.

However, do countries with different exchange rate regimes experience significantly different growth rates during global recessions and recoveries? To address this question, I amend the previous specification to incorporate the timing of global recession and global recovery dummies and their interaction with the fixed exchange rate regime dummy. The main results are reported in Table 2 (columns 2, 6, 10, and 14). First, there is no evidence of significant average growth differences between fixers and non-fixers during global recessions. Second, non-fixers enjoy a significantly stronger average growth rate than fixers during global recoveries. These findings are consistent across the four different exchange rate classifications; however, they are not statistically significant for S. Moreover, these results do not significantly change when including the external conditions and domestic turmoil controls (columns 4, 8, 12, and 16). If anything, the results strengthen somewhat.

In summary, the evidence suggests that during global recessions, the average growth rate for fixers is not significantly different from that of non-fixers. However, fixers grow at an average rate that is significantly smaller than that of non-fixers during global recoveries. These intriguing results, however, need to be taken with a grain of salt as the static panel growth regression with FE model is most likely to be misspecified.

III.2. Dynamic panel growth regression analysis

I use a dynamic panel growth regression model to address the misspecification of the static panel growth model and to separate the short-run from the long-run growth effects of global recessions and global recoveries. In the analysis, I utilize the IRR exchange rate

[21] The tables do not include the country-fixed effect parameters and a constant. Moreover, the reported table include robust standard errors.

classification as a benchmark measure, reflecting its high correlation with the other exchange rate measures, its comprehensive country-time coverage, and its careful identification of a country's anchor currency. Later, I check whether the main results are robust across the other exchange rate measures.

The dynamic panel specifications I use include country fixed effects. These models, which include a lagged dependent variable as regressor, are then estimated using ordinary least squares (OLS-FE) and instrumental variables (IV-FE) methods.[22] The first method is used as a reference only, as the estimated coefficients are typically biased. To implement the second method, a set of instrumental variables is needed. In the empirical section, I have used the following set of instruments: the growth rate of real GDP per capita (lags 2-5), the growth rate of real GDP per capita of the rest of the world (lag 3), the yearly change in the growth rate of real GDP per capita of the rest of the world (lag 4), yearly changes in trade and financial openness (lags 3-4), and the yearly change in the exchange rate regime (lags 3-4).[23]

In columns 1-3 of Table 3, I report the regression results for the output growth and exchange rate relationship obtained from estimating equation (1). The results in columns 2 and 3 confirm that there are no significant differences in the average long-run growth performance between fixers and non-fixers. Column 2 also provides evidence that the lagged fixed exchange rate may be treated as an exogenous variable, since the p-value for the C test of endogenous regressors does not reject its null. Because of this, I treat the lagged fixed exchange rate as an exogenous variable in the different empirical exercises. The test of overidentifying restrictions (Hansen J statistic) suggests that the instrument set is appropriate. Moreover, first stage regression results (which are not reported) show that the instruments have important independent and significant explanatory power over the endogenous variable (lagged per capita real GDP). Lastly, the Kleinbergen-Paap reduced rank test rejects the null hypothesis of under identification.

I next explore whether the choice of an exchange rate regime affects how global recessions and global recoveries impact domestic economic growth. Table 3, columns 4-5,

[22] Panel unit root test for the regressand and each of the regressors in this model rejects the null hypothesis of a unit root in each of these series. Results are available from the author.

[23] This set of instruments is used across all the IV-FE regressions of the empirical section, with the only exception of the IV-FE regressions for the advanced economies which use a modified set that includes a sub-set of the original instruments plus the inflation rate (lags 3 and 4).

reports the regression results from estimating equation (2).[24] As before, the OLS-FE results, column 4, are provided for reference purposes only.[25] The IV-FE results suggest the following striking findings. (1) Fixers are more hurt than non-fixers during global recessions. However, this growth difference is significant at a 10 percent level. (2) Fixers recover at a slower pace (on average some -0.8 percentage points) than non-fixers during a global recovery. This growth difference is significant at a 1 percent level. Thus, non-fixer countries recover at a faster pace than fixer countries. The set of instruments I have used in these regressions seem adequate as suggested by the J test of overidentifying restrictions and the Kleinbergen-Paap robust reduced rank test.

The main findings of this section are striking. Global recessions and global recoveries have differentiated effects on a given country's average growth depending on its exchange rate selection, with non-fixers faring better than fixers.

IV. Robustness Tests

I now explore the robustness of the findings reported earlier, checking for their sensitivity with respect to a sample split, the inclusion of other controls, and the use of alternative measures of exchange rate regime.

Are the growth differences between fixer and non-fixer countries during global recessions and global recoveries typical to both advanced and developing countries? To address this question, I re-estimate equation (2) for each of these country groups (see Appendix 1). One important point to remember is that by splitting the sample into two groups, the reference sample growth averages change vis-à-vis the averages where the full sample is used. As a result, the growth differences might not be comparable.

Table 4 reports the main findings from this exercise. Let's first focus our attention on the results for the advanced economies group that is column 4. On the one hand, there is no evidence that during a global recession the economic growth of advanced fixer countries is more affected than the growth of advanced non-fixer countries. Nevertheless, the adverse effect of global recession on the economic growth of these economies can amount to 1.8 percentage points. On the other hand, advanced fixer economies recover at a slower pace than their non-fixer counterparts. The difference

[24] Additional lagged dependent variables have been included as regressors, however, they were not statistically significant. Moreover, there is no evidence of serially correlated error terms.

[25] Note however that the OLS-FE persistence parameter estimates is smaller than that obtained from the IV-FE regressions which is consistent with a downward bias.

between the average growth in these two advanced country sub-groups is almost one percentage point and statistically significant. These results conform to the theoretical insights of Corsetti et al., (2017).

The results for the emerging and developing country group are reported in column 6 of Table 4. As in the case of the advanced economies, global recessions do not have a differentiated growth effect over fixer or non-fixer emerging and developing economies. The adverse growth effect of a global recession in these economies is 0.7 percentage points, which is less than half that experienced by the advanced economies. Global recoveries, in contrast, have a differentiated growth effect in the developing economies as the average economic growth in fixer economies is weaker than that in non-fixer economies. There is almost a 0.8 percentage point growth difference, and this difference is statistically significant at the 5 percent significance level.

I examine next whether the inclusion of other controls affects the main findings so far. Among the controls considered are international trade and financial openness, investment (level and change), government consumption (level and change), and international reserves (level and change). As noted earlier, proxies for most of these variables are in the form of ratios to GDP. The annual changes of these variables are included to capture their cyclical variations. Lastly, these additional variables are lagged by one period. These variables have been included in the specification because some authors have argued about their potential importance for economic growth.[26]

The main results of this exercise are shown in Table 5. The inclusion of these additional controls does not change the thrust of our main results. Indeed, most of the additional controls have little influence on output growth and change the critical coefficients of the analysis (columns 1-13) marginally. Importantly, the coefficient of the interaction between the fixed exchange rate dummy and the global recession dummy becomes statistically insignificant when controlling for investment and government consumption (columns 5-10). This suggests that the earlier result stating that economic growth in fixer economies is more affected by a global recession than the growth in non-fixer economies is not robust. The main baseline result, however, is preserved. Non-fixer countries experience a stronger growth during global recoveries than their fixer counterparts. Indeed, economic growth during global recoveries in the former economies is higher than that of the latter economies by 0.7 to 0.9 percentage points.

[26] The inclusion of annual changes in the exchange rate regime as an additional regressor does not significantly alter the main conclusions of this paper.

Finally, I explore whether the findings of this study so far are robust to the use of the different measures of exchange rates. This analysis is fundamental because one of the reasons behind the plethora of non-robust results in the exchange rate regimes and economic growth literature is, precisely, the existence of distinct exchange rate measures. Towards this objective, I replicate the results from Table 3 using the IMF, the Bleaney and Tian, and the Shambaugh exchange rate classifications.

Table 6 reports the main results from this exercise using the four different measures of exchange rate regime. On the one hand, there is no robust evidence that fixer economies are more affected by a global recession than non-fixers. While average growth in fixer economies is significantly lower than non-fixers with the IRR and IMF measures, it is not statistically significant with the other two exchange rate measures. On the other hand, there is evidence that economic growth in non-fixer economies is significantly stronger than that of fixers during global recovery periods. On average non-fixers grow between 0.5 to 1 percentage points higher than fixers during these episodes.

In sum, all the robustness exercises in this section suggest that the global recovery result is robust to sample splits, additional controls, and the different exchange rate measures. This finding is undoubtedly striking given the fact that non-results plague many of the studies on the relationship between the exchange rate regime and growth.

V. Conclusions

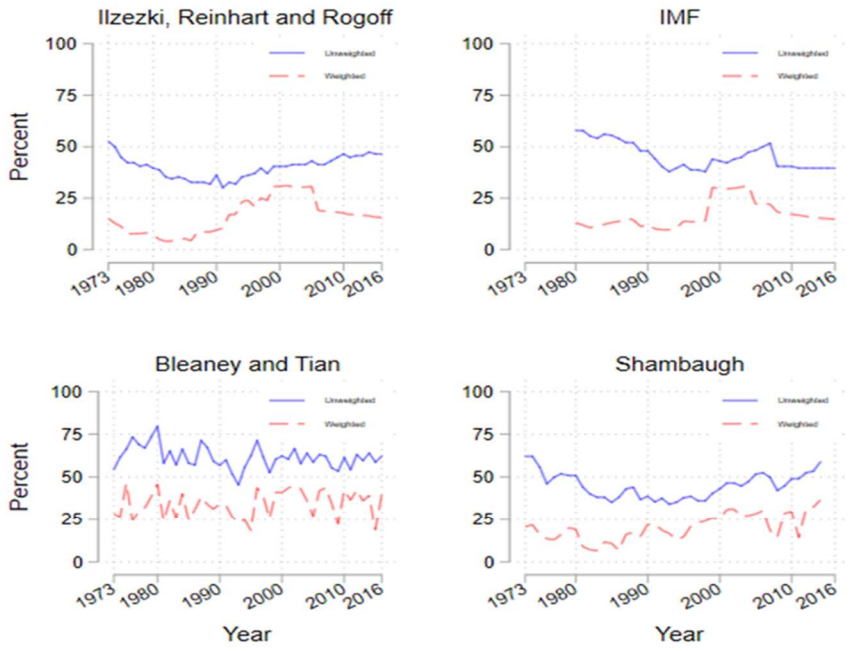
The link between exchange rate regimes and economic growth and how this link is affected by global cycles have been comprehensively examined in this study. While there is no robust relationship between exchange rate regimes and long-term growth, countries with fixed exchange rate regimes are more affected by the global cycle than countries with non-fixed rates. Economies with fixed exchange rates experience a weaker growth performance during global recessions and global recoveries than those with non-fixed regimes. However, the former result is not as robust as the second one. These striking findings suggest that exchange rate flexibility could help countries better weather global slumps. Exchange rate flexibility is helpful because it allows countries to faster adjust their relative prices in response to a negative global shock and/or stimulates the domestic economy in conditions where the policy rate has reached the zero lower bound.

Several areas need further research. First, the channels behind this paper's findings need to be identified. In future work, I plan to explore whether export growth during global recoveries is faster and stronger in countries with non-fixed exchange rate regimes than in countries with fixed regimes. Second, the issue of how much exchange rate flexibility is needed to protect a country from global shocks needs to be examined further. This study, by creating two broad exchange rate classes (fixers and non-fixers), might give the impression that all fixers (non-fixers) are alike; however, this is not the case, as in the real world, there is a continuum of exchange rate regimes. Moreover, little is known as to why some countries often transition from one regime to another. Third, the effectiveness of fiscal and monetary policies in countries with fixed (non-fixed) exchange rates needs to be studied more carefully, particularly when an economy faces the zero lower bound. This latter issue is, undoubtedly, more relevant for the advanced economies. However, the interplay between the use of unconventional monetary measures and exchange rate regimes requires more research.

The recent interest in examining the link between exchange rate regimes and output growth around the business cycle seems adequate given the little success in finding a strong and robust relationship between exchange rates and growth in the long term. There is increasing evidence that the recovery from global shocks or natural shocks is dependent on the exchange rate regime a country chooses. Therefore, the issue of to what extent a country's business cycle characteristics are affected by its exchange rate regime needs to be revisited.

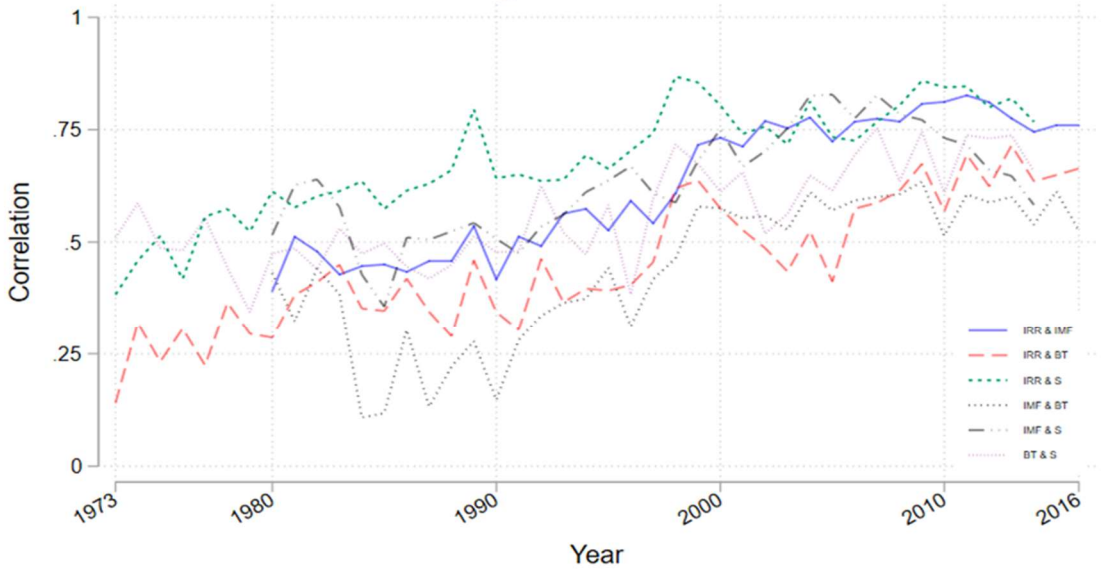
The empirical literature on exchange rate regimes and growth is full of non-robust results. This situation in part reflects the fact that the existing de facto exchange rate measures are so diverse and have little concordance. Without significant progress in unifying these exchange rate measures, there will always be questions about the robustness of empirical findings that are linked to exchange rates. In a related issue, efforts must be made to understand how and why some countries selected their exchange rate regimes. This task becomes complicated in the presence of conflicting exchange rate classifications.

Figure 1. Share of Countries with Fixed Exchange Rates



Source: Author's calculations

Figure 2. Correlation Between the Different Exchange Rate Classifications



Source: Author's calculations

Table 1. Exchange Rate Regime Classifications: Correlation
(1973-2016)

	Ilzetsky, Reinhart and Rogoff	IMF	Bleaney and Tian	Shambaugh
Ilzetsky, Reinhart and Rogoff	1			
IMF	0.616	1		
Bleaney and Tian	0.477	0.441	1	
Shambaugh	0.723	0.632	0.578	1

Note: Pairwise correlation. Each classification comprises two main regimes: fixed and non-fixed exchange rates. Data is annual. Data on the IMF classification is available from 1980 while data on the Shambaugh classification is available until 2015.

Table 2. Economic Growth and Exchange Rate Regimes: Static Panel Regression Model. [1/]

	Ilzetzky, Reinhart, Rogoff Classification				IMF Classification [2/]				Bleaney and Tian Classification				Shambaugh classification			
	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Fixed exchange rate dummy (FXR), lagged	0.0002	0.0030	-0.0024	0.0010	-0.0102***	-0.0065***	-0.0098***	-0.0057**	0.0031*	0.0049***	0.0013	0.0037**	-0.0003	0.0002	-0.0015	-0.0003
	[0.0023]	[0.0024]	[0.0022]	[0.0024]	[0.0024]	[0.0025]	[0.0022]	[0.0023]	[0.0016]	[0.0018]	[0.0016]	[0.0018]	[0.0019]	[0.0021]	[0.0018]	[0.0020]
Global recession dummy		-0.0251***		-0.0128***		-0.0258***		-0.0123***		-0.0236***		-0.0106***		-0.0288***		-0.0160***
		[0.0030]		[0.0032]		[0.0030]		[0.0032]		[0.0037]		[0.0039]		[0.0033]		[0.0034]
Fixed exchange rate dummy (lagged)		-0.0090*		-0.0085*		-0.0091*		-0.0107**		-0.0076		-0.0082		0.0006		0.0003
X Global recession dummy		[0.0053]		[0.0052]		[0.0054]		[0.0052]		[0.0051]		[0.0050]		[0.0050]		[0.0048]
Global recovery dummy		-0.0011		-0.0008		-0.0014		0.0005		0.0002		0.0005		-0.0034*		-0.0025
		[0.0017]		[0.0017]		[0.0016]		[0.0016]		[0.0023]		[0.0022]		[0.0019]		[0.0019]
Fixed exchange rate dummy (lagged)		-0.0077**		-0.0089***		-0.0107***		-0.0124***		-0.0070**		-0.0075**		-0.0023		-0.0042
X Global recovery dummy		[0.0032]		[0.0032]		[0.0030]		[0.0030]		[0.0030]		[0.0029]		[0.0030]		[0.0030]
ROW real percapita growth			0.6281***	0.4758***			0.6343***	0.4729***			0.6227***	0.4781***			0.6190***	0.4708***
			[0.0467]	[0.0507]			[0.0495]	[0.0534]			[0.0481]	[0.0524]			[0.0469]	[0.0512]
Interest rate anchor country			0.0672***	0.0605***			0.0777***	0.0774***			0.0650***	0.0585***			0.0644***	0.0536***
			[0.0202]	[0.0200]			[0.0206]	[0.0204]			[0.0206]	[0.0205]			[0.0208]	[0.0207]
Free falling dummy			-0.0264***	-0.0268***			-0.0312***	-0.0323***			-0.0259***	-0.0262***			-0.0260***	-0.0262***
			[0.0041]	[0.0041]			[0.0046]	[0.0045]			[0.0042]	[0.0042]			[0.0043]	[0.0042]
													0.0000	0.0406	0.0693	0.0802
R2-Adjusted	-0.0256	0.0174	0.0461	0.0586	-0.0223	0.0333	0.0727	0.0920	-0.0251	0.0149	0.0444	0.0553	-0.0264	0.0144	0.0441	0.0544
N. of cases	4599	4599	4599	4599	3817	3817	3817	3817	4451	4451	4451	4451	4477	4477	4477	4477
N. of countries	114	114	114	114	114	114	114	114	112	112	112	112	114	114	114	114
Ho.: (1) FXR dummy (lagged) = 0																
(2) FXR dummy (lagged) X Global recession dummy = 0																
(3) FXR dummy (lagged) X Global recovery dummy = 0																
Chi2		7.4147		9.4708		31.6071		36.8147		9.2968		8.6585		0.6771		2.5427
p-value		0.0598		0.0236		0.0000		0.0000		0.0256		0.0342		0.8786		0.4676

Note: The dependent variable is the growth rate of real GDP per capita. Robust standard and MA (1) errors are reported in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

[1/] Differences in the sample size reflect different coverages of the exchange rate classification databases or missing data on the interest rate of anchor country.

[2/] Data covers the 1980-2016 period.

Table 3. Economic Growth and Exchange Rate Regimes: Dynamic Panel Model

	OLS-FE (1)	IV-FE (2) [1/]	IV-FE (3)	OLS-FE (4)	IV-FE (5)
Real GDP percapita growth, lagged	0.2507***	0.3542***	0.3545***	0.2445***	0.3308***
	[0.0284]	[0.0833]	[0.0831]	[0.0307]	[0.0819]
Fixed exchange rate dummy, lagged	-0.0025	-0.0023	-0.0029	0.0012	0.0007
	[0.0018]	[0.0068]	[0.0019]	[0.0022]	[0.0022]
Global recession dummy [2/]				-0.0100***	-0.0093***
				[0.0030]	[0.0031]
Lagged fixed exchange rate dummy X				-0.0091*	-0.0091*
global recession dummy				[0.0051]	[0.0051]
Global recovery dummy [3/]				0.0023	0.0030*
				[0.0015]	[0.0016]
Lagged fixed exchange rate dummy X				-0.0090***	-0.0082***
global recovery dummy				[0.0028]	[0.0030]
ROW real percapita growth	0.6266***	0.6246***	0.6250***	0.4821***	0.4840***
	[0.0455]	[0.0466]	[0.0463]	[0.0502]	[0.0502]
Interest rate anchor country	0.0679***	0.0658***	0.0654***	0.0611***	0.0592***
	[0.0182]	[0.0183]	[0.0177]	[0.0181]	[0.0177]
Free falling	-0.0246***	-0.0218***	-0.0219***	-0.0254***	-0.0232***
	[0.0040]	[0.0044]	[0.0044]	[0.0040]	[0.0043]
R2-Adjusted	0.1253	0.1138	0.1138	0.1348	0.1271
N. of cases	4101	4101	4101	4101	4101
No of countries	114	114	114	114	114
IV-Tests					
Kleibergen-Paap statistic	…	134.1610	105.8810	…	113.7644
p-value	…	0.0000	0.0000	…	0.0000
Hansen J statistic	…	10.3857	10.3952	…	10.2366
p-value	…	0.4073	0.4952	…	0.5092
Endogeneity test (for fixed exchange rate, lagged)	…	0.0055	…	…	…
p-value	…	0.9409	…	…	…

Note: The dependent variable is the growth rate of real GDP per capita. Robust standard and MA (1) errors are reported in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the IV regression, the growth rate of real GDP per capita (lag) is treated as endogenous. The instruments consist of the growth rate of real GDP per capita (lags 2, 3, 4 and 5), the growth rate of real GDP per capita of the Rest of the World (lag 3), the yearly change in the growth rate of real GDP of the rest of the World (lag 4), yearly changes in trade and financial openness (lags 3 and 4), and the yearly change in the exchange rate regime (lags 3 and 4). The statistics and p-values for the Kleibergen-Paap underidentification test and Sargan-Hansen overidentification test.

[1/] Both the growth rate of real GDP per capita (lag) and the fixed exchange rate dummny (lag) are treated as endogenous variables.

[2/] Takes the value of 1 during the global recession years (1975, 1982, 1991, and 2009) and 0 otherwise.

[3/] Takes the value of 1 during the global recovery years (1976-78, 1983-85, 1992-94, and 2010-12) and 0 otherwise.

Table 4. Economic Growth and Exchange Rate Regimes: Country Groups

	All Countries		Advanced Countries		Emerging and Developing Countries	
	OLS-FE	IV-FE	OLS-FE	IV-FE	OLS-FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)
Real GDP percapita growth, lagged	0.2445***	0.3308***	0.3111***	0.3191***	0.2309***	0.3241***
	[0.0307]	[0.0819]	[0.0427]	[0.0971]	[0.0331]	[0.0957]
Fixed exchange rate dummy, lagged	0.0012	0.0007	-0.0033	-0.0038	0.0045	0.0034
	[0.0022]	[0.0022]	[0.0026]	[0.0027]	[0.0029]	[0.0031]
Global recession dummy [1/]	-0.0100***	-0.0093***	-0.0181***	-0.0178***	-0.0069*	-0.0065
	[0.0030]	[0.0031]	[0.0038]	[0.0043]	[0.0039]	[0.0040]
Lagged fixed exchange rate dummy X	-0.0091*	-0.0091*	-0.0096	-0.0101	-0.0100	-0.0099
global recession dummy	[0.0051]	[0.0051]	[0.0067]	[0.0068]	[0.0062]	[0.0062]
Global recovery dummy [2/]	0.0023	0.0030*	0.0009	0.0006	0.0027	0.0033*
	[0.0015]	[0.0016]	[0.0019]	[0.0024]	[0.0019]	[0.0019]
Lagged fixed exchange rate dummy X	-0.0090***	-0.0082***	-0.0097**	-0.0093**	-0.0093***	-0.0083**
global recovery dummy	[0.0028]	[0.0030]	[0.0038]	[0.0040]	[0.0034]	[0.0036]
ROW real percapita growth	0.4821***	0.4840***	0.4045***	0.3978***	0.5189***	0.5183***
	[0.0502]	[0.0502]	[0.0591]	[0.0590]	[0.0621]	[0.0618]
Interest rate anchor country	0.0611***	0.0592***	0.1016***	0.1005***	0.0422**	0.0437**
	[0.0181]	[0.0177]	[0.0273]	[0.0304]	[0.0210]	[0.0204]
Free falling	-0.0254***	-0.0232***	0.0010	0.0007	-0.0261***	-0.0237***
	[0.0040]	[0.0043]	[0.0103]	[0.0106]	[0.0042]	[0.0047]
R2-Adjusted	0.1348	0.1271	0.2887	0.2885	0.1222	0.1131
N. of cases	4101	4101	923	906	3178	3178
No of countries	114	114	22	22	92	92
IV-Tests						
Kleibergen-Paap statistic	…	113.7644	…	72.1453	…	82.3683
p-value	…	0.0000	…	0.0000	…	0.0000
Hansen J statistic	…	10.2366	…	9.5862	…	7.5069
p-value	…	0.5092	…	0.1432	…	0.7567

Note: The dependent variable is the growth rate of real GDP per capita. Robust standard and MA (1) errors are reported in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the IV regression, the growth rate of real GDP per capita (lag) is treated as endogenous. For the full sample and Developing Country group the instruments include the growth rate of real GDP per capita (lags 2, 3, 4 and 5), the growth rate of real GDP per capita of the Rest of the World (lag 3), the yearly change in the growth rate of real GDP of the rest of the World (lag 4), yearly changes in trade and financial openness (lags 3 and 4), and the yearly change in the exchange rate regime (lags 3 and 4). For the Advanced Country group the set of instruments includes the growth rate of real GDP per capita (lag3), the growth rate of the real GDP per capita of the Rest of the World (lags 3 and 4), yearly changes in trade openness (lags 3 and 4) and the inflation rate (lags 2 and 3). The statistics and p-values for the Kleibergen-Paap underidentification test and Sargan-Hansen overidentification test.

[1/] Takes the value of 1 during the global recession years (1975, 1982, 1991, and 2009) and 0 otherwise.

[2/] Takes the value of 1 during the global recovery years (1976-78, 1983-85, 1992-94, and 2010-12) and 0 otherwise.

Table 5. Economic Growth and Exchange Rate Regimes: Additional Controls

	IV-FE (1)	IV-FE (2)	OLS-FE (3)	IV-FE (4)	IV-FE (5)	OLS-FE (6)	IV-FE (7)	IV-FE (8)	OLS-FE (9)	IV-FE (10)	IV-FE (11)	OLS-FE (12)	IV-FE (13)
Real GDP percapita growth, lagged	0.3239***	0.3269***	0.2439***	0.3194***	0.2845***	0.2477***	0.3425**	0.3405***	0.2391***	0.3581***	0.3213***	0.2541***	0.3542***
	[0.0822]	[0.0833]	[0.0307]	[0.0837]	[0.0975]	[0.0367]	[0.1385]	[0.0992]	[0.0329]	[0.1042]	[0.0832]	[0.0313]	[0.1089]
Fixed exchange rate dummy, lagged	-0.0001	0.0000	0.0022	-0.0009	0.0017	0.0007	0.0015	0.0007	0.0013	0.0006	0.0011	0.0015	0.0009
	[0.0024]	[0.0025]	[0.0023]	[0.0028]	[0.0026]	[0.0023]	[0.0025]	[0.0024]	[0.0023]	[0.0024]	[0.0025]	[0.0022]	[0.0025]
Global recession dummy [1/]	-0.0096***	-0.0092***	-0.0100***	-0.0095***	-0.0122***	-0.0112***	-0.0115***	-0.0110***	-0.0119***	-0.0097***	-0.0094***	-0.0099***	-0.0092***
	[0.0031]	[0.0031]	[0.0030]	[0.0031]	[0.0033]	[0.0030]	[0.0036]	[0.0032]	[0.0030]	[0.0035]	[0.0031]	[0.0030]	[0.0031]
Lagged fixed exchange rate dummy X global recession dummy	-0.0091*	-0.0093*	-0.0091*	-0.0093*	-0.0078	-0.0078	-0.0082	-0.0076	-0.0079	-0.0079	-0.0090*	-0.0094*	-0.0093*
	[0.0052]	[0.0052]	[0.0051]	[0.0052]	[0.0052]	[0.0051]	[0.0053]	[0.0051]	[0.0051]	[0.0055]	[0.0051]	[0.0051]	[0.0051]
Global recovery dummy [2/]	0.0031*	0.0033**	0.0021	0.0034**	0.0018	0.0018	0.0020	0.0023	0.0016	0.0014	0.0031*	0.0021	0.0027
	[0.0016]	[0.0017]	[0.0015]	[0.0017]	[0.0018]	[0.0015]	[0.0018]	[0.0017]	[0.0015]	[0.0018]	[0.0016]	[0.0015]	[0.0017]
Lagged fixed exchange rate dummy X global recovery dummy	-0.0081***	-0.0085***	-0.0091***	-0.0084***	-0.0080**	-0.0083***	-0.0082**	-0.0074**	-0.0084***	-0.0084**	-0.0083***	-0.0084***	-0.0073**
	[0.0030]	[0.0030]	[0.0029]	[0.0031]	[0.0031]	[0.0029]	[0.0032]	[0.0031]	[0.0029]	[0.0033]	[0.0030]	[0.0028]	[0.0035]
Trade openness, lagged	0.0085		-0.0033**	0.0086									
	[0.0095]		[0.0013]	[0.0096]									
Financial openness, lagged		0.0011	-0.0008	0.0012									
		[0.0020]	[0.0007]	[0.0020]									
Investment share, lagged					0.0475	-0.0395***	0.0197						
					[0.0545]	[0.0124]	[0.0783]						
Investment share, lagged change						0.0100	-0.1343						
						[0.0276]	[0.2704]						
Government consumption share, lagged								0.0237	-0.0047	0.0710			
								[0.1222]	[0.0130]	[0.1310]			
Government consumption share, lagged change									-0.0238	0.4379			
									[0.0342]	[0.2667]			
International reserves to GDP ratio, lagged											0.0212	0.0033	0.0003
											[0.0543]	[0.0068]	[0.0662]
International reserves to GDP ratio, lagged change												0.1268***	0.1546
												[0.0170]	[0.2598]
ROW real percapita growth	0.4850***	0.4798***	0.4835***	0.4809***	0.4943***	0.4882***	0.4644***	0.4949***	0.4863***	0.5368***	0.4765***	0.4504***	0.4468***
	[0.0505]	[0.0509]	[0.0504]	[0.0512]	[0.0516]	[0.0505]	[0.0814]	[0.0532]	[0.0511]	[0.0618]	[0.0558]	[0.0497]	[0.0723]
Interest rate anchor country	0.0646***	0.0665***	0.0533***	0.0732***	0.0714***	0.0608***	0.0634**	0.0577	0.0663***	0.0602	0.0771	0.0630***	0.0578
	[0.0195]	[0.0225]	[0.0187]	[0.0240]	[0.0207]	[0.0191]	[0.0266]	[0.0386]	[0.0195]	[0.0409]	[0.0494]	[0.0192]	[0.0601]
Free falling	-0.0229***	-0.0226***	-0.0261***	-0.0222***	-0.0240***	-0.0255***	-0.0237***	-0.0231***	-0.0254***	-0.0242***	-0.0228***	-0.0246***	-0.0221***
	[0.0044]	[0.0044]	[0.0040]	[0.0045]	[0.0046]	[0.0042]	[0.0045]	[0.0046]	[0.0042]	[0.0047]	[0.0047]	[0.0040]	[0.0049]
R2-Adjusted	0.1116	0.1256	0.1361	0.1094	0.1186	0.1396	0.1162	0.1250	0.1363	0.0286	0.1288	0.1497	0.1391
N. of cases	4090	4090	4090	4090	3880	3880	3880	3880	3880	3880	4094	4094	4094
No of countries	114	114	114	114	111	111	111	111	111	111	114	114	114
IV-Tests													
Kleibergen-Paap statistic	88.1470	129.7081	...	83.0593	82.7255	...	17.7093	27.2617	...	23.6105	32.5714	...	17.4936
p-value	0.0000	0.0000	...	0.0000	0.0000	...	0.0601	0.0042	...	0.0087	0.0006	...	0.0641
Hansen J statistic	8.2403	10.0144	...	8.0492	9.9595	...	9.6441	10.4215	...	7.5648	10.0951	...	9.0850
p-value	0.6054	0.4392	...	0.5292	0.4441	...	0.3801	0.4043	...	0.5785	0.4322	...	0.4295

Note: The dependent variable is the growth rate of real GDP per capita. Robust standard and MA (1) errors are reported in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the IV regression, the growth rate of real GDP per capita (lag) is treated as endogenous. The instruments consist of the growth rate of real GDP per capita (lags 2, 3, 4 and 5), the growth rate of real GDP per capita of the Rest of the World (lag 3), the yearly change in the growth rate of real GDP of the rest of the World (lag 4), annual changes in trade and financial openness (lags 3 and 4), and the yearly change in the exchange rate regime (lags 3 and 4). The statistics and p-values for the Kleibergen-Paap underidentification test and Sargan-Hansen overidentification test.

[1/] Takes the value of 1 during the global recession years (1975, 1982, 1991, and 2009) and 0 otherwise.

[2/] Takes the value of 1 during the global recovery years (1976-78, 1983-85, 1992-94, and 2010-12) and 0 otherwise.

Table 6. Economic Growth and Exchange Rate Regimes: Alternative Exchange Rate Classifications

	Ilzezky, Reinhart, Rogoff Classification		IMF Classification		Bleaney and Tian Classification		Shambaugh Classification	
	OLS-FE	IV-FE	OLS-FE	IV-FE	OLS-FE	IV-FE	OLS-FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real GDP percapita growth, lagged	0.2445***	0.3308***	0.2595***	0.2783***	0.2486***	0.3432***	0.2431***	0.3282***
	[0.0307]	[0.0819]	[0.0269]	[0.0836]	[0.0314]	[0.0813]	[0.0310]	[0.0829]
Fixed exchange rate dummy, lagged	0.0012	0.0007	-0.0023	-0.0023	0.0020	0.0014	-0.0012	-0.0015
	[0.0022]	[0.0022]	[0.0023]	[0.0023]	[0.0016]	[0.0017]	[0.0019]	[0.0018]
Global recession dummy [1/]	-0.0100***	-0.0093***	-0.0114***	-0.0113***	-0.0119***	-0.0111***	-0.0135***	-0.0128***
	[0.0030]	[0.0031]	[0.0036]	[0.0036]	[0.0041]	[0.0042]	[0.0033]	[0.0033]
Lagged fixed exchange rate dummy X	-0.0091*	-0.0091*	-0.0130**	-0.0129**	-0.0054	-0.0054	-0.0003	-0.0003
global recession dummy	[0.0051]	[0.0051]	[0.0061]	[0.0061]	[0.0053]	[0.0052]	[0.0048]	[0.0048]
Global recovery dummy [2/]	0.0023	0.0030*	0.0032**	0.0033**	0.0039*	0.0048**	0.0012	0.0020
	[0.0015]	[0.0016]	[0.0016]	[0.0016]	[0.0020]	[0.0021]	[0.0016]	[0.0018]
Lagged fixed exchange rate dummy X	-0.0090***	-0.0082***	-0.0100***	-0.0098***	-0.0081***	-0.0079***	-0.0056**	-0.0053**
global recovery dummy	[0.0028]	[0.0030]	[0.0029]	[0.0031]	[0.0026]	[0.0027]	[0.0026]	[0.0026]
ROW real percapita growth	0.4821***	0.4840***	0.4532***	0.4539***	0.4802***	0.4817***	0.4787***	0.4810***
	[0.0502]	[0.0502]	[0.0527]	[0.0527]	[0.0518]	[0.0518]	[0.0508]	[0.0509]
Interest rate anchor country	0.0611***	0.0592***	0.1051***	0.1034***	0.0570***	0.0560***	0.0550***	0.0538***
	[0.0181]	[0.0177]	[0.0227]	[0.0245]	[0.0184]	[0.0179]	[0.0187]	[0.0182]
Free falling	-0.0254***	-0.0232***	-0.0251***	-0.0246***	-0.0241***	-0.0218***	-0.0247***	-0.0226***
	[0.0040]	[0.0043]	[0.0049]	[0.0054]	[0.0040]	[0.0043]	[0.0041]	[0.0044]
R2-Adjusted	0.1348	0.1271	0.1489	0.1486	0.1332	0.1237	0.1299	0.1223
N. of cases	4101	4101	3329	3329	3888	3888	3986	3986
No of countries	114	114	114	114	112	112	114	114
IV-Tests								
Kleibergen-Paap statistic	…	113.7644	…	109.3620	…	113.8943	…	108.3907
p-value	…	0.0000	…	0.0000	…	0.0000	…	0.0000
Hansen J statistic	…	10.2366	…	10.5028	…	12.8140	…	10.4561
p-value	…	0.5092	…	0.4858	…	0.3057	…	0.4899

Note: The dependent variable is the growth rate of real GDP per capita. Robust standard and MA (1) errors are reported in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the IV regression, the growth rate of real GDP per capita (lag) is treated as endogenous. The instruments consist of the growth rate of real GDP per capita (lags 2, 3, 4 and 5), the growth rate of real GDP per capita of the Rest of the World (lag 3), the yearly change in the growth rate of real GDP of the rest of the World (lag 4), yearly changes in trade and financial openness (lags 3 and 4), and the yearly change in the exchange rate regime (lags 3 and 4). The statistics and p-values for the Kleibergen-Paap underidentification test and Sargan-Hansen overidentification test.

[1/] Takes the value of 1 during the global recession years (1975, 1982, 1991, and 2009) and 0 otherwise.

[2/] Takes the value of 1 during the global recovery years (1976-78, 1983-85, 1992-94, and 2010-12) and 0 otherwise.

Appendix 1
List of Countries

Advanced Economies (22)				
Australia	Finland	Ireland	Norway	United Kingdom
Austria	France	Italy	Portugal	United States
Belgium	Germany	Japan	Spain	
Canada	Greece	Netherlands	Sweden	
Denmark	Iceland	New Zealand	Switzerland	

Emerging and Developing Economies (92)				
Albania	Colombia	Hungary	Mexico	Slovenia
Algeria	Comoros	India	Mongolia	South Africa
Angola	Costa Rica	Indonesia	Morocco	Sri Lanka
Antigua y Barbuda	Croatia	Israel	Mozambique	St. Kitts and Nevis
Argentina	Cyprus	Jamaica	Myanmar	St. Lucia
Bahrain	Czech Republic	Jordan	Namibia	St. Vicent and the Grenadines
Bangladesh	Dominica	Kazakhstan	Nepal	Swaziland
Barbados	Dominican Rep.	Kenya	Pakistan	Tanzania
Belarus	Egypt	Korea	Panama	Thailand
Belize	El Salvador	Lao P.D.R.	Papua New Guinea	Tonga
Benin	Estonia	Latvia	Paraguay	Trinidad and Tobago
Bolivia	Fiji	Lesotho	Peru	Tunisia
Botswana	FYR Macedonia	Lithuania	Philippines	Turkey
Brazil	Ghana	Malawi	Poland	Uruguay
Bulgaria	Grenada	Malaysia	Republic of Congo	Venezuela
Cabo Verde	Guatemala	Maldives	Russia	Vietnam
Chad	Guyana	Mali	Seychelles	
Chile	Honduras	Malta	Singapore	
China	Hong Kong	Mauritius	Slovak Republic	

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