

# Exit from Exchange Rate Regimes and Length of Economic Recovery: Propensity Score Matching Approach\*

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## Abstract

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# 1 Introduction

Analyzing the process of economic recovery should stand at the forefront of economic research, especially in light of depressed economic growth in Japan and probability of prolonged stagnation-like scenario projected for the Euro Area. Intriguingly, many empirical papers investigate causes and consequences of economic downturns, yet only handful of them concern themselves with factors determining the length and amplitude of economic recovery. The same holds for discussion on the role of exchange rate regime in determining standard macroeconomic variables (see discussion in Cushman and De Vita, 2017), which is rather overcompassing; however, only a limited set of theoretical or empirical papers focuses on effects of regime switch as one of the potential factors leading to a more speedy recovery when occurring during the phases of economic slowdown or deep recession.

Since the authoritative treatment by Eichengreen and Sachs (1985) it has been understood that the currency peg is likely to play a prominent role in prolonging the ongoing crisis and delaying the subsequent recovery from crisis. As argued, the countries that were willing to abandon the gold standard at the earlier stages had lower real wages and a more speedy recovery than countries that insisted on defending it. On top of that, this behaviour is not motivated and cannot be treated as beggar-thy-neighbour policy as the series of competitive devaluation were not without benefits for the system as a whole. This story has been reiterated in Bernanke and Carey (1996) who argue that the combination of downward wage rigidity and fixed exchange rate regime (in Great Depression the Gold Standard) led to the crisis propagation across globe. While the discourse in both of the papers might be still treated as more of an anecdotic sort of evidence, Schmitt-Grohe and Uribe (2011) show that currency pegs are highly costly during regular business-cycle fluctuations if an endogenous connection between macroeconomic volatility and unemployment is introduced and, as a result, there are large welfare gains from stabilization policy; contrary to the standard Calvo-Rotemberg type of models when the losses from currency pegs are negligible (Gali and Monacelli, 2005). On the other hand, Aizenman and Glick (2005) argue contrary by showing that the exits from the fixed ER regimes in the last two decades were associated with costly adjustments often coupled with advent of a impending crisis. From the different angle, recent behavior of predominantly small and open economies showed that the stabilization policy conducted via temporary swing from flexible to intermediate exchange rate regime and/or imposition of capital controls has yet again been included into the active monetary policy toolbox. It is, hence, safe to conclude, that the final word addressing this issue is yet to be sad.

This paper therefore builds upon the seminal narrative by Eichengreen and Sachs (1985) and aims to empirically analyse role of exchange rate regime switch on the length of crisis recovery over the course of the last seven decades. As an addition to the standard literature on currency crises, the use of database compiled by Ilzetzki et al. (2017) allows us to take a closer look at the effects of often neglected reverse pull from flexible to semi or fully fixed exchange rate regime. We specifically target the exchange rate regime changes that occur at the beginning or during the economic crush and this choice is viewed as a policy response conditional on set of

underlying confounding factors. The model design therefore relies on the use of propensity score matching (PSM henceforth) approach recently applied in Cushman and De Vita (2017) in the context of exchange rate regime choice and FDI inflows to developing countries. In the first stage (matching) we model probability of regime switch given the set of standardly discussed economic determinants when countries with sufficiently high probability fall into the treatment group. In the second stage the closest neighbours from two groups (treated/not treated) are compared and tested for a presence of significant differences in terms of the length of the economic recovery. As part of the robustness check we adopt survival analysis as performed in Tudela (2004).

From the policy implications point of view, our paper contributes to the brewing discussion whether the management of exchange rate should be once again introduced into the monetary policy tooling even in the presence of standard inflation targeting framework. Additionally, our findings might provide additional evidence whether the active ER management might bring about positive welfare gains if used in the periods of severe economic distress.

## 2 Literature and Empirical Specification

The propensity score matching procedure is built upon specification of two separate decisions: firstly to determine probability of regime switching, and secondly to investigate differences in length of recovery from crises. The following literature review therefore lists relevant publications in both fields.

By the nature of the topic, first strand of literature is related to the currency crises literature and exit from fixed exchange rate regimes. Krugman (1979) and Flood and Garber (1984) represent the baseline model of balance of payments crises where the decision to stop defending the ER regime is driven by depletion of the stock of foreign exchange reserves and inability to borrow. Walti (2005) discusses the survival rate of fixed ER models with duration analysis and uses set of conditioning variables, such as inflation, economic growth, openness, current account balance, budget balance, unemployment, and the real exchange rate. Fieiss and Shankar (2009) adopt agent's portfolio choices approach arguing that if costs of intervention do not exceed benefits the country will maintain its current ER regime (in this case fixed one). The determinants of switching probability include foreign liabilities/assets ratio, GDP growth, RER, M0/reserves, volatility of stock market indices, growth in stock market indices, RIR in the US and gross capital flows/GDP.

Literature dealing with the determinants of economic recovery usually addresses few separate issues, i) the length, ii) costs (amplitude) of recovery. Most of the recent studies falling into the second category look at the before and after comparison of relevant macroeconomic variables, e.g. Dao (2017), Tsangarides (2010), Takats and Upper (2013). Takats and Upper (2013) measure amplitude by change in real GDP trough to trough+g (g - chosen arbitrary for periods 1,...,4 years). In order to eliminate offsetting by fiscal expenditures and net export, the real GDP is also replaced by the private domestic absorption (C,I) in Takats and Upper (2013). Fiscal costs of recovery from crises are often considered (Claessens et al. 2012).

Among the determinants of economic recovery Takats and Upper (2013) list previous

drop in output, credit/GDP, credit gap, REER, public debt/GDP among the most important ones and add CA/GDP, NIR, RIR, VIX, world growth, growth of trading partners, nominal bank (private) debt. Tsangarides (2010) considers trade partners growth, terms of trade, FX reserves/GDP, CA/GDP, net PI/GDP, fiscal expenses/GDP, short-term external debt/GDP, dummies (Latin America, oil exporting, inflation targeting). Dao (2017) includes financial openness index, NPL, trade freedom (Herigate), export product concentration, export market concentration, daily oil production, ToT and lags of GDP growth, inflation, FX reserves, CA/GDP, FA/GDP.

The specification of crisis length requires a separate discussion. The literature dealing the credit-less recovery offers an useful guidance for empirical definition of economic downturns. By Bijsterbosch and Dahlhaus (2011) the recovery is defined as the phase in the cycle that follows a trough to new peak. Similarly, in Francis et al. (2014) recovery measures length of time required for unemployment to return to its pre-recession levels subsequent to a trough occurring at time  $t$ . Braun and Larrain(2005) base their identification strategy on identifying cyclical component by HP filter (at least 8 years of observations). The troughs are identified as years when cyclical GDP is more than one standard deviation below zero. In presence of consecutive troughs, then the one with the lowest cyclical GDP is selected. Recession starts in year consecutive after previous cyclical peak and ends at the through year. Ambrosius (2016) investigates determinants of length of recovery from banking crises by using extensive set of exogenous regressors, including standard growth predictors and growth history, internal factors (financial, indebtedness, balance of payments and exchange rate-related), crises policies and external factors.

## 2.1 Matching Design and Data

In what follows we build upon the Cushman and De Vita (2017) to discuss specificities of the propensity score matching in our empirical setup. The unbalanced panel data on currency ER regime covering 70 years and 180 countries (Ilzetzki et al., 2017), is transformed into country/year combination that identifies one unit, thus effectively working with the simple cross-sectional specification. In order to control for effect of time, as standardly done by inclusion of time trend or time dummies in panel setup, we introduce year dummies as covariates.

Only those country/year observations are considered when the start of economic crisis, measured as negative YoY growth rate of real GDP, is observable. In other words we work with only crisis events. These country/year observations are matched with information about the change in the exchange rate regime that occurred one year or later after the official outbreak of a crisis. Hence, we eliminate those occurrences where the economic downturn was specifically caused by exit from an exchange rate regime. Instead we consider change in the ER regime as a conscious decision of policy makers to use it as a part of the stabilizing policy toolkit. In the propensity score matching fashion the group of treated countries are thus those who went through the exit phase after the materialization of a crisis.

The identification of crisis and length of recovery is built upon the following algorithm.

The start of the crisis is set to the year when there is a YoY drop in a real GDP. The end of the crisis marked by a year when the real GDP stops declining and reaches its trough. The length of the recovery is measured from the beginning of crisis till the point when the real GDP overpasses the pre-crisis levels for the first time.

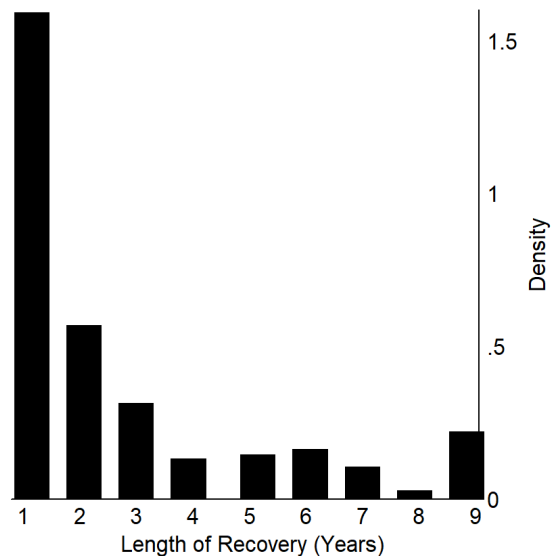


Figure 1: Length of Economic Recovery Distribution

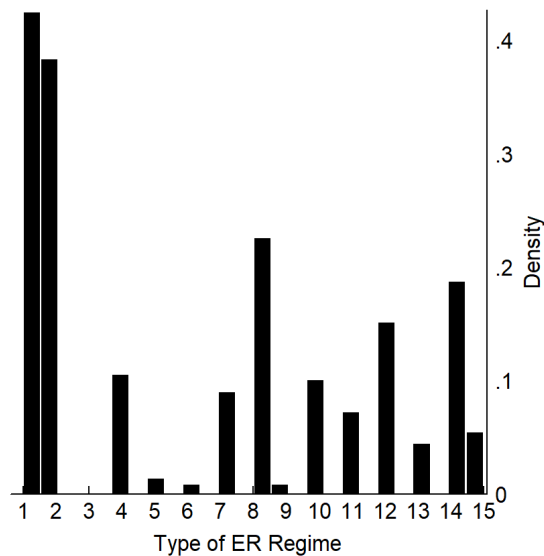


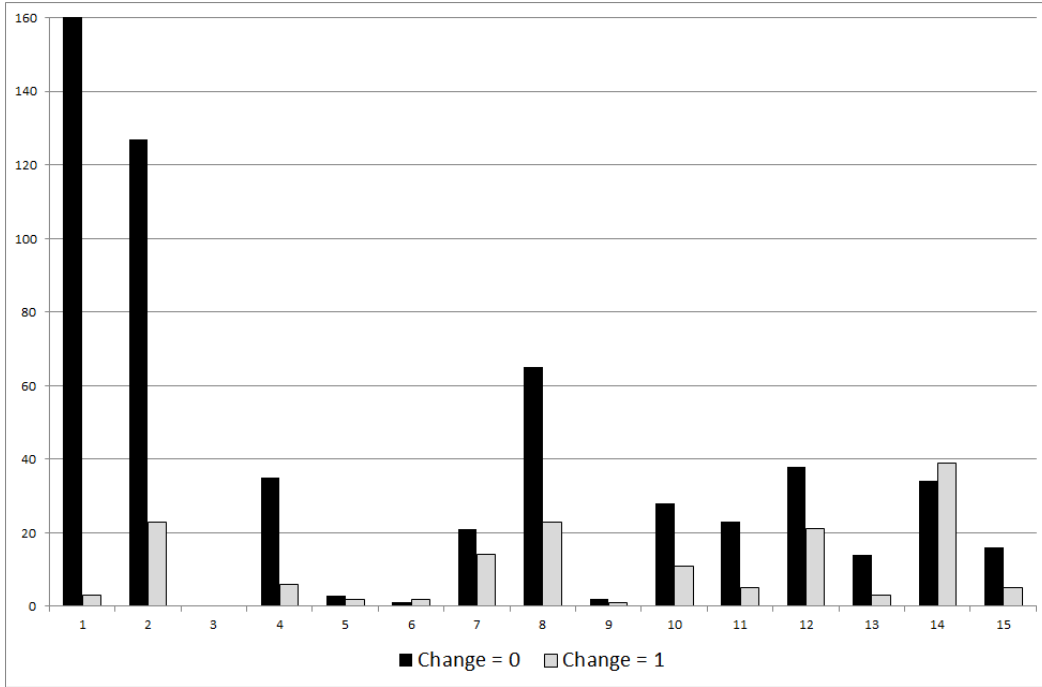
Figure 2: Pre-crisis Exchange Rate Regime Distribution

In the Figure 1 we plot distribution of length of recovery in our unrestricted sample. As apparent, most of the crisis very relatively short-lived of duration of one year. On the other side, there exists relatively high portion of countries who experienced rather prolonged periods of slow recovery lasting six or more years. The distribution of years is censored from the right at nine years as we do not allow for longer length of crisis recovery. These instances are usually associated with long-term downward trend in economic performance. During these periods few upsurges in economic activity might occur, but the overall trend in economic activity is usually declining. The initial drop in economic activity is followed by second or even third sub-crisis, hence the overall pattern resembles the W or triple V letter. We label these particular crisis events as 'depressions' (Table A6).

Iltzecki et al. (2017) is used for ER regime classification. The pre-crisis distribution of exchange rate regimes in our sample is depicted in the Figure 2. Not surprisingly, the most frequent ER regime is either no separate legal tender or currency board arrangement. The intermediate regimes are concentrated represented by less strict arrangements with wider fluctuations bands or frequent changes in central parities. Managed floating tends to dominate the pure floating in our sample. Interestingly, most of the changes in ER regimes occur when existing the less stricter intermediate arrangements or managed floating category (Figure 3).

The use of propensity score matching requires addressing list of the critical modelling issues. Firstly, to address the problem of confoundedness potential conditioning determinants are to belong to one of the four groups:

Figure 3: Distribution of ER Regimes Given the Change in Regime during the Crisis (1=change)



1. all covariates that affect either treatment probability or outcome,
2. covariates that affect treatment probability,
3. covariates that affect outcome (potential confounders).
4. covariates that affect both treatment probability and outcome (true confounders),

While Rubin and Thomas (1996), Brookhart et al. (2006), Austin et al. (2007) argue for use of the [3] or [4], Deuss (2012) and Austin (2011) advocate the [2]. Translating into our model setup, the best covariates should belong to the group of: i) potential confounders - i.e. determinants of length of economic recovery, ii) true confounders - covariates that simultaneously affect treatment probability (ER regime switch) and length of recovery. The final set of covariates is therefore chosen from the relevant literature in order to fulfill the discussed requirement.

Secondly, strict exogeneity requires that covariates must not have been influenced by the treatment, i.e. regime switch can not affect conditioning factors. In order to address this issue we use only the pre-crisis data for units. We employ matching procedure with 5 nearest neighbors, 0.01 caliper and logit link function specification. In the specific instances when the smaller number of observations pose serious limitations on the convergence process of the PMS technique we change the number of nearest neighbours to 10 and caliper to 0.05.

Growth-related control variables are taken from the Penn-World tables 9.0 as in Feenstra (2015). Grouping of ER regimes used in Iltzecki et al. (2017) into three main categories

(fixed, intermediate, floating) follows Cushman and De Vita (2017). List of our benchmark covariates include economic size ( $\ln(\text{GDP})$ ,  $\ln(\text{GDP})$  squared), level of economic development ( $\ln(\text{GDPpc})$ ,  $\ln(\text{GDPpc})$  squared), lag of real economic growth preceding the crisis year, crisis length measured by number of years to through, severity of crisis measured by relative drop in GDP from peak to through, ER regime category (fixed, intermediate, floating) and change in fiscal expenditures following the crisis outburst. As a further robustness check we include three year averages of M2/GDP, NX/GDP, external Debt/GDP, growth rate in nominal exchange rate calculated for years preceeding the crisis event, inflation rate and change in nominal interest rate following the crisis outburst. Description of data is available in the Table A5. Number of observations (i.e. country/year units for crisis events) in full sample is 728 instances with 158 cases for treatment group and 570 for untreated units (Table A6).

### 3 Results

We firstly run OLS regression to test impact of selected benchmark indicators potentially affecting the length of crisis recovery. We also separately control for effect of initial ER regime by introducing three possible combinations of three regime groups (fixed, intermediate, flexible). In the second set of regressions (specifications [2], [4], [6]) we replace dummy indicator of ER regime change by distinguishing the regime change conditional on pre-crisis type of ER regime. Results are available in the Table 1.

As apparent, the fixed exchange rate regime is associated with longer crisis recovery period of length of approximately four mounths against both, intermediate and flexible ER regimes. On the other hand, nor floating nor intermediate regime contribute to the length of crisis recovery in any direction. Change in exchange rate regime that occurs during the crisis is conducive to prolongation of the crisis recovery, irrespective of the intitial type of regime. Interestingly, abandoning the floating regime during the crisis periods, however, might be associated with slightly longer crisis recovery period. The set of control variables deliver expected results, with the severity being the one exception. While size of the economy, up to a certain optimal point, and number of crisis years contribute positively to length of recovery, the sizable fiscal expenditures tend to shorten number of years in economic recovery. As expected, the more severe the intial adverse shock to real GDP the more prolonged the return to the pre-crisis levels. Given the presence of both, the  $\ln(\text{GDP})$  and its square, we calculate the turning point for which the effect of economic size starts positively benefitting economies by decreasing their length of recovery. It turns out that the economic size of economies in our sample follows the normal distribution, with small abnormal peak around the centre, and the turning point is located almost at the mean of distribution (Figure 4).

We now turn our attention to the findings from the propensity score matching procedure. As discussed the OLS results might be biased due to the fact that the decision to use exchange rate as a policy tool to mitigate effects of crisis events is likely to be driven by the legth of the crisis (and outlook for sluggish economic recovery) itself. From this reason we employ the PSM technique that in the first step models the probability of underlying policy maker decision.

Table 1: Determinants of the Crisis Recovery Length by OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Change (1= ER regime switch)	0.728*** (0.00)		0.728*** (0.00)		0.728*** (0.00)	
Fixed			0.264 (0.11)	0.337* (0.07)	0.330*** (0.00)	0.329*** (0.00)
Intermediate	-0.330*** (0.00)	-0.329*** (0.00)	-0.066 (0.64)	0.008 (0.96)		
Floating	-0.264 (0.11)	-0.337** (0.07)			0.066 (0.64)	-0.008 (0.96)
Ln(GDP)	0.329*** (0.00)	0.323*** (0.00)	0.329*** (0.00)	0.323*** (0.00)	0.329*** (0.00)	0.323*** (0.00)
Ln(GDP)_sq	-0.017*** (0.00)	-0.016*** (0.00)	-0.017*** (0.00)	-0.016*** (0.00)	-0.017*** (0.00)	-0.016*** (0.00)
Ln(GDPpc)	-0.299 (0.53)	-0.293 (0.54)	-0.299 (0.53)	-0.293 (0.54)	-0.299 (0.53)	-0.293 (0.54)
Ln(GDPpc)_sq	0.019 (0.50)	0.019 (0.51)	0.019 (0.50)	0.019 (0.51)	0.019 (0.50)	0.019 (0.51)
L.growth	-0.004 (0.67)	-0.005 (0.65)	-0.004 (0.67)	-0.005 (0.65)	-0.004 (0.67)	-0.005 (0.65)
Crisis years	1.220*** (0.00)	1.222*** (0.00)	1.220*** (0.00)	1.222*** (0.00)	1.220*** (0.00)	1.222*** (0.00)
Severity	-0.054*** (0.00)	-0.054*** (0.00)	-0.054*** (0.00)	-0.054*** (0.00)	-0.054*** (0.00)	-0.054*** (0.00)
Fiscal	-0.003** (0.03)	-0.003** (0.03)	-0.003** (0.03)	-0.003** (0.03)	-0.003** (0.03)	-0.003** (0.03)
Fixed*Change		0.674** (0.04)		0.674** (0.04)		0.674** (0.04)
Floating*Change		0.857*** (0.00)		0.857*** (0.00)		0.857*** (0.00)
Intermediate*Change		0.700*** (0.00)		0.700*** (0.00)		0.700*** (0.00)
Constant	-0.380 (0.87)	-0.388 (0.86)	-0.644 (0.77)	-0.725 (0.75)	-0.710 (0.75)	-0.717 (0.75)
N	728	728	728	728	728	728
R2	0.841	0.841	0.841	0.841	0.841	0.841
Ln(GDP) turning point	9.759	9.797	9.759	9.797	9.759	9.797



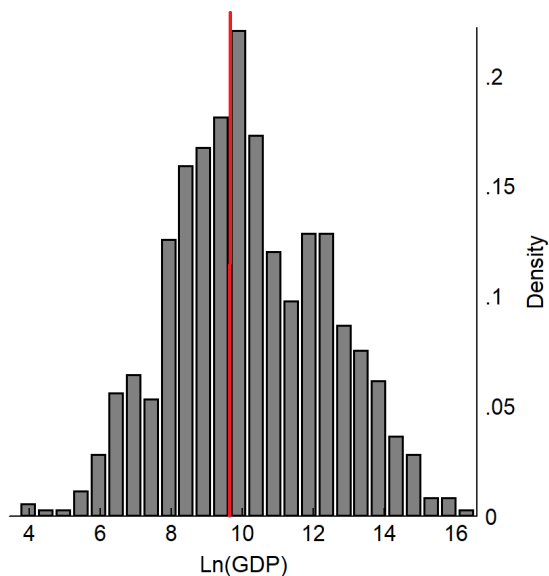


Figure 4: Economic Size Distribution and Turning Point

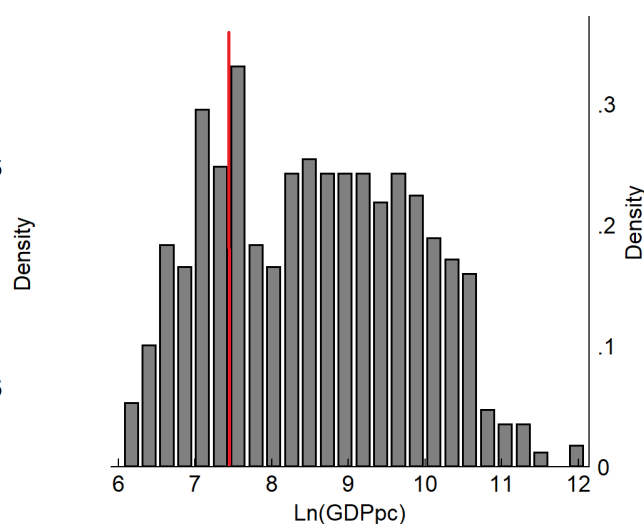


Figure 5: Economic Development Distribution and Turning Point, 1st stage tobit

Results from the first-stage logistic regression (Table 2) show that the length of crisis event increases probability of change in the ER regime during the recovery period. Rather than the economic size, the level of economic development is conducive to introduction of ER regime switch. Inclusion of squared term allows for computation of turning point at which the probability of regime switch start declining after reaching a certain level of economic development. As depicted in the Figure 5, it is predominantly the less developed countries that are more likely to introduce shift in ER policies during the crisis periods as part of their policy toolbox. Additionally, countries operating in the intermediate and floating regime are more likely to abandon their ER regime during the economic distress. As apparent in the underlying data (Figure 3), there exist only rather few instances when the countries exited corner fixed regimes and either introduced their new currencies or abandoned the currency board in exchange for a more monetary policy flexibility. In reality, most of the shifts from the fully fixed ER regimes occur during the calm periods of sustained economic growth and positive future economic outlook.

The Table 3 reports estimated ATT effects from the specification with benchmark regressors, as listed in Table 2. In the full, unconstrained model, the switch in the ER regime occurring in the years following the initial drop in real GDP (treated) does lead to less speedy recovery from the crisis. However, since the full sample includes many instances when the subsequent recovery has been too quick in order for full impact of such a change to materialize, we restrict our sample to include observations where recovery lasted at least two or more years (model 2 and 4), or at least three or more years (model 3 and 5). On top of that we also investigate properties of models when excluding the periods that might be termed as "depressions" due to their long-lasting presence and presence of other smaller sub-crises that occurred within them (model 4 and model 5). In all of the instances the ATT estimates between the treated and control

Table 2: Benchmark regression - 1st stage tobit estimates (1=change in ER regime)

	(1)	(2)	(3)	(4)	(5)	Fix	Inter	Float
Intermediate	1.767*** (0.00)	1.572*** (0.00)	1.971*** (0.00)	1.398*** (0.00)	2.136*** (0.00)			
Floating	2.190*** (0.00)	1.622*** (0.00)	1.852*** (0.00)	1.479*** (0.00)	2.082*** (0.00)			
LnGDP	0.309 (0.52)	0.497 (0.42)	0.291 (0.73)	0.726 (0.26)	1.242 (0.20)	0.093 (0.94)	-0.811 (0.51)	-0.388 (0.80)
LnGDP_sq	-0.014 (0.53)	-0.018 (0.52)	-0.011 (0.78)	-0.029 (0.33)	-0.056 (0.21)	0.017 (0.79)	0.046 (0.42)	0.007 (0.92)
LnGDPpc	3.792** (0.01)	5.883*** (0.00)	5.481** (0.04)	5.460** (0.01)	4.493 (0.16)	2.922 (0.55)	9.386**** (0.00)	8.207 (0.29)
LnGDPpc_sq	-0.246*** (0.00)	-0.373*** (0.00)	-0.363** (0.02)	-0.347** (0.00)	-0.311 (0.10)	-0.200 (0.49)	-0.594*** (0.00)	-0.503 (0.28)
L.growth	-0.038 (0.17)	-0.04 (0.24)	-0.059 (0.23)	-0.052 (0.19)	-0.149* (0.05)	-0.001 (0.99)	-0.102 (0.14)	0.014 (0.89)
Crisis years	0.392*** (0.00)	0.164 (0.18)	0.079 (0.60)	0.048 (0.75)	-0.187 (0.36)	0.267 (0.34)	0.468* (0.07)	-0.637* (0.08)
Severity	-0.040** (0.01)	-0.036** (0.02)	-0.035** (0.04)	-0.033* (0.09)	-0.038 (0.12)	-0.089** (0.03)	-0.003 (0.87)	-0.147** (0.03)
Fiscal (diffG)	0.009** (0.02)	0.007 (0.11)	0.007 (0.16)	0.006 (0.21)	0.007 (0.26)	0.000 (0.98)	0.009 (0.21)	0.008 (0.58)
Constant	-19.72*** (0.00)	-15.27 (0.98)	-11.21 (0.98)	-27.09*** (0.00)	-22.27 (0.11)	-16.97 (0.40)	-35.55** (0.02)	15.830 (0.99)
Untreated	497	220	124	171	84	80	65	39
Treated	158	119	87	88	54	27	50	33
Total	655	339	211	259	138	107	115	72
Length of recovery	all	>1 year	>2 years	>1 year	>2 years	>1 year	>1 year	all
Depressions	yes	yes	yes	no	no	yes	yes	yes

Note: Regression *Fix* with subsample of country-year pairs with pre-crisis fixed ER regime. Regression *Inter* with subsample of country-year pairs with pre-crisis intermediate ER regime. Regression *Float* with subsample of country-year pairs with pre-crisis floating ER regime. *Depressions* include observations with multiple consequent crisis periods.

group points to the approximately one year difference in favor of countries who retained their pre-crisis ER regime. However, this difference turns statistically insignificant once focusing on more prolonged recovery periods. Additionally, while the estimates for the subset of countries conditional on their pre-crisis ER regimes deliver no statistically significant ATT effects, the subgroup of intermediate fixers actively using the ER regime arrangements shows first evidence of quicker recovery.

The higher standard errors in case of restricted samples might point to the problem of missing conditioning variables in the PSM procedure. We therefore proceed by inclusion of other control variables, however in a step-by-step fashion due to limited data availability for the additional regressors. We run the PSM on the subsample including only crisis recovery periods longer than one year (model 2, Table 2) as we want to focus on periods of longer recessions rather than short-lived drop in economic activity. The calculated ATT effects for individual specifications are reported in the Table 4.

Table 3: ATT Effects for Benchmark Specification

		Treated	Controls	Diff	S.E.*	t-stats*	p-value*
Model (1)	Unmatched	4.28	2.31	1.97	0.21	9.27	
	ATT	3.97	2.95	<b>1.02**</b>	<b>0.40</b>	<b>2.54</b>	<b>0.011</b>
Model (2)	Unmatched	5.25	3.93	1.32	0.27	4.83	
	ATT	4.90	3.78	<b>1.11**</b>	<b>0.54</b>	<b>2.04</b>	<b>0.041</b>
Model (3)	Unmatched	6.33	5.07	1.26	0.30	4.20	
	ATT	6.34	5.21	<b>1.13</b>	<b>0.87</b>	<b>1.29</b>	<b>0.198</b>
Model (4)	Unmatched	4.34	3.42	0.93	0.26	3.52	
	ATT	4.26	3.26	<b>1.00*</b>	<b>0.52</b>	<b>1.92</b>	<b>0.055</b>
Model (5)	Unmatched	5.33	4.51	0.82	0.33	2.49	
	ATT	5.77	4.29	<b>1.48</b>	<b>1.26</b>	<b>1.18</b>	<b>0.238</b>
Fix	Unmatched	6.70	4.56	2.14	0.51	4.18	
	ATT	6.32	5.61	<b>0.70</b>	<b>1.09</b>	<b>0.65</b>	<b>0.517</b>
Inter	Unmatched	4.48	3.69	0.79	0.43	1.82	
	ATT	4.36	4.49	<b>-0.13</b>	<b>0.69</b>	<b>-0.19</b>	<b>0.849</b>
Float	Unmatched	4.15	2.31	1.84	0.59	3.10	
	ATT	3.83	2.72	<b>1.11</b>	<b>1.24</b>	<b>0.90</b>	<b>0.370</b>

Note: \* bootstrapped (100 reps.)

In the presence of other control variables the differences between control and treated group remains in most cases insignificant confirming the hypothesis, that active use of exchange rate management does not necessarily result in a more speedy crisis recovery. The average duration of crisis recovery for treated groups (i.e. active ER management) is, on average, longer than in control group in approximately six to nine months, however these difference is likely to be attributed to existing differences in the nature of individual crises events rather than to the change in the ER regime. From the list of the control variables reported in the Table 4, the variables related to the openness of an economy (trade openness, net trade) are associated with the highest reduction in the ATT compared to the benchmark results in Table 3 which might

underlying the fact that the openness is highly conducive to the speed of economic recovery, especially in small and open economies.

Table 4: ATT Effects for Other Control Variables

Added conditioning variable	#	Diff (T-C)	S.E.*	t-stats*	p-value*
M2	248	0.72	0.76	0.96	0.338
NX	251	0.58	0.78	0.75	0.750
ER	301	0.84*	0.48	1.74	0.081
Debt	150	1.14	1.47	0.77	0.441
Inflation	168	0.88	1.34	0.65	0.513
Reserves	181	0.79	1.09	0.73	0.465
Res/GDP	173	0.71	1.06	0.67	0.502
Openness	185	0.62	1.11	0.56	0.574
dNIR	75	0.69	0.99	0.69	0.489
Composite I (ER, NX, M2)	198	0.74	1.12	0.66	0.509
Composite II (Debt, Res/GDP, Open)	65	0.78**	0.37	2.08	0.038

Note: \* bootstrapped (100 reps.)

To conclude, our results tentatively suggest that the active exchange rate management might not necessarily be associated with wider economic benefits, except mitigation of ER volatility, that would lead to a more speedy recovery. Empirical evidence also shows that countries often use the change in the ER regime only as the last-resort tool once all the other options, fiscal or monetary policy measures, have been exhausted. The observed differences in length of recovery between countries with active (treated) and passive (control) ER management have a tendency to disappear once controlling for fundamental characteristics of countries related to their trade openness and monetary policy conduct.

### 3.1 Robustness Checks

The overlap (or common support) condition for correct use of the PSM procedure states that units need to have at least some chance of being both treated and non-treated. As a direct consequence, in our robustness check we rule out all countries that are members of a monetary union as they do not have the luxury to use the exchange rate regime as a stabilization policy tool. These includes countries who are members of the Euro Area, ECCU, WAEMU and CEMAC currency unions, hence occupy the spot in the group [1] in the Figure 3. Number of observations in the sub-sample decreases to the 572 country-year units. The benchmark results, as in specifications in Table 2 and 3, confirm the statistically significant difference between treated and control group of approximately one year. The inclusion of Debt, inflation and reserves (per GDP) from the group of other control variables reduces this difference to cca nine months and turns the ATT insignificant. Model with change of interest rate delivers difference in mean between control and treatment group of only three months.

Secondly, we exclude the measure of fiscal expenditures from the benchmark regression

due to its possibly problematic balancing properties. As the fiscal policy has been widely used to mitigate the business cycle as well as to combat unwanted repercussions of economic crises, the mean of fiscal expenditures between treated and control group does not satisfy the balancing properties in few instances. The benchmark results (as in Table 2 and 3) confirm the statistically significant difference between treated and control group of approximately one year. As in the previous robustness check, the presence of external debt, inflation and FX reserves (per GDP) substantially decrease ATE up to half a year and renders the difference statistically insignificant.

## 4 Conclusion

This paper investigates the effect of switch in the exchange rate regime on length of economic recovery following the crisis event defined by initial drop of real GDP. We build dataset incorporating country-year units for 180 countries spanning over 70 years in which we identify 728 crisis events with 158 cases when countries changed their ER regimes. Utilizing the propensity score matching procedure we model probability of change in the exchange rate regime on set of benchmark conditioning variables and compare length of economic recovery between treatment (i.e. change) and control group. On average, the countries that changed the ER regime during the economic crisis events are likely to experience economic recovery longer than non-switcher of approximately one year. However, the inclusion of few specific control variables (trade openness, other monetary policy tools) reduces this difference to half a year and higher heterogeneity of underlying nature of economic crises renders the difference in economic recovery length statistically insignificant.

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## 6 Appendix

Figure A6: ER Regimes Classification

ER regimes classification	
Fix	1 No separate legal tender or currency union
Fix	2 Pre announced peg or currency board arrangement
Fix	3 Pre announced horizontal band that is narrower than or equal to +/-2%
Fix	15 Dual market in which parallel market data is missing.
Intermediate	4 De facto peg
Intermediate	5 Pre announced crawling peg; de facto moving band narrower than or equal to +/-1%
Intermediate	6 Pre announced crawling band that is narrower than or equal to +/-2% or de facto horizontal band that is narrower than or equal to +/-2%
Intermediate	7 De facto crawling peg
Intermediate	8 De facto crawling band that is narrower than or equal to +/-2%
Intermediate	9 Pre announced crawling band that is wider than or equal to +/-2%
Intermediate	10 De facto crawling band that is narrower than or equal to +/-5%
Intermediate	11 Moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time)
Intermediate	12 De facto moving band +/-5%/ Managed floating
Floating	13 Freely floating
Floating	14 Freely falling

Note: Classification by Cushman and de Vita (2017) on Ilzetzki et al. (2017)



Table A5: Data Description and Sources

	Description	Source
Fix	Dummy, 1= fixed regime in t-1	Ilzetzi et al. (2017)
Intermediate	Dummy, 1= intermediate regime in t-1	Ilzetzi et al. (2017)
Floating	Dummy, 1= floating regime in t-1	Ilzetzi et al. (2017)
LnGDP	Ln(GDP), constant prices	Penn World Tables
LnGDP_sq	Ln(GDP), constant prices, squared	Penn World Tables
Ln(GDPpc)	Ln(GDP) in PPP per capita, constant prices,	Penn World Tables
Ln(GDPpc)_sq	Ln(GDP) in PPP per capita, constant prices, squared	Penn World Tables
L.growth	YoY real growth rate, t-1	Penn World Tables
Crisis years	Number of years to through	Penn World Tables
Severity	% change from previous peak to through	Penn World Tables
Fiscal	Change in fiscal expenditures, t+1 over t-1, t=crisis beginning	Penn World Tables
M2	M2/GDP, 3-year average, pre-crisis	World Bank
NX	NX/GDP, 3-year average, pre-crisis	World Bank
ER	Change in nominal ER, 3-year average, pre-crisis	World Bank
Debt	External debt/GDP, 3-year average, pre-crisis	World Bank
Inflation	Inflation rate in t-1	World Bank
Reserves	Change in total reserves (including gold), t over t-1, t=crisis beginning	World Bank
Res/GDP	Total reserves (including gold) over GDP, pre-crisis level	World Bank
Openness	Imports and exports of goods and services over GDP, pre-crisis level	World Bank
dNIR	Change in nominal IR, t minus t-1, t=crisis beginning	World Bank

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Aruba	2001	2	3	2	0	0
Aruba	2009	3	6	2	0	0
Angola	1981	1	3	15	0	0
Angola	1990	1	1	15	0	0
Angola	1992	2	5	14	0	0
Anguilla	1974	1	1	1	0	0
Anguilla	1982	1	2	1	0	0
Anguilla	1991	1	1	1	0	0
Anguilla	1995	1	1	1	0	0
Anguilla	2002	1	1	1	0	0
Anguilla	2008	5	7	1	0	0
Albania	1984	1	1	15	0	0
Albania	1987	2	2	15	0	0
Albania	1990	4	9	15	1	1
Albania	1997	1	2	14	1	0
United Arab Emirates	1978	1	1	4	0	0
United Arab Emirates	1982	5	9	4	0	0
United Arab Emirates	2009	1	2	2	0	0
Argentina	1959	1	1	14	0	0
Argentina	1963	1	1	12	0	0
Argentina	1975	2	2	14	0	0
Argentina	1978	1	1	14	0	0
Argentina	1981	5	9	14	1	1
Argentina	1985	1	2	2	1	0
Argentina	1988	3	4	14	1	0
Argentina	1995	1	1	2	0	0
Argentina	1999	4	6	2	1	0
Armenia	2009	1	4	8	0	0
Antigua and Barbuda	1995	1	1	1	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Antigua and Barbuda	2001	1	2	1	0	0
Antigua and Barbuda	2009	4	6	1	0	0
Australia	1982	1	1	8	0	0
Australia	1990	1	2	13	0	0
Austria	1975	1	1	7	0	0
Austria	1978	1	1	7	0	0
Austria	1981	1	1	4	1	0
Austria	2009	1	2	1	0	0
Azerbaijan	2011	1	1	4	0	0
Burundi	1968	2	2	4	0	0
Burundi	1972	1	1	2	0	0
Burundi	1974	1	2	2	0	0
Burundi	1980	1	1	2	0	0
Burundi	1982	1	1	2	0	0
Burundi	1984	1	1	7	1	0
Burundi	1993	6	9	10	1	1
Burundi	1999	2	2	10	0	0
Burundi	2003	1	1	10	0	0
Burundi	2005	1	1	7	1	0
Belgium	1958	1	1	4	0	0
Belgium	1975	1	1	4	0	0
Belgium	1981	1	1	4	0	0
Belgium	1993	1	1	4	0	0
Belgium	2009	1	1	1	0	0
Benin	1962	1	1	1	0	0
Benin	1975	2	4	1	0	1
Benin	1978	1	1	1	0	0
Benin	1983	1	1	1	0	0
Benin	1987	1	1	1	0	0
Benin	1989	1	1	1	0	0
Burkina Faso	1971	1	1	1	0	0
Burkina Faso	1973	1	1	1	0	0
Burkina Faso	1976	1	1	1	0	0
Burkina Faso	1980	1	1	1	0	0
Burkina Faso	1983	2	2	1	0	0
Burkina Faso	1987	1	1	1	0	0
Burkina Faso	1990	1	1	1	0	0
Bangladesh	1975	1	1	7	1	0
Bulgaria	1989	7	9	15	1	1
Bulgaria	1996	3	6	14	1	0
Bulgaria	2009	1	5	2	0	0
Bahrain	1975	1	1	2	0	0
Bahrain	1981	3	9	2	0	1
Bahrain	1985	1	5	2	0	0
Bahrain	1994	1	2	2	0	0
Bahamas	1974	2	5	2	0	0
Bahamas	1981	1	2	2	0	0
Bahamas	1990	3	6	2	0	0
Bahamas	2003	1	2	2	0	0
Bahamas	2008	2	7	2	0	0
Bosnia and Herzegovina	2009	2	4	2	0	1
Bosnia and Herzegovina	2012	1	1	2	0	0
Belize	1982	2	3	2	0	0
Bermuda	1981	2	5	2	0	1
Bermuda	1984	1	1	2	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Bermuda	1990	2	5	2	0	0
Bermuda	2002	1	1	2	0	0
Bermuda	2009	6	6	2	0	0
Bolivia	1953	3	6	14	1	1
Bolivia	1956	2	4	14	1	0
Bolivia	1968	2	5	8	1	0
Bolivia	1980	6	9	14	1	0
Brazil	1981	2	4	14	0	0
Brazil	1988	1	1	14	0	0
Brazil	1990	2	3	14	0	0
Brazil	2009	1	1	12	0	0
Barbados	1974	2	3	2	1	0
Barbados	1981	2	5	2	0	0
Barbados	1990	3	7	2	0	0
Barbados	2001	1	2	2	0	0
Barbados	2009	2	6	2	0	1
Barbados	2013	1	1	2	0	0
Brunei Darussalam	1980	5	9	11	0	1
Brunei Darussalam	1985	3	9	11	0	0
Brunei Darussalam	1997	2	2	11	0	0
Brunei Darussalam	2008	2	3	11	0	0
Brunei Darussalam	2013	2	2	11	0	0
Bhutan	1975	1	1	2	0	0
Botswana	1969	1	1	1	0	0
Botswana	2009	1	1	8	0	0
Central African Republic	1971	3	5	1	0	0
Central African Republic	1979	3	6	1	0	1
Central African Republic	1983	1	1	1	0	0
Central African Republic	1987	4	7	1	0	1
Central African Republic	1990	3	4	1	0	0
Central African Republic	1996	1	2	1	0	0
Central African Republic	2002	2	4	1	0	0
Central African Republic	2013	1	2	1	0	0
Canada	1954	1	1	4	0	0
Canada	1982	1	2	8	0	0
Canada	1991	1	2	8	0	0
Canada	2009	1	1	12	0	0
Switzerland	1958	1	1	2	0	0
Switzerland	1975	2	5	12	0	0
Switzerland	1982	1	2	11	1	0
Switzerland	1991	3	3	11	0	0
Switzerland	2009	1	1	11	0	0
Chile	1954	1	3	14	0	0
Chile	1959	1	1	14	1	0
Chile	1972	3	6	14	1	0
Chile	1982	2	5	14	1	0
Chile	1999	1	1	9	0	0
Chile	2009	1	1	12	0	0
China	1960	2	5	12	0	0
China	1967	2	2	12	0	0
China	1976	1	1	8	0	0
Côte d'Ivoire	1965	1	1	1	0	0
Côte d'Ivoire	1980	4	9	1	0	1
Côte d'Ivoire	1983	2	3	1	0	0
Côte d'Ivoire	1987	1	1	1	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Côte d'Ivoire	1990	3	5	1	0	0
Côte d'Ivoire	2000	3	8	1	0	0
Côte d'Ivoire	2011	1	1	1	0	0
Cameroon	1967	1	3	1	0	0
Cameroon	1976	1	1	1	0	0
Cameroon	1980	1	1	1	0	0
Cameroon	1986	9	9	1	0	0
D.R. of the Congo	1961	1	1	15	0	0
D.R. of the Congo	1965	1	1	12	1	0
D.R. of the Congo	1970	1	1	12	0	0
D.R. of the Congo	1975	4	9	14	1	1
D.R. of the Congo	1982	1	1	14	0	0
D.R. of the Congo	1989	8	9	14	0	0
Congo	1974	2	2	1	0	0
Congo	1977	1	2	1	0	0
Congo	1985	2	7	1	0	0
Congo	1993	2	3	1	0	0
Congo	1997	1	1	1	0	0
Congo	1999	1	1	1	0	0
Congo	2007	1	1	1	0	0
Colombia	1999	1	2	10	1	0
Comoros	1989	1	2	2	0	0
Comoros	1994	2	3	2	0	0
Cabo Verde	2009	1	1	2	0	0
Costa Rica	1956	1	1	4	0	0
Costa Rica	1961	1	1	4	0	0
Costa Rica	1981	2	3	14	1	0
Costa Rica	2009	1	1	5	0	0
Curaçao	2009	1	2	2	0	0
Curaçao	2012	3	3	2	0	0
Cyprus	1964	1	1	2	0	0
Cyprus	1974	2	5	8	1	0
Cyprus	2009	4	6	1	0	1
Cyprus	2012	3	3	1	0	0
Czech Republic	1997	2	2	8	1	0
Czech Republic	2009	3	6	8	0	1
Czech Republic	2012	2	2	8	0	0
Germany	1975	1	1	13	0	0
Germany	1982	1	1	13	0	0
Germany	1993	1	1	13	0	0
Germany	2003	1	1	1	0	0
Germany	2009	1	2	1	0	0
Djibouti	1985	2	3	2	0	0
Djibouti	1989	1	1	2	0	0
Djibouti	1991	1	1	2	0	0
Djibouti	1994	1	1	2	0	0
Djibouti	1996	2	3	2	0	0
Dominica	1979	1	2	1	0	0
Dominica	1989	1	1	1	0	0
Dominica	1993	1	1	1	0	0
Dominica	2002	1	1	1	0	0
Dominica	2005	1	1	1	0	0
Dominica	2009	1	1	1	0	0
Dominica	2012	1	2	1	0	0
Denmark	1955	1	1	2	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Denmark	1974	2	2	8	0	0
Denmark	1980	2	2	7	0	0
Denmark	1988	1	1	7	0	0
Denmark	1993	1	1	7	0	0
Denmark	2008	4	7	2	0	1
Denmark	2012	2	2	2	0	0
Dominican Republic	1961	1	1	10	0	0
Dominican Republic	1965	1	2	8	0	0
Dominican Republic	1968	1	1	8	0	0
Dominican Republic	1985	1	1	14	1	0
Dominican Republic	1990	1	2	14	0	0
Dominican Republic	2003	1	1	8	0	0
Algeria	1966	1	1	10	0	0
Algeria	1971	1	1	10	0	0
Algeria	1987	2	2	10	1	0
Algeria	1991	1	1	12	0	0
Algeria	1993	2	2	12	1	0
Ecuador	1983	1	1	14	0	0
Ecuador	1987	1	1	14	1	0
Ecuador	1999	1	2	14	1	0
Egypt	1954	2	3	12	0	0
Egypt	1966	2	2	10	0	0
Spain	1953	1	1	8	0	0
Spain	1959	1	1	8	0	0
Spain	1981	1	1	8	0	0
Spain	1993	1	1	8	0	0
Spain	2009	4	6	1	0	0
Estonia	1999	1	1	2	0	0
Estonia	2008	2	7	2	1	0
Ethiopia	1959	1	1	2	0	0
Ethiopia	1970	1	1	2	0	0
Ethiopia	1975	4	5	2	0	0
Ethiopia	1985	1	1	2	0	0
Ethiopia	1987	1	1	10	0	0
Ethiopia	1989	3	7	10	0	0
Ethiopia	1998	1	1	7	0	0
Ethiopia	2003	1	1	7	0	0
Finland	1953	1	1	10	0	0
Finland	1958	1	1	2	1	0
Finland	1991	3	5	8	1	0
Finland	2009	4	6	1	0	1
Finland	2012	3	3	1	0	0
Fiji	1980	1	1	8	0	0
Fiji	1982	2	2	8	0	0
Fiji	1985	1	1	8	0	0
Fiji	1987	1	2	8	0	0
Fiji	1991	1	1	8	0	0
Fiji	1997	1	2	8	0	0
Fiji	2000	1	1	8	0	0
Fiji	2007	1	1	8	0	0
Fiji	2009	1	1	8	0	0
France	1975	1	1	8	0	0
France	1993	1	1	4	0	0
France	2009	1	2	1	0	0
Gabon	1966	1	1	1	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Gabon	1977	4	9	1	0	1
Gabon	1982	1	1	1	0	0
Gabon	1985	3	5	1	0	0
Gabon	1992	1	2	1	0	0
Gabon	1999	4	9	1	0	1
Gabon	2006	1	1	1	0	0
Gabon	2008	2	2	1	0	0
United Kingdom	1969	1	1	2	0	0
United Kingdom	1974	2	3	12	0	0
United Kingdom	1980	2	3	12	0	0
United Kingdom	1991	1	2	9	1	0
United Kingdom	2008	2	5	11	1	0
Georgia	2009	1	1	8	0	0
Ghana	1972	1	1	12	1	0
Ghana	1975	6	9	14	0	1
Ghana	1979	4	7	14	1	0
Guinea	1964	3	6	2	0	1
Guinea	1967	3	6	2	1	0
Guinea	1977	1	1	7	0	0
Guinea	1979	1	1	10	1	0
Guinea	2009	1	1	7	1	0
Gambia	1971	1	1	2	0	0
Gambia	1976	1	1	2	0	0
Gambia	1979	1	2	2	0	0
Gambia	1983	1	2	15	0	0
Gambia	2005	1	1	8	0	0
Gambia	2011	1	1	10	0	0
Guinea-Bissau	1977	1	1	2	0	0
Guinea-Bissau	1980	4	8	2	1	1
Guinea-Bissau	1986	1	1	5	0	0
Guinea-Bissau	1998	3	7	1	0	1
Guinea-Bissau	2002	1	2	1	0	0
Guinea-Bissau	2012	1	2	1	0	0
Equatorial Guinea	1965	1	1	1	0	0
Equatorial Guinea	1970	1	1	2	1	0
Equatorial Guinea	1978	2	3	2	1	0
Equatorial Guinea	1986	1	1	1	0	0
Equatorial Guinea	1989	2	3	1	0	0
Equatorial Guinea	2010	1	1	1	0	0
Equatorial Guinea	2013	1	2	1	0	0
Greece	1974	1	2	8	1	0
Greece	1981	3	4	8	1	0
Greece	1987	1	1	8	0	0
Greece	1993	1	1	4	0	0
Greece	2008	6	7	1	0	0
Grenada	1980	1	1	1	0	0
Grenada	1992	2	3	1	0	0
Grenada	2001	1	1	1	0	0
Grenada	2004	1	1	1	0	0
Grenada	2006	1	1	1	0	0
Grenada	2009	3	6	1	0	0
Guatemala	1982	3	6	2	1	0
China, Hong Kong SAR	1998	1	2	2	0	0
China, Hong Kong SAR	2009	1	1	2	0	0
Honduras	1960	1	2	2	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Honduras	1963	1	1	2	0	0
Honduras	1974	1	1	2	0	0
Honduras	1982	2	2	2	0	0
Honduras	1994	1	1	10	0	0
Honduras	1999	1	1	7	1	0
Honduras	2009	1	1	2	0	0
Croatia	1999	1	1	4	1	0
Croatia	2009	6	6	4	0	0
Haiti	1967	1	1	2	0	0
Haiti	1981	5	9	2	1	1
Haiti	1986	2	2	8	0	0
Haiti	1989	4	9	10	1	1
Haiti	1992	3	9	10	1	1
Haiti	2001	3	6	10	1	0
Haiti	2010	1	2	7	0	0
Hungary	1985	1	1	10	0	0
Hungary	1988	1	1	10	0	0
Hungary	1990	4	9	10	1	0
Hungary	2009	2	6	8	1	1
Hungary	2012	1	1	8	0	0
Indonesia	1998	1	5	14	1	0
India	1965	2	2	2	0	0
India	1972	1	1	2	0	0
India	1979	1	1	8	0	0
Ireland	1956	3	4	2	0	0
Ireland	1983	1	1	8	0	0
Ireland	2008	2	6	1	0	0
Iran	1970	2	6	2	1	1
Iran	1975	1	1	8	0	0
Iran	1977	6	9	12	1	1
Iran	1984	4	7	12	0	0
Iran	1993	2	3	12	1	0
Iran	2012	2	3	14	1	0
Iraq	1972	1	1	2	1	0
Iraq	1981	5	9	2	1	1
Iraq	1989	4	9	12	0	1
Iraq	1994	2	2	12	0	0
Iraq	2002	2	3	12	0	0
Iceland	1961	1	1	8	0	0
Iceland	1967	2	3	8	0	0
Iceland	1983	1	1	14	0	0
Iceland	1988	1	1	8	0	0
Iceland	1991	2	3	8	0	0
Iceland	2009	2	5	10	0	0
Israel	1953	1	1	15	0	0
Israel	1965	1	1	2	0	0
Israel	2002	1	1	9	0	0
Italy	1975	1	1	8	0	0
Italy	1993	1	1	8	0	0
Italy	2008	5	7	1	0	1
Italy	2012	3	3	1	0	0
Jamaica	1974	6	9	2	1	0
Jamaica	1984	2	3	8	0	0
Jamaica	1997	2	4	7	1	0
Jamaica	2008	4	7	7	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Jordan	1968	1	1	2	0	0
Jordan	1970	3	7	2	0	1
Jordan	1973	2	3	2	0	0
Jordan	1983	1	1	2	0	0
Jordan	1985	1	1	2	0	0
Jordan	1989	2	3	10	1	0
Japan	1974	1	1	8	0	0
Japan	1998	2	2	13	0	0
Japan	2008	3	5	13	0	0
Kazakhstan	1998	1	1	8	0	0
Kenya	1968	1	1	2	0	0
Kenya	1970	1	1	2	0	0
Kenya	1975	1	1	2	0	0
Kenya	1992	1	2	14	1	0
Kyrgyzstan	2002	1	1	8	0	0
Kyrgyzstan	2005	1	1	7	1	0
Kyrgyzstan	2010	1	1	7	0	0
Kyrgyzstan	2012	1	1	7	0	0
Cambodia	1989	1	1	14	1	0
Saint Kitts and Nevis	1991	1	1	1	0	0
Saint Kitts and Nevis	1998	1	1	1	0	0
Saint Kitts and Nevis	2003	1	1	1	0	0
Saint Kitts and Nevis	2009	3	5	1	0	0
Republic of Korea	1980	1	1	7	1	0
Republic of Korea	1998	1	1	14	1	0
Kuwait	1973	6	9	2	1	1
Kuwait	1980	5	9	7	0	1
Kuwait	1985	1	1	7	0	0
Kuwait	1988	1	1	7	0	0
Kuwait	1990	2	3	7	0	0
Kuwait	1999	1	1	7	0	0
Kuwait	2009	2	3	4	0	0
Lao People's DR	1977	2	3	12	0	0
Lao People's DR	1987	2	2	12	1	0
Lebanon	1975	4	9	8	1	1
Lebanon	1982	1	2	10	0	0
Lebanon	1986	1	1	14	0	0
Lebanon	1988	2	9	14	1	1
Lebanon	1997	1	1	2	0	0
Lebanon	1999	1	1	2	0	0
Liberia	1975	1	1	1	0	0
Liberia	1980	6	9	1	1	0
Liberia	1990	6	9	15	1	0
Liberia	2003	2	5	13	1	0
Saint Lucia	1980	1	3	1	0	0
Saint Lucia	1997	1	1	1	0	0
Saint Lucia	2000	3	3	1	0	0
Saint Lucia	2005	1	1	1	0	0
Saint Lucia	2007	1	1	1	0	0
Saint Lucia	2010	1	1	1	0	0
Saint Lucia	2012	2	3	1	0	0
Sri Lanka	1953	1	1	2	0	0
Sri Lanka	1956	1	4	2	0	0
Sri Lanka	2001	1	1	7	1	0
Lesotho	1968	1	1	1	0	0



Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Lesotho	1971	1	1	1	0	0
Lesotho	1975	1	1	1	0	0
Lesotho	1979	2	7	1	1	0
Lithuania	1999	1	1	2	0	0
Lithuania	2009	1	5	2	0	0
Luxembourg	1954	1	1	2	0	0
Luxembourg	1975	1	3	4	0	0
Luxembourg	1981	1	1	4	0	0
Luxembourg	2008	2	3	1	0	0
Luxembourg	2012	1	1	1	0	0
Latvia	2008	3	7	11	1	0
China, Macao SAR	1996	4	5	2	0	0
Morocco	1965	2	2	2	0	0
Morocco	1981	1	1	11	0	0
Morocco	1983	1	1	11	0	0
Morocco	1987	1	1	11	0	0
Morocco	1992	2	2	11	0	0
Morocco	1995	1	1	11	0	0
Morocco	1997	1	1	11	0	0
Republic of Moldova	2009	1	1	8	0	0
Republic of Moldova	2012	1	1	8	0	0
Madagascar	1963	1	3	2	0	0
Madagascar	1972	4	7	15	1	1
Madagascar	1976	2	3	2	0	0
Madagascar	1981	2	8	2	1	0
Madagascar	1991	2	5	12	1	1
Madagascar	1994	1	1	14	1	0
Madagascar	2002	1	2	12	0	0
Madagascar	2009	1	3	12	0	0
Maldives	1975	1	2	4	0	0
Maldives	1982	1	1	8	1	0
Maldives	2005	1	1	2	0	0
Maldives	2009	1	1	4	0	0
Mexico	1953	1	1	2	0	0
Mexico	1982	2	3	14	1	0
Mexico	1986	1	3	14	0	0
Mexico	1995	1	2	14	1	0
Mexico	2001	1	1	12	0	0
Mexico	2009	1	1	12	0	0
TFYR of Macedonia	2001	1	2	7	1	0
TFYR of Macedonia	2009	1	1	4	0	0
TFYR of Macedonia	2012	1	1	4	0	0
Mali	1967	1	1	2	0	0
Mali	1973	2	2	4	0	0
Mali	1978	1	1	4	0	0
Mali	1980	1	2	4	0	0
Mali	1983	1	2	4	1	0
Mali	1987	1	2	1	0	0
Mali	1991	1	1	1	0	0
Mali	2000	1	1	1	0	0
Malta	1957	1	1	2	0	0
Malta	1983	1	1	11	0	0
Malta	2009	1	1	1	0	0
Myanmar	1986	4	7	11	1	1
Myanmar	1991	1	1	12	1	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Montenegro	1999	1	1	1	0	0
Montenegro	2009	2	4	1	0	1
Montenegro	2012	1	1	1	0	0
Mongolia	1990	4	9	2	1	0
Mongolia	2009	1	1	8	1	0
Mozambique	1977	1	1	2	0	0
Mozambique	1982	3	9	2	1	0
Mozambique	1992	1	1	14	0	0
Mauritania	1973	1	1	2	1	0
Mauritania	1977	2	2	8	0	0
Mauritania	1982	2	4	8	1	0
Mauritania	1990	1	1	10	0	0
Mauritania	1995	1	1	8	1	0
Mauritania	1997	1	2	8	0	0
Mauritania	2000	1	1	8	0	0
Mauritania	2009	1	1	8	0	0
Mauritius	1980	1	2	8	0	0
Malawi	1967	1	1	2	0	0
Malawi	1981	1	4	12	1	0
Malawi	1987	1	1	13	0	0
Malawi	1992	1	1	13	0	0
Malawi	1994	1	2	14	1	0
Malawi	2001	1	1	12	0	0
Malawi	2011	1	1	7	0	0
Malaysia	1958	1	1	2	0	0
Malaysia	1985	1	1	8	0	0
Malaysia	1998	1	2	13	1	0
Malaysia	2009	1	1	11	0	0
Namibia	1993	1	1	1	0	0
Niger	1964	1	1	1	0	0
Niger	1969	1	2	1	0	0
Niger	1972	3	6	1	0	0
Niger	1980	5	9	1	0	1
Niger	1983	6	9	1	0	1
Niger	1989	2	4	1	0	0
Niger	2000	1	1	1	0	0
Niger	2004	1	1	1	0	0
Niger	2009	1	1	1	0	0
Nigeria	1961	1	2	2	0	0
Nigeria	1965	3	5	2	0	0
Nigeria	1978	6	9	12	1	1
Nigeria	1987	1	1	13	1	0
Nicaragua	1958	2	2	10	0	0
Nicaragua	1968	1	1	2	0	0
Nicaragua	1978	6	9	2	1	1
Nicaragua	1982	1	1	13	0	0
Nicaragua	1984	8	9	14	1	1
Nicaragua	1993	1	1	5	1	0
Nicaragua	2009	1	1	5	0	0
Netherlands	1958	1	1	2	0	0
Netherlands	1981	2	2	7	0	0
Netherlands	2009	3	6	1	0	1
Netherlands	2012	2	3	1	0	0
Norway	1988	1	1	11	1	0
Norway	2009	1	3	11	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Nepal	1965	1	1	2	0	0
Nepal	1971	1	1	2	0	0
Nepal	1973	1	1	2	0	0
Nepal	1980	1	1	10	0	0
Nepal	1983	1	1	8	0	0
New Zealand	1967	2	2	2	0	0
New Zealand	1970	1	1	2	0	0
New Zealand	1975	2	6	11	0	0
New Zealand	1988	2	5	12	0	1
New Zealand	1991	1	1	12	0	0
New Zealand	2008	2	3	12	0	0
Oman	1973	1	1	2	0	0
Oman	1987	1	1	2	0	0
Oman	1999	1	1	2	0	0
Oman	2002	2	4	2	0	0
Oman	2011	1	1	2	0	0
Pakistan	1954	1	2	2	0	0
Panama	1983	1	1	1	0	0
Panama	1988	1	3	1	0	0
Peru	1958	1	1	10	0	0
Peru	1978	1	1	14	0	0
Peru	1982	2	4	14	0	0
Peru	1988	4	8	14	1	0
Peru	1998	1	1	8	0	0
Philippines	1984	2	5	14	1	0
Philippines	1991	1	2	7	1	0
Philippines	1998	1	1	12	1	0
Poland	1990	2	6	14	1	0
Portugal	1975	1	1	10	0	0
Portugal	1983	2	2	8	0	0
Portugal	1993	1	2	7	1	0
Portugal	2003	1	1	1	0	0
Portugal	2009	4	6	1	0	0
Paraguay	1962	1	1	8	0	0
Paraguay	1966	1	1	8	0	0
Paraguay	1982	2	3	12	1	0
Paraguay	1999	2	3	7	1	0
Paraguay	2009	1	1	12	0	0
Paraguay	2012	1	1	12	0	0
Qatar	1977	1	1	2	0	0
Qatar	1980	4	8	2	0	0
Qatar	1991	1	1	2	0	0
Qatar	1993	1	1	2	0	0
Romania	1997	3	4	14	0	0
Romania	2009	2	6	7	1	0
Russian Federation	2009	1	2	10	1	0
Rwanda	1975	1	1	2	0	0
Rwanda	1984	1	2	8	1	0
Rwanda	1989	5	9	8	1	1
Rwanda	1993	2	7	8	1	0
Saudi Arabia	1975	1	1	4	1	0
Saudi Arabia	1978	1	1	4	0	0
Saudi Arabia	1982	6	9	4	0	1
Saudi Arabia	1987	1	1	4	0	0
Saudi Arabia	1989	1	1	4	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Saudi Arabia	1993	1	3	4	0	0
Saudi Arabia	1999	1	1	4	0	0
Saudi Arabia	2001	2	2	4	0	0
Saudi Arabia	2009	1	1	4	0	0
Sudan (Former)	1972	1	2	15	1	0
Sudan (Former)	1978	4	8	15	0	1
Sudan (Former)	1983	2	3	15	0	0
Sudan (Former)	1987	1	1	15	0	0
Sudan (Former)	1989	1	1	15	0	0
Sudan (Former)	2011	2	3	8	1	0
Senegal	1963	1	1	1	0	0
Senegal	1967	1	1	1	0	0
Senegal	1969	1	1	1	0	0
Senegal	1971	1	1	1	0	0
Senegal	1973	1	2	1	0	0
Senegal	1977	2	2	1	0	0
Senegal	1980	2	2	1	0	0
Senegal	1984	1	2	1	0	0
Senegal	1989	1	1	1	0	0
Senegal	1991	1	1	1	0	0
Senegal	1993	1	1	1	0	0
Singapore	1964	1	1	2	0	0
Singapore	1985	1	1	11	0	0
Singapore	1998	1	1	11	0	0
Singapore	2001	1	1	11	0	0
Singapore	2009	1	1	11	0	0
Sierra Leone	1967	1	2	2	0	0
Sierra Leone	1976	1	1	12	0	0
Sierra Leone	1983	1	1	14	0	0
Sierra Leone	1991	7	9	14	1	1
Sierra Leone	1995	5	9	12	1	0
El Salvador	1979	4	9	8	1	0
El Salvador	2009	1	2	1	0	0
Serbia	1999	1	3	14	1	0
Serbia	2009	2	4	7	0	1
Serbia	2012	1	1	7	0	0
Sao Tome and Principe	1980	6	9	8	1	0
Sao Tome and Principe	1990	1	3	14	1	0
Suriname	1979	7	9	10	1	1
Suriname	1986	2	3	14	1	0
Suriname	1990	2	7	12	1	1
Suriname	1993	1	4	14	1	0
Suriname	1999	1	1	14	0	0
Slovakia	1999	1	1	8	1	0
Slovakia	2009	1	2	1	1	0
Slovenia	2009	3	6	1	0	1
Slovenia	2012	2	3	1	0	0
Sweden	1977	1	1	8	0	0
Sweden	1991	3	4	8	1	0
Sweden	2008	2	3	6	1	0
Sweden	2012	1	1	11	0	0
Seychelles	1980	4	5	8	0	0
Seychelles	1994	2	2	8	0	0
Seychelles	2000	4	6	8	0	0
Seychelles	2008	2	2	8	1	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
Syrian Arab Republic	1963	1	1	15	0	0
Syrian Arab Republic	1966	1	2	15	0	0
Syrian Arab Republic	1970	1	2	8	1	0
Syrian Arab Republic	1973	1	1	8	0	0
Syrian Arab Republic	1977	1	1	10	0	0
Syrian Arab Republic	1984	1	1	10	0	0
Syrian Arab Republic	1986	1	2	10	0	0
Syrian Arab Republic	1989	1	3	10	0	0
Syrian Arab Republic	1999	1	2	10	0	0
Syrian Arab Republic	2011	3	4	10	0	0
Chad	1963	2	6	1	0	1
Chad	1966	1	2	1	0	0
Chad	1972	2	2	1	0	0
Chad	1976	6	9	1	0	0
Chad	1993	1	1	1	0	0
Chad	1999	2	2	1	0	0
Chad	2006	1	1	1	0	0
Chad	2011	1	1	1	0	0
Togo	1973	3	4	1	0	0
Togo	1980	5	9	1	0	1
Togo	1987	1	1	1	0	0
Togo	1992	2	4	1	0	0
Togo	1998	1	1	1	0	0
Togo	2000	3	3	1	0	0
Thailand	1997	2	4	4	1	0
Thailand	2009	1	1	11	0	0
Trinidad and Tobago	1983	7	9	2	0	1
Trinidad and Tobago	1992	2	2	2	1	0
Trinidad and Tobago	2009	2	5	4	0	0
Tunisia	1967	1	1	2	0	0
Tunisia	1973	1	1	2	0	0
Tunisia	1982	1	1	8	0	0
Tunisia	1986	1	1	8	0	0
Tunisia	2011	1	1	8	0	0
Turkey	1954	1	2	12	1	0
Turkey	1959	2	3	12	1	0
Turkey	1979	2	2	14	0	0
Turkey	1994	1	1	14	0	0
Turkey	1999	1	1	10	0	0
Turkey	2001	1	1	14	1	0
Turkey	2009	1	1	12	0	0
U.R. of Tanzania	1981	1	1	12	0	0
U.R. of Tanzania	1983	1	1	12	0	0
Uganda	1975	1	2	12	0	0
Uganda	1978	5	9	12	1	1
Uganda	1984	2	3	14	1	0
Ukraine	2009	2	6	4	1	0
Uruguay	1958	4	6	14	1	1
Uruguay	1962	2	2	12	1	0
Uruguay	1972	1	2	14	0	0
Uruguay	1982	3	5	5	1	0
Uruguay	1988	1	1	14	0	0
Uruguay	1995	1	1	14	0	0
Uruguay	1999	4	7	8	1	0
United States	1954	1	1	2	0	0

Table A6: Crisis Periods

Country	Year	Crisis years	Recovery	ER regime	Regime change	Depress.
United States	1958	1	1	2	0	0
United States	1974	2	2	13	0	0
United States	1980	1	1	13	0	0
United States	1982	1	1	13	0	0
United States	1991	1	1	13	0	0
United States	2008	2	3	13	0	0
St. Vincent & Grenadines	1994	1	1	1	0	0
St. Vincent & Grenadines	2007	1	1	1	0	0
St. Vincent & Grenadines	2009	3	6	1	0	0
Venezuela	1960	1	2	2	0	0
Venezuela	1966	1	1	2	0	0
Venezuela	1980	4	7	2	1	0
Venezuela	1989	1	2	14	1	0
Venezuela	1994	1	1	14	0	0
Venezuela	1996	1	1	14	0	0
Venezuela	1999	1	2	6	0	0
Venezuela	2002	2	3	6	1	0
Venezuela	2009	2	3	2	0	0
Viet Nam	1973	1	1	15	0	0
Viet Nam	1980	1	1	15	0	0
Yemen	2011	2	4	10	0	0
South Africa	1977	1	1	12	0	0
South Africa	1982	2	2	12	0	0
South Africa	1985	1	2	12	1	0
South Africa	1990	3	4	15	0	0
South Africa	2009	1	1	12	0	0
Zambia	1969	1	3	2	0	0
Zambia	1973	1	1	12	0	0
Zambia	1975	1	1	12	0	0
Zambia	1977	4	6	12	0	0
Zambia	1984	2	2	12	1	0
Zambia	1991	2	2	14	0	0
Zambia	1994	1	3	14	0	0
Zambia	1998	1	1	14	0	0
Zimbabwe	1966	2	3	4	0	0
Zimbabwe	1976	3	4	4	0	0
Zimbabwe	1984	1	1	12	1	0
Zimbabwe	1992	1	2	14	0	0
Zimbabwe	1999	9	9	14	0	0