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Soft Power and Exchange Rate Volatility

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Abstract

Standard models—based exclusively on macro-financial variables—have made little progress in explaining the behavior of exchange rates. In this paper, we introduce a neglected set of "soft power" factors capturing a country's demographic, institutional, political and social underpinnings to uncover the "missing" determinants of exchange rate volatility over time and across countries. Based on a balanced panel dataset comprising 115 countries during the period 1996–2011, the empirical results are generally robust across different estimation methodologies and show a high degree of persistence in exchange rate volatility, especially in emerging market economies. After controlling for standard macroeconomic factors, we find that the "soft power" variables—such as an index of voice and accountability, life expectancy, educational attainment, the z-score of banks, and the share of agriculture relative to services—have a statistically significant influence on the level of exchange rate volatility across countries.

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Contents

Page

I. Introduction 3

II. Literature Overview and Conceptual Framework 4

III. Measuring Exchange Rate Volatility 5

IV. Econometric Model And Estimation Methodology 7

V. Data 9

VI. Empirical Results 12

VII. Concluding Remarks 15

Figures

1. Exchange Rate Volatility 6

Tables

1. Pooled Model (OLS) 17
2. Pooled Model (IV) 19
3. Fixed Effects Model (GMM): Exogenous Control Variables 21
4. Fixed Effects Model (GMM): Exogenous PCA Control Variables 23
5. Fixed Effects Model (GMM): Endogenous PCA Control Variables 25

Appendix Tables

A1. Sample of Countries 27

A2. Variable Definitions 28

References 31

I. INTRODUCTION

Since the breakdown of the Bretton Woods system, major shifts in the global economy and financial markets have exacerbated the magnitude of exchange rate fluctuations. While Friedman (1953) famously argued that exchange rate volatility is a manifestation of macroeconomic volatility, empirical studies have uncovered a range of anomalies and puzzles that contradict the theoretical models of exchange rates. Meese and Rogoff (1983), for example, showed that there is no stable relationship between exchange rate movements and fundamental factors, conflicting with the theoretical models predicting that exchange rate volatility can only increase when the variability of the underlying fundamentals increases. Exchange rate volatility is still of great interest to academics, policymakers, and market practitioners because the potential linkages between the behavior of exchange rates and other economic and financial variables.

The general consensus in the literature is that the behavior of exchange rates reflects global and country-specific macro-financial factors, such as income growth, inflation, fiscal and current account balances, foreign exchange reserves, financial and trade openness, and the size and type of capital flows. It has also been shown that structural characteristics of the foreign exchange market such as the exchange rate regime and technical features such as order flows influence the extent of exchange rate volatility. Notwithstanding a cascade of follow-up papers, however, the findings of Meese and Rogoff (1983) remain unchallenged, with little progress in explaining—and predicting—exchange rate fluctuations with macroeconomic fundamentals. Although Engle and West (2005) contend that exchange rates and fundamentals may be linked in a way that is more or less consistent with asset-pricing models of the exchange rate, this disconnect undermines the notion of exchange rates as a shock absorber. If exchange rates fluctuate beyond what is necessary to absorb real economic shocks, they become an autonomous source of shocks and instability. A significant share of exchange rate fluctuations is indeed shown to be explained by shocks originating in the foreign exchange market itself, due to movements in the exchange rate risk premium (Artis and Ehrmann, 2006; Farrant and Peersman, 2006).

The purpose of this paper is therefore to empirically unearth the "missing" cross-country determinants of exchange rate volatility, in contrast to the large literature that aims to explain the changes in the level of exchange rates over time. Using a balanced panel comprising 115 countries from 1996 to 2011, we investigate the importance of "soft power" variables that encapsulate a country's demographic, institutional, political and social underpinnings that are generally ignored in the literature.[1] In addition, we include 10 control variables, drawn from

[1] The concept of soft power—popularized by Nye (1990) in studying international relations—captures intangible resources beyond material considerations. Although the Institute for Government has developed an index of soft power for a limited set of countries over the period 2009–2012, it is difficult to quantify a multi-dimensional concept in a single indicator. Accordingly, in this paper, we focus on the underlying factors of "soft power" in a broad set of countries over a longer span of time.

the literature on exchange rate modeling, and which are expected to capture the conventional macro-financial drivers of exchange rate volatility. With regards to the "soft power" characteristics of individual countries, rather than relying on an arbitrary choice of a small set of variables, we take an 'agnostic' view and initially consider a wide range of demographic, institutional, political and social indicators. However, since there is inevitably a high degree of collinearity among the explanatory variables, we utilize a variable reduction technique that systematically eliminates those variables in the original set that are best explained by the remaining variables. The empirical findings are generally robust across different estimation methodologies and indicate a high degree of persistence in exchange rate volatility over time, especially in emerging market economies. After controlling for conventional measures of macroeconomic performance, we find that a number of "soft power" variables—such as an index of voice and accountability, life expectancy, educational attainments, the z-score of banks, and the share of agriculture relative to services—have a significant influence on the volatility of exchange rates across countries.

The remainder of this paper is organized as follows. Section II provides a brief overview of the literature. Section III explains how we estimate exchange rate volatility. Sections IV and V describe our empirical methodology and data sources, respectively. The econometric results are presented in Section VI, while we offer concluding remarks in Section VII.

II. Literature Overview and Conceptual Framework

The literature on exchange rates is vast, covering a wide range of theoretical and empirical strands. The volatility of exchange rates can have welfare costs through multiple channels, but mainly by increasing transaction costs and reducing the gains to international trade. A rich body of studies points out, albeit with mixed results, a negative effect of exchange rate volatility on investment, employment, growth, and international trade (Chowdhury, 1993; Federer, 1993; Dixit and Pindyck, 1994; Ramey and Ramey, 1995; Caballero and Pindyck, 1996; Obstfeld and Rogoff, 1998; Aizenman and Marion, 1999; Dell'Ariccia 1999; Bleaney and Greenway, 2001; Sauer and Bohara, 2001; Devereux and Engel, 2003; Rosenberg, 2004; Chong and Gradstein, 2009; Baum and Caglayan, 2010). This is likely to be a significant concern in emerging market economies, especially where large exchange rate misalignments contribute to the risks of sudden reversals of capital flows.

With regards to the principal determinants of exchange rate volatility, the focus has been almost exclusively on macroeconomic fundamentals and structural characteristics of the foreign exchange market. Among the key findings in this literature is a positive link between real exchange rate volatility and the flexibility of nominal exchange rates (Mussa, 1986; Baxter and Stockman, 1989; Flood and Rose, 1995; Morales-Zumaquero and Sosvilla-Rivero, 2010). The relationship between exchange rate volatility and economic openness, on the other hand, is less clear. While Hau (2002) and Bleaney (2008) show that more open economies tend to have lower exchange rate volatility, Amor (2008) finds the opposite result in the case of Asian countries. Bravo-Ortega and di Giovanni (2006), on the other hand, show that exchange rate volatility is negatively related to trade openness and per capita GDP and positively to trade taxes and a measure of remoteness (trade-weighted distance from the rest of the world), concluding that trade costs increase exchange rate volatility. The literature also suggests that productivity shocks play an important role in explaining real exchange rate fluctuations (Alexius, 2005). Beyond macroeconomic fundamentals, Lyons (2001) and Canales-Kriljenko and Habermeier (2004) show that structural characteristics and technical features of the foreign exchange market may influence the degree of exchange rate volatility.

There is no theoretical map linking measures of "soft power" to exchange rate volatility.[2] There is, however, a bourgeoning literature on the institutions-growth nexus, laying out a conceptual framework that is relevant to the analysis of how "soft power" can influence the behavior of exchange rates (or other asset prices, for that matter). There is broad consensus in the literature that institutions—generally defined as the economic, legal, political, and social organization of a country—are the fundamental determinants of cross-country differences in economic performance and financial developments (North and Thomas, 1973; La Porta *et al.*, 1997; Acemoglu, Johnson, and Robinson, 2001). Acemoglu and others (2003) expand this negative relationship to macroeconomic volatility, as measured by the volatility of the growth rate of output per worker, and demonstrate that macroeconomic policies have no predictive power after controlling for the impact of institutions. The institutions-growth nexus also helps to clarify the linkages between "soft power" characteristics—underpinning the quality of institutions—and exchange rate volatility.

The contribution of this paper is therefore to investigate the nature and scale of relationship between exchange rate volatility and institutional infrastructure and social features across countries. We expect to see "soft power" factors to have a prominent role in determining exchange rate volatility—directly and indirectly—by fostering better policy choices and shaping the pattern and evolution of macroeconomic fundamentals and risk premia.

III. Measuring Exchange Rate Volatility

Rather than focusing exclusively on the behavior of bilateral exchange rates, we adopt an aggregate view of exchange rate volatility, using trade shares as weights to obtain the volatility of a country's effective exchange rate. It is also important to realize that the degree of exchange rate variability to which a country is exposed is not necessarily closely related to the type of exchange rate regime it has adopted. A country may peg its currency to an anchor currency (or a basket of currencies), but will float against all other currencies if the anchor currency does as well. Accordingly, since the choice between using the nominal effective

[2] Phillips and others (2013) empirically link exchange rates to indicators of demographics, institutions and social policy in assessing current accounts, but this analysis does not attempt to explain exchange rate volatility.

exchange rate (NEER) and the real effective exchange rate (REER) is not likely to affect significantly measured volatility or the econometric results, we prefer the REER as the unit of measurement in this analysis.

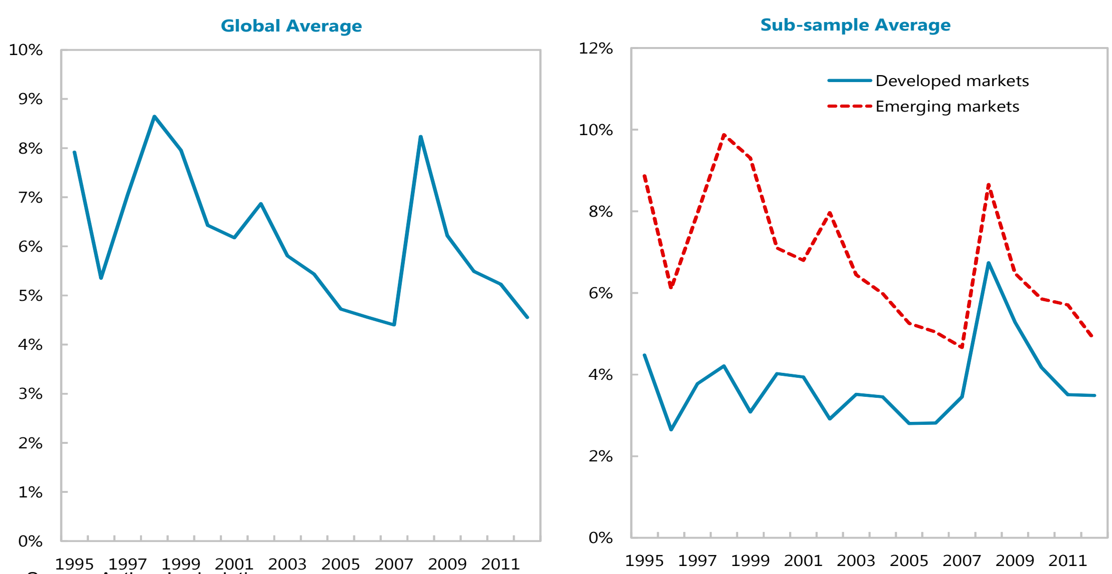
We measure the annual volatility of the exchange rate as the natural logarithm of the realized variance of the REER return, computed using monthly returns. In particular, we define the volatility of the exchange rate for country *i* in year *t* as

(1) $\mathrm{VOL}_{i,t} = \ln \sum_{k=1}^{12} r_{i,t-1+k/12}^{2}$

where $r_{i,t-1+k/12} = \ln s_{i,t-1+k/12} - \ln s_{i,t-1+(k-1)/12}$ is the change in the natural logarithm of the REER for country *i* between month *k*–1 and month *k* of year *t*–1, and $s_{i,t-1+k/12}$ is the exchange rate at the end of month *k* of year *t*.

Figure 1 plots the realized standard deviation of REER returns over time, averaged across countries, both for the full sample (Panel A) and the developed and emerging market sub-samples (Panel B). Exchange rate volatility declined from an average of 7.7 percent in the second half of the 1990s to 5.5 percent during the period 2000–07, driven mainly by the moderation in emerging market economies. The difference between average exchange rate volatility between advanced and developing countries narrowed from the peak of 6.2 percentage points in 1999 to 1.2 percentage points in 2007. Although the global economic and financial crisis resulted in a surge in exchange rate volatility to 8.2 percent in 2008, the behavior of REERs moderated towards the pre-crisis level by 2012. However, there is substantial variation across countries and over time, with a minimum of 1 percent to a maximum of 86 percent during the period 1995–2012.

Figure 1. Exchange Rate Volatility, 1995-2012



Source: Authors' calculations.

IV. Econometric Model And Estimation Methodology

The "soft power" variables are more likely to have an impact on exchange rate volatility in the cross-section rather than the time series, and accordingly our starting point is a pooled regression that attempts to uncover this:

$$(2)\ \mathrm{VOL}_{i,t} = \mu + \alpha \mathrm{VOL}_{i,t-1} + \beta' \mathbf{X}_{i,t} + \gamma' \mathbf{Z}_{i,t} + \varepsilon_{i,t}$$

where $\mathrm{VOL}_{i,t}$ is the volatility of the REER for country *i* in year *t*, as defined in Section III, $\mathbf{X}_{i,t}$ is a *J*x1 vector of structural variables, $\mathbf{Z}_{i,t}$ is a *K*x1 vector of macroeconomic control variables and $\varepsilon_{i,t}$ is a random error, which we assume to be uncorrelated across time and countries. The dynamic nature of the model reflects the fact that it is well documented in the literature that at short horizons, the volatility of exchange rate returns is a highly persistent process. The degree of persistence in volatility decreases as the return horizon increases but, as we show below, it remains significant at the annual horizon used in this study.

We begin the analysis by estimating the pooled model given by (2) using two approaches. In the first, we assume that all of the right hand side variables are strictly exogenous and use OLS. In the second, we assume that the control variables, $\mathbf{Z}_{i,t}$, are pre-determined and use the Instrumental Variables (IV) approach, with the first lag of the control variables used as instruments. In both cases, we report robust standard errors of the estimated coefficients. The model is estimated both for the full sample of 115 countries and the sub-sample of 90 emerging market countries and 25 developed market countries.

To further explore the relationship between exchange rate volatility and the "soft power" variables, we consider a fixed effects version of the model:

$$(3)\ \mathrm{VOL}_{i,t} = \mu_i + \alpha \mathrm{VOL}_{i,t-1} + \beta' \mathbf{X}_{i,t} + \gamma' \mathbf{Z}_{i,t} + \varepsilon_{i,t}$$

where μ_i is an unobserved country-specific effect. The presence of the country-specific effect in conjunction with the lagged dependent variable creates a bias in the usual least squares dummy variable estimator when the time dimension is fixed, since demeaning creates a correlation between the error term and the lagged dependent variable in the transformed model. We therefore estimate the model using the System Generalized Method of Moments (GMM) approach of Blundell and Bond (1998). This involves constructing two sets of equations, one with first differences of the endogenous and pre-determined variables instrumented by suitable lags of their own levels, and one with the levels of the endogenous and pre-determined variables instrumented with suitable lags of their own first differences.[3]

[3] The use of the Difference GMM approach of Arellano and Bond (1991), which uses only the first difference equation, yields similar results but with reduced statistical significance for some variables.

Strictly exogenous variables in the model enter the instrument matrix in the conventional way, i.e. in first differences or levels depending on the equation, with one column per instrument. The number of available instruments increases with the time period t and so the model is estimated as a system of equations, with one equation for each period.

The System GMM approach yields consistent estimates of the model parameters while allowing for potential endogeneity in the regressors. We estimate two versions of the model given by Equation (3). In the first, we assume that the control variables, $\mathbf{Z}_{i,t}$, are strictly exogenous. In the second, we assume that they are endogenous. In both cases, we assume that the structural variables are strictly exogenous. We use one-step GMM and report robust standard errors.[4] We also report the Hansen J test of over-identifying restrictions for the joint validity of the instruments. As an additional test of the validity of the instruments, we report the Arellano and Bond (1998) test for second-order serial correlation in the error term of the first-difference equation.[5]

The use of all available lagged levels of the variables in the GMM estimation leads to a proliferation in the number of instruments. This reduces the efficiency of the estimator in finite samples, and potentially leads to over-fitting. This is a particular problem when the right hand side variables are assumed to be pre-determined or endogenous, since for these variables, each time period contributes a separate vector to the instrument matrix. A further issue is that the use of a large number of instruments significantly weakens the Hansen J test of over-identifying restrictions, and so the detection of over-identification is hardest when it is most needed. Conversely, however, restricting the instrument set too much results in a loss of information that leads to imprecisely estimated coefficients. Estimation of such models therefore involves a delicate balance between maximizing the information extracted from the data on the one hand, and guarding against over-identification on the other.

To establish the robustness of our results, therefore, we estimate various specifications of the model. First, only the one or two most recent lags of the available instruments are used in the GMM estimation. Second, the instruments are collapsed into a single vector, which reduces the number of moment conditions for a given number of instrument lags used. Third, the control variables are replaced by their significant principal components (i.e. those that have an associated eigenvalue greater than unity). We report the results obtained using different combinations of these restrictions.

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[4] The use of the two-step GMM yields similar results but with reduced statistical significance for some variables.

[5] The error term in the first-difference equation is first order serially correlated by construction, but higher order serial correlation should be zero under the maintained assumption that the error term in Equation (3) is serially uncorrelated.

V. DATA

Our objective in this paper is to empirically investigate the importance of "soft power" variables that encapsulate a country's demographic, institutional, political and social underpinnings that are generally ignored in the literature. Accordingly, we include a number of control variables, drawn from the literature on exchange rate modeling, and which are expected to capture the conventional macro-financial drivers of exchange rate volatility. With regards to the "soft power" factors, rather than relying on an arbitrary choice of a small set of variables, we take an 'agnostic' view and consider a wide range of demographic, institutional, political and social indicators. We expect these "soft power" characteristics such as governance and social conditions to have a significant effect on exchange rate volatility—directly and indirectly—by fostering better policy choices and shaping the pattern and evolution of macroeconomic fundamentals and risk premia.

The empirical analysis employs annual data for a broad panel of 115 countries over the period 1996–2011.[6] The full list of countries is reported in Table A1 in the Appendix. The choice of sample represents a balance between data availability for individual countries and a desire to have a large a sample as possible. In this section, we provide a detailed description of the variables used in the empirical analysis.

Dependent Variable

The volatility of each country's exchange rate, $\mathrm{VOL}_{i,t}$, is measured by the realized volatility of the REER, as described in Section III, constructed using monthly data drawn from the IMF's *International Financial Statistics* database.

Control Variables

We include 10 control variables, drawn from the literature on exchange rate modeling, and which are expected to capture the fundamental macroeconomic drivers of exchange rate volatility. The control variables are consumer price inflation (CPII), the volatility of the terms of trade (TOTV), the volatility of labor productivity growth (PRDV), the volatility of the ratio of government consumption to GDP (GOVV), the ratio of the current account balance to GDP (CBAL), trade openness (OPEN), export concentration (CONC), the exchange rate regime (REGM), the ratio of credit to GDP (CRED) and stock market capitalization (SCAP). These series are compiled from the IMF's *International Financial Statistics* and *World Economic Outlook* databases and the World Bank's *World Development*

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[6] Although we have a relatively short time dimension, the balanced panel used in this paper provides equal heterogeneity conditional distribution and thereby should yield more robust estimations than unbalanced panels generally exploited in the empirical literature.

Indicators database. Panel B of Table A2 in the appendix gives the precise definitions of the 10 control variables, their sources and expected signs.

"Soft Power" Variables

Rather than relying on an arbitrary choice of a small set of variables to capture the "soft power" characteristics of individual countries, we take an 'agnostic' view and initially consider a wide range of demographic, institutional, political and social indicators drawn from a number of different sources. In particular, we start with a universe of 20 variables, split into five broad categories:

Governance: Political stability (POLS), government effectiveness (GOVE), regulatory quality (REGQ), rule of law (RLAW), control of corruption (CORR), voice and accountability (VCEA).

Population: Median age (MAGE), total fertility (FERT), infant mortality (MORT), life expectancy (LIFE), child dependency (CHIL).

Education: Average years of primary schooling (PRIS), average years of secondary schooling (SECS), average years of tertiary schooling (TERS).

Financial Sector: Bank z-score (ZSCR), bank concentration (BCNC), financial openness (FOPN).

Development: Per capita GDP (RGDP), GDP of the agriculture sector (AGRC), GDP of the agriculture sector relative to the service sector (AGMS).

The data for these variables are drawn from the World Bank's *Governance Indicators* database, the *Polity IV Database*, and the *International Country Risk Guide*. Panel A of Table A1 in the Appendix gives precise definitions of the 20 "soft power" variables, their sources and their expected signs with respect to exchange rate volatility.

There is inevitably a high degree of collinearity among the control and "soft power" variables, both among variables within the same category, and among variables in different categories. As is well known, while collinearity does not invalidate the estimation of the econometric model, it may complicate the interpretation of the estimated coefficients by inflating the associated standard errors, potentially making it difficult to distinguish the marginal effects of individual variables. In the sample, absolute pairwise correlations range from zero to close to unity. As might be expected, the highest correlations are between variables within the same category (for example, a correlation of 0.95 between GOVE and RLAW), but there are also some high correlations between variables in different categories (for example, a correlation of 0.83 between RGDP and CORR).

In the panel data model that we estimate, we allow for unobserved year effects, and in some cases, also country effects. This will tend to reduce collinearity since the pairwise correlation between any two variables arises partly from common year or country effects. For example, the correlation between GOVE and RLAW falls from 0.95 to 0.43 once both variables are demeaned by year and by country. Nevertheless, in spite of the fact that the inclusion of year and country effects in the model will tend to reduce effective pairwise correlations, we mitigate the effects of potential collinearity among the predictor variables by using variable reduction, which eliminates those variables in the original set that are best explained by the remaining variables according to some statistical criterion.[7]

The variable reduction technique that we employ is based on the variance inflation factor (VIF) of each variable x_i, which is given by

$$VIF_i = \frac{1}{1 - R_i^2}$$

where R_i^2 is the coefficient of determination in a regression of x_i on the remaining variables. The VIF measures the extent to which a variable can be explained by a linear combination of the remaining variables, and shows how much the variance of the estimated coefficient is increased as a result of collinearity. We recursively estimate the VIF for each of the entire set of 20 "soft power" variables, each time dropping the variable that has the highest VIF. We continue until no variable has a VIF higher than 5.0. This yields a final set of nine "soft power" variables: POLS, VCEA, LIFE, PRIS, TERS, ZSCR, BCNC, FOPN, AGMS. The number of variables retained within each category in the full sample ranges from one (for the population category) to three (for the financial sector category).

We undertake two robustness checks to explore the sensitivity of the final model specification to the way in which the variable reduction procedure is implemented. First, we used an alternative—and more conservative—VIF threshold of 2.5, which yields six "soft power" variables. The lower VIF threshold inevitably reduces the number of retained variables, leading to a more parsimonious model with somewhat lower collinearity between the variables. However, all of the variables in both the governance and development categories are eliminated when the lower VIF threshold is employed. Second, we applied the variable reduction procedure after demeaning each variable by both country and year (i.e. after extracting fixed country and year effects). Owing to the lower pairwise correlations between the demeaned variables, fewer variables are dropped, but the qualitative conclusions

[7] The spirit of our variable reduction approach is similar to Stock and Watson (2002) who replace a large number of predictors with a smaller set of estimated factors in macroeconomic forecasting.

that we draw are broadly similar. We report results only for the VIF cut-off of 5.0 applied to the 20 "soft power" variables without demeaning.[8]

The control variables generally have much lower pairwise correlations, both with each other, and with the control variables. For example, the highest correlation within the set of control variables is 0.57 (between TOTV and CONC), and the highest correlation between the control variables and the "soft power" variables is 0.53 (between MAGE and CONC). As a check, we applied the variable reduction procedure described above to the combined set of 30 "soft power" and control variables. With a VIF threshold of 5.0, none of the control variables is eliminated. Even at the VIF threshold of 2.5, all of the control variables are retained. Moreover, the set of "soft power" variables that was retained (using either VIF threshold) was almost identical to when the control variables were excluded from the variable reduction procedure.

VI. Empirical Results

We begin the analysis by first reporting the results of the pooled panel model using the OLS approach, in Table 1, for our full sample of 115 countries as well as the sub-samples of 25 developed and 90 emerging market economies over the period 1996–2011. We estimate both static and dynamic versions of the pooled model. The results show that lagged exchange rate volatility in the dynamic model is statistically significant for all three samples, indicating a high degree of persistence over time. While its inclusion does not alter the sign of other variables included in the analysis, it significantly lowers the magnitude of the other coefficients. Furthermore, the persistence of exchange rate volatility appears to be substantially greater in emerging market economies than in developed countries.

Turning first to the control variables, the pattern of coefficients is broadly as expected, but the magnitude of the relationship varies between advanced and emerging market economies. The estimated coefficients on consumer price inflation (CPII) and productivity growth volatility (PRDV) have the predicted positive sings, but are insignificant in the case of advanced economies. Trade openness (OPEN) is a highly significant factor with a dampening effect on exchange rate volatility, but it does not appear to be important in the case of developing countries where export concentration (CONC) is more influential. In line with previous research, exchange rate regime (REGM) is a significant determinant of exchange rate volatility, as greater flexibility leads to a higher level of volatility. Finally, both measures of financial development (CRED and SCAP) appear to have a significant positive effect, except in the case of stock market capitalization (SCAP) in developing countries.

[8] The results for the other cases are available on request.

The results obtained from the pooled panel estimation show that a number of “soft power” variables are statistically significant, highlighting the influence of intangible resources underpinned by demographic, institutional, political and social characteristics. In particular, we find that the index of voice and accountability (VCEA) and life expectancy (LIFE) have dampening effects on exchange rate volatility. Likewise, financial openness (FOPN) and the Z-score of banks (ZSCR) lower the volatility of exchange rates. These findings remain robust to the inclusion of lagged exchange rate volatility, as well as for the sub-samples of advanced and developing countries. Interestingly, the results show that primary schooling (PRIS) contributes to greater exchange rate volatility, while tertiary educational attainments (TERS) have a dampening effect, especially in developing countries.[9] The estimations based on the IV approach, presented in Table 2, are broadly similar in terms of the sign and magnitude of coefficients in the pooled panel data estimations, but yield different results in terms of statistical significance.

The estimations based on the pooled panel model exclude unobserved country-specific effects. We therefore estimate a fixed effects version of the dynamic model given by Equation (3) for the sample of 115 countries, using the System GMM technique, initially under the assumption that both the control and “soft power” variables are strictly exogenous. Table 3 presents the four specifications estimated using various combinations of instrument reduction. In specification (1), all available lags of the lagged dependent variable are used as GMM instruments, with each contributing a vector to the instrument matrix. The lagged exchange rate volatility remains highly significant, with a coefficient of 0.391, suggesting that volatility is persistent, but less so than at shorter horizons. A number of the control variables are significant, and with the expected signs. Of the “soft power” variables, voice and accountability (VCEA), life expectancy (LIFE), primary schooling (PRIS), and the Z-score of banks (ZSCR) are significant at the one percent level, and financial openness (FOPN) at the five percent level. All except PRIS have the expected sign. However, while the Hansen *J* test does not reveal any misspecification, it is likely to be weakened by the use of so many instruments, and so the estimation results must be treated with caution.

We therefore investigate the robustness of the System GMM results by considering alternative specifications that reduce the instrument set by restricting the number of lags used as instruments to the most recent two (specification (2)), collapsing the instruments into a single vector (specification (3), and both (specification (4). These restrictions all lead to a reduction in the p-value of the Hansen *J* test, and in the case of specifications (2) and (3), there is evidence that the instrument set is misspecified. However, specification (4), which uses ‘only’ 37 instruments (versus the 153 instruments used in the unrestricted case), appears

[9] Although human capital is usually measured by substantial errors (Cohen and Soto, 2007), these findings remain robust if we use alternative measures of educational attainments, and indicate a nonlinear effect of human capital accumulation.

to be reasonably well specified in terms of instrument choice. The estimation results for this specification (as well as for specifications (2) and (3)) are broadly similar to the unrestricted case. The notable difference is that the coefficient on lagged exchange rate volatility, while remaining statistically very significant, is considerably lower in value, suggesting lower persistence. The remaining coefficients are generally similar, though larger in magnitude. The preliminary conclusion from Table 3, under which it is assumed that both the control and "soft power" variables are strictly exogenous, is therefore that exchange rate volatility is negatively related to voice and accountability, life expectancy, fragility of the banking sector and financial openness, and positively related to primary schooling.

With the aim of reducing the instrument set further, Table 4 repeats the estimation of Table 3, but with the control variables replaced by their four significant principal components (i.e. those with an associated eigenvalue greater than one). All four specifications yield coefficient estimates on the "soft power" variables that are similar to those reported in Table 3, suggesting that the control variables are adequately captured by their first four principal components. In all four cases, the second, third and fourth principal components are significant at the one percent level, while the first is not statistically significant. Again, the first specification, in which the instrument set is unrestricted, gives no evidence of misspecification although this may be caused by the proliferation of instruments. This is confirmed by the fact that for the second and third specifications, the null hypothesis of instrument validity is strongly rejected. However, the fourth specification appears to be well specified. The estimated coefficients are similar to the coefficients for the corresponding specification in Table 3, although with marginally lower magnitude and statistical significance. The overall conclusions, however, remain unchanged.

The analysis thus far has assumed that both the control and the "soft power" variables are strictly exogenous. However, feedback effects between exchange rate volatility and economic conditions would lead to a violation of this assumption. Table 5 therefore considers an alternative specification of the model in which the control variables, which largely capture macroeconomic determinants of exchange rate volatility, are assumed to be endogenous. This inevitably leads to a significant increase in the number of instruments that are available in the estimation of the model. To mitigate the effect of this, we continue to use the first four principal components of the control variables in place of the variables themselves. We consider three of the four specifications of the instrument set used in Tables 3 and 4. In particular, we omit the case where all available lags are used as instruments in their uncollapsed form since this yields an unfeasibly large instrument set. However, in addition to using the two most recent lags of the instruments, we also consider the case where only the single most recent lag is used, both uncollapsed and collapsed. Using the two most recent lags of the instruments, uncollapsed, (specification (1)), the second, third and fourth principal components of the control variables are again significant, and have the same signs and similar magnitudes as in Table 4.

The coefficient on lagged exchange rate volatility is highly significant (and considerably larger), and the coefficients on the "soft power" variables are similar to the previous case. Very similar estimation results are obtained when just the single most recent lag used (specification (2)), although the third principal component of the control variables loses its significance. But again, in both of these specifications, the inability of the Hansen *J* test to reject the null hypothesis of instrument validity may be due to the number of instruments used. Indeed, when the instrument set is collapsed, which substantially reduces the total number of instruments, there is weak evidence of misspecification when either the full set of lags is used (specification (3)) or when only the two most recent lags are used (specification (4)). The estimated coefficients on the "soft power" variables and on lagged exchange rate volatility are largely unchanged, but the coefficients on the principal components of the control variables are all close to zero, and none is significant. Finally, using only the most recent lag of the instruments, collapsed into a single vector, the model appears to be well specified. Only the third principal component of the control variables is significant, although now with a negative coefficient. VCEA is no longer significant, but POLS is significantly negative. LIFE has lost its statistical significance, but the coefficient is similar to the other specifications. PRIS, ZSCR and FOPN remain significant and the magnitudes of their coefficients are broadly unchanged. It therefore appears that allowing for endogeneity in the control variables does not significantly affect the estimated relationship between exchange rate volatility and the "soft power" variables.

VII. Concluding Remarks

A rich body of empirical research has identified a number of anomalies and puzzles that contradict the theoretical models of exchange rates and showed no robust relationship between exchange rate volatility and the variability of underlying macroeconomic fundamentals. As conventional empirical models have made little progress in explaining the behavior of exchange rates, in this paper we attempt to uncover the "missing" sources of exchange rate volatility by introducing a neglected set of factors. Using a balanced panel dataset comprising of 115 advanced and developing countries over the period 1996–2011, in addition to standard macroeconomic factors, we consider 20 "soft power" variables that encapsulate a country's demographic, institutional, political and social underpinnings.

The empirical results are generally robust across different estimation methodologies, as well as for the sub-samples of advanced and developing countries. First, we show that exchange rate volatility is highly persistent over time, especially in emerging market economies. Second, after controlling for standard macroeconomic factors, we find that a number of the "soft power" variables—including an index of voice and accountability, life expectancy, educational attainments, financial openness, the Z-score of banks, and the share of agriculture relative to services—have a significant influence on the level of exchange rate volatility across countries. What is the link, for example, between life expectancy and exchange rate volatility? We reason that improvements in life expectancy—and education—

foster human capital accumulation and thereby contribute to an atmosphere that is less conducive to financial volatility.

The empirical findings presented in this paper have a number of policy implications related to minimizing the distortionary effects of excessive exchange rate volatility. In line with the existing literature, we show that macroeconomic strength remains a crucial axis of exchange rate stability. Beyond the standard metrics, however, we find that countries with greater “soft power” (i.e. better institutional quality) tend to experience a lower degree of exchange rate volatility. Therefore, institutional and structural reforms would also help reduce exchange rate volatility. This paper, in our view, is as a first step and calls for further empirical and theoretical studies to unlock the interactions between quantitative measures of “soft power” and exchange rates.

Table 1. The Determinants of FX Volatility
Pooled Model (Ordinary Least Squares)

The table reports the results of estimating the pooled panel data model given by Equation (2) over the period 1996-2011 using the Ordinary Least Squares method. Results are reported for the full sample of 115 countries, the sub-sample of 25 developed countries and the sub-sample of 90 emerging countries. Year dummies are included in the estimation but not reported. The table reports the estimated coefficients and robust standard errors. '***', '**' and '*' denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. The table also reports the number of observations and the adjusted R-squared.

	Static			Dynamic		
	All	**Developed**	**Emerging**	**All**	**Developed**	**Emerging**
Lagged volatility				0.485***	0.346***	0.439***
				(0.025)	(0.049)	(0.030)
Control variables						
Inflation	1.741***	2.319	1.765***	0.902***	2.195	1.008***
	(0.184)	(1.978)	(0.179)	(0.141)	(1.742)	(0.145)
Vol of productivity growth	3.645***	1.480	2.943***	1.710***	0.674	1.526**
	(0.718)	(2.879)	(0.743)	(0.655)	(2.767)	(0.683)
Vol of terms of trade	0.209	0.353	0.446*	0.027	0.006	0.184
	(0.232)	(1.127)	(0.238)	(0.204)	(1.048)	(0.211)
Vol of gov cons/GDP	1.241	-0.101	1.505	-1.064	-1.510	-0.631
	(2.238)	(7.374)	(2.306)	(2.044)	(7.047)	(2.082)
Current account/GDP	-0.228	0.381	0.224	-0.189	0.455	0.044
	(0.168)	(0.481)	(0.194)	(0.149)	(0.441)	(0.175)
Trade openness	-0.156***	-0.222***	-0.024	-0.071***	-0.146***	-0.001
	(0.028)	(0.049)	(0.042)	(0.026)	(0.045)	(0.036)
Export concentration index	0.351***	0.197	0.115	0.261***	0.061	0.149*
	(0.092)	(0.413)	(0.099)	(0.083)	(0.382)	(0.089)
FX regime	0.258***	0.130**	0.343***	0.135***	0.108**	0.190***
	(0.021)	(0.054)	(0.024)	(0.020)	(0.049)	(0.025)
Credit/GDP	0.088***	0.161***	0.151**	0.066**	0.117**	0.125**
	(0.033)	(0.053)	(0.059)	(0.030)	(0.051)	(0.056)
Stock market cap/GDP	0.104***	0.205***	0.002	0.044**	0.137***	-0.021
	(0.026)	(0.049)	(0.034)	(0.022)	(0.045)	(0.031)
"Soft power" variables						
Political stability	-0.002	0.258***	-0.004	-0.004	0.138*	-0.006
	(0.022)	(0.085)	(0.024)	(0.019)	(0.078)	(0.021)

Voice and accountability	-0.153***	-0.248***	-0.083***	-0.085***	-0.171*	-0.053**
	(0.026)	(0.092)	(0.028)	(0.023)	(0.096)	(0.024)
Life expectancy	-0.018***	0.067***	-0.018***	-0.009***	0.039*	-0.011***
	(0.002)	(0.022)	(0.003)	(0.002)	(0.021)	(0.002)
Primary schooling	0.093***	0.106***	0.035***	0.058***	0.085***	0.030**
	(0.012)	(0.033)	(0.013)	(0.010)	(0.030)	(0.012)
Tertiary schooling	0.020	0.543***	-0.054	-0.004	0.328***	-0.043
	(0.053)	(0.103)	(0.066)	(0.049)	(0.101)	(0.062)
Bank Z-score	-0.006***	-0.006***	-0.004***	-0.004***	-0.005***	-0.002**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Bank concentration	0.002**	-0.000	0.002**	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Financial openness	-0.038***	-0.129***	-0.013	-0.025***	-0.098**	-0.012
	(0.010)	(0.044)	(0.011)	(0.009)	(0.040)	(0.010)
GDP agriculture minus services	-0.112	1.441***	-0.279**	-0.099	1.110**	-0.194*
	(0.117)	(0.519)	(0.121)	(0.102)	(0.490)	(0.109)
Observations	1840	400	1440	1840	400	1440
Adjusted R-squared	0.405	0.645	0.354	0.550	0.697	0.479

Table 2. The Determinants of FX Volatility
Pooled Model (Instrumental Variables)

The table reports the results of estimating the pooled panel data model given by Equation (2) over the period 1996-2011 using the Instrumental Variable method. The control variables are assumed to be pre-determined and the first lags are used as instruments. Results are reported for the full sample of 115 countries, the sub-sample of 25 developed countries and the sub-sample of 90 emerging countries. Year dummies are included in the estimation but not reported. The table reports the estimated coefficients and robust standard errors. '***', '**' and '*' denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. The table also reports the number of observations and the adjusted R-squared.

		Static			**Dynamic**	
	All	**Developed**	**Emerging**	**All**	**Developed**	**Emerging**
Lagged volatility				0.551***	0.354***	0.521***
				(0.028)	(0.055)	(0.035)
Control variables						
Inflation	1.566***	-3.544	1.651***	-0.022	-4.787	0.092
	(0.256)	(5.311)	(0.251)	(0.358)	(5.859)	(0.361)
Vol of productivity growth	4.192***	1.586	2.939***	1.821**	0.511	1.315
	(0.946)	(3.834)	(0.980)	(0.904)	(3.929)	(0.939)
Vol of terms of trade	0.130	-0.115	0.426	-0.137	-0.358	-0.003
	(0.271)	(1.238)	(0.276)	(0.239)	(1.088)	(0.245)
Vol of gov cons/GDP	2.621	-4.994	3.237	0.685	-6.660	1.369
	(2.990)	(9.281)	(3.048)	(2.718)	(8.841)	(2.729)
Current account/GDP	-0.552**	-0.341	0.054	-0.486**	-0.591	-0.260
	(0.218)	(0.811)	(0.257)	(0.191)	(0.837)	(0.236)
Trade openness	-0.188***	-0.205***	-0.081*	-0.099***	-0.118**	-0.079*
	(0.031)	(0.061)	(0.047)	(0.028)	(0.058)	(0.041)
Export concentration index	0.407***	0.614	0.096	0.265***	0.663	0.125
	(0.104)	(0.512)	(0.113)	(0.095)	(0.475)	(0.102)
FX regime	0.247***	0.150**	0.314***	0.094***	0.082	0.118***
	(0.025)	(0.067)	(0.028)	(0.024)	(0.065)	(0.030)
Credit/GDP	0.060*	0.116*	0.095	-0.001	0.057	-0.002
	(0.035)	(0.063)	(0.062)	(0.031)	(0.062)	(0.055)
Stock market cap/GDP	0.157***	0.229***	0.062	0.101***	0.152**	0.076**
	(0.031)	(0.060)	(0.043)	(0.028)	(0.064)	(0.039)
"Soft power" variables						
Political stability	0.003	0.234***	0.002	-0.008	0.146*	-0.009
	(0.023)	(0.086)	(0.024)	(0.020)	(0.080)	(0.022)

Voice and accountability	-0.158***	-0.249***	-0.080***	-0.074***	-0.159	-0.040
	(0.028)	(0.090)	(0.028)	(0.024)	(0.098)	(0.025)
Life expectancy	-0.016***	0.062***	-0.016***	-0.006**	0.042*	-0.006**
	(0.003)	(0.023)	(0.003)	(0.002)	(0.022)	(0.003)
Primary schooling	0.101***	0.130***	0.037***	0.055***	0.088***	0.030**
	(0.012)	(0.036)	(0.014)	(0.011)	(0.033)	(0.012)
Tertiary schooling	0.019	0.518***	-0.064	0.008	0.334***	-0.040
	(0.054)	(0.105)	(0.067)	(0.049)	(0.103)	(0.063)
Bank Z-score	-0.007***	-0.007***	-0.005***	-0.004***	-0.005***	-0.004***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Bank concentration	0.001	-0.001	0.001	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Financial openness	-0.045***	-0.182***	-0.018	-0.032***	-0.123***	-0.021**
	(0.011)	(0.046)	(0.012)	(0.010)	(0.044)	(0.011)
GDP agriculture minus services	-0.100	1.499**	-0.278**	-0.048	0.890	-0.125
	(0.119)	(0.583)	(0.121)	(0.104)	(0.571)	(0.112)
Observations	1725	375	1350	1725	375	1350
Adjusted R-squared	0.397	0.651	0.348	0.539	0.691	0.461

Table 3. The Determinants of FX Volatility
Fixed Effects Model (GMM)
Control Variables Assumed to be Strictly Exogenous

The table reports the results of estimating the dynamic panel data model given by Equation (2) for the sample of 115 countries over the period 1996-2011 using one-step system GMM. The control variables and structural variables are assumed to be strictly exogenous. In specifications (1) and (3), all lags from 2 onwards are used as GMM instruments. In specifications (2) and (4), lags 2 and 3 are used as GMM instruments. In specifications (3) and (4), the GMM instruments are collapsed into a single column. Year dummies are included in the estimation but not reported. The table reports the estimated coefficients and robust standard errors. '***', '**' and '*' denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. The Hansen J test tests the null hypothesis that the instruments are valid in the presence of overidentification. The AR2 test is the Arellano-Bond test of the null hypothesis of no second order serial correlation in the errors of the first difference equation. The table also reports the number of observations and the number of instruments.

	(1)	**(2)**	**(3)**	**(4)**
Lags used for GMM	2, -	2, 3	2, -	2, 3
Instruments collapsed	No	No	Yes	Yes
Lagged volatility	0.391***	0.273***	0.225***	0.166***
	(0.035)	(0.039)	(0.050)	(0.054)
Control variables				
Inflation	1.123***	1.330***	1.413***	1.517***
	(0.199)	(0.236)	(0.259)	(0.279)
Vol of productivity growth	2.372***	2.907***	3.124***	3.392***
	(0.726)	(0.810)	(0.860)	(0.900)
Vol of terms of trade	0.084	0.137	0.159	0.186
	(0.266)	(0.294)	(0.307)	(0.324)
Vol of gov cons/GDP	-0.138	0.441	0.676	0.966
	(2.325)	(2.591)	(2.719)	(2.874)
Current account/GDP	-0.193	-0.200	-0.203	-0.207
	(0.186)	(0.218)	(0.232)	(0.249)
Trade openness	-0.095**	-0.117**	-0.125**	-0.136**
	(0.043)	(0.050)	(0.053)	(0.057)
Export concentration index	0.279**	0.298**	0.305**	0.315**
	(0.110)	(0.127)	(0.133)	(0.142)
FX regime	0.151***	0.181***	0.194***	0.209***
	(0.029)	(0.035)	(0.037)	(0.041)

Credit/GDP	0.061	0.067	0.069	0.072
	(0.041)	(0.049)	(0.053)	(0.057)
Stock market cap/GDP	0.061*	0.076*	0.082*	0.089*
	(0.035)	(0.041)	(0.044)	(0.047)
"Soft power" variables				
Political stability	0.003	0.002	0.002	0.002
	(0.029)	(0.035)	(0.037)	(0.040)
Voice and accountability	-0.098***	-0.115***	-0.121***	-0.129***
	(0.037)	(0.042)	(0.045)	(0.048)
Life expectancy	-0.011***	-0.013***	-0.014***	-0.015***
	(0.003)	(0.004)	(0.004)	(0.004)
Primary schooling	0.063***	0.073***	0.077***	0.082***
	(0.017)	(0.020)	(0.021)	(0.022)
Tertiary schooling	0.004	0.008	0.010	0.012
	(0.074)	(0.089)	(0.095)	(0.102)
Bank Z-score	-0.005***	-0.005***	-0.006***	-0.006***
	(0.001)	(0.002)	(0.002)	(0.002)
Bank concentration	0.000	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Financial openness	-0.029**	-0.033**	-0.034**	-0.036**
	(0.014)	(0.016)	(0.017)	(0.018)
GDP agriculture minus services	-0.133	-0.137	-0.139	-0.141
	(0.163)	(0.192)	(0.204)	(0.219)
Observations	1725	1725	1725	1725
Number of instruments	153	75	49	37
Hansen J test p-value	0.960	0.056	0.000	0.173
AR2 test p-value	0.561	0.987	0.755	0.441

Table 4. The Determinants of FX Volatility
Fixed Effects Model (GMM)
PCA Control Variables Assumed to be Strictly Exogenous

The table reports the results of estimating the dynamic panel data model given by Equation (2) for the sample of 115 countries over the period 1996-2011 using one-step system GMM. The control variables are replaced by their first four principal components, and are assumed to be strictly exogenous. In specifications (1) and (3), all lags from 2 onwards are used as GMM instruments. In specifications (2) and (4), lags 2 and 3 are used as GMM instruments. In specifications (3) and (4), the GMM instruments are collapsed into a single column. Year dummies are included in the estimation but not reported. The table reports the estimated coefficients and robust standard errors. '***', '**' and '*' denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. The Hansen J test tests the null hypothesis that the instruments are valid in the presence of overidentification. The AR2 test is the Arellano-Bond test of the null hypothesis of no second order serial correlation in the errors of the first difference equation. The table also reports the number of observations and the number of instruments.

	(1)	**(2)**	**(3)**	**(4)**
Lags used for GMM	2, -	2, 3	2, -	2, 3
Instruments collapsed	No	No	Yes	Yes
Lagged volatility	0.397***	0.280***	0.234***	0.176***
	(0.036)	(0.039)	(0.051)	(0.055)
Control variables				
PC1	0.020	0.025	0.028	0.030
	(0.014)	(0.017)	(0.017)	(0.019)
PC2	-0.114***	-0.136***	-0.144***	-0.155***
	(0.022)	(0.026)	(0.028)	(0.030)
PC3	0.044***	0.055***	0.060***	0.065***
	(0.016)	(0.019)	(0.021)	(0.022)
PC4	0.098***	0.118***	0.127***	0.137***
	(0.018)	(0.021)	(0.023)	(0.025)
"Soft power" variables				
Political stability	0.008	0.008	0.008	0.008
	(0.028)	(0.034)	(0.036)	(0.039)
Voice and accountability	-0.089**	-0.103**	-0.108**	-0.115**
	(0.035)	(0.041)	(0.043)	(0.046)
Life expectancy	-0.010***	-0.012***	-0.013***	-0.014***
	(0.003)	(0.004)	(0.004)	(0.004)
Primary schooling	0.051***	0.060***	0.063***	0.067***
	(0.017)	(0.020)	(0.021)	(0.022)

Tertiary schooling	0.030	0.039	0.043	0.047
	(0.076)	(0.090)	(0.096)	(0.103)
Bank Z-score	-0.004***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.002)	(0.002)	(0.002)
Bank concentration	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Financial openness	-0.025*	-0.028*	-0.030*	-0.031*
	(0.013)	(0.015)	(0.016)	(0.018)
GDP agriculture minus services	-0.185	-0.198	-0.203	-0.209
	(0.162)	(0.191)	(0.203)	(0.218)
Observations	1725	1725	1725	1725
Number of instruments	147	69	43	31
Hansen J test p-value	0.938	0.020	0.001	0.213
AR2 test p-value	0.548	0.947	0.811	0.502

Table 5. The Determinants of FX Volatility
Fixed Effects Model (GMM)
PCA Control Variables Assumed to be Endogenous

The table reports the results of estimating the dynamic panel data model given by Equation (2) for the sample of 115 countries over the period 1996-2011 using one-step system GMM. The control variables are replaced by their first four principal components, and are assumed to be endogenous. In specifications (1) and (4), lags 2 and 3 are used as GMM instruments. In specifications (2) and (5), only lag 2 is used as a GMM instrument. In specification (3), all lags from 2 onwards are used as GMM instruments. In specifications (3), (4) and (5), the GMM instruments are collapsed into a single column. Year dummies are included in the estimation but not reported. The table reports the estimated coefficients and robust standard errors. '***', '**' and '*' denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. The Hansen J test tests the null hypothesis that the instruments are valid in the presence of overidentification. The AR2 test is the Arellano-Bond test of the null hypothesis of no second order serial correlation in the errors of the first difference equation. The table also reports the number of observations and the number of instruments.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Lags used for GMM	2, 3	2, 2	2, -	2, 3	2, 2
Instruments collapsed	No	No	Yes	Yes	Yes
Lagged volatility	0.323***	0.313***	0.278***	0.262***	0.264***
	(0.037)	(0.043)	(0.054)	(0.062)	(0.067)
Control variables					
PC1	0.022	-0.003	-0.002	0.007	-0.001
	(0.027)	(0.030)	(0.044)	(0.053)	(0.064)
PC2	-0.137***	-0.105**	-0.065	0.005	0.081
	(0.035)	(0.049)	(0.051)	(0.068)	(0.084)
PC3	0.049*	0.043	0.003	-0.022	-0.080*
	(0.026)	(0.028)	(0.034)	(0.037)	(0.042)
PC4	0.089***	0.108***	0.067	-0.005	0.005
	(0.029)	(0.031)	(0.049)	(0.065)	(0.078)
"Soft power" variables					
Political stability	0.011	-0.002	-0.037	-0.092	-0.138**
	(0.036)	(0.043)	(0.047)	(0.058)	(0.069)
Voice and accountability	-0.104**	-0.105**	-0.074	-0.015	0.032
	(0.045)	(0.053)	(0.066)	(0.078)	(0.091)
Life expectancy	-0.011***	-0.012***	-0.011**	-0.009	-0.010
	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)
Primary schooling	0.058***	0.054***	0.055**	0.054**	0.049*
	(0.019)	(0.019)	(0.022)	(0.026)	(0.029)

Tertiary schooling	0.041	0.052	0.084	0.141	0.158
	(0.084)	(0.085)	(0.092)	(0.106)	(0.115)
Bank Z-score	-0.005***	-0.005***	-0.006***	-0.007***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Bank concentration	0.001	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Financial openness	-0.027*	-0.030*	-0.036**	-0.043**	-0.050**
	(0.014)	(0.015)	(0.017)	(0.021)	(0.023)
GDP agriculture minus services	-0.189	-0.157	-0.071	0.118	0.187
	(0.183)	(0.185)	(0.237)	(0.287)	(0.317)
Observations	1725	1725	1725	1725	1725
Number of instruments	229	164	99	39	34
Hansen J test p-value	1.000	0.990	0.074	0.068	0.750
AR2 test p-value	0.753	0.738	0.877	0.950	0.844

Table A1. Sample of Countries

The table reports the 115 countries that are used in the empirical analysis.

Algeria	Ecuador	Lao People's Dem. Rep.	Portugal
Argentina	Egypt	Latvia	Romania
Armenia	El Salvador	Lesotho	Russian Federation
Australia	Estonia	Libya	Saudi Arabia
Austria	Finland	Lithuania	Senegal
Bahrain	France	Luxembourg	Sierra Leone
Barbados	Gabon	Malawi	Singapore
Belgium	Germany	Malaysia	South Africa
Belize	Ghana	Maldives	Spain
Benin	Greece	Mali	Sri Lanka
Bolivia	Guatemala	Malta	Swaziland
Botswana	Guyana	Mauritius	Sweden
Brazil	Haiti	Mexico	Switzerland
Burundi	Honduras	Moldova	Tanzania
Cambodia	Hungary	Morocco	Thailand
Cameroon	Iceland	Mozambique	Togo
Canada	India	Namibia	Trinidad and Tobago
Central African Rep.	Indonesia	Netherlands	Tunisia
Chile	Iran	New Zealand	Turkey
China	Ireland	Nicaragua	Uganda
Hong Kong	Israel	Niger	Ukraine
Colombia	Italy	Norway	United Arab Emirates
Congo	Jamaica	Pakistan	United Kingdom
Costa Rica	Japan	Panama	United States
Côte d'Ivoire	Jordan	Papua New Guinea	Uruguay
Cyprus	Kazakhstan	Paraguay	Venezuela
Czech Republic	Kenya	Peru	Vietnam
Denmark	Korea	Philippines	Yemen
Dominican Republic	Kuwait	Poland	

Table A2. Variable Definitions

The table reports the variables used in the empirical analysis, their definitions, sources and expected signs. Panel A reports details of the control variables, while Panel B reports details of the "soft power" variables.

Panel A: Control Variables

Variable	**Definition**	**Source**	**Expected sign**
Inflation	Annual growth of rate of country level CPI inflation	IMF	
Volatility of terms of trade	5y rolling standard deviation of annual country level terms of trade index growth	IMF	
Volatility of labour productivity growth	5y rolling standard deviation of annual labour productivity growth for each country. Productivity is calculated as real GDP divided by total employment	UNCTAD	
Volatility of gov con/GDP	5y rolling standard deviation of annual government consumption to GDP ratio	UNCTAD	
Current account balance/GDP	Annual current account balance to GDP ratio	IMF	
Trade openness	Real exports plus real imports divided by real GDP	UNCTAD	
Export concentration index	Concentration indices of merchandise exports and imports by country.	UNCTAD	
FX regime	FX regime dummy condensed between 1 (fixed) and 3 (free float), based on the official IMF exchange rate classification	IMF	
Credit/GDP	The ratio of domestic credit provided by the banking sector to GDP	Worldwide Governance Indicators (World Bank)	
Stock market cap/GDP	The ratio of stock market capitalization to GDP	Worldwide Governance Indicators (World Bank)	

Panel B: "Soft Power" Variables

Variable	**Definition**	**Source**	**Expected sign**
Governance variables			
Political stability	The likelihood of political instability and/or politically- motivated violence, including terrorism	Worldwide Governance Indicators (World Bank)	Negative
Government effectiveness	The quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	Worldwide Governance Indicators (World Bank)	Negative

Regulatory quality	The ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	Worldwide Governance Indicators (World Bank)	Negative
Rule of law	The extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	Worldwide Governance Indicators (World Bank)	Negative
Control of corruption	The extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	Worldwide Governance Indicators (World Bank)	Negative
Voice & accountability	The extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media	Worldwide Governance Indicators (World Bank)	Negative
Population variables			
Median age	Median age of the total population	UN World Pop Prospects	Negative
Total fertility	Number of children per woman	UN World Pop Prospects	Positive
Infant mortality	Infant mortality rate for both sexes combined	UN World Pop Prospects	Positive
Life expectancy	Life expectancy at birth for both sexes combined	UN World Pop Prospects	Negative
Child dependency ratio	Ratio of population aged 0-14 per 100 population aged 15-64	UN World Pop Prospects	Positive
Education variables			
Primary schooling	Average years of primary schooling, age 15+	World Bank	Negative
Secondary schooling	Average years of secondary schooling, age 15+	World Bank	Negative
Tertiary schooling	Average years of tertiary schooling, age 15+	World Bank	Negative
Financial variables			
Z-score of banks	(ROA+(equity/assets))/st. dev(ROA) where st. dev(ROA) is the standard deviation of ROA calculated from underlying bank-by-bank unconsolidated data from Bankscope). Citation: Thortsen Beck and Asli Demirgüç-Kunt, "Financial Institutions and Markets Across Countries and over Time: Data and Analysis", World Bank Policy Research Working Paper No. 4943, May 2009.	World Bank	Negative
Bank concentration	Assets of three largest commercial banks as a share of total commercial banking assets	World Bank	Positive
Financial Openness	The Chinn-Ito index measuring a country's degree of capital account openness	http://web.pdx.edu/~ito/Chinn-Ito_website.htm	Negative

Economic development variables

GDP per capita	Real GDP divided by total population	UNCTAD	Negative
% GDP agriculture - % GDP service sector	% share of agricultural sector in total GDP minus % share of service sector in total GDP	UNCTAD	Positive
% GDP of agriculture	% share of agricultural sector in total GDP	UNCTAD	Positive

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