

DO EXCHANGE RATE REGIMES MATTER FOR ECONOMIC GROWTH?

1. INTRODUCTION

Choice of exchange rate regimes is one of the more debated and controversial decisions governments in any nations make. In fact it is an issue that has been at the heart of international macroeconomic policymaking for as long as the subject exists, and has a profound influence on key economic policy objectives. The implications of regimes on economic growth have received more significance over the last two decades when the world economy has been characterized by systematic episodes of economic and financial crises.

Proponents of fixed regimes argue that stable exchange rates foster economic growth by promoting macroeconomic stability. By eliminating foreign exchange risk, lowering transactions costs and reducing both the risk premium in the real interest rate and policy uncertainty, fixed rates promote international trade, division of labor, investment and hence economic growth. Moreover, pegged regime foster a low inflationary environment that further contributes to growth through the development of a country's financial sector (see Aizenman, 1994; Dornbusch, 2001; Mundell, 1995; Shambaugh and Klein, 2010).

On the other hand, proponents of flexible regimes argue that it allows countries to adjust to real shocks more easily. Recent episodes of currency crises have highlighted the costs of maintaining exchange rate pegs under increasing free capital mobility. As a result, flexible exchange rates would constitute a more appropriate regime to avoid crisis and to achieve stable long-term growth. Moreover, a flexible exchange rate also allows a country to have an independent monetary policy providing the economy with another means to accommodate both domestic and foreign shocks (see Calvo, 1999; Fischer, 2001; Meade, 1951; Friedman, 1953).

This theoretical ambiguity on the impact of exchange rate regimes on economic growth is clearly compounded by the multiplicity of various channels through which regimes could affect growth. Part

of this ambiguity could also be due to the fact that on grounds of monetary neutrality, exchange rate regime, a nominal variable should be unimportant for long-term growth performance. Thus the question of whether regimes matter for growth is more an empirical one.

However, the empirical literature is equally ambiguous in answering this. Recent studies by Bailliu *et al.* (2003), Ghosh *et al.* (2002), De Grauwe and Schnabl (2008) show fixed regimes promote growth relative to more flexible arrangements. In rebuttal, Eichengreen and Leblang (2003), Harms and Kretschmann (2009), Husain *et al.* (2005), Levy-Yeyati and Sturzenegger, (2003) find greater exchange rate flexibility to be associated with higher economic growth. Yet there is a third strand of literature (see De Vita, 2011; Miles 2006, 2008; Shambaugh and Klein, 2010) that finds no significant effect of regimes on growth. As such no result appears to be reasonably robust to changes in country coverage, sample period, estimation methods, or regime classification. A conspicuous issue is the lack of studies after the turn of the millennium.

This time period is especially important as it saw a change in the international financial architecture with the introduction of the euro while several other nations changed their exchange rate regimes in the aftermath of the currency crises of the 1990s. Moreover, this time span also encompasses recent episodes of economic recessions in various regions of the world.

The present study contributes to the literature in several aspects. I first provide both a bivariate and a tripartite regime classification for 156 nations spanning the period 1999-2012 where little to none exists. Secondly, regimes are identified according to levels of economic development as their influence as well as that of other macroeconomic factors on growth could differ across income groups. This is especially important as recent literature (see Calvo and Mishkin, 2003) argues that the standard theories on exchange rates apply largely for advanced countries and are often misplaced for emerging markets or low income countries. Thirdly, drawing on an estimation equation that encompasses several variables that influence growth and employing different econometric models, I examine if regimes matter for economic growth.

The remainder of the paper proceeds as follows. Section 2 presents the estimation framework. Section 3 discusses the data construction and provides some preliminary statistics. Section 3 follows with the results along with robustness checks. Finally, section 5 concludes.

2. ESTIMATION FRAMEWORK

The estimation framework is derived from the Solow growth model that controls for other determinants of growth:

$$\begin{aligned} \Delta(\text{GDP per capita growth})_{it} = & a_0 + a_1 \log(y_i/y_{US})_{it}^{1990} + \\ & a_2(\text{Investment/GDP})_{it} + a_3(\text{Trade Openness})_{it} + \\ & a_4(\text{Capital controls})_{it} + a_5(\text{Government Expenditure/GDP})_{it} + \\ & a_6(\text{Years of secondary education})_{it} + a_7 \log(\text{Pop})_{it} + a_8(\Delta \text{Pop})_{it} + \\ & a_9(\text{Life expectancy})_{it} + a_{10}(\text{Africa dummy})_{it} + \\ & a_{11}(\text{Regime dummies})_{it} + \lambda_t + \varepsilon_{it} \end{aligned} \quad (1)$$

where I represents each country and t each year, λ_t is time fixed effects and ε_{it} is an independently and identically distributed error term.

I use the log of a nation's *per capita* GDP (PPP-adjusted) relative to the US in 1990 to control for convergence or "catch-up" effects. *A priori* expectation of a_1 is negative. To capture factor accumulation I use the ratio of gross fixed capital accumulation to GDP. I expect $a_2 > 0$ ¹. Next, greater trade openness contributes positively towards economic growth, both by increasing allocative efficiency and by accelerating the transfer of technology. So, I expect $a_3 > 0$ ². I further use capital controls to capture a nation's external financial orientation where the sign of a_4 is ambiguous. On one hand, greater restriction to international capital flows may reduce growth by decreasing the domestic investment rate, and by decreasing domestic financial intermediation. On the other, greater impediments to cross-border capital flows may reflect better institutions in place that provide more prudent regulation and oversight of markets. This in turn prevents speculative capital flows, which are often inimical to economic growth. The recent global financial crisis has brought this issue more to the forefront of discussions. Greater government expenditure can promote growth through employment creation. At the same time it can increase budget deficits and public debt that in turn can hurt economic growth. So, a_5 is ambiguous³.

¹ Such positive impact of FDI on growth has been found in South Asia and East Europe in the recent studies of Upadhyaya *et al.* (2013), Sapienza (2010), Iliuta and Ram (2005).

² For recent studies on the positive effect of trade openness on growth see the works of Capolupo and Celi (2005) on Central and East European countries; Deme and Homaifar (2001) on Japan and South Korea.

³ Cebula (2013) finds greater central government budget deficits to lower growth in OECD nations for 1996-2006.

Additionally, other controls variables as employed in the typical empirical growth regression include average numbers of years of secondary education, government expenditure to GDP ratio, log of population, population growth rate, life expectancy at birth and a dummy variable with a value of 1 if the country belongs to the African continent.

3. VARIABLE CONSTRUCTION AND DATA DESCRIPTION

The full dataset encapsulates 156 countries from 1999 to 2012. The Appendix enlists the complete set of nations. I measure economic growth by the percentage change in real GDP *per capita* (PPP-adjusted). Data are sourced from the World Bank's World Development Indicators.

3.1 Exchange Rate Regime Classification

Exchange rate regime classification for each country-period is based on the information provided by the International Monetary Fund in its Annual Report on Exchange rate Arrangements and Exchange Restrictions (AREAER). This regime categorization comprises of eight categories till 2007. Following Ghosh (2014), I treat no separate legal tender, currency board and conventional fixed pegs under fixed rates; pegged regimes within horizontal bands, crawling pegs and crawling bands under intermediate; and finally both managed floating with no predetermined band and independently floating under the flexible category. From 2008 onwards, the Fund introduced three new categories: stabilized arrangements, pegged-exchange rates with horizontal bands, and other managed arrangements that I club under intermediate regimes. Both managed and independently floating were further renamed as floating and free floating, respectively, that I aggregate under flexible regimes.

Table 1 shows the distribution of regimes. At the beginning and middle of the sample period, the polar regimes of fixed and flexible dominate in both emerging markets and low income countries with fewer cases of intermediate ones. In advanced economies, flexible regimes are most prevalent throughout the time period as one would expect. However post-2007, the distribution is very symmetric across the three regime categories with a movement away from both fixed and flexible regimes towards intermediate ones that is primarily driven

TABLE 1 - *Distribution of Exchange Rate Regimes for 1999-2012*

Years	Full Sample			Advanced Economies			Emerging Market Economies			Low Income Countries		
	Flexible	Intermediate	Fixed	Flexible	Intermediate	Fixed	Flexible	Intermediate	Fixed	Flexible	Intermediate	Fixed
1999	69	15	69	15	3	3	24	8	31	31	4	35
2000	72	14	67	16	2	3	28	7	28	29	5	36
2001	74	14	65	16	2	3	28	8	27	31	4	35
2002	77	13	65	15	3	3	32	6	26	31	4	36
2003	79	12	64	15	3	3	32	5	27	33	4	34
2004	82	9	64	16	2	3	33	3	28	34	4	33
2005	74	9	72	15	3	3	29	4	31	31	2	38
2006	67	11	77	16	2	3	27	7	30	25	2	44
2007	66	13	76	17	2	2	27	7	30	23	4	44
2008	63	38	54	17	1	3	26	19	19	20	19	32
2009	55	44	56	17	1	3	21	23	20	17	21	33
2010	53	48	54	17	1	3	19	26	19	17	22	32
2011	53	48	54	16	2	3	21	24	19	16	23	32
2012	48	49	55	13	2	3	20	25	19	15	23	33

by both emerging markets and low income countries. Clearly, there is a “crowding to the middle” across the spectrum of regime choices in the immediate aftermath of the global financial crisis. Ironically, this mimics the “vanishing middle” hypothesis of the early 1990s.

The increase in intermediate regimes reflects the change in IMF’s regime classification that was primarily motivated by a surge in the number of countries more actively managing their exchange rates in recent years by using increasingly complex intervention practices. Notably, after the global financial crisis and till around September 2011, central banks, especially in major emerging markets like Brazil, Russia, India, Indonesia etc. have intervened heavily in foreign exchange markets in a rather mad scramble for dollars to limit currency movements. Such actions typically help to contain depreciation pressures, which can pose significant inflationary problems, raise the costs of imports or increase the burden of foreign currency-denominated debt⁴. As Williamson (2000) suggests intermediate regimes allow nations to reap the benefits of both fixed and flexible rates without having to incur some of their costs.

3.2 Other Variables

Capital controls are constructed using the information from the *AREAER* that is the premier source for *de jure* institutional measures. I assign a value of 1 if any restrictions are in place in any year in any country, zero otherwise, for each of the 13 categories under capital transactions as well as for five other categories to capture exchange-based controls that indirectly affect capital flows (presence of dual exchange rates, bilateral payments arrangements, controls on payments for invisible transactions and current transfers, repatriation and surrender requirements)⁵. These 18 categories are

⁴ More recently, in April 2013, the US Treasury Department’s semi-annual report on exchange rate policies also opines that among major emerging markets, many, especially in Asia, have more tightly managed regimes, with varying degrees of active management.

⁵ The 13 categories include controls on capital market securities, money market instruments, collective investment securities, derivatives and other securities, commercial credits, financial credits; guarantees, sureties, and financial backup facilities; controls on direct investment, liquidation of direct investment, real estate transactions, personal capital transactions, commercial banks and other credit institutions, and finally controls on institutional investors.

then averaged for each year to construct the capital controls index, very similar to Miniane (2004) who covers 14 categories.

Trade openness is measured by the sum of exports and imports divided by PPP-adjusted nominal GDP, all measured in US dollars. Trade data for each nation are sourced from the IMF's Direction of Trade Statistics (DOTS) database. All other variables are sourced from WDI. Table 2 provides their summary statistics across regime-types. Noticeably, average growth rates across the sample period is higher for floaters, followed by intermediate regimes and then for peggers.

TABLE 2 - *Descriptive Statistics across Regime Types*

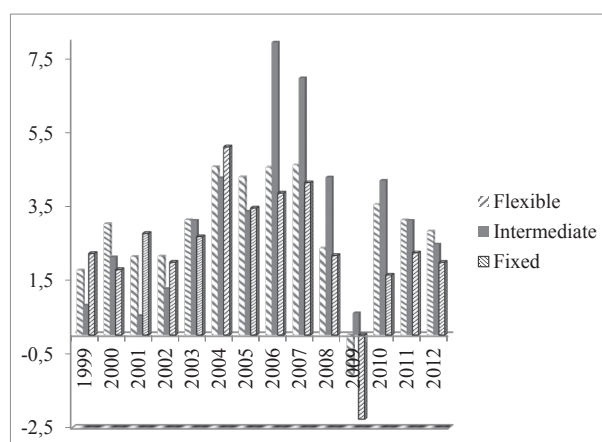
	Flexible		Intermediate		Fixed	
	Average	Std. Dev	Average	Std. Dev	Average	Std. Dev
Economic Growth	3.02	4.83	2.70	4.72	2.39	6.00
(GDP per capita ^{US\$/i}) ₉₀	0.28	0.30	0.18	0.20	0.27	0.38
Investment-to-GDP	22.70	49.42	22.67	6.35	23.51	9.49
Government Spending-to-GDP	14.64	5.44	15.23	5.79	16.42	7.16
Land area	1239015.77	2481471.37	852183.75	2372868.216	385239.556	1089716.5
Population	58089728.7	144655305	51865025.68	189271058.2	20754630.8	120966259
Life Expectancy	67.48	11.07	69.02	7.73	65.29	10.50
Population Growth	1.38	1.08	1.41	1.01	1.99	3.29
Secondary Education	6.27	0.88	6.31	0.96	6.29	0.89
Labor Force	25801173.2	60976127.2	26112156.25	112030078.6	10700200.6	70156484
Capital Controls	0.51	0.28	0.54	0.28	0.64	0.27
Capital Flows-to-GDP	0.16	0.58	0.16	0.39	0.29	0.81
Trade Openness	0.42	0.64	0.54	0.93	0.47	0.39
Flexibility Index	0.36	0.26	0.28	0.26	0.21	0.25
z-score	3.18	6.13	15.27	243.69	2.49	14.78
Inflation	10.33	27.27	9.15	9.62	37.89	862.47
Banking Crisis	0.22	0.42	0.30	0.46	0.30	0.46
Currency Crisis	0.06	0.25	0.04	0.19	0.02	0.14
Reserves-to-Imports	0.57	1.36	0.82	1.72	0.69	1.42
Institutional Quality	-0.09	1.00	-0.38	0.79	-0.18	0.75

3.3 Preliminary Diagnostics

Figure 1 shows the averages of annual economic growth rates across the three regime types. Floaters have higher growth rates

relative to pegged regimes for each year. Pointedly, from year 2006 onwards nations with intermediate regimes exhibit higher growth rates than both fixers and floaters, except in year 2012. This provides some rationale to the increase in choice of intermediate regimes seen during the global financial crisis and its immediate aftermath. Even in year 2009 at the height of The Great Recession, nations with intermediate regimes had positive growth rates compared to negative growth for the other two regime categories.

FIGURE 1- *Average Annual Growth Rates across Different Exchange Rate Regimes*



4. RESULTS

Table 3 presents the results. I use time fixed effects that capture the effects of global shocks common to all countries considered. Regs 1 and 2 use two dummies with a value of 1 for episodes of fixed and intermediate regimes, respectively, and zero otherwise. The coefficient of the fixed dummy suggests fixers grow on average 0.58 per cent per year less than floaters. Reg 2 shows intermediate regimes grow significantly by 0.55 per cent more than the rest. Most of the control variables enter with plausible signs and magnitudes. Investment-to-GDP ratios, population size, secondary education and trade openness significantly increase growth, all in accordance with theoretical priors. On the other hand, initial *per capita* GDP relative to that in the US negatively influences growth, confirming the convergence hypothesis. Likewise government expenditure-to-GDP,

TABLE 3 - *Effect of Regimes on Economic Growth for the World*

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Constant	1.694 (0.764)	0.708 (0.328)	1.614 (0.728)	1.388 (0.627)	1.452 (0.661)	2.322 (0.755)	2.334 (0.759)	6.48 (1.23)	2.57 (0.42)
Log(GDPpercapita ^{US\$}) ₉₀	-0.288* (-1.973)	-0.293* (-2.001)	-0.273* (-1.857)	-0.310** (-2.127)	-0.345** (-2.371)	-0.557*** (-2.76)	-0.568*** (-2.835)	0.271 (0.838)	-0.517 (-1.00)
Investment-to-GDP	0.183*** (11.169)	0.179*** (11.01)	0.182*** (11.132)	0.182*** (11.119)	0.181*** (11.104)	0.023*** (2.898)	0.022*** (2.892)	0.197*** (9.028)	0.059 (0.062)
Government Spending-to-GDP	-0.045** (-2.13)	-0.047** (-2.209)	-0.047** (-2.204)	-0.044** (-2.066)	-0.047** (-2.198)	-0.059** (-2.015)	-0.058** (-2.001)	-0.108*** (-3.637)	-0.029 (-0.57)
Secondary Education	0.304** (2.434)	0.275** (2.212)	0.30** (2.399)	0.297** (2.375)	0.318** (2.522)	0.256 (1.484)	0.259 (1.503)	0.329* (1.973)	0.182 (0.29)
Life Expectancy	-0.088*** (-3.997)	-0.086*** (-3.921)	-0.088*** (-4.02)	-0.086*** (-3.936)	-0.086*** (-3.913)	-0.038 (-1.27)	-0.037 (-1.25)	-0.121 (-3.686)	0.027 (0.63)
Log(Population)	0.164** (2.278)	0.226*** (3.455)	0.172** (2.376)	0.18*** (2.49)	0.177*** (2.526)	0.092 (0.941)	0.089 (0.908)	0.016 (0.068)	-0.174 (-0.77)
Population Growth	-0.75*** (-8.322)	-0.771*** (-8.59)	-0.753*** (-8.353)	-0.755*** (-8.363)	-0.775*** (-8.641)	-0.787*** (-6.042)	-0.784*** (-6.036)	-0.696*** (-5.463)	-0.567*** (-3.32)
Fixed Regime	-0.581** (-2.174)		-0.49* (-1.746)			-0.383 (-0.991)		-1.17 (-0.615)	-1.11* (-1.64)
Intermediate Regime		0.549* (1.689)	0.370 (1.086)			0.211 (0.473)		7.381*** (2.865)	-0.203 (-0.3)
Regime Dummy				-0.228* (-1.636)	-0.413* (-2.066)		-0.436 (-1.185)		-1.11* (-1.64)
Trade Openness	0.565*** (3.147)	0.562*** (3.127)	0.56*** (3.12)	0.569*** (3.17)	0.582*** (3.239)	0.78*** (3.126)	0.783*** (3.141)		-1.677 (-1.25)
Capital Controls	-0.004 (-0.008)	-0.239 (-0.546)	-0.018 (-0.039)	-0.083 (-0.182)	-0.149 (-0.336)	0.509 (0.788)	0.525 (0.815)		-2.096* (-1.71)
Africa Dummy	-1.036*** (-2.736)	-0.99*** (-2.608)	-1.004*** (-2.646)	-1.056*** (-2.788)	-1.076*** (-2.839)	-0.846*** (-1.634)	-0.861*** (-1.668)	-0.346 (-0.681)	
Growth _(t-1)									0.202** (2.15)
adj. R2/ Chi-sq	0.197	0.196	0.197	0.196	0.197	0.170	0.172	0.170	83.31
N	1581	1581	1581	1581	1581	385	385	1450	1389

Terms in brackets denote t-stats based on robust standard errors clustered in countries. *, **, *** indicates significance at the 10%, 5%, 1% level.

population growth and a dummy for the African continent negatively affect growth as expected *a priori*. The coefficient of life expectancy is negative and significant that is contrary to theoretical priors. Finally, capital controls is found to have no significant influence on

economic growth⁶. When the two dummies are used in the same estimation equation in Reg 3, the coefficient of the fixed regime is negative and significant while the intermediate regime is positive but insignificant. Reg 4 shows the results using a 2-step dummy where floating, intermediate and fixed regimes are assigned values of 0, 1 and 2, respectively. Reg 5 shows the results, using an alternative regime classification where both managed floating and conventional pegs are categorized under the intermediate category. In both specifications the regime dummy is negative and significant implying the movement from a non-fixed regime to a fixed one reduces growth by 0.22 and 0.44 per cents, respectively.

Regs 6 and 7 show the results using three non-overlapping panels, typical in empirical growth models. With sample size spanning from 1999 to 2012, I use two 5-year panels from 1999-2003; 2004-08; and one 4-year panel from 2009-12. For the regime dummy, I assign a value of 0, 1 or 2 depending on the regime that had the highest continuous spell. Both the fixed and intermediate dummies now lose their significance level. When I use the 2-step dummy, the coefficient remains negative but is insignificant. Using such non-overlapping panels are thought to be long enough to eliminate business cycle effects but short enough to capture important changes that occur over time for a particular country. However, with the data spanning for 14 years using this approach lowers the sample size. Thus the smaller data sample is not able to speak as clearly and undermines this methodology.

4.1 Robustness Checks

Notwithstanding the aforementioned results, the analysis will not be complete without performing several robustness tests. The first issue I address is potential endogeneity problems especially between regimes, economic growth, trade openness etc. To dispel such concerns of reverse causality, I use the ratio of the country's GDP over the US, land size, foreign exchange reserves-to-imports

⁶ This *de jure* capital controls measure was replaced with a *de facto* capital openness variable defined as the sum of the absolute values of inward and outward flows of capital (both foreign direct and portfolio investments) as a share of GDP, sourced from IMF's International Financial Statistics. However, this was statistically insignificant as well.

ratio and an island dummy as instruments for the regime dummies. The two-stage least square results (Reg 8) show fixed regimes are negative albeit insignificant but intermediate regimes continue to positively and significantly influence economic growth.

Economic growth for any nation may show a path dependency pattern where previous year's growth rates influence the present one. I account for this by using a dynamic panel GMM estimation method developed by Arellano and Bover (1995), Blundell and Bond (1998) that essentially regresses levels and changes in economic growth rates on the lags of the same variable as well as other explanatory variables using lagged levels as instruments. These internal instruments help to eliminate bias resulting from possible endogeneity of independent variables. I consider the variable representing initial condition like the GDP *per capita* relative to the US, time-invariant variables, the regime dummies, trade openness and capital controls as predetermined ones. All other explanatory variables are treated as endogenous. I use two-period lags of the predetermined and one-period lag of the endogenous variables as instruments. Fixed regimes lower growth relative to flexible while intermediate regimes are insignificant (Reg. 9). It is notice worthy that capital controls now negatively and significantly affects economic growth. This implies reducing restrictions to cross-border capital flows or embracing greater financial liberalization will promote growth. Finally, higher economic growth in one period increases growth in the next.

4.1.1. Using *de facto* Measures of Flexibility

Exchange rate regime dummies used thus far are based on the IMF's regime classification. Since 1998, the Fund's classification methodology has shifted to compiling more factual regimes of countries as determined by the Fund based on various sources, including information from their staff, press reports, other relevant papers, as well as the behavior of bilateral nominal exchange rates and international reserves. Despite this move towards more factual classification concerns remain with the possible discrepancy between *de jure* and *de facto* regimes. This is especially pertinent in the light of recent surges in foreign reserves accumulation by nations, seen post global financial crisis. So, I next implement two *de facto* measures capturing countries regimes.

Following Bayoumi and Eichengreen (1998), I use the changes in exchange rate per unit of US dollar divided by sum of itself and the changes in foreign exchange reserves.

$$(FLEX)_t = \frac{\Delta_E}{\Delta_{FER} + \Delta_E} \quad (2)$$

where Δ_E = changes in exchange rates, Δ_{FER} = changes in foreign exchange reserves. All changes are in absolute values. This provides a scaling device of the index between zero and one with a higher value denoting a greater degree of exchange rate flexibility. A caveat of this measure is that percentage changes of foreign reserves tend to be biased by the stock of reserves. Given the same absolute change in foreign reserves, countries with a large stock of these reserves exhibit low percentage changes, while countries with a small stock of foreign reserves exhibit high percentage changes. As such, I also use an alternate *de facto* measure of exchange rate flexibility, first proposed by Ghosh *et al.* (2002).

$$z = \sqrt{\mu_{\Delta e}^2 + \sigma_{\Delta e}^2} \quad (3)$$

This measure incorporates exchange rate fluctuations both around a constant level as well as around a gradual depreciation path. The parameter μ corresponds to the arithmetic average of month-to-month percentage exchange rate changes of the year t , while σ corresponds to the standard deviation of the month-to month percentage exchange rate changes of the year t . The z scores are calculated for each year in the sample. Regs 1 and 2 in Table 4 shows the two *de facto* indices to be positive and statistically significant implying greater exchange rate flexibility to promote growth. Both results are consistent with the earlier ones using the regime dummies.

One can conceive that countries with worst macro prudentials are most likely to adopt a fixed-type regime to impose policy credibility and discipline. So to control for weak macroeconomic fundamentals in influencing the results, I use a lagged inflation rate and a dummy for both banking and currency crises. These are especially relevant in the light of the recent global financial crisis. Banking crisis is a dummy variable with a value of 1 if the share of non-performing loans to total loans exceed 10 percent in a year, zero otherwise. The banking crisis variable is significant and of the expected negative sign. But the regime dummies are statistically insignificant (Reg 3, Table 4). Following Frankel and Rose (1996), I define currency crisis with a value of 1 and zero otherwise, if the nominal depreciation of a nation's currency with respect to the US dollar is 25 percent or greater, and which is at least 10 percent greater than the depreciation in the preceding year. It is significantly inimical to growth. Pointedly, fixed regimes significantly lower growth by 0.51 per cent than floaters while intermediate regimes are insignificant. Next, a la Reinhart and

TABLE 4 - *Robustness Checks on the Results*

	Flexibility	z-score	Bank Crises	Currency Crisis	Freely Falling	Institutional Quality
Constant	0.175 (0.078)	0.244 (0.111)	-3.243 (-1.088)	-0.396 (-0.170)	-0.436 (-0.197)	0.607 (0.273)
Log(GDPpercapita ^{US\$}) ₉₀	-0.357*** (-2.386)	-0.306** (-2.078)	-1.409*** (-6.448)	-0.25 (-1.598)	-0.245* (-1.622)	-0.009 (-0.059)
Investment-to-GDP	0.179*** (10.33)	0.181*** (10.817)	0.082*** (3.059)	0.197*** (11.354)	0.202*** (12.122)	0.189*** (11.572)
Government Spending- to-GDP	-0.046** (-2.082)	-0.043** (-2.005)	-0.000 (-0.019)	-0.033 (-1.527)	-0.049 (-2.342)	-0.028 (-1.274)
Secondary Education	0.32** (2.49)	0.292 (2.326)	0.165 (1.131)	0.351*** (2.688)	0.337*** (2.707)	0.239* (1.902)
Life Expectancy	-0.083*** (-3.619)	-0.084 (-3.751)	-0.022 (0.769)	-0.071*** (-3.106)	-0.067*** (-3.022)	-0.057** (-2.453)
Log(Population)	0.262*** (3.898)	0.253*** (3.863)	0.027 (0.292)	0.174** (2.347)	0.171** (2.433)	0.131* (1.814)
Population Growth	-0.803*** (-8.78)	-0.789*** (-8.699)	-1.402*** (-6.78)	-0.592*** (-5.262)	-0.653*** (-5.998)	-0.773*** (-8.608)
Fixed Regime			-0.099 (-0.327)	-0.509* (-1.716)	-0.475* (-1.695)	-0.672 (-2.382)
Intermediate Regime			-0.189 (-0.539)		0.399 (1.179)	0.161 (0.469)
Flexibility Index	1.124*** (2.539)	0.077*** (2.973)	-0.394 (-1.462)			
Trade Openness	0.505*** (2.792)	0.579*** (3.23)	0.799*** (3.205)	-0.057 (-0.304)	0.186 (1.007)	0.631*** (3.514)
Capital Controls	-0.717 (-1.592)	-0.495 (-1.119)	0.477 (0.761)	-0.196 (-0.412)	-0.285 (-0.633)	-0.226 (-0.497)
Africa Dummy	-0.776* (-1.963)	-0.816** (-2.131)	-0.372 (-0.808)	-0.714* (-1.806)	-0.654* (-1.728)	-0.607 (-1.558)
$\pi_{(t-1)}$			-0.015* (-1.77)	0.001 (0.305)		
Banking Crisis			-0.725** (-2.147)		0.270 (0.294)	
Freely Falling						
Currency Crisis				-1.596*** (-2.618)		
Institutional Quality						0.862*** (4.10)
adj. R2	0.205	0.199	0.318	0.203	0.199	0.206
N	1471	1549	776	1369	1492	1580

Terms in brackets denote t-stats based on robust standard errors clustered in countries. *, **, *** indicates significance at the 10%, 5%, 1% level.

Rogoff (2004), I isolate nations with annual inflation rates above 40 percent into a separate “freely falling” category, with the implication that the macroeconomic imbalances in such countries overwhelm the possible effects of regimes, and hence are deleterious to growth. Its coefficient is insignificant while the fixed regimes are found to lower growth by 0.48 per cent.

Finally, I control for quality of institutions due to the heterogeneity in the range of countries⁷. To measure institutional quality I used an average of the estimates of the six categories of control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law, voice and accountability that are provided by the World Bank’s Worldwide Governance Indicators (WGI) database. Each category ranges between -2.5 to 2.5 with a higher value implying better institutional quality. Its coefficient is positively significant while fixed regimes are again negative and intermediate insignificant.

Additionally the impact of regimes or for that matter any variable on economic growth could be dependent on a country’s level of growth. For example, regimes may not matter for nations exhibiting the highest growth rates in the sample. To discern this issue I used a simultaneous quantile regression approach. Both fixed and intermediate regime dummies were found to be insignificant for the 20th and 80th quantile of economic growth. But for nations in the 40th and 60th quantile in the sample, fixed regimes significantly lower growth with coefficients of -0.571 and -0.414, respectively, while intermediate regimes are insignificant⁸.

4.2 Results across Levels of Economic Development and Continents

Table 5 shows the results for advanced economies, emerging markets and low income countries. Nations are categorized under these three income groups based on the World Economic Outlook (2012) of the IMF. For both advanced and low income countries fixed regimes lower growth while intermediate regimes are

⁷ A recent pertinent study that explores the role of institutional quality on growth for the major emerging markets of Brazil, Russia, India and China is that of Goel and Koehonen (2012).

⁸ The entire sets of results are not shown for purposes of brevity but are available on request.

TABLE 5 - *Effect of Regimes on Growth across Levels of Economic Development*

	Advanced Economies			Emerging Markets			Low Income Countries		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Constant	6.312 (0.819)	7.333 (0.964)	5.838 (0.715)	5.767** (2.114)	6.056** (2.213)	6.057** (2.185)	-0.377 (-0.099)	-2.197 (-0.606)	-3.578 (-1.014)
Log(GDPpercapita ^{US/\$}) ₉₀	-1.781*** (-3.416)	-1.827*** (-3.524)	-1.754*** (-3.317)	-0.67*** (-2.955)	-0.706*** (-3.104)	-0.718*** (-3.136)	-0.101 (-0.274)	-0.105 (-0.285)	-0.193 (-0.535)
Investment-to-GDP	0.036 (0.825)	0.041 (0.952)	0.062 (1.494)	0.001 (0.40)	0.001 (0.328)	0.001 (0.316)	0.217*** (8.589)	0.211*** (8.444)	0.204*** (8.248)
Government Spending-to-GDP	-0.031 (-0.824)	-0.024 (-0.643)	-0.021 (-0.555)	-0.123*** (-3.475)	-0.128*** (-3.61)	-0.111*** (-3.248)	-0.074** (-2.037)	-0.067* (-1.834)	-0.057 (-1.561)
Secondary Education	0.203 (1.088)	0.176 (0.957)	0.151 (0.809)	0.462*** (3.11)	0.482*** (3.233)	0.462*** (3.002)	0.514* (1.685)	0.433 (1.44)	0.321 (1.087)
Life Expectancy	-0.095 (-1.232)	-0.109 (-1.441)	-0.103 (-1.24)	-0.117*** (-4.432)	-0.121*** (-4.591)	-0.114*** (-4.35)	-0.053* (-1.674)	-0.035 (-1.184)	-0.018 (-0.599)
Log(Population)	0.043 (0.368)	0.043 (0.375)	0.088 (0.76)	0.188* (1.804)	0.193* (1.846)	0.154 (1.48)	0.016 (0.083)	0.103 (0.552)	0.187 (1.04)
Population Growth	-0.331* (-1.616)	-0.331* (-1.62)	-0.345* (-1.671)	-0.971*** (-10.598)	-0.985*** (-10.717)	-0.958*** (-10.526)	-0.538** (-2.036)	-0.495* (-1.879)	-0.505* (-1.922)
Fixed Regime	-0.988** (-2.12)			0.548 (1.587)			-1.997*** (-3.273)		
Intermediate Regime	-0.090 (-0.19)			1.354*** (3.463)			0.181 (0.255)		
Regime Dummy		-0.442* (-1.968)	-0.145 (-0.477)		0.315* (1.828)	0.177 (0.677)		-0.923*** (-3.075)	-1.481*** (-3.627)
Trade Openness	1.305*** (3.445)	1.322*** (3.498)	1.192*** (2.798)	1.865** (2.212)	1.986** (2.354)	2.061*** (2.44)	0.545** (2.091)	0.582** (2.236)	0.613** (2.358)
Capital Controls	-0.629 (-0.805)	-0.745 (-0.968)	-0.702 (-0.899)	0.664 (1.18)	0.605 (1.069)	0.718 (1.269)	0.835 (0.877)	0.698 (0.735)	0.521 (0.582)
adj. R2	0.559	0.559	0.552	0.366	0.359	0.356	0.130	0.128	0.133
N	233	233	233	727	728	728	662	662	662

Terms in brackets denote t-stats based on robust standard errors clustered in countries. *, **, *** indicates significance at the 10%, 5%, 1% level.

insignificant. Opposite results are revealed for emerging markets – fixed regimes are insignificant while intermediate regimes positively and significantly influence growth. The 2-step regime dummy is negative and significant for both advanced and low income countries signifying the movement towards more fixed-type regime lowers growth while in contrast, it is positively significant in emerging markets.

Finally, I disaggregate nations across continents. Results in Table 6 summarize the coefficients of the fixed and intermediate regime dummies used in the same estimation specification. Also shown are the coefficients of the two tripartite regime classifications. Fixed regimes lower growth in Africa, North Central Americas and the Caribbean (NCCA), and South America while it is insignificant in Europe but promotes economic growth in Asia. Intermediate regimes positively and significantly affect growth in Asia but are insignificant for all other continents. Both the 2-step dummies are negative and significant in affecting growth in Africa, NCCA and South America, again indicating that the movement from a non-fixed to fixed regime lowers economic growth. On the contrary, the coefficient is positive and significant in Asia suggesting the movement from flexible to pegged-type regimes promote economic growth.

TABLE 6 - *Effect of Regimes on Growth across Continents*

	Africa	Asia	Europe	NCCA	South America
Fixed Regime	-1.238* (-1.832)	0.738* (1.76)	0.344 (0.482)	-2.95*** (-2.533)	-1.228* (-1.613)
Intermediate Regime	0.371 (0.40)	2.520*** (4.508)	-0.544 (-0.833)	-0.424 (-0.455)	-0.444 (-0.495)
Regime Dummy1	-0.579* (-1.722)	0.371* (1.742)	0.125 (0.351)	-1.383** (-2.411)	-0.601* (-1.61)
Regime Dummy2	-1.079** (-2.264)	0.96*** (2.505)	0.071 (0.151)	-2.036** (-2.476)	-0.89* (-1.914)

Terms in brackets denote t-stats based on robust standard errors clustered in countries. *, **, *** indicates significance at the 10%, 5%, 1% level. NCCA denotes North Central Americas and the Caribbean.

5. CONCLUSION

Using a panel-data set of 156 countries over the 1999-2012 period this study first provides a broad classification of exchange rate regimes. I observe a trend towards intermediate regimes in the immediate aftermath of the global financial crisis. I next find strong evidence that fixed regimes lower economic growth. In addition, both intermediate regimes and the movement towards a more flexible-regime positively influence growth. Examining across the level of economic

development, I find fixed regimes lower growth in both advanced and low income countries while intermediate regimes are insignificant. Likewise, fixed regimes lower growth in Africa, North Central Americas and the Caribbean, and South America.

At this point one should be cautious in reading the policy implications of the results. This is not to suggest nations should massively adopt flexible exchange rate regimes. Countries with relatively underdeveloped financial sectors lack market instruments to conduct domestic open market operations. As such fixed regimes may discipline monetary policy and lower inflation, which in turn may promote growth. Indeed such evidence is revealed for emerging markets – a fixed-type regime, more specifically intermediate regimes positively and significantly influence growth after the turn of the century. The positive influence of intermediate regimes on growth is in line with the view that such regimes can be a viable option for nations, especially for emerging markets economies that want to trade off credibility and flexibility in their choice of regimes. In fact, the findings here support the revival of the intermediate option in the new millennium. Consistent with this finding is the fact that both fixed and intermediate regimes positively and significantly affect growth in Asia, a region characterized by major emerging markets.

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ABSTRACT

The implications of exchange rate regimes on economic growth have received renewed attention in the aftermath of the recent global financial crisis. Creating both bivariate and tripartite regime classifications the present study examines their impact on growth for 156 nations spanning the period 1999-2012. Using several robustness checks including *de facto* measures of regime flexibility, I find fixed regimes lower growth in the full sample, advanced and low income countries as well as in Africa, South America, and North Central Americas and the Caribbean. On the other hand intermediate regimes promote growth in emerging markets and in the Asian continent.

Keywords: Advanced Economies, Economic Growth, Emerging Markets, Exchange Rate Regimes, De Facto Regime Flexibility, Low Income Countries, Panel Data Methods

JEL Classification: E42, F33, F43, O40, O50

RIASSUNTO

I regimi dei tassi di cambio influenzano la crescita economica?

Le implicazioni dei regimi dei tassi di cambio sulla crescita economica sono ritornati ad essere oggetto di analisi. Adottando una articolata classificazione dei regimi dei tassi di cambio questo lavoro ne esamina l'impatto sulla crescita per 156 paesi nel periodo 1999-2012. Controllando la robustezza dei modelli, comprese alcune misure *de facto* di flessibilità del regime di cambio, i risultati evidenziano che i regimi di cambi fissi rallentano la crescita, sia nei paesi ad economia avanzata che in quelli a basso reddito, ed anche in Africa, Sud America, Nord e Centro America e Caraibi. Regimi intermedi invece hanno promosso la crescita nei mercati emergenti e nei paesi asiatici.

APPENDIX:

List of countries covered^a

Afghanistan (LIC), Algeria (EM), Angola (EM), Antigua and Barbuda (LIC), Argentina (EM), Armenia (LIC), Australia (AE), Azerbaijan (EM), Bahamas, The (EM), Bahrain (EM), Bangladesh (LIC), Barbados (EM), Belarus (EM), Belize (LIC), Benin (LIC), Bhutan (LIC), Bolivia (LIC), Bosnia and Herzegovina (EM), Brazil (EM), Brunei Darussalam (AE), Botswana (EM), Bulgaria (EM), Burkina Faso (LIC), Burundi (LIC), Cambodia (LIC), Cameroon (LIC), Canada (AE), Cape Verde (LIC), Central African Republic (LIC), Chad (LIC), Chile (EM), China (EM), Colombia (EM), Congo, Dem. Rep. (LIC), Congo, Rep. (LIC), Costa Rica (EM), Cote d'Ivoire (LIC), Croatia (EM), Czech Republic (AE), Denmark (AE), Dominica (LIC), Dominican Republic (EM), Djibouti (LIC), Ecuador (EM), Egypt (EM), El Salvador (EM), Equatorial Guinea (LIC), Eritrea (LIC), Estonia^b (EM), Ethiopia (LIC), Euro area (AE), Fiji (LIC), Gabon (LIC), Gambia, The (LIC), Guinea-Bissau (LIC), Georgia (LIC), Ghana (LIC), Grenada (LIC), Guatemala (EM), Guyana (LIC), Haiti (LIC), Honduras (LIC), Hong Kong SAR, China (AE), Hungary (EM), Iceland (AE), India (EM), Indonesia (EM), Iran (EM), Iraq (EM), Israel (AE), Jamaica (EM), Japan (AE), Jordan (EM), Kazakhstan (EM), Korea, Rep. (AE), Kuwait (EM), Kyrgyz Republic (LIC), Lao PDR (LIC), Latvia (EM), Lebanon (EM), Lesotho (LIC), Liberia (LIC), Libya (EM), Lithuania (EM), Madagascar (LIC), Malawi (LIC), Malaysia (EM), Maldives (LIC), Mali (LIC), Malta^b (AE), Mauritius (EM), Mexico (EM), Mongolia (LIC), Morocco (EM), Mozambique (LIC), Myanmar (LIC), Namibia (EM), Nepal (LIC), New Zealand (AE), Nicaragua (LIC), Niger (LIC), Nigeria (LIC), Norway (AE), Oman (EM), Pakistan (EM), Papua New Guinea (LIC), Paraguay (EM), Peru (EM), Philippines (EM), Poland (EM), Qatar (EM), Romania (EM), Russian Federation (EM), Saudi Arabia (EM), Senegal (LIC), Serbia (EM), Seychelles (LIC), Sierra Leone (LIC), Singapore (AE), Slovak Republic^b (AE), Slovenia^b (AE), Solomon Islands (LIC), Somalia (LIC), South Africa (EM), Sri Lanka (EM), St. Kitts and Nevis (LIC), St. Lucia (LIC), St. Vincent & the Grenadines (LIC), Sudan (LIC), Swaziland (LIC), Sweden (AE), Switzerland (AE), Syrian Arab Republic (EM), Tajikistan (LIC), Tanzania (LIC), Thailand (EM), Timor-Leste (LIC), Togo (LIC), Trinidad and Tobago (EM), Tunisia (EM), Turkey (EM), Turkmenistan (LIC), Uganda (LIC), Ukraine (EM), United Arab Emirates (EM), United

Kingdom (AE), USA (AE), Uruguay (EM), Uzbekistan (LIC), Vanuatu (EM), Venezuela, RB (EM), Viet Nam (LIC), Yemen Rep. (LIC), Zambia (LIC), Zimbabwe (LIC).

^a AE: Advanced economy, EM: Emerging market, LIC: Low income country.

^b Data are prior to joining euro area.