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The Credibility of a Soft Pegged Exchange Rate in Emerging Market Economies: Evidence from a Panel Data Study

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We examine the credibility of the pegged exchange rate system to the US dollar in eleven emerging market economies: Bahamas, Bahrain, Barbados, Belize, Egypt, Jordan, Oman, Kuwait, Lebanon, Qatar and Venezuela, over the annual span from 1996 to 2012. The interest rate differential between the domestic economies and the base country are regressed on a set of macro-fundamentals derived from the theory and empirical work of currency crises. We construct different setups to consider the small sample size at hand and the nexus between current account and money stock as in the notion implied by the monetary approach to the balance of payments. Both unbalanced fixed effects and first difference GMM models provide evidence that inflation differential is the main driving force for generating realignment expectations, and explains why anchoring interest rates in not feasible for soft fixed exchange rate targeting countries.

Key Words: Fixed Exchange Rate System; Panel data; Monetary Policy; Price Stability.

JEL Classification Numbers: C23, E50, E58.

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1. INTRODUCTION

Over the last century, fixed exchange rate systems have drawn considerable attention on their stability and durability. In fact, exchange rate targeting has been widely adopted as a trustworthy mechanism to stabilise inflation rates, and to eliminate the exchange rate risk, which complicates the decisions on financial and trade transactions. Theoretically, it is thought that a fixed exchange rate can act as a coordinating and signalling device to stabilise inflation expectations (Tamgac, 2013), with its virtue of being a perfectly controllable policy variable and an easily observed quantitative target of monetary policy (Herrendorf, 1997). These characteristics are based on the belief that all market agents under a peg propose zero domestic inflation rates and, consequently, with unambiguous actions of policy makers, the monetary policy is fully observed by individuals.

Despite these appeals, the salient failure of pegged exchange rate regimes across the world proves that the lifetime of pegs is short-lived. Even when the system does not fall apart, deteriorations in the level of nominal interest rates, reserves loss and/or exchange rate devaluation or revaluation often take place (Bubula and Otker-Rpbe, 2003). Indeed, the failure of fixed exchange rate systems, from the collapse of the gold standard, the Bretton Woods system, the European Monetary System (EMS), to the currency crises in Latin America and the contagion crisis in East Asia, raises susceptibilities on the real stability of pegs. Hence, the literature on currency crises has emerged to identify why a fixed exchange rate is more crises prone and what factors hamper the credibility of this nominal anchor. The first generation model of currency crises, led by Krugman (1979), demonstrates that the fall of the fixed exchange rate regime comes as a result of the inconsistency between the exchange rate policy and fiscal stance. The second generation models, on the other hand, presume that a currency crisis may happen when all macrofundamentals are well-behaved, owning to self-fulfilling expectations or sunspot events.[1] However, this assumption seems unlikely. Some economists; e.g., Krugman (1979) and Bordo and Schwartz (1996), have challenged this belief on the grounds that keeping the exchange rate fixed can only be threatened when the economic fundamentals are not sound.

In effect, during the past two decades, while the majority of countries abandoned all forms of exchange rate restrictions, and moved towards more resilient exchange rate arrangements, pegging exchange rates remained a preferable choice to import the anti-inflationary credible policy in some emerging markets and developing countries. The empirical works on past currency crises have shown that exchange rate fixers were not successful

[1]Sunspots are extrinsic random variables that affect market agents' decisions and are fundamentally based on the market psychology and self-fulfilling prophecies.

at bringing the foreign credibility into their economies prior to the fall (Svensson, 1994), and thereby, the fixed exchange rate system collapsed eventually. Therefore, following the insights of currency crises models, the pertinent question to raise is whether or not the recent experience of a conventional pegged exchange rate has been successful in bringing low inflation and consistent macroeconomic foundations into domestic economies.

To answer this question, and on the basis of currency crises empirical works, we build a projection exercise, as in the work of Rose and Svensson (1994), to study the credibility of a fixed exchange rate regime in eleven countries: Bahamas, Bahrain, Barbados, Belize, Egypt, Jordan, Oman, Kuwait, Lebanon, Qatar and Venezuela, adhered to the fixed exchange rate to the US dollar. The dollar, according to the IMF 2013 report on exchange rate arrangements and restrictions, serves as the preeminent anchor currency. However, owning to data limitation or unavailability for emerging markets and developing countries, the analysis includes only eleven countries with few missing observations. Therefore, with the difficulty to consider the analysis at individual level, and the intention to draw a general conclusion about the overall credibility of the conventional pegged exchange rate to the US dollar, the analysis relies on linear unbalanced panel data models.

The analysis is based upon the previous works on the EMS credibility before the crisis, which are mainly built on the Uncovered Interest rate Parity (UIP) condition. Ideally, the UIP presumes, under the assumption of market efficiency, that the expected changes in exchange rates are captured by nominal interest rate differentials. The interest rate differentials are thus used in the previous works on credibility to measure the realignment expectations of market agents. This measure for the credibility reflects the behaviour of the economic fundamentals, which are the determinants of market agents' realignment expectations. Nevertheless, the UIP failed empirically because of its fundamentals of rationality and risk neutrality (Sarno and Taylor, 2002).[2] So despite being a clearing mechanism in the capital market, the UIP condition has received criticisms on its biasedness. However, the UIP could differ across exchange rate regimes, time horizons and country-specific characteristics (Chaboud and Wright, 2005). Hence, not accepting the UIP could be attributed to the absence of a precise specification of the sampling distribution of data or to other reasons (Huisman et al., 1998). In this respect, Juselius (1995) says that both the UIP and the PPP are connected, so the rejection of either of them can be because it is necessary to analyse them together. The UIP may also fail if the time-varying risk premium is ignored (Francis et al., 2002). Therefore, to

[2]McCallum (1994) claims that the deviation from the UIP occurs as a result of monetary policy actions which exploit the trade-off between the interest rate and exchange rate stability.

reflect the premium required to convince agents to invest in risky currencies, it is necessary to account for the time-varying risk premia which comes from highly volatile prices and interest rates, namely in emerging market economies (Li et al., 2012). Consequently, as the exchange rate expectations can be correlated with the default risk premium (McCallum, 1994), the interest rate differential consists of two components: the currency premium and country premium (Frankel et al., 2004), both of which are highly vulnerable to economic fundamentals.[3] Unfortunately, a key problem with this is that decomposing the country risk premium from exchange rate premium is not a possible task.

In fact, the UIP works systematically across different economies, but its validity could differ across time, data and exchange rate regimes. Nevertheless, the tendency for any deviation in the short-run will revoke adjustments to restore equilibrium (Juselius, 1995). For fixed exchange rate regimes, a deviation from the UIP is one of fixed exchange rate systems' defences, i.e., the interest rate defense. According to Flood and Rose (2002) deviations from the UIP can be seen as a policy action, which is "a necessary condition for an interest rate defense", to convince investors to invest in domestic securities. The persistence of a positive interest rates differential also reflects that "the announced commitment to a fixed exchange rate may not be sufficient to eliminate devaluation risk completely" (Caramazza, 1993).

Hence, our aim is to study the overall credibility of the fixed exchange rate system, thus it is more important to understand how the economic fundamentals, which are used to form the market agents' expectations, may complicate anchoring domestic interest rates and widen the spread between the anchor country and the followers. In fact, market agents would expect higher return to bearing the risk related to investing in riskier assets (De Paoli and Sondergaard, 2009), or holding long-term assets (Thornton, 2012). So, if risk averse investors perceive that the monetary regime is highly credible and can meet the convertibility of the currency, such additional uncertainty should not exist. The major risk to hold assets denominated in domestic currency should be attributed to the nature of the peg under investigation; the peg which is described in the literature as 'soft'. To examine the credibility of a soft peg to the US dollar, we regress the interest rate differential as a measure of realignment expectations on a set of relevant macroeconomic indicators, i.e. inflation differential, current account, government debt, money supply and international reserves. The interest rate differential reflects the macroeconomic structure of the domestic economy, as changes in the macroeconomic factors affect domestic interest rates, given that the macroeconomic fundamentals of the anchor country are exogenous.

[3]The latter component of risk was ignored in all previous studies on currency crises.

We utilise the IMF *de facto* classification of exchange rate regimes and monetary policy framework of different years. Nevertheless, as it is important for market agents to acquire a publicly announced pledge of exchange rate fixity from monetary authority itself, it is intended to combine both *de jure* and *de facto* arrangements to define the year in which the fixed exchange rate was effectively adopted. We think that having an official announcement of the peg would certainly make the exchange rate policy a more transparent and stronger signalling device. However, owning to the absence of the IMF reports from the beginning of our assessment period, namely before 1999, we base our *de facto* classification on the changes in international reserves and nominal exchange rates, which is similar to the criteria of Levy-Yeyati and Sturzenegger (2005).

The paper reveals that inflation differential is the main factor that generates realignment expectations on the fixed exchange rate parity condition. This explains why anchoring interest rates is not possible for countries with conventional fixed exchange rate systems. Overall, importing the credibility of anti-inflationary policies from abroad is doubtful and, therefore, it is suggested that the monetary credibility should be built domestically.

The paper is organised as follows. Section two presents some theoretical considerations and introduce the credibility measure used in the study. Section three outlines the data. Section four presents the methodology applied. Section five contains the empirical results. Section six provides the conclusions and economic implications.

2. THEORETICAL CONSIDERATIONS AND BRIEF LITERATURE REVIEW

The ineffective monetary policy in a pegged exchange rate economy implies that any change in domestic assets' price, [increase/decrease], induces financial mobility, [outflow/inflow], but leaves the level of output unaffected. This means that the use of monetary tool can only lead to a deterioration in current account which lasts temporarily. In effect, restoring the equilibrium back to a predetermined central parity is achieved at the expense of foreign reserves. This indicates that money supply should be restricted to increasing. However, the first generation models of currency crisis have shown that monetary authorities with an exchange rate target may raise the stock of domestic assets.

On the basis of the standard UIP condition, the interest rate differential between the domestic countries and their anchor country, reflects the devaluation or realignment expectations of market agents, the representation of the UIP is as follows:

$$\Delta s^{e}_{t+k} = i_t - i^{f}_{t} \tag{1}$$

Where Δs^{e}_{t+k} denotes the changes in the logarithm of the spot exchange rate at time t, while the subscripts e and k refer to the market expectations and maturity of assets denominated in domestic currency, respectively, and the right hand side of the equation represents the interest rate differential (IR).

The vast majority of empirical works which attempt to explain the currency crises measure the devaluation expectations as the interest rate differential or the interest differential-drift adjustment for a fixed exchange rate currency within horizontal bands. However, the drift approach does not work for all the countries with soft pegs under assessment, since the majority of the countries in the study are point fixer except Egypt and Kuwait.[4] Furthermore, the literature on the EMS and other currency crises presumes that the country risk premium is relatively small and can be neglected, which means that the interest rate differential could fully reflect the expected changes in exchange rate. In our study and due to huge differences in economic structure between the base country and its followers, the measure of interest rate differential consists of two components: currency and country risk premium. However, although accounting for the country risk premium is intricate, we intend to measure the overall credibility of importing low prices from abroad, so such differentiating is not needed, given that realignment expectations increase with weak economic structure and institutions. In addition, the study considers interest rate on deposits, thereby, the country risk premium is likely to be attached to the deregulation of banking system and financial intermediaries whose work per se can be supervised by central banks.

In general, currency crises are mainly characterised by a huge devaluation in the value of currency; however, the devaluation is not always the only threat of speculative attacks. In some cases, the revaluation may result from speculations over a strong currency (Grilli, 1986). This in our study represents the case of an oil-producing country, namely Kuwait, which dropped out of the fixed exchange rate regime voluntarily during the onset of the 2008 financial crisis. The central bank of Kuwait could not preserve the central fixed parity, set at 299.63 fils per dollar with margins $\pm$ 3.5%, throughout the whole adoption period from 2003 to 2007; the nominal exchange rate even jumped to exceed the upper limit of the margin. Although it might be thought that the accumulation of foreign reserves in

[4]The central bank of Egypt was spurred to devalue several times to stimulate the competitive position. There is no determined band, though. Due to the capital inflows, the central bank found itself obliged to devalue with the escalating fiscal deficit, until it surrendered the parity in 2003. It is worth noting that the Egyptian Pound has been again in distress since the 2011 revolution; however, in our study, all the years following the exit from the pegged system is disregarded, provided our aim to measuring the credibility of the fixed exchange rate system.

such cases is better than their loss, maintaining the peg comes at the cost of price stability.

We calculate the interest rate differential, [5] as the difference between the domestic interest rates on deposits, with one year maturity, and the annual interest rate on treasury bills of the base country.[6] We link the credibility measure to a number of macroeconomic determinants of market expectations selected on the basis of the monetary strand of balance of payments theory and related empirical work on currency crises. The macrofundamentals included are: inflation differential (ID), ratio of debt to GDP (D), ratio of current account to GDP (CA), foreign reserves (R), money growth (Ms), ratio of import to GDP (M) and adequacy (Ad).[7] Unfortunately, it was not possible to obtain data on unemployment, labour costs, and fiscal deficit among many others. All the macro indicators are measured at yearly frequency, which better reflects the changes in interest rates cycle, as explained by Bernhardsen (2000). Furthermore, data on macro indicators for the examined countries cannot be obtained at shorter frequencies.

[5]We also attempt to measure the realignment expectations through employing the exchange rate pressure index of Eichengreen et al., (1994); however, the macroeconomic fundamentals did not reflect any information on the exchange rate pressure. The difference in results between the interest rate differential and the index could be attributed to three main reasons. First, the interest rate differential is one of the index components, which could be seen as a fixed exchange rate defense mechanism, i.e, the interest rate defense of the parity. Hence, although domestic interest rates changes are not generated away of fundamentals, fundamentals cannot detect a pressure on the exchange rate, given the role of the monetary authority in resisting speculative attacks via the interest rate defence. Second, During episodes of low credibility of the system or a surge of a speculative attacks, the monetary authority would borrow international reserves; these borrowed reserves are not captured by the index and thereby the changes in foreign reserves are not sufficient to reflect low credibility. Third, the index has a drawback concerning its weighting scheme; that is, although the index is set to make the variance of each part equal, the volatility of exchange rates changes are small and thus, in cases of revaluation or devaluation, the weight of these changes becomes extremely large, while changes in foreign reserves are assigned with a neglected weight (Li et al., 2006).

[6]Data on Treasury Bills (TB) for many fixed exchange rate targeters were not found. In some countries, the facility of TB began a few years ago. However, the differences between TB, available for some countries in the study, and that of the anchor country is higher than that between deposit interest rates and US' TB. Although a more positive interest rate differential would be more informative in reflecting the feedback from the macrofundamentals, we think that the negative consequences of using the interest rate on deposit is unlikely to be substantial.

[7]We did not include any reputational factors, although many countries in our sample were successful at keeping their exchange rate fixed. This is to consider the increased risk of pegging continuation. The few observations on unemployment rates available on the World Bank database indicate that the unemployment rate amounts around 20% in many countries; it even goes beyond 30% in some countries like Jordan, Bahamas and Egypt. Furthermore, in some cases, the country's credit rating might get downgraded financially, see for instance, Standard and Poor's-Jordan in years 2010-2012.

Essentially, inflation differential, among all macrofundamentals, is extremely substantial in determining the credibility of pegs, since it reflects the type of government in power. Theoretically, it is argued that a tough government pledges to maintain inflation down (Holden and Vikøren, 1996) and tracks closely inflation rates of the country to which the exchange rate is anchored (Frankel et al., 2004). The increase in domestic prices widens the differential which necessarily feedbacks to nominal interest rates. Many empirical studies on explaining the market agents' devaluation expectations have found a significant impact of inflation differential on interest rate differential prior to currency crises. The relation is supposed to be positive with the measure of devaluation expectations and negative with the credibility. Due to data limitation, data on fiscal balance could not be found, but the ratio of debt to GDP is a reflection of fiscal imbalances. This indicator has been widely incorporated in the literature to study the effect of government mismanagement and to empirically test the fiscal discipline of pegged exchange rates as implied by the theory.[8] Indeed, an increase in fiscal debt threatens the sustainability of a fixed exchange rate system and lowers its credibility. The demand management also entails that money supply growth, as marked in the literature review section, must remain constant. In fact, the inability to control money supply endangers the re-controllability over the system stability. In addition, the literature emphases that current account imbalances is a major reason for financial crises (Lane and Milesi-Ferretti 2012) as the deterioration in current account decreases the level of foreign reserves stock and increases the external debt (Krugman, 1996).

We also consider the foreign reserves as a main determinant of realignment expectations, Since the foreign reserves, under the fixed exchange rate system, is a main instrument to maintain the stability of the regime and hold off speculative attacks. Hence, we include the changes in reserves as a possible determinant which might affect the credibility positively. In addition, we incorporate a ratio relating reserves to domestic money growth, that is, an adequacy ratio of the foreign reserve level. A high adequacy ratio indicates that money supply grows relatively faster than international reserves, which lowers the credibility of the peg.

3. DATA

The main sources of the data are the IMF international financial statistics and the World Bank database.[9] The data consists of annual observa-

[8]See for example Amato and Tronzano (2000), Tornell and Velasco (2000), Marini and Piersanti (2003), Vuletin (2004) and El-Shagi (2011).

[9]The codes of the data are provided in Table 2

tions from 1996 through 2012 for eleven emerging markets and developing economies: Bahamas, Bahrain, Barbados, Belize, Egypt, Jordan, Oman, Kuwait, Lebanon, Qatar and Venezuela. The countries are selected based on their exchange rate classification and data availability.

TABLE 1.

Panel Data Properties

Macro-indicator	Obs	Mean	S.D	Min	Max
IR	183	3.8	4.7	−1.76	30.02
ID	187	3.24	10.11	−6.81	96.94
D	170	54.93	39.64	4.72	177.01
CA	187	1.92	15.1	−31.71	45.02
R	187	9.47	24.24	−80.76	69.63
Ms	184	14.14	12.93	−2.04	75.28
AD	183	0.66	0.39	0.09	1.79
M	182	45.21	18.44	16.72	94.2

TABLE 2.

Data Identification Codes and Sources

Macro-indicator Macro-indicator	Data source	Code
IR	IMF-IFS	60L..ZF
TB	IMF-IFS	60C–ZF
ID, except Oman and Lebanon	IMF-IFS	64..XZF
D	WEI	GC.DOD.TOTL.GD.ZS
CA	WEI	BN.CAB.XOKA.GD.ZS
R	IMF-IFS	1..DZF
Ms	WEI	FM.LBL.BMNY.ZG
M	WEI	NE.IMP.GNFS.ZS
ID for Oman and Lebanon	WEI	FP.CPI.TOTL.ZG
Nominal ER	IMF-IFS	DG.ZF

Data on international foreign reserves, nominal exchange rate, annual interest rate on deposit, annual interest rate on Treasury Bill of Federal Reserve bank and inflation for all countries but Lebanon and Oman, are extracted from the IMF/international financial statistics.[10] Whereas, the ratio of debt to GDP, current account to GDP, money growth, import to GDP indicators and inflation for Lebanon and Oman are imported from

[10]Data on treasury bills could not be found for the majority of countries. Yet, for countries whose TB rates are available, the differential is positive and even higher then that of domestic annual deposit.

the World Development Indicators database. Table 1 shows the number of observations and the basic statistics of each indicator used in the analysis.

4. METHODOLOGY

We start with a panel model which assumes exogeneity of explanatory variables. This exogeneity assumption works theoretically with the Krugman model on demand mismanagement, where money supply is assumed to be determined by the monetary authority. As our sample consists of oil-producing countries, non-oil producers and import-reliant economies, the economic heterogeneity should be considered. Applying the pooled OLS approach, without inserting country specific dummy variables, will inevitably provide biased estimates. Hence, to eliminate all the countries-unobserved heterogeneity, the fixed effects model is employed. The specified linear representation is as follows.

$$RE = X_{it}\beta_{\kappa} + \alpha_i + \varepsilon_{it} \tag{2}$$

$$U_{it} = \alpha_i + \epsilon_{it} \tag{3}$$

Where the regressand is the proxy for market agents' realignment expectations, i.e., interest rate differential. X_{it} is a vector of regressors, which either change over time but remain constant at country level, or vary across both time and countries. β_k is the $\kappa \times 1$ vector of coefficient on X. α_i and ε_{it} are random country-specific effects and idiosyncratic disturbances, respectively. Whereas, the makeup of the two, U_{it}, is called the composite errors. In this model, the country-unobserved component is presumed to be correlated with the set of regressors. The correlation with the time-invariant component of the error permits the explanatory variables to enter the equation in the very limited feature of endogeneity (Cameron and Trivedi, 2010).

Employing the OLS allows to accept implicitly the restrictive assumption that the regressors are uncorrelated with the latent variables, which necessities using the within estimator. However, unlike the within estimator, random effects assume that a country heterogeneity is orthogonal to regressors.

As a first step, it is crucial to test for group-wise homoscedasticity in the variances of individual heterogeneity. Breusch and Pagan (1980) build a statistic test based on Lagrange Multiplier (LM) fundamental set under the normality assumption of the composite errors. In later work, Wooldridge (2010)'s LM test adds an advantage of not limiting the distribution of the errors to normality. As the panel sample at hand is unbalanced, we follow the LM test for unbalanced panels, which is constructed by Greene (2003)

and modified for empirical work in STATA package to take account of the distribution of composite errors and the variation in the number of observation across individual units. The test is developed under the assumption of cross sectional dependence. Hence, the rejection of the homoscedasticity is likely to be, in addition to the reasons related to unobserved components and idiosyncratic errors correlation, due to contemporaneous correlations across individuals. Subsequently, the test can be utilised to identify the presence of cross sectional dependence based on the squared pair-wise correlation coefficients in long panels, where T is sufficiently larger than N. Nevertheless, the size distortions get bigger when N increases, and thereby LM statistic provides invalid inferences. Pesaran (2004) develops a Cross-sectional Dependence (CD) test which depends upon the pair-wise correlation coefficient when the cross sectional dimension is much larger than the time series dimension. In his spatial dependence Monte Carlo simulation based on a comparison with Breusch and Pagan test, generated under different setups, he finds that the LM test is only effective when N is considerably smaller than T. However, based on this simulation and with the consideration of our study's panel dimensional properties, where the number of countries is slightly smaller than that of the time dimension, the CD test is nearly as powerful as the LM test. In the presence of the spatial patterns, Driscoll and Kraay (1998) propose a spatial correlation standard errors for pooled OLS and fixed effects estimator in finite samples, which make the estimator feasible regardless of the cross sectional dimension at hand. Their simulations and empirical examples reflect the necessity to account for spatial dependence in order to avoid incorrect statistical inferences.

The autocorrelation test used in this study is derived by Wooldridge (2010) which detects the existence of first order serially correlated errors. The test is introduced to empirical usage by Drukker et al., (2003) to be performed after the estimation of pooled OLS and fixed effects models, and is workable whether the explanatory variables are endogenous or exogenous. A final specification test we run is the Hausman (1978) test to compare which of the two estimators, fixed or random effects, is more consistent under the null hypothesis of countries correlated effects.

Nevertheless, the fixed or random effects models do not allow for dynamic settings and assume that regressors protrude exogenously. In effect, assuming endogeneity is of important interest in the study as the macrofundamentals cannot be determined away from the money market dynamics.

Inserting lagged regressand in equation 2 revokes the inconsistency of the within estimator due to the correlation with the idiosyncratic errors. Moving further to assume that some or all the regressors are endogenously determined would violate the condition of no correlation between the errors and regressors. One way to control for heteroskedasticity and autocorrela-

tion associated with this dynamic specification is to use a set of moments assumed to be orthogonal to the error process, or in another term, exogenous. Hence, to allow for endogenous regressors in the linear specification, the First Difference-Generalised Method of Moments (FD-GMM) is performed considering the appropriate lag length in regressors.

The general model that represents all the above features is,

$$\Delta y_{it} = \Delta\delta_1 y_{i,t-1} + \cdots + \delta_q \Delta y_{i,t-q} + \beta \Delta x_{it} + \Delta U_{it} \tag{4}$$

Δ is the difference operator, $y_{i,t-q}$ denotes the lagged dependent variable up to time q, x_{it} is the exogenous, predetermined or endogenous regressors.

We decide to apply the FD-GMM, put forward by Arellano and Bond (1991), rather than the system GMM in an attempt to minimise the number of instruments, as the size of the sample at hand is small. Moreover, since all the variables considered in the study are in level, the lagged differenced instruments are more likely to be powerful. However, the critical concern is to acquire valid instruments. Sargan test with an asymptotic Chi-squared distribution under the homoscedasticity assumption tests the validity of instruments or overriding restrictions, which refers to the difference between the number of instruments employed and that of estimated parameters. Although the rejection of the null hypothesis implies the need to reconsider either the model setup or the instruments, the test does not work when the errors are heteroscedastic. It also over-rejects the null of instruments invalidity as stated by Arellano and Bond (1991). In the last step, Arellano and Bond's test for autocorrelation is carried out, in which the errors must be uncorrelated at the second order.

5. RESULTS

In order to account for shifts in exchange rate regimes, as the fixing start year differs across the countries, a constant binary variable for the exchange rate arrangement along a set of slope dummies interacted with the time-varying macrofundamentals are inserted.[11]

The fundamentals are divided into four 'projection-equations'.[12] In the first equation, we include inflation differential, debt, current account, foreign reserves, money growth and their related slope dummy variables. In the second equation, all the above indicators are kept but the current account is replaced by the ratio of import to GDP.[13] Then in the third setup, we exclude both the money growth and import and employ the current

[11]Other dummies were incorporated to consider the 2008 financial crisis. However, the dummies were found insignificant.

[12]The variables are lagged one period to avoid simultaneity bias.

[13]Due to data unavailability, neither data on export nor openness were found for many countries in the sample. We sought to consider the trade-effect on the realignment

account alongside the other variables. Finally, the adequacy measure is incorporated to act for the dual impact of money growth and foreign reserves. We intend to split the indicators into these sorts of groups for two reasons.[14] First, our sample size is relatively small, so it is likely to obtain less powerful results as the number of regressors increases. Second, to take into account the negative relation between the stock of money supply and foreign reserves, as implied by the monetary approach to the balance of payments theory.[15] The basic idea of the theory is that when central banks issue more domestic money supply, the public expenditure goes above the national income, which, consequently, leads to a balance of payments deficit (Blejer (1979)). In other words, the current account deficit can be interpreted as an outcome of excrescent growth of domestic money.[16]

Along the previously mentioned indicators, other setups, not reported, were estimated. We incorporated other variables, considered in the empirical studies of currency crises models, like the exchange rate misalignment, pressure index, that is, the ratio of international reserves to import, output and real exchange rate. The latter factor is vital in determining the competitiveness, which represents a main temptation for realignment. Indeed, this fundamental receives much concerns in the literature since the appreciation in real exchange rate was the main reason for devaluation in many previous currency crises (Dornbusch et al., 1995). Nonetheless, employing the relative PPP-based measure may induce collinearity with the inflation differential, especially as many cases in our sample kept their nominal exchange rate fixed. With the difficulty to incur data on other real exchange rate indexes, namely the traded-goods index, the results with relative PPP-based index would be inaccurate. More importantly, the sample contains five oil-producing countries, where exports rely mainly upon crude oil whose prices are determined in the world market, as well as some import-reliant economies; the fact which makes the supposition of realignment to improve the external position unlikely.[17] Nevertheless, all the unreported indicators were found to be constantly insignificant.

To ensure that our setups are not prone to multicollinearity, we apply the Variance Inflation Factor (VIF) test after the pooled OLS regression.

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expectations, but the choice to include the ratio of import to GDP came from the inability to acquire a reliable measure for the degree of openness.

[14]See Frankel and Rose (1996) for more relevant variables on currency crashes in emerging markets.

[15]See Frenkel and Johnson (2013).

[16]We also remove the reserves in other setups, but the outcomes remain unchanged.

[17]Egypt represents a special case, though. Two years before the abandonment of the peg, the central bank devalued several times in an attempt to support the price competitiveness. Even though, its IMF classification did not change until the peg was abandoned.

TABLE 3.

Within estimators with default standard errors

	equation 5	equation 6	equation 7	equation 8
	coefficient	coefficient	coefficient	coefficient
ID	0.576^{***}	0.556^{***}	0.615^{***}	0.642^{***}
D	0.033^{*}	0.041^{**}	0.037^{*}	0.034^{*}
CA	0.034		0.023	0.022
R	−0.023	−0.001	-0.031^{*}	
Ms	−0.065	-0.155^{**}		
eradummy	2.244	−4.068	1.68	0.656
pdummy	-0.369^{***}	-0.318^{***}	-0.416^{***}	-0.448^{***}
ddummy	0.01	0.006	0.014	0.011
cadummy	-0.065^{*}		-0.063^{*}	-0.067^{*}
rdummy	0.036^{**}	0.009	0.035^{**}	
mdummy	0.000	0.103		
M		-0.185^{***}		
tdummy		0.136^{*}		
AD				−0.733
addummy				2.243
cons	−0.794	7.213^{***}	−1.586	−1.104
VIF	4.23	5.08	4.15	5.07
Fixed effect[F-test]	F(5,83)=6.96	F(5,5)=23.46	F(4,86)=7.39	F(4,74)=9.72
P-F(11,141)	(0.000)	(0.000)	(0.000)	(0.000)
LM test: Chi2 (11)	−359.77	−280.66	−1222.46	−530.4
Prob > Chi2	(0.000)	(0.000)	(0.000)	(0.000)
Autocorrelation, F(1,10)	−133.43	−96.118	−76.072	−83.148
Prob > F(1,10)	(0.000)	(0.000)	(0.000)	(0.000)
CD test	−6.506	−6.611	−9.168	−6.672
CD test: probability	(0.000)	(0.000)	(0.000)	(0.000)
Hausman: Prob>Chi2 (9)	−0.023	−0.1	−0.081	−0.011

Note: VIF is the variance inflation factor that tests whether multicollinearity exists. Greene (2003)'s LM test for unbalanced panel: H_0: $\sigma_i^2 = \sigma^2$ for all I. Wooldridge (2010)'s autocorrelation H_0: no first order autocorrelation. Pesaran (2004)'s CD test: H_0: errors are cross sectional independence. ***, **, * denote significance at 1%, 5% and 10%, respectively. Standard Errors are between parenthesis. Probability is between brackets.

The test hypothesises that a percentage of 10 or above is an evidence of collinearity among regressors. The results, shown in Table 3, suggest that our setups are not subject to multicollinearity.

The following equations represent the different constructed setups.

$$\begin{aligned}\Delta IR_{i,t} =&\mathrm{era}_{i,t} + \beta_1 \Delta ID_{i,t-1} + \beta_2 D_{i,t-1} + \beta_3 CA_{i,t-1} + \beta_4 R_{i,t-1} + \beta_5 \mathrm{Ms}_{i,t-1} \\ &+\beta_6 \mathrm{pduumy}_{i,t-1} + \beta_7 \mathrm{ddummy}_{i,t-1} + \beta_8 \mathrm{cadummy}_{i,t-1} \\ &+\beta_9 \mathrm{rdummy}_{i,t-1} + \beta_{10} \mathrm{mdummy}_{i,t-1} + \alpha_i + \varepsilon_{i,t}\end{aligned} \tag{5}$$

$$\begin{aligned}\Delta IR_{i,t} =&\mathrm{era}_{i,t} + \beta_1 \Delta ID_{i,t-1} + \beta_2 D_{i,t-1} + \beta_3 M_{i,t-1} + \beta_4 R_{i,t-1} + \beta_5 \mathrm{Ms}_{i,t-1} \\ &+\beta_6 \mathrm{pduumy}_{i,t-1} + \beta_7 \mathrm{ddummy}_{i,t-1} + \beta_8 \mathrm{tdummy}_{i,t-1} \\ &+\beta_9 \mathrm{rdummy}_{i,t-1} + \beta_{10} \mathrm{mdummy}_{i,t-1} + \alpha_i + \varepsilon_{i,t}\end{aligned} \tag{6}$$

$$\begin{aligned}\Delta IR_{i,t} =&\mathrm{era}_{i,t} + \beta_1 \Delta ID_{i,t-1} + \beta_2 D_{i,t-1} + \beta_3 CA_{i,t-1} + \beta_4 R_{i,t-1} \\ &+\beta_5 \mathrm{pduumy}_{i,t-1} + \beta_6 \mathrm{ddummy}_{i,t-1} + \beta_7 \mathrm{cadummy}_{i,t-1} \\ &+\beta_8 \mathrm{rdummy}_{i,t-1} + \alpha_i + \varepsilon_{i,t}\end{aligned} \tag{7}$$

$$\begin{aligned}\Delta IR_{i,t} =&\mathrm{era}_{i,t} + \beta_1 \Delta ID_{i,t-1} + \beta_2 D_{i,t-1} + \beta_3 CA_{i,t-1} + \beta_4 AD_{i,t-1} \\ &+\beta_5 \mathrm{pduumy}_{i,t-1} + \beta_6 \mathrm{ddummy}_{i,t-1} + \beta_7 \mathrm{cadummy}_{i,t-1} \\ &+\beta_8 \mathrm{addummy}_{i,t-1} + \alpha_i + \varepsilon_{i,t}\end{aligned} \tag{8}$$

Where the regressand is interest rate differential, era is the exchange rate arrangement constant dummy variable, which takes the value of one when the exchange rate system is fixed, and zero otherwise, ID is the inflation differential, D and CA are the ratio of debt to GDP and current account to GDP, respectively, Ms is the money growth, M refers to the percentage of imported goods on GDP, R denotes the log of changes in international reserves, in US dollar, AD is the ratio of money growth to foreign reserves, pdummy (inflation differential), ddummy (debt), mdummy (money growth), cadummy(current account), tdummy (import), addummy (adequacy), rdummy (foreign reserves) are the interactive dummy variables, calculated by multiplying each related regressor with exchange rate arrangement.[18]

The estimation of the fixed effects model indicates that the individuals' heterogeneity is significant. Expectedly, the F-test reported in Table 3 implies a rejection of the null hypothesis that all dummy parameters except one are zero, and thereby assures the inefficiency of pooled OLS estimates of coefficients.

Nevertheless, the specification tests for autocorrelation and heteroskdasticity indicate that the results of fixed effects, reported in Table 3 are inefficient. In fact, with autocorrelated and heteroskedastic errors, relying on the default errors is misleading. Therefore, we first apply the White (1980)'s robust standard errors.[19] The results are presented in Table 4. We modify the Hausman test to consider the usage of robust standard errors following the procedures set by (Hoechle (2007)). The within estimator

[18]The credibility proxy is regressed on the lagged values of the expectations determinants.

[19]The results using cluster robust errors are found indistinguishable from those using the robust standard errors.

TABLE 4.

Within estimators with robust standard errors

	equation 5	equation 6	equation 7	equation 8
	coefficient	coefficient	coefficient	coefficient
ID	0.576^{***}	0.556^{***}	0.615^{***}	0.642^{***}
D	0.033	0.041	0.037	0.034
CA	0.034		0.023	0.022
R	-0.023	-0.001	-0.031^{**}	
Ms	-0.065	-0.155^{***}		
eradummy	2.244	-4.068	1.68	0.656
pdummy	-0.369^{***}	-0.318^{***}	-0.416^{***}	-0.448^{***}
ddummy	0.01	0.006	0.014	0.011
cadummy	-0.065^{*}		-0.063	-0.067
rdummy	0.036^{*}	0.009	0.035^{**}	
mdummy	0.000	0.103		
M		-0.185		
tdummy		0.136		
AD				-0.733
addummy				2.243
cons	-0.794	7.213^{**}	-1.586	-1.104
Hausman-robust SE: Prob>F	(0.000)	(0.000)	(0.000)	(0.000)

Note: ***, **, * denote significance at 1%, 5% and 10%, respectively. Probability is between brackets.

according to the test is more efficient than random effects. The results, shown in Table 4, reflect that inflation differentials in all setups account roughly for 20% of the spread. However, some of the other indicators appear either significant in their interactive dummy or with a wrong sign, such as international reserves in equation 7. Nevertheless, the homoscedasticity tested by the LM test for unbalanced panels may also indicate the presence of cross sectional dependence. In addition, the CD test, developed by Pesaran (2004), can also be used to examine whether the cross sections are independent. Both tests, as reported in Table 3, confirm that we cannot presume independence across countries. Therefore, we utilise the Driscoll and Kraay (1998) corrector for standard errors. In principle, this is built upon Newey-West autocorrelation and heteroskedasticity correction for cross-sections averages of moment conditions (Hoechle, 2007). Consequently the lag length needed to correct for autocorrelation is specified by the default plug-in procedures, that is,

$$L(T) = floor\left[4\left(\frac{T}{100}\right)^{\left(\frac{2}{9}\right)}\right] \tag{9}$$

where T is the number of time dimension.[20] In accordance, the Hausman specification test is corrected in the way defined by Hoechle (2007). The test's p-value rejects the hypothesis that random effect provides consistent estimates.

TABLE 5.

Within estimators with spatial correlation standard errors

	equation 5	equation 6	equation 7	equation 8
	coefficient	coefficient	coefficient	coefficient
ID	0.576^{***}	0.556^{***}	0.615^{***}	0.642^{***}
D	0.033	0.041^{**}	0.037^{*}	0.034^{*}
CA	0.034^{*}		0.023	0.022
R	-0.023^{*}	-0.001	-0.031^{***}	
Ms	-0.065	-0.155^{***}		
eradummy	2.244	-4.068^{*}	1.68	0.656
pdummy	-0.369^{***}	-0.318^{***}	-0.416^{***}	-0.448^{***}
ddummy	0.01	0.006	0.014	0.011
cadummy	-0.065^{***}		-0.063^{**}	-0.067^{***}
rdummy	0.036^{**}	0.009	0.035^{***}	
mdummy	0.000	0.103^{**}		
M		-0.185^{**}		
tdummy		0.136^{*}		
AD				-0.733
addummy				2.243
cons	-0.794	7.213^{**}	-1.586	-1.104
Hausman-Spatial dependence	(0.000)	(-0.009)	(0.000)	(0.000)

Note: ***, **, * denote significance at 1%, 5% and 10%, respectively. Probability is between brackets.

The results, presented in Table 5, provide evidence that inflation differential is the main driving fundamental that affects the credibility of the peg. On average, 20% of interest rate differential is explained by the difference in inflation between the domestic economies and the base country. This reflects why anchoring interest rates is not possible in the exchange rate targeters considered in this study. In fact, inflation differential increases the prices of traded goods, and, consequently, deteriorates the competitive position of an economy. It also triggers higher inflationary expectations, which affect the long-run interest rates (Bernhardsen, 2000).

The impact of inflation differential on realignment expectations is also confirmed by the results of FD-GMM, shown in Table 6, where the coefficient of inflation differential appears with the same magnitude and significance. The deterioration in current account, in the first equation of Table 5,

[20] See Hoechle (2007) for more details.

TABLE 6.

First difference GMM

	equation 5	equation 6	equation 7	equation 8
	coefficient	coefficient	coefficient	coefficient
L.IR	0.254^{**}	0.183^{*}	0.222	0.208
ID	0.472^{***}	0.453^{***}	0.508^{***}	0.544^{***}
Ms	-0.177^{*}	-0.214^{***}		
D	0.021	0.03	0.041	0.034
CA	0.058^{*}		0.021	0.005
R	-1.565	2.474	-6.417^{**}	
pdummy	-0.265^{**}	-0.199^{**}	-0.289^{***}	-0.318^{***}
ddummy	-0.002	-0.009	-0.005	0.003
mdummy	0.08	0.132^{*}		
cadummy	-0.082^{**}		-0.062	-0.043
rdummy	5.006	0.077	7.044^{***}	
eradummy	2.88	-2.809	2.622	2.348
M		-0.153		
tdummy		0.107		
AD				-0.003
addummy				0.003
cons	-0.317	7.232^{***}	-2.327	-2.047
Sargan test: Chi2	(128)=147.37	(128)=139.47	(132)=171.67	(132)=176.46
Sargan test: Prob>Chi2	0.115	0.225	0.011	0.005
Arellano and Bond	0.654	0.718	0.156	0.151

Note: ***, **, * denote significance at 1%, 5% and 10%, respectively. Sargan test tests the validity of overriding restrictions under homoscedasticity assumption. Arellano and Bond tests whether errors are independent at second order.

also affects the credibility negatively by 3%. In the same equation, however, reserves appear with a low effect and a wrong sign. Nonetheless, when we apply the non-linear test to examine whether the total effect is not different from zero, the assumption is not rejected. It is possible, as emphasised by Rose and Svensson (1994), that the changes in international reserves do not precisely measure the ability of central banks intervention. Unfortunately, coupled with the absence of data on intervention for our set of countries, the capability of central bank to intervene in foreign exchange rate markets has not been captured. Further, the reserves effect might not be clear with the possibility of borrowing reserves during the episodes of unsuccessful speculative attacks (Holden and Vikøren, 1996). When current account is replaced by import in equation 6, the money growth becomes significant, but appears in a wrong sign. Likewise, the ratio of imported good to GDP significantly influences the credibility of the peg, but with an incorrect sign.

Whether this ratio is seen as a measure for the vulnerability to external shocks that is, the inflation shocks, namely in import-reliant countries, or as a composition of current account, the coefficient should appear in a positive sign. This inaccuracy might be attributed to unavailability of data on export for all countries, the factor which weakens the setup structure of equation 6. According to the results of setups 6 and 8, debt to GDP ratio appears significant, regardless of the exchange rate arrangement.

TABLE 7.

Within estimators Six countries: Bahamas, Bahrain, Barbados, Belize, Jordan and Oman.

	equation 5	equation 6	equation 7	equation 8
	coefficient	coefficient	coefficient	coefficient
ID	0.244^{***}	0.272^{***}	0.242^{***}	0.222^{***}
D	0.018	0.013	0.023^{**}	0.032^{**}
CA	-0.025^{**}		-0.026^{***}	-0.031^{*}
R	1.91	0.834	1.307	
Ms	−0.023	−0.007		
M		-0.037^{***}		
AD				3.096^{***}
cons	1.122	3.657^{***}	0.627	−1.38
LM test: Chi2 (6)	37	54.01	48.28	40.19
Prob > Chi2	(0.000)	(0.000)	(0.000)	(0.000)
Autocorrelation, F(1,5)	87.14	74.933	94.042	72.079
Prob > F(1,5)	(0.000)	(0.000)	(0.000)	(0.000)
Hausman: Prob>F(5,5) (9)	0	0	0.399	0

Note: Greene (2003)'s LM test for unbalanced panel: $H_0 : \sigma_i^2 = \sigma^2$ for all I. Wooldridge (2010)'s autocorrelation H_0: no first order autocorrelation. ***, **, * denote significance at 1%, 5% and 10%, respectively. Standard Errors are between parenthesis. Probability is between brackets.

In general, the sample might be highly heterogeneous with the poolability of low and high income countries. In particular, some countries are characterised either with high interest rates such as Venezuela, or with positive current account and low debt, e.g., Qatar and Kuwait. Hence, we exclude such countries and examine the credibility for six countries which have been fixing the exchange rate during the study period: Bahamas; Bahrain, Barbados, Belize, Jordan, Oman. We investigate the relation using the within estimator approach.[21] The results, shown in Table 7, manifests that inflation differential has a dominant impact on expectations. Moreover, current

[21]The sample became smaller with the exclusion of some countries, so we did not proceed to the FD-GMM.

account deteriorations affect the credibility by 3% across the setups.[22] Interestingly, the domestic currencies are expected to realign when the money supply growing faster than foreign reserves. The plausible explanation for this strong effect of the adequacy ratio is that the adequacy of reserves in these countries might not be enough to repel the realignment expectations. However, to allow for endogeneity in the macroeconomic setting, as addressed by the second generation models, we utilise the Arellano and Bond (1991)'s first difference GMM, which give almost the same results obtained from the fixed effects model, as shown in Table 6

The results from the fixed effects model and GMM model show that the inflation differential is the main driving force for realignment expectations. This is in line with other studies where inflation differential acts as a prominent explanatory fundamental for the majority of collapsed exchange rate regimes prior to crises, which partially explains the difficulty to anchor interest rates. When we refine the sample to include only the countries which did not experience any shift in exchange rate regime during the study period, the fixed effects model shows that inflation differential remains a vital factor. The deterioration in current account also appears to be an important indicator for expecting realignment in these countries. Interestingly, the reserve adequacy is highly significant and imposes strong impacts on expectations. This might reflect the economic nature of these countries, where four of them are oil-importers; even the two oil producing countries, Bahrain and Oman, produce less crude oil compared to their neighbours: Kuwait and Qatar.[23]

6. CONCLUSIONS

The study underlines the relationship between the realignment expectations and macroeconomic fundamentals, which reflects the overall credibility, in eleven countries adhered to the fixed exchange rate to the US dollar. The exchange rate fixers are assumed to preserve a very low interest rate differential which, according to the UIP, is supposed to equal the expected changes in exchange rates.

Different setups are constructed to consider the small sample size at hand and to account for the relation between current account and money stock in the principle implied by the monetary approach to the balance of payments. It is found, by applying the fixed effects model and GMM model, that anchoring inflation through pegging the currency is dubious,as the inflation differential accounts for around 20% of the changes in interest rate

[22]We also estimate the random effects for setup 7 as suggested by the Hausman test under spatial dependence. All the determinants remain with the same significance and magnitude but the current account turns to be insignificant.

[23]The US energy information administration.

differential. This finding is consistent with the results of the earlier work on credibility of the EMS at time proceeding the crisis. This undoubtedly indicates that credibility of low inflation must be built domestically and set on micro-foundations. As addressed by Svensson (1994), the monetary credibility can be built domestically by consolidating "institutional reforms". These reforms entail the integrated cooperation of monetary and exchange rate policies including central bank independence. However, the fixed exchange rate system might serve the international trade as the dollar is the currency used in pricing petroleum. It is also likely that the seemingly prolonged successful exchange rate targeting in the examined countries, except in Egypt, Venezuela and Kuwait, reflects their economic nature of being either oil-producers or reliant importers.

REFERENCES

Amato, A. and M. Tronzano, 2000. Fiscal policy, debt management and exchange rate credibility: Lessons from the recent italian experience. *Journal of Banking & Finance* **24**, 921-943.

Arellano, M. and S. Bond, 1991. Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *The Review of Economic Studies* **58**, 277-297.

Bernhardsen, T., 2000. The relationship between interest rate differentials and macroeconomic variables: a panel data study for european countries. *Journal of International Money and Finance* **19**, 289-308.

Bordo, M. D. and A. J. Schwartz, 1996. Why clashes between internal and external stability goals end in currency crises, 1797–1994. *Open Economies Review* **7**, 437-468.

Breusch, T. S. and A. R. Pagan, 1980. The lagrange multiplier test and its applications to model specification in econometrics. *The Review of Economic Studies* **1**, 239-253.

Bubula, A. and I. Otker-Robe, 2003. Are pegged and intermediate exchange rate regimes more crisis prone? IMF Working Paper, WP/03/223.

Cameron, A. C. and P. K. Trivedi, 2010. Microeconometrics using stata. Stata Press.

Caramazza, F., 1993. French-German interest rate differentials and time-varying realignment risk. *IMF Staff Papers* **40**, 567-583.

Chaboud, A. P. and J. H. Wright, 2005. Uncovered interest parity: it works, but not for long. *Journal of International Economics* **66**, 349-362.

De Paoli, B. and J. Sondergaard, 2009. Foreign exchange rate risk in a small open economy. Bank of England working papers, no. 365.

Dornbusch, R., I. Goldfajn, R. O. Valdés, S. Edwards, and M. Bruno, 1995. Currency crises and collapses. *Brookings Papers on Economic Activity* **26**, 219-293.

Driscoll, J. C. and A. C. Kraay, 1998. Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics* **80**, 549-560.

Drukker, D. M. et al., 2003. Testing for serial correlation in linear panel-data models. *Stata Journal* **3**, 168-177.

Eichengreen, B., A. K. Rose, and C. Wyplosz, 1994. Speculative attacks on pegged exchange rates: an empirical exploration with special reference to the european monetary system. Technical report, National Bureau of economic research, no 4898.

El-Shagi, M., 2011. The impact of fixed exchange rates on fiscal discipline. *Scottish Journal of Political Economy* **58**, 685-710.

Flood, R. P. and A. K. Rose, 2002. Uncovered interest parity in crisis. *IMF Staff Papers* **49**, 252-266.

Francis, B. B., I. Hasan, and D. M. Hunter, 2002. Emerging market liberalization and the impact on uncovered interest rate parity. *Journal of International Money and Finance* **21**, 931-956.

Frankel, J., S. L. Schmukler, and L. Serven, 2004. Global transmission of interest rates: monetary independence and currency regime. *Journal of International Money and Finance* **23**, 701-733.

Frankel, J. A. and A. K. Rose, 1996. Currency crashes in emerging markets: An empirical treatment. *Journal of International Economics* **41**, 351-366.

Frenkel, J. A. and H. G. Johnson, 2013. *The Monetary Approach to the Balance of Payments (Collected Works of Harry Johnson)*, Volume 7. Routledge.

Greene, W. H., 2003. Econometric analysis, 5th. *Upper Saddle River, NJ*.

Grilli, V. U., 1986. Buying and selling attacks on fixed exchange rate systems. *Journal of International Economics* **20**, 143-156.

Hausman, J. A., 1978. Specification tests in econometrics. *Econometrica* **46**, 1251-1271.

Herrendorf, B., 1997. Importing credibility through exchange rate pegging. *The Economic Journal* **107**, 687-694.

Hoechle, D., 2007. Robust standard errors for panel regressions with cross-sectional dependence. *Stata Journal* **7**, 281.

Holden, S. and B. Vikøren, 1996. The credibility of a fixed exchange rate: how reputation is gained or lost. *Scandinavian Journal of Economics* **98**, 485-502.

Huisman, R., K. Koedijk, C. Kool, and F. Nissen, 1998. Extreme support for uncovered interest parity. *Journal of International Money and Finance* **17**, 211-228.

Juselius, K., 1995. Do purchasing power parity and uncovered interest rate parity hold in the long run? an example of likelihood inference in a multivariate time-series model. *Journal of Econometrics* **69**, 211-240.

Krugman, P., 1979. A model of balance-of-payments crises. *Journal of Money, Credit and Banking* **11**, 311-325.

Krugman, P., 1996. Are currency crises self-fulfilling? In *NBER Macroeconomics Annual 1996, Volume 11*, pp. 345-407. MIT press.

Lane, P. R. and G. M. Milesi-Ferretti, 2012. External adjustment and the global crisis. *Journal of International Economics* **88**, 252-265.

Levy-Yeyati, E. and F. Sturzenegger, 2005. Classifying exchange rate regimes: Deeds vs. words. *European economic review* **49**, 1603-1635.

Li, D., A. Ghoshray, and B. Morley, 2012. Measuring the risk premium in uncovered interest parity using the component garch-m model. *International Review of Economics & Finance* **24**, 167-176.

Li, J., R. S. Rajan, and T. Willett, 2006. Measuring currency crises using exchange market pressure indices: the imprecision of precision weights. In *available at www.princeton.edu/pcglobal/conferences/IPES/papers/chiu_willett_S1100_*, Volume 1.

Marini, G. and G. Piersanti, 2003. Fiscal deficits and currency crises. CEIS Tor Vergata-Research Paper Series, no. 15.

McCallum, B. T., 1994. A reconsideration of the uncovered interest parity relationship. *Journal of Monetary Economics* **33**, 105-132.

Pesaran, M., 2004. General diagnostic tests for cross section dependence in panels. Cambridge Working Papers in Economics, no. 0435.

Rose, A. K. and L. E. Svensson, 1994. European exchange rate credibility before the fall. *European Economic Review* **38**, 1185-1216.

Sarno, L. and M. P. Taylor, 2002. *The economics of exchange rates*. Cambridge University Press.

Svensson, L. E., 1994. Fixed exchange rates as a means to price stability: what have we learned? *European Economic Review* **38**, 447-468.

Tamgac, U., 2013. Duration of fixed exchange rate regimes in emerging economies. *Journal of International Money and Finance* **37**, 439-467.

Thornton, D. L., 2012. How did we get to inflation targeting and where do we need to go to now? a perspective from the us experience. *Federal Reserve Bank of St. Louis Review* **94**(January/February 2012).

Tornell, A. and A. Velasco, 2000. Fixed versus flexible exchange rates: Which provides more fiscal discipline? *Journal of Monetary Economics* **45**, 399-436.

Vuletin, G. J., 2004. Exchange rate regimes and fiscal performance. do fixed exchange rate regimes generate more discipline than flexible ones? *Proceedings of the Econometric Society* **no. 74.**

Wooldridge, J. M., 2010. *Econometric analysis of cross section and panel data*. MIT press.