A Theory of Currency Unions and Equity Price Shocks

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Abstract: This paper investigates the effects of financial shocks on per capita national income of multiple currency unions in different geographic locations. Though exposure to financial market shock is hardly considered and not generally measured as an important convergence criterion for unionization, currency unions are generally formed to attain greater regional and global economic integration. As a general theory, this paper finds that shocks to equity prices have imprecise implications for the performance of currency unions with divergent sources of income, different currency arrangements, evolutionary trade alliances, and unequal financial exposure. Specifically, historical alliances, geographic proximity, or even union membership, may not provide sufficient explanation for income volatility in currency unions after an exposure to equity price shocks. By utilizing annual time series data without seasonal adjustments to decompose variances, this paper finds that changes in equity prices may not significantly account for the volatility in per capita income of currency unions with weak intra-union trading patterns and less stringent currency arrangements.

Keywords: Currency Unions, financial shocks, national income, variance decomposition.

I. INTRODUCTION

This paper investigates the effects of financial shocks on per capita national income of multiple currency unions in different geographic locations. Though exposure to financial market shock is hardly considered and not generally measured as an important convergence criterion for unionization, currency unions are generally formed to attain greater regional and global economic integration. The fundamental objective of this research is to investigate the extent to which shocks to equity prices affect the economic performances of different currency unions. As a general theory, this paper finds that shocks to equity prices have imprecise implications for the performance of currency unions with divergent sources of income, different currency arrangements, evolutionary trade alliances, and unequal financial exposure. Specifically, historical alliances, geographic proximity, or even union membership, may not provide sufficient explanation for income volatility in currency unions after an exposure to equity price shocks.

By utilizing annual time series data, without seasonal variations, to decompose variances, this paper finds that changes in equity prices may not significantly account for the volatility in per capita income of currency unions with weak intra-union trading patterns and less stringent currency arrangements. While per capita national income in Eurozone and Eastern Caribbean countries are relatively more sensitive to changes in American equity prices, empirical evidence—evaluated over a long period of time (38 to 55 years)—suggests that currency unions of Africa may be relatively insensitive to shocks that emanate from US and European financial markets.

Ever since the 2007/8 global financial crises, a lot has been written about the destabilizing effects of sovereign debts and exposure to financial markets. This research investigates—for the very first time and to the best of my knowledge—the relationship between economic performance of currency unions (in terms of per capita national income of unions in divergent geographic locations) and changes in share prices (as proxies of financial market performance in UK, France, and US over an extended period). Some of the findings of the paper are embedded in the text and reproduced in the appendix for comparative analysis.

An historical and academic overview of the relevant union literature is provided in the ensuing section, where the contending arguments about the viabilities of currency unions and the institutional and structural limitations are discussed. The next section is followed by a discussion of the variables of choice, real GDP per capita, equity prices, and exports and imports as a percentage of GDP. It also recalls the pertinent time series econometric literature and the contributions of this paper to the literature. Model specifications, for estimating the relevant economic theories, are also presented in the same section. The empirical findings and conclusions are presented at the end of the paper.

II. LITERATURE REVIEW

The history of macroeconomic stabilization has very close association with exchange rates, goods and

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services markets, net exports, and the relationship between the money supply and interest rates. In 1996, Mishkin directed attention to the effects of investment and savings proposed by Meltzer in 1995. In the 1990s, monetarists espoused the view that relative asset prices and real wealth affect the macroeconomy through monetary policy. Apart from bonds, foreign exchange and equities received substantial attention as transmission mechanisms of monetary policy. Of course, the monetarists noted that exchange rates have an impact on net exports; but they also noted that interest rates also affect exchange rates.[1]

In 1969, Tobin argued that monetary policy affects the valuation of equities. Therefore, wealth generated from equities must have some amount of impact on the aggregate economy. The theory, which is widely regarded as "Tobin's q," focused on the ratio of the market value of firms to the cost of replacing capital, implying that increases in *q* should concomitantly increase a firm's market value relative to the cost of replacing capital. In effect, increases in *q* have stimulative consumption and capital accumulation effects. Consequently, it must be possible that subterranean financial forces or disturbances must have substantial or trivial consequences for countries that are determined to forge and preserve currency unions as a choice of monetary policy. In reality, the shocks to financial market transactions may have profound asymmetric effects.

Currency valuation or the stability of foreign exchange has always gained serious considerations for lasting international trade and monetary arrangements. Because of the theoretical appeal rather than the practical realities of unionization, various nations have engaged in alliances to proactively reduce transaction costs and maintain stable exchange rate regimes. In reality, regional monetary arrangements and the calculations they have subsumed neither incorporate the full weight of exogenous financial shocks nor reflect the intensity of intra-union trade that is expected to exploit geographic proximities for lower transaction costs. The prototypical arguments surrounding the structure and viability of these unions can be found in the work of Mundell (1961).

Mundell was largely interested in delineating the parameters for a successful optimum currency area based on some ex-colonial and burgeoning European experiences. Of course, the movement to establish such unions in the 1960s was nothing new. The French had vigorously pursued such a policy in portions of Central and Western Africa (see Appendix A for a list of countries in these regions). In general, the parameters for successful unionization are largely contingent on price flexibility or stability, labor mobility, the symmetry of endogenous (regional) shocks, the degree of innovation, and the size of a government's balance sheet.

"It is patently obvious that periodic balance-of-payments crises will remain an integral feature of the international economic system as long as fixed exchange rates and rigid wage and price levels prevent the terms of trade from fulfilling a natural role in the adjustment process."[2]

The existence of price flexibility ensures that prices will rise in surplus countries and fall in deficit countries. Price adjustment (flexibility), rather than adjustment to money supply, is traditionally more appealing to obtain less painful stabilization. The European paradigm for currency union has been historically conflictive. In 1958, Meade argued that the conditions for a common currency are less propitious in Western Europe, because labor immobility and a fixed exchange rate regime will foreclose the prospects of internal and external adjustments. Unlike Meade, Scitovsky (1958) was much more optimistic. He envisioned greater capital mobility while expressing the need for supranational employment policies to mitigate concerns about labor immobility. Consequently, the classical diagnosis for economic stabilization put the burden of adjustment on surplus countries to engage in policies that will revise their general price levels.

Arguments of trade creation and diversion accompanied the dichotomous arguments of union viabilities. Notably, the trade creating or diverting arguments are preponderantly older than arguments about the optimal conditions of unionization. For example, in the 1950s Viner investigated the operations of customs unions to assess the trade-creating effects of such unions (Viner 1950). Trade creation occurs when unionization causes higher-cost domestic production to be replaced by lower-cost imports. Viner's pioneering work actually focused on the production rather than consumption effects of

[1]When domestic real interest rate falls, domestic dollar deposits become relatively unattractive in contradistinction to deposits denominated in foreign currencies.

[2]See Mundell, p.657.

Table 1: Macroeconomic Conditions and Policy Options

Quadrant	Macroeconomic Condition	Proposed Policy Mix
Quadrant I	Current account surplus and inflation Current account deficit and inflation	Fiscal contraction and revaluation
Quadrant II	Current account deficit and inflation Current account deficit and unemployment	Fiscal contraction and devaluation
Quadrant III	Current account surplus and unemployment Current account deficit and unemployment	Expansionary fiscal and devaluation
Quadrant IV	Current account surplus and inflation Current account surplus and unemployment	Expansionary fiscal and revaluation

international trade. Later, Meade (1955) incorporated the consumption effects.

Magee (2008) provided further trade-creating measurement extensions by using panel data and fixed effects for a variety of countries in order to estimate the effects of regional agreements on trade flows while controlling for country pair, importer-year, and exporter-year fixed effects. In most cases, he found that controlling for the fixed effects greatly reduced the estimated impact of regional agreements on trade. A benefit of the research suggests that customs unions tend to outperform free trade areas.

Contemporary studies of currency unions are largely dichotomous and concentrated on the prospects of success and failures/challenges of such unions.[3] These studies tend to mirror classical propositions and, until recently, have generally focused on the viability of the European Union and some challenges within the Eastern Caribbean Currency Union (ECCU). The 2008 crisis and the prospects of European fiscal integration have directed some attention to the sustainability of the unions in Africa that have strong colonial ties to France (Agbor 2012).

Some of the most comprehensive presentations on the ECCU can be found in the work of Schipke *et al*. (2013). Coverage include monetary and exchange rate issues, external competitiveness, the financial sector, and fiscal policy and growth issues. A concise analysis of the classical arguments about stringent fixed exchange regimes, inappropriate fiscal measures, and problematic unemployment (in cases of falling output and labor immobility), is presented in Table **1** and Figure **1**.

The basic argument is that flexibility of exchange rates allow for revaluation or devaluation, depending on the macroeconomic condition of output, productivity, and unemployment.

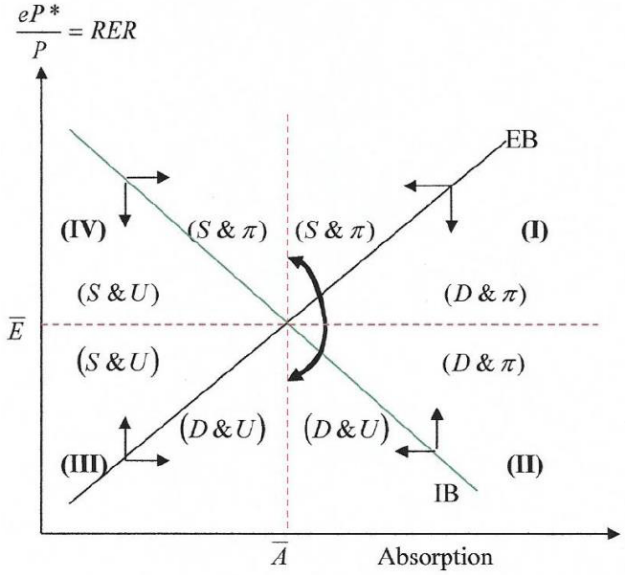


Figure 1: Monetary and Fiscal Policies with the Swan Diagram

Notes: S=surplus, D= deficit, U=unemployment, π = inflation, IB= internal balance,

EB=external balance, and RER= real exchange rate; where *e* is for the nominal rate and P* is for the foreign price level. The semicircle denotes the surplus, deficit, inflation, and unemployment effects of austerity without expenditure switching or exchange rate policy.

The swan diagram (Figure **1**) shows that a country faces daunting stabilization challenges when it tries to attain external balance within a currency union that has an uncompromising fixed exchange rate policy.[4] The IB (internal balance) and EB (external balance) respectively show internal and external equilibria.

[3]See Stiglitz (2016), Warburton (2012), Sapir (2011), Dixon (2011), and Masson and Pattilo (2001)

[4]For an extensive analysis of the swan, see the work of Perkins *et al*. (2006).

Areas to the right and left of the IB line denote inflationary pressures and unemployment respectively. Areas to the left and right of the EB curve typify surpluses and deficits respectively. The prospective diagnoses for the restoration of internal and external equilibria, depending on the situational frictions, are provided in Table **1**. For example, a nation with a surplus and inflationary pressure or unemployment (Quadrant IV) is advised to revalue its currency and increase spending or absorption.

In a currency union with rigid exchange rate policy, counterintuitive policy choices are probable and undesirable choices. Analogously, a depreciation of currency and increased spending (the diagnoses for disequilibria in Quadrant III) may equally be untenable with inflexible exchange rates and austerity. It is also worth noting that there are times when a single monetary or fiscal policy may be desirable when absorption is optimal, but a currency is overvalued or undervalued. The swan also suggests interrelated effects of policy choices. For example, increased spending reduces surpluses and automatically revalues undervalued currencies.

One study that has endogenized out-of-union international trade as part of the considerations for the stability of currency unions is that of Frankel and Rose (1998). Beyond the attractive and appealing geographic synergies that are normally touted, they considered international trade patterns and international business cycle correlations as endogenous. However, their research was limited to twenty industrialized countries and thirty years of data. They found that countries with closer trade links tend to have more tightly correlated business cycles, and they concluded that countries are more likely to satisfy the criteria for entry into a currency union after taking steps toward economic integration.

Countries that are exposed to external and disruptive financial market shocks may well pose some external threats to the stability of currency unions by generating upward or downward pressures on aggregate prices, because of unemployment or inflation in member countries. This exposure to external financial market shock is hardly considered to be an important convergence criterion. Yet, this theory may be more consequential if intra-union trade is robust or trade creating.

This paper extends the literary discussion and theoretical underpinnings of integration by investigating the impact of financial shocks on national income for a variety of currency unions that are situated in different parts of the world with diverse levels of per capita income. The trend in financial market performance for the period under review suggests that returns from equity investments have favorably increased over the years. As a result, the shocks should be expected to generate positive outcomes for countries that are properly integrated with the respective US and European markets. Pointedly, the data include and exclude serious episodic declines in financial returns and are less susceptible to noisy biases. The next section discusses the variables and corresponding econometric theories.

III. VARIABLES AND MODEL SPECIFICATIONS

For the purposes of this study, three variables are of interest: (i) GDP per capita, (ii) Exports as a percentage of GDP, and (iii) Imports as a percentage of GDP. Of the three variables, the volatility of GDP per capita is targeted for empirical evaluation. Unfortunately, this variable does not tell us much about the normative issue of income distribution, which is beyond the scope of this work. GDP per capita is defined in terms of the sum of gross value added by all resident producers of an economy, including product taxes less subsidies that are not included in the value of products. The midyear population is used to denominate national income. GDP per capita is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The annual data, without seasonal adjustments, are operationalized in constant 2010 U.S. dollars.[5] For comparative reasons, the data for all variables are aggregated into mean values for each currency union.

Exports of goods and services represent the value of all goods and other market services provided to the rest of the world as a percentage of GDP. This operationalization minimizes the correlative effects of annual sales and aggregate national income. Exports include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. Exports do not include transfer

[5]GDP per capita, and imports and exports data have been obtained from World Bank national accounts data, and OECD National Accounts data files. The attributes of the variables have been presented as the institutions define them.

payments and compensation of employees and investment income (formerly called factor services).

Imports of goods and services represent the value of all goods and other market services received from the rest of the world as a percentage of GDP. As reported by the World Bank, imports include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. Imports exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

The share/stock price is a proxy for aggregate financial market performance. Equity prices affect household consumption and/or business capital accumulation. The share indices are national and their annualized forms, used in this study, are derived from monthly data of broad price indices expressed as simple arithmetic mean of daily data. They have been compiled by foreign stock exchanges and made available to the Organization for Economic Cooperation and Development (OECD). The prices of common shares are derived from stock trades on national or foreign stock exchanges, using the closing daily values of the monthly data. Additionally, the share prices are expressed as simple arithmetic averages of the daily data.

The share price index measures how the value of the stocks in the index is changing by including considerations of dividend payments.[6] Share prices are generally sensitive to interest rate and inflation (monetary phenomena) and are good financial market and forecasting proxies, because of their forward-looking attributes. They provide perceptions about the prospects of financial markets and the profound reactions to frictions in such markets. As such, they are frequently used in the construction of forward looking indices and indicators.

Although primarily designed as measurements of market performance for use by individual investors and investment fund managers, the OECD reports that business and government analysts also use share price indices as indicators of economic activity. The prices constitute a crucial component of the Composite Leading Indicators series (CLIs) used to forecast economic cycles of a country.[7] One drawback of this variable, more so for country-specific studies, is that the markets may not accurately reflect economic performance when companies engage in multiple transactions across geographic locations or regions. In effect, unlike aggregate regional studies, the variable may not be extremely valuable for country-specific studies. Figure **2** reports share prices for the US, UK, and France.

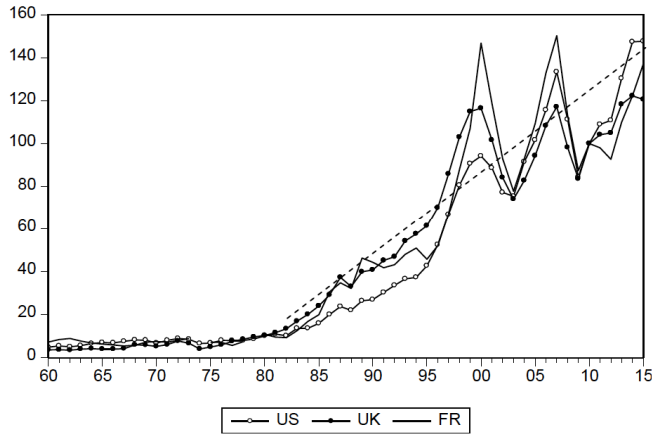


Figure 2: Share Prices for the US, UK, and France (1960-2015).

Data Source: OECD.

While the trajectory of prices shows episodic variations between 1960 and 2015, the trend is upward sloping and it reflects a positive equity return (capital gains) over a longer period. The next section discusses the relevant econometric literature and model specifications.

(b) Econometric discussion and model specifications

The vector autoregression (VAR) model is the preferred model for decomposing variances and making projections. The VAR to be estimated takes the following representation:

$$Y_t = \Phi_1 Y_{t-1} + \varepsilon_t ; \quad (1)$$

[6]Here, the word "capitalization" is contextually used to indicate the sum of a corporation's stock, long-term debt and retained earnings. Elsewhere, capitalization may also refer to the number of outstanding shares multiplied by share price.

[7]According to the OECD, the OECD system of Composite Leading Indicators (CLIs) provides early warning signs of turning points in business cycles or fluctuation in the output gap, fluctuation of the economic activity around its long-term potential level. By focusing on turning points (peaks and troughs), this approach results in CLIs that provide qualitative rather than quantitative information on short-term economic movements. The source of this information/data is the Organization of Economic Cooperation and Development (OECD). Reference period 2010=100. The dataset is from the Monthly Monetary and Financial Statistics.

Table 2: Lag-Length Evaluative Criteria /Tests*

Test and Series	Eurozone	CFA W. Africa	CFA C. Africa	ECCU
Akaike (1960-2007)	-2.75	2.82 (1.98)	7.63 (7.07)	N/A
Schwarz (1960-2007)	-1.97	3.64 (2.77)	8.45(7.86)	N/A
Akaike (1960-2015)	-2.12	2.65 (2.05)	7.44 (7.5)	-0.42 (-0.37)
Schwarz (1960-2015)	-1.39	3.4 1(2.78)	8.19 (9.43)	0.10 (0.15)

*US financial markets are utilized to estimate the Eurozone criteria, financial markets of the US and France are selected for the CFA countries (US values in parenthesis), and the financial markets of the US and UK are used to estimate the criteria for the ECCU, with the US values in parenthesis. The ECCU sample is for 1977 to 2015 and three variables are considered at a time (GDP, exports/gdp, and UK or US equity prices), because of data limitations.

where Y_t is a vector of endogenous variables without any formal causal ordering, Φ_1 is for the estimated coefficients of the endogenous variables in the VAR system, and ε_t is for innovations perturbations, or disturbances that are associated with exogenous occurrences. The Akaike and Schwarz information test are the preferred diagnostic tests for the lag structure in this case, where Akaike is defined as:

$$AIC = \ln\frac{\varepsilon'\varepsilon}{n} + \frac{2k}{n}, \tag{2}$$

and the Schwarz as:

$$SIC = \ln\frac{\varepsilon'\varepsilon}{n} + \frac{k}{n}\ln n; \tag{3}$$

n is for the sample size and *k* is for the number of estimated coefficients. The data for the Eurozone and the CFA countries have been broken up into two samples: (i) 1960-2007, before the 2007/8 Great Recession, and (ii) 1960-2015, a hybrid sample (based on data availability) to reflect a holdout component. The suggested lag-length evaluation tests are reported in Table **2**.

Parameter accounting poses some empirical challenges for elaborate model specifications. As such, all equations have been parsimoniously estimated. For the VAR system, each equation follows the conventional procedure for parameter accounting: V*L + C or V; where V is for the number of variables, L is for the number of lags, and C is for the number of constants or variables. To ensure that the number of parameters estimated does not exceed the number of observations; no more than three or four variables are estimated for each equation.

Since VARs are more useful when they are stationary, Argand diagrams reported in Appendix B evaluate the characteristic roots, which may be complex for a variety of models. Eviews 7 reports the inverse roots. The characteristic equation is specified as:

$$y_t = \rho_1 y_{t-1} + \varepsilon_t, \tag{4}$$

with the expectation that $1 - \rho_1 y_{t-1} = 0$. The AR (1) process has a stable characteristic root of $x^* = \frac{1}{\rho_1}, \forall\ x^* = y_{t-1}$, implying that the series are stationary for each characteristic root when $|\rho_1| < 1$ or $|x^*|>1$.

By redefining the VAR as a moving average (MA) process, the VAR provides a more meaningful representation of the system for the purposes of analyzing shocks to the system of endogenous variables.[8] The redefinition expresses a variable in terms of its current and previous innovations, shocks, or disturbances. Hence, an MA(q) process is generally denoted as:

$$Y_t = \sum_{j=0}^{q} \theta_j \varepsilon_{t-j}; \tag{5}$$

where *θ* is for the innovation parameters; the dynamic multipliers are methodically derived from such a representation.

Consider a starting period, $y_0 = \Phi y_{-1} + w_0$ and an ensuing period 1, $y_1 = \Phi y_0 + w_1$, by recursive substitution, it can be shown that:

$$y_1 = \Phi y_0 + w_1 = \Phi(\Phi y_{-1} + w_0) + w_1 = \Phi^2 y_{-1} + \Phi w_0 + w_1 \tag{6}$$

Accordingly, the dynamic multipliers can be estimated as:

[8]See Hamilton, p.2 for a comprehensive derivation and analysis of the dynamic multipliers.

$$\frac{\partial y_1}{\partial w_0} = \Phi . \quad (7)$$

Hence, Equation 7 defines the usual dynamic multipliers. The results of these multipliers or impulses are reported in Appendix C for comparative analysis and, when necessary, selections are embedded in the paper as part of the empirical findings. For consequential analysis of the shocks, the shocks are orthogonalized so that they are uncorrelated. The variables are rescaled to obtain standardization of the shocks while transforming the innovations so that they are uncorrelated.

The transformation is achieved by factorizing the matrix of endogenous variables to find a lower triangular matrix (P) to premultiply the standard VAR, equation (Equation 4), in order to produce:

$$PP' = \Phi, or\ p^{-1} * y_t = p^{-1} * \rho_1 y_{t-1} + p^{-1} * \varepsilon_t \quad (8)$$

The innovations, $u_t = P^{-1} * \varepsilon_t$, become orthogonal to each other but they present some theoretical ambiguities that are associated with causal ordering.[9] The generalized impulse response proposed by Pesaran and Shin (1998) is given more consideration to ameliorate the theoretical problem. While the appropriate responses usually present no significantly different ocular outcome, this study adopts preference for the randomized or generalized impulse (GIRF) definition, which is not sensitive to causal ordering:

$$GIRF(n,\varepsilon_t,\varpi_{t-1}) = E\left[y_{t+n} \mid \varepsilon j,t,\varpi_{t-1}\right] - E\left[y_{t+n} \mid \varpi_{t-1}\right]. \quad (9)$$

Panagiotidis *et al*. concisely present a more comprehensive discussion of GIRF in the form of Equation 9, where *n* is for the forecast horizon, ε_t is for a contemporaneous shock, and ϖ_{t-1} is for realized information.[10] The Expectations operator indicates that the GIRF is a random variable given by the difference between two conditional expectations denoted as random variables. The expectation of y_{t+1} is contingent on a history of information and any given shock $\varepsilon_{j,t}$, thereby integrating out all other contemporaneous and future shocks. The second component of Equation 9 presents the conditional expectation of y_{t+1}, given observed information. As a result, the impulse responses proposed by Pesaran and Shin (Equation 10) are unique and rather insensitive to the ordering of the variables in a system:

$$\psi_j^0 = \frac{1}{\sqrt{\sigma_j^2}} \Phi^n \sum \delta_j ; \quad (10)$$

where σ_j^2 is the variance of the *jth* innovation (δ_j).Variance decompositions measure the proportion of *n* step ahead forecast error variance that is explained by each time of shock to the VAR:

$$\theta_{ij}^0 = \frac{\sum_{l=0}^{n} (\delta_i^l \Phi_l P\delta)^2}{\sum_{i=0}^{n} (\delta_i^l \Phi i \sum \Phi_i^l \delta_i)} . \quad (11)$$

It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. As a practical matter, the variance decomposition explains the proportion of fluctuations (volatility) in the endogenous variables that is associated with shocks to each of the variables in the system for a given period.

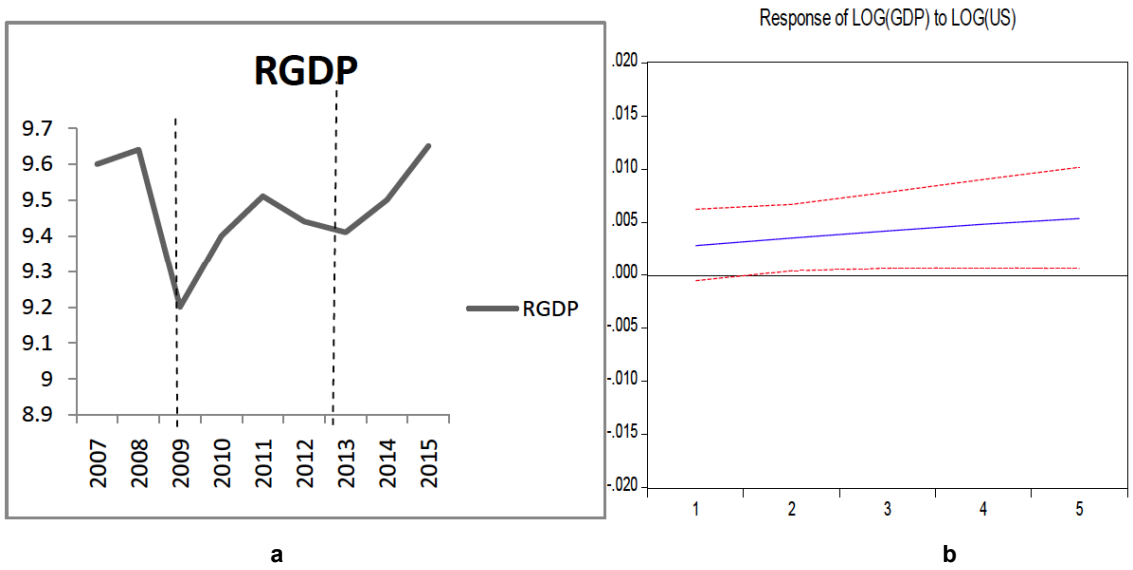
IV. EMPIRICAL FINDINGS AND CONCLUSION

Some prevalent and practical theories can used to evaluate the exposure of currency unions to macroeconomic instability. The work of Cashin *et al.,* (IMF 2008) provides a good benchmark for appraising these theories. A brief reference to these theories should be worthwhile: (i) the state of macroeconomic fundamentals, (ii) external liquidity, (iii) monetary conditions, and (iv) financial soundness indicators.

Macroeconomic fundamentals are broadly defined to include real GDP growth, inflation, nominal exchange rate depreciation, and overall fiscal balance as a percentage of GDP. These variables collectively affect loan availability, real return on assets, foreign exchange risk, and institutional failures. External liquidity takes into consideration trade flows, terms of trade, and official reserve (convertible currencies) to cover broad money. The stability of any financial system is presumed to be contingent on the continuity of leveraged trade, repayment possibilities for financing trade, and resistance to the undesirable effects of sudden capital flows (reversals).

[9] That is, $E(u_t u_t') = E(P^{-1} e_t e_t' (P^{-1})') = I$, where $PP' = \sum$. This transformation is variously known as the Cholesky decomposition, which is susceptible to causal ordering. The second innovation impacts the first endogenous variable but not the third; the third impacts the second but not the fourth, implying that the contemporaneous relationship among the variables in the Y_t vector have a recursive structure.

[10] See Panagiotidisa,T, Pellonib, G and Polasekc,W (2003). "Macroeconomic Effects of Reallocation Shocks: A generalised impulse response function analysis for three European countries." Available at file:///F:/EeconConf17/GeneralizedIMPfn.pdf.



a **b**

Figure 3: a: Real GDP of the Eurozone. Source: Stiglitz (2016), p.66.

b Response of GDP(pc) to US Equity Shock. Author's projection (see Appendix C (i)).

Monetary conditions include liquidity, the cost of borrowing money at home and abroad, and the availability of deposit insurance to minimize bank runs and disruptions. Monetary conditions must mitigate the excesses of moral hazard.[11] Financial soundness indicators are defined by capital adequacy (bank equity-asset ratios), bank liquidity, and profitability (which may be measured by interest rate spread and pre-tax return over average assets as a proxy).[12] According to Cashin *et al.,* the vulnerability to foreign currency (FC) risk could be measured by the ratio of net foreign assets (NFA) to GDP. However, they use the ratio of foreign currency deposits in the banking system over the estimated official reserves for each country to evaluate financial soundness of the ECCU countries. They note that empirical results could be distorted when official reserves for every ECCU country are pooled. Further, they observe that even if the banking system is well balanced in its FC operations, FC risk may still materialize owing to maturity mismatches [excesses of current liabilities over current assets]. Therefore, they conclude that it might be prudent to also monitor the evolution of FC liabilities in particular.

The Eurozone, like the other currency unions, has peculiarities within it that are both structural and fundamental. Though long-term interest rate started to converge round about 2002, credit growth, including foreign borrowing, surged as financial institutions became highly leveraged while investing in financial securities.[13]

Macroeconomic vulnerability increased as exposure to financial transactions denominated in real estate intensified. Leveraged imports increased concomitantly to disproportionately disturb the balance sheets of weaker European economies. The union precariously survived until a financial crisis was triggered in 2007/8. Beyond the immediate impact of the 2007/8 financial crisis, this paper has focused on the explanatory power of equity prices over the volatility of GDP per capita for a longer period of time, say 38 and 55 years.

As a general theory, this paper finds that shocks to equity prices have imprecise implications for the performance of currency unions with very divergent sources of income, flexible currency arrangements, and amorphous financial exposures. As such, the consequences of shocks to equity prices may not be contingent on historical alliances, geographic proximity, or even union membership when trade flows are multidimensional and currencies are not stringently pegged.

[11] As an evaluative criterion for short-term borrowing costs of loans throughout the world, the Intercontinental Exchange London Interbank Offered Rate (LIBOR) is variously used by the world's leading banks. Five currencies—US dollar, the euro, pound sterling, Japanese yen and Swiss franc—are considered for seven maturities: overnight, one week, and 1, 2, 3, 6 and 12 months. The rate that is often quoted is the three-month US dollar rate.

[12] See also Demirgüc-Kunt and Detragiache (1998) and Kaminsky and Reinhart (1999).

[13] See Anand *et al.,* p.7.

Discounting the 2007/2008 financial crisis, the evidence suggests that the Eurozone countries have collectively benefitted from the trend in American equity prices and that real GDP has been growing, albeit at a sluggish pace, in the post crisis period (see Figure **3a**). The response of per capita income to US equity price shock in the Eurozone (Figure **3b**) mirrors such a trajectory in the near future. Evidently, some countries, especially the peripherals—for example, Greece, Portugal, Spain, and Ireland—have not grown robustly, because of monetary arrangements and heterogeneous structural problems. By 2015, non-Eurozone European countries had a GDP growth of 8.1 percent higher than in 2007.[14] In 2013, unemployment reached 27.8 percent in Greece (Stiglitz 2016:71).

It should be recalled that two procedures are used for decomposing variances and forecasting trajectories (5 years hence). A sample preceding the 2007 crisis (a less noisy sample) and a partial holdout (hybrid) sample that extends the empirical inquiry to 2015. The fundamental idea is to evaluate the efficacy of the models by comparing the standard errors (SE). The standard errors show no significant variations for all the samples considered (see Tables **3**, **5**, and **6**).

Extra-union trading patterns of Africa and the Eastern Caribbean regions are reported in Tables **4** and **8a**. For the sake of brevity, trading patterns of Eurozone members have not been reported here. However, a fuller discussion of such patterns can be found in "The Limits of Monetary Treaty" (Warburton 2012). The trading patterns generally help to provide perspectives on sources of income, and they normally indicate levels of vulnerability or resistance against the headwinds of macro instability. The impact of financial shocks on per capita output is provided in Appendix C. Only the impulse responses of the hybrid samples are reported to avoid redundancies.

Variance decompositions for all estimates, including standard errors, are reported in Tables **5** through **7**. As far as the Eurozone countries are concerned, the performance of US financial markets and trade (exports and imports as a percentage of GDP) account for a considerable amount of volatility in European per capita income over a five-year period. As a result of positive shocks to US equity prices, European per capita income and exports as a percentage of GDP tend to gradually increase and explain about 5 to 6 percent of the volatility in per capita income within 3 years after an equity price shock (see Tables **3a** and b, and Appendix C(i)). Studies that have disaggregated the Eurozone sample, notably some IMF studies, observe that the spread of disturbances to core economies could have significant global consequences.[15]

Though the CFA regions of Africa are characterized as "currency unions," they have peculiar attributes that are unlike those of the Eurozone. For example, they have access to liquidity unlike their European counterparts and they do not necessarily have to fully cover broad money supply or liabilities. They barely have to meet a threshold of financial soundness. These flexibilities are fundamentally important safeguards against international financial shocks.

Since the 1930s and 1940s, France established currencies in its colonies that were pegged to the French franc. Hence, France is naturally one of those European nations that had a long experience with the functionality of currency unions. By the end of the Second World War, the currencies of the French colonies were unified into *le franc des Colonies Françaises d'Afrique* (CFA franc) and a parity was set at 0.5 CFA franc per French franc in October 1948 (Hadjimichael and Galy 1997). The monetary arrangements of the African countries with France transverses the two geographic regions of Africa, West and Central Africa, to include France. The West African Economic and Monetary Union (WAEMU) and the Economic and Monetary Community of Central Africa (CEMAC) respectively serve the African regions (See Appendix A for a list of countries).

By pegging the CFA franc to the French franc (now euro), the French Treasury guaranteed the convertibility of the CFA franc into French franc, which facilitated some amount of capital mobility within the CFA zones. Though the CFA zones are considered to be a currency area, the area is not necessarily optimal (see Tables **4a** and **4b** for trade patterns and imputed transaction costs). Invariably, this is also true for the Eurozone. The French Treasury, through an operations account, makes a commitment to convert into euro all CFA franc notes issued by WAEMU and CEMAC central banks for "unlimited" lines of credit, conditional

[14] Stiglitz, p.67

[15] See IMF (2011) Euro Area Policies: Spillover Report 2011, Washington DC, accessed November 19, 2016 http://www.imf.org/external/pubs/ft/scr/2011/cr11185.pdf

Table 3a: Variance Decomposition for Eurozone Income (Per Capita GDP)*

Period	SE GDP & Exports/GDP	Past GDP	Export/GDP	Import/GDP	US' Financial Market
2008	0.01 (1.07)	100			
2009	0.01 (1.41)	94	1.98 (0.62)	3.7	0.33
2010	0.02 (1.62)	84	5.35 (1.87)	9.1	1.37
2011	0.02 (1.77)	74	8.92 (3.6)	14.2	3.09
2012	0.02 (1.88)	64	12.07 (5.69)	18.44	5.31

*Notes: Variation in Export/ GDP explained by US financial markets in parenthesis. Related standard errors are also in parenthesis.

Table 3b: Variance Decomposition for Eurozone Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	Import/GDP	US' Financial Market
2016	0.01 (1.38)	100.0000			
2017	0.02 (1.84)	91.27	1.79 (0.11)	6.65	0.28
2018	0.02 (2.15)	77.11	4.44 (0.36)	17.48	0.97
2019	0.02 (2.37)	63.09	6.80 (0.75)	28.17	1.94
2020	0.03 (2.54)	51.46	8.55 (1.27)	36.96	3.03

on financial soundness.[16] Gulde and Tsangarides (2008:116) find that without the French convertibility guarantee, CEMAC's reserves in 2005 would have had to cover 5.8 months of imports instead of 3.8 months. This measure of flexibility is not readily available to the Eurozone countries confronting inflexible exchange rates and fiscal imbalances. Recalling discussions of Figure **1**, it should be reasonably apparent why inflexibilities can be problematic. Additionally, France provided more than one quarter of the development assistance for the franc zone countries in 1990-2008.

Are the CFA countries insulated from equity price shocks in America and France? The choice of French equity prices or markets is rather nostalgic and based on the presumption that strong trading relations exist between France and its former colonies. Yet, the colonial moorings are not as strong as colonial trade history would suggest. The empirical evidence is both surprising and revealing. Only five of the 14 CFA countries robustly traded with France and the US in 2014, and only 4 engaged in high level intra-union trade (see Tables **4a** and **4b**). This is striking partly because some of the central reasons for forming currency unions are strongly predicated on theories supporting the arguments for robust intra-regional trade, reduction of transaction cost, and the stimulation of economic growth (reduction in unemployment); apart from arguments for price stability.

For the CFA West and Central African countries, all samples reveal that changes in asset prices account for very little variation or volatility of per capita income. Variability increases over a longer time horizon, but mostly for less than 2 percent (see Tables **5a** through **6b**). Exports as a percentage of GDP explain more of the variability in per capita income, essentially because of what could be considered to be the indirect trade effects. Though these countries do not have a direct and significant trading relationships with the US and France, their trading partners may be susceptible to adverse current account imbalances as equity prices change in the US or France. The income responses to the shocks in French equity prices are generally flat, but income in the CFA countries respond more negatively to shocks in US equity prices (see Appendix C(i)). These countries collectively trade more with the US, Japan, China, France, Australia, Spain, UK, and Brazil (see Tables **4a** and **4b**). The response further suggests that private capital outflows might need important attention. The trade exposures exacerbate currency risks for the countries, more so than their western counterparts.

[16]At least 20 percent of sight (short-term) liabilities of each central bank must be covered by foreign exchange reserves, and at least 50 percent of foreign exchange reserves of each member country must be held in the operations account. Countries that draw on the overdraft facilities are subject to increasing interest rate penalties (see Agbor 2012).

Table 4a: CFA West, Top Export Destinations (Millions of $US, 2014)

	Mali	Niger	Senegal	B. Faso	Benin	Togo	Ivory Coast	G. Bissau
Switzerland	282	--	288	1,900	--	255	--	--
Bahrain	86.3	--	--	--	--	--	--	--
China	89.8	133		115	188	--	--	44.9
India	70.2	--	158	--	186	181	--	160
France	--	524	132	--	--	--	1,010	
Vietnam	--	--	--	--	--	--		28.3
USA	--	80	--	--	--	--	1,250	--
Nigeria	--	138	--	--	--	--	--	--
Sierra Leone	--	--	--	--	701	--	--	--
Mali*	--	--	471	251	--	--	--	--
B. Faso*	--	134	--	--	281	412	--	--
UAE	--	--	164	X	--	--	--	--
Singapore	--	--	--	152	--	--	--	--
Ivory Coast*	--	--	--	136	--	--	--	--
Gabon	--	--	--	--	141	--	--	--
Lebanon	--	--	--	--	--	268	--	--
Cameroon	--	--	--	--	--	169	--	2.3
Netherlands	--	--	--	--	--	--	1,210	3.01
Germany	--	--	--	--	--	--	900	--
S. Africa	--	--	--	--	--	--	886	--

*Union members. Data Source: http://atlas.media.mit.edu/en/profile/country/ben/

Table 4b: CFA Central, Top Export Destinations (Millions of $US, 2014)

	Chad	CAR	Cameroon	Gabon	Congo, R	Eq. Guinea
USA	2,080	--	--	697	397	--
Japan	263	--	--	1,290	--	--
China	96.9	30	721	1,440	4,840	2,880
Turkey	16.3	2.42	--	--		
Singapore	15.6	--	--	--	--	1,030
Indonesia	--	14.6	--	--	--	--
Morocco	--	5.68	--	--	--	--
France	--	3.71	--	--	--	900
Spain	--	--	814	--	--	--
India	--	--	520	704	--	--
Netherlands	--	--	488	--	--	--
Italy	--	--	474	--	823	--
Australia	--	--	--	945	694	--
Gabon*	--	--	--	--	542	--
UK	--	--	--	--	--	1,750
Brazil	--	--	--	--	--	999

*Union member. Data Source: http://atlas.media.mit.edu/en/profile/country/ben/

Table 5a: Variance Decomposition for CFA West African Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	Import/GDP	Fin. Markets Fr. /(US)
2008	0.03 (1.5)	100.0000			
2009	0.04 (1.91)	97.42	1.44 (0.001)	0.79	0.36 (0.21)
2010	0.04 (2.12)	94.39	2.70 (0.001)	1.89	1.02 (0.54)
2011	0.05 (2.25)	91.89	3.26 (0.002)	2.99	1.85 (0.95)
2012	0.05 (2.34)	89.95	3.31 (0.007)	3.96	2.78 (1.43)

*Notes: Variation in Export/ GDP explained by US financial markets in parenthesis. Related standard errors are also in parenthesis.

Table 5b: Variance Decomposition for CFA West African Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	Import/GDP	Fin. Markets Fr. /(US)
2016	0.03 (1.47)	100			
2017	0.04 (1.93)	97.11	1.94 (0.1)	0.93	0.01(0.01)
2018	0.05 (2.22)	93.49	4.26 (0.29)	2.23	0.02 (0.01)
2019	0.06 (2.44)	90.28	6.23 (0.53)	3.48	0.01 (0.01)
2020	0.07 (2.60)	87.64	7.75 (0.82)	4.60	0.01 (0.03)

Table 6a: Variance Decomposition for CFA Central African Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	Import/GDP	Fin. Markets Fr. /(US)
2008	0.06 (3.06)	100.0000			
2009	0.09 (3.89)	99.05	0.42 (0.11)	0.49	0.04 (0.1)
2010	0.10 (4.35)	97.94	0.99 (0.33)	0.98	0.09 (0.25)
2011	0.11 (4.62)	96.98	1.55 (0.66	1.33	0.14 (0.41)
2012	0.12 (4.81)	96.21	2.04 (1.07)	1.55	0.19 (0.60)

*Notes: Variation in Export/ GDP explained by US financial markets in parenthesis. Related standard errors are also in parenthesis.

Table 6b: Variance Decomposition for CFA Central African Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	Import/GDP	Fin. Markets Fr. /(US)
2016	0.06 (3.08)	100.0000			
2017	0.08 (3.88)	99.39	0.19 (0.07)	0.41	0.02 (0.06)
2018	0.09 (4.29)	98.51	0.42 (0.21)	1.03	0.04 (0.17)
2019	0.10 (4.53)	97.62	0.63 (0.44)	1.69	0.07 (0.31)
2020	0.11(4.67)	96.82	0.79 (0.72)	2.30	0.09 (0.47)

Like the Eurozone and the CFA countries, the ECCU countries share a common currency (the EC dollar), but the EC dollar has been pegged to the U.S. dollar at the same rate for more than three decades. In a somewhat analogous way that is comparable to the CFA franc, the Eastern Caribbean countries struck a

Table 7a: Variance Decomposition for Eastern Caribbean Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	US' Equity Markets
2016	0.03 (3.22)	100		
2017	0.04 (4.12)	95.34	2.18 (3.08)	2.48
2018	0.05 (4.68)	89.16	5.30 (8.63)	5.54
2019	0.06 (5.11)	83.63	8.34 (15.11)	8.03
2020	0.07 (5.46)	79.25	10.10 (21.50)	9.75

*Notes: Variation in Export/ GDP explained by US financial markets in parenthesis. Related standard errors are also in parenthesis.

Table 7b: Variance Decomposition for Eastern Caribbean Income (Per Capita GDP)*

Period	SE GDP & Exports/ GDP	Past GDP	Export/GDP	UK's Equity Markets
2016	0.03 (3.4)	100.0000		
2017	0.04 (4.5)	96.92	0.39(0.1)	2.69
2018	0.05 (5.23)	91.33	1.28 (0.32)	7.39
2019	0.05 (5.7)	84.78	2.58 (0.66)	12.64
2020	0.06 (6.03)	78.30	4.15 (0.01)	17.55

monetary arrangement that has inbuilt-flexibility. The union functions as a quasi-currency board and has enjoyed considerable price stability over the years.[17]

Despite its exposure to several exogenous shocks, the empirical evidence elsewhere suggests that the ECCU has never experienced a systemic banking crisis (Cashin *et al*.: 2008). Of course, banking crisis is a specific type of financial crisis, involving bank runs, mergers and/or failures. A financial crisis emanating from asset price deflation is usually a special genre of crises involving speculation and colossal declines in asset prices. However, the intellectual differences may not necessarily do sufficient justice to the indistinguishable and dire consequences of these crises (a difference without consequential distinction).

In 2008, Cashin *et al*. used the then relatively new binary classification tree (BCT) to study the resistance of the Caribbean countries to banking crisis.[18]

They provide support for the theory that the Caribbean region is generally resilient to banking crisis. Nineteen out of fifty countries, ten of which are Caribbean countries, in their sample did not experience any systematic banking crisis between 1990 and 2005. However, they caution against increases in financial vulnerabilities. This research finds that financial market shocks in the US and the UK could explain a much higher percentage of the volatility in per capita income of the unionized Eastern Caribbean countries relative to those of the Eurozone and the CFA countries. For the variables considered, shocks to equity prices and exports as a percentage of GDP seem to explain about 10 to 16 percent of the variation in per capita income within two to three years after a financial shock (see Table **7a** and **7b**).

Of course, strong financial institutions and intermediation can resist these shocks; suggesting that there is always a very strong role for a lender of last resort when moral hazard is not disruptive. These findings are generally consistent with the theory that currency unions with high foreign currency exposure and low liquidity could experience a destabilizing crisis. It remains to be seen how the ECCU will balance a consequential financial shock against its moral hazard safeguards. At any rate, maintaining the currency pegs and balancing reserves and liquidity seem to have worked well for the ECCU. Are the patterns of international trade a stabilizing precondition for the ECCU? Table **8a** below provides an interesting clue.

[17]Theoretically, a complete currency board must have 100 percent coverage of its domestic money supply or liabilities. The ECCB is mandated to hold foreign exchange equivalent to at least 60 percent of demand liabilities. However, the practical coverage has been close to 100 percent, with an operational target of about 80 percent; see Schipke *et al.* p. 407 fn. It is noteworthy that the Eastern Caribbean Central Bank (ECCB) performs a very limited role as lender of last resort (LOLR); see IMF (2008), p.4, prepared by Paul Cashin, Mario Dehesa, Pablo Druck, Rupa Duttagupta, Hunter Monroe, Nkunde Mwase, Koffie Nassar, Emilio Pineda, Yan Sun, and Evridiki Tsounta.

[18]The BCT is an improvement on crisis methodology, partly because it is sensitive to indicator thresholds when it comes to recognizing the probability of crisis. It also uncovers nonlinearities that are difficult to detect in standard regression models; see Cashin *et al*. for a comprehensive discussion of the BCT methodology.

Table 8a: ECCU, Top Export Destinations (Millions of $US, 2014)

	St. Lucia	St. Kitts & Nevis	Grenada	Dominica	Antigua & Barbuda	Anguilla	Montserrat
USA*	64.4	25.5	7.58	--		4.62	1.47
Suriname	108	--	--	--	28.7	--	--
Barbados	26	--	--	--	--	--	--
Trinidad/Tob.*	21	--	--	--	--	--	0.326
UK	16.7	--	--	--	--	--	--
Poland	--	20.9	--	--	137	--	--
Bolivia	--	5.4	--	--	--	--	--
Germany	--	4.2	3.06	--	--	--	--
Turkey	--	3.55		--	--	--	--
St. Lucia*	--	--	4	--	--	1.23	--
Netherlands	--	--	2.51	--	--	--	--
Antig./Barbuda*	--	--	2.06	--	--	--	--

Table 8a: ECCU, Top Export Destinations (Millions of $US, 2014) (continued)

	St. Lucia	St. Kitts & Nevis	Grenada	Dominica	Antigua & Barbuda	Anguilla	Montserrat
Jamaica	--	--	--	36.2	--	--	--
Guyana	--	--	--	4.62	--	--	--
Bahama	--	--	--	3.14	--	--	--
S. Africa	--	--	--	2.71	--	--	--
France	--	--	--	2.68	--	--	0.761
Cameroon	--	--	--	--	27.3	--	--
Senegal	--	--	--	--	18.2	--	--
Thailand	--	--	--	--	3.88	--	--
Azerbaijan	--	--	--	--	--	5.86	--
Indonesia	--	--	--	--	--	4.02	--
Belgium-Lux.	--	--	--	--	--	0.531	--
St. Kitts-Nevis*	--	--	--	--	--	--	0.748
Australia	--	--	--	--	--	--	0.271

*Union members. Data Source: http://atlas.media.mit.edu/en/profile/country/ben/

Unlike the other currency unions with very weak intra-union trade, the ECCU countries maintain a robust trade with the US, the country with which it anchors its currency. Of the seven ECCU countries, there is a robust trade among four union members (a relatively higher percentage compared to their African counterparts and, to some extent, some of their European counterparts).

The ECCU countries, with the exception of Antigua and St. Lucia, generally purchase their imports from the US as a dominant trading partner. In effect, it should not be very surprising that unlike the other currency unions, the ECCU has been able to maintain a reasonable degree of exchange rate and price stability. As long as interest rates continue to be low and less volatile in the US, the ECCU is well positioned to enjoy some amount of macro stability. Accordingly, it turns out that it is the only union for which the response of aggregate per capita income to equity price shocks is so profoundly positive. Increases in share prices raise per capita income on impact and into the near future (five years) (see Figure **4**).

This paper finds that in postulating theories about currency unions, it is empirically important to consider

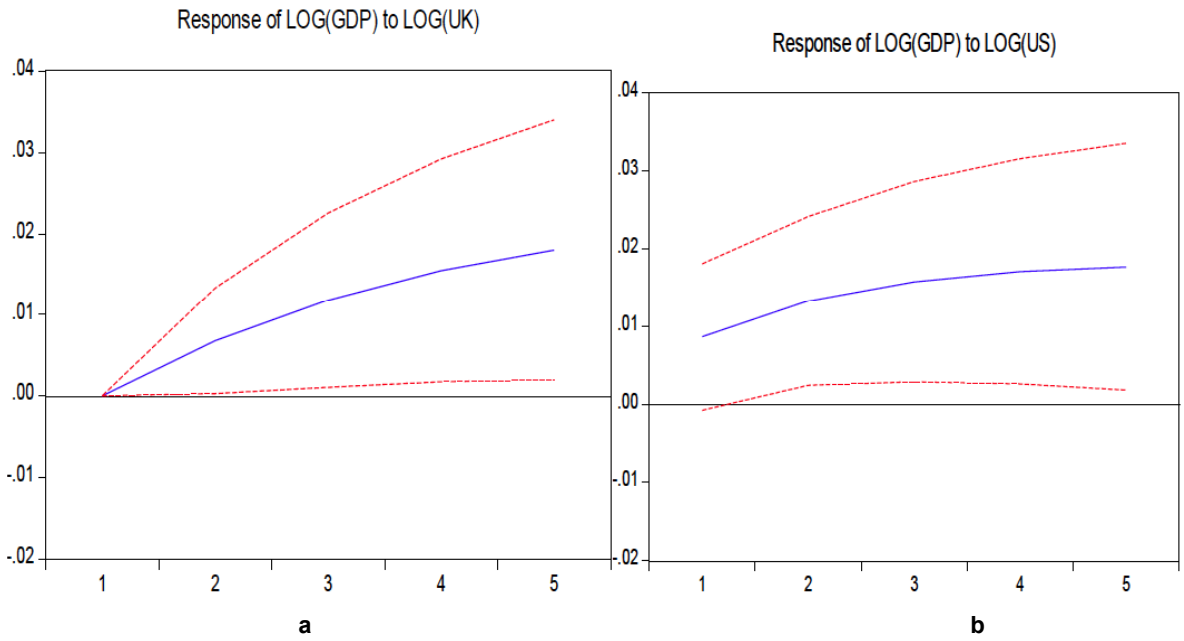


Figure 4: Responses of ECCU's Per Capita Income to Shocks in Equity Prices. ECCU (**a**) 2016-2020 (UK) ECCU (**b**) 2016-2020 (US).

the quality of intra-union trade, the flexibility of exchange rate arrangement, and exposures to changes in asset prices. As a result, the effects of financial shocks on per capita national income may provide ambiguous results for currency unions in different geographic locations with different institutional arrangements. Consequently, asset price shocks, historical trade allegiances, and intra-union trade may not adequately explain the volatility of per capita income of currency unions when countries do not trade very well among themselves and are not very well integrated with countries that have robust economies and relatively stable financial markets. Of course, these anomalies or ironies are normally perpetuated by restrictive extra-union trade policies. While peripheral ties may produce indirect effects, the pace of stabilization will ultimately be dependent on the flexibility of monetary arrangement and other structural conditions that are available to each member of a currency union.

APPENDIX A

Sample of Countries 1960-2007 and 1960-2015

Eurozone	CFA (West Africa)	CFA (Central Africa)	ECCU
Ireland	Mali	Chad	St. Lucia
Netherlands	Niger	CAR	St. Kitts and Nevins
Germany	Senegal	Cameroon	Grenada
Belgium	Burkina Faso	Gabon	Dominica
Portugal	Benin	Congo	Antigua & Barbuda
France	Togo	Equatorial Guinea*	Anguilla (UK)*
Italy	Cote d'Ivoire		Montserrat (UK)*
Spain	Guinea-Bissau		
Luxembourg			
Greece			
Malta			
Cyprus			

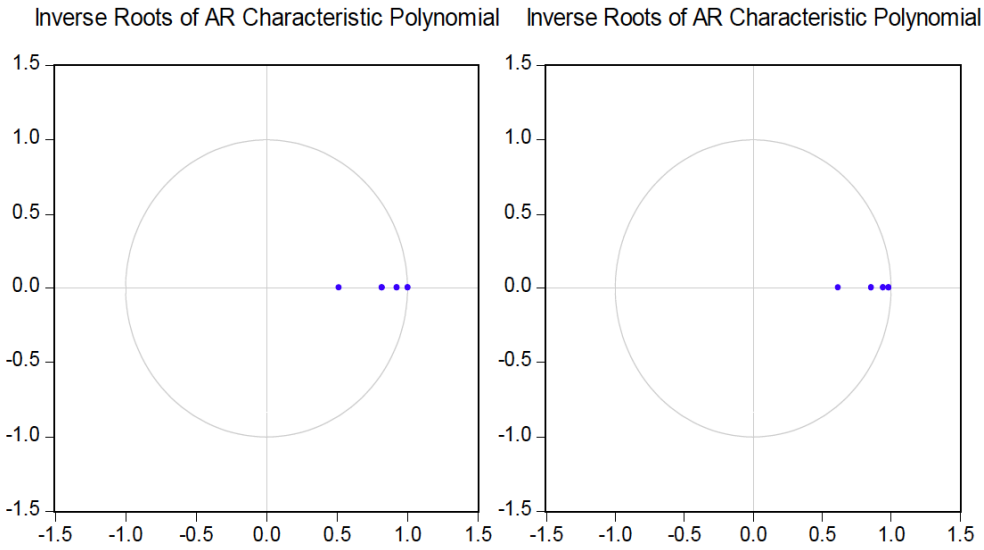
Eurozone	CFA (West Africa)	CFA (Central Africa)	ECCU
Slovenia			
Latvia			
Estonia			
Finland			
Lithuania			
Austria			
Slovakia			

Notes: Export, import and GDP data for Mali and Guinea Bissau started from 1967 and 1970 respectively. ECCU data started from 1977 and 1979 for St Lucia's export data.
*Countries excluded from sampling for data and other reasons.

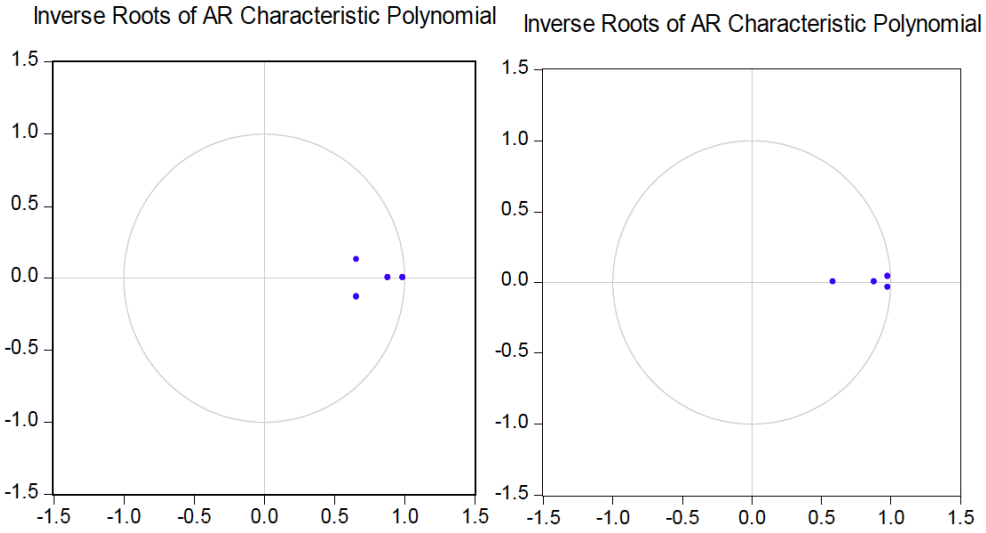
APPENDIX B

Stationarity Conditions

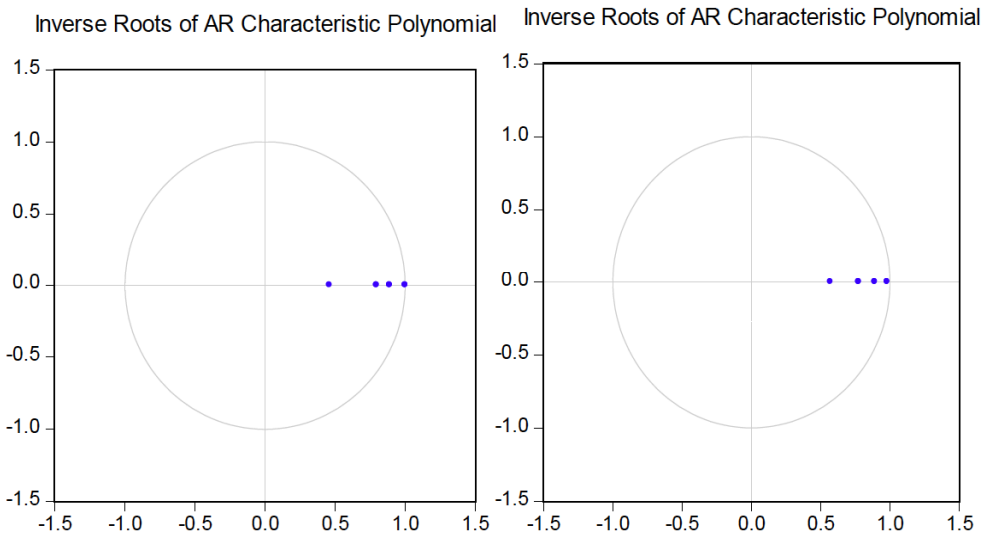
Eurozone Countries: 1960-2007 ***1960-2015***



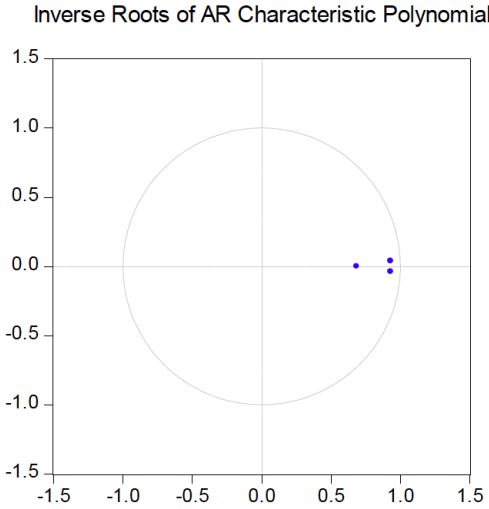
CFA West African Countries: 1960-2007 ***1960-2015***



CFA West African Countries: 1960-2007 ***1960-2015***



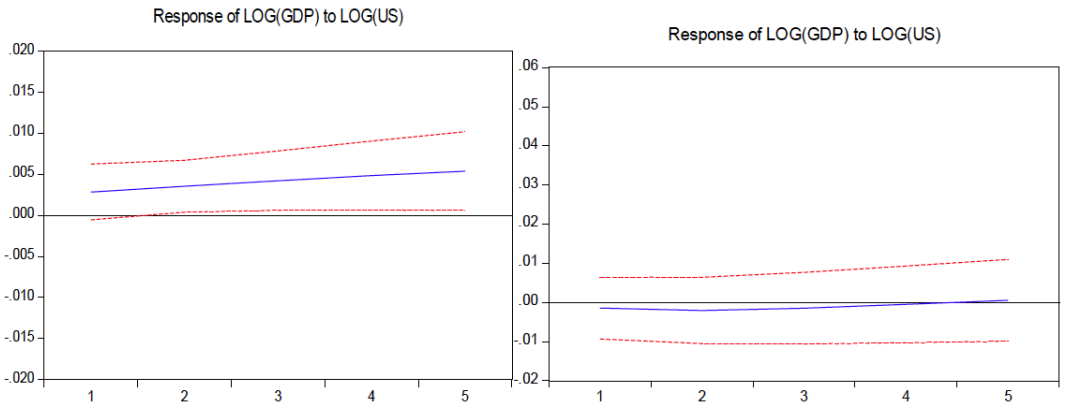
The Eastern Caribbean Currency Union 1977-2015



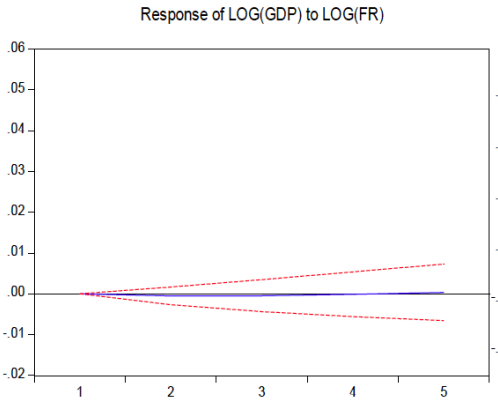
APPENDIX C (I)

Responses of Per Capita Income to Shocks in Equity Prices

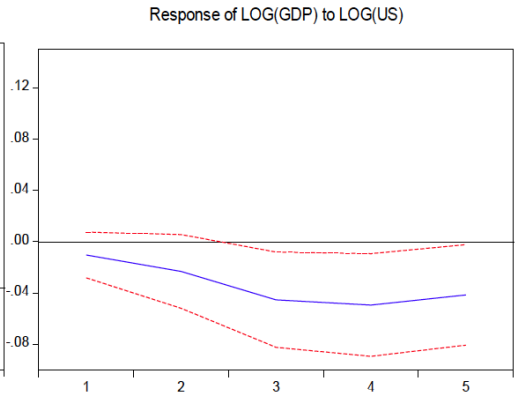
Eurozone 2016-2020 (US) ***CFA West 2016-2020 (US)***



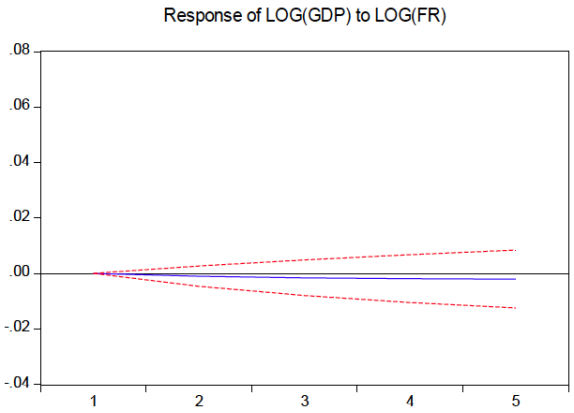
CFA West 2016-2020 (France)



CFA Central 2016-2020 (US)

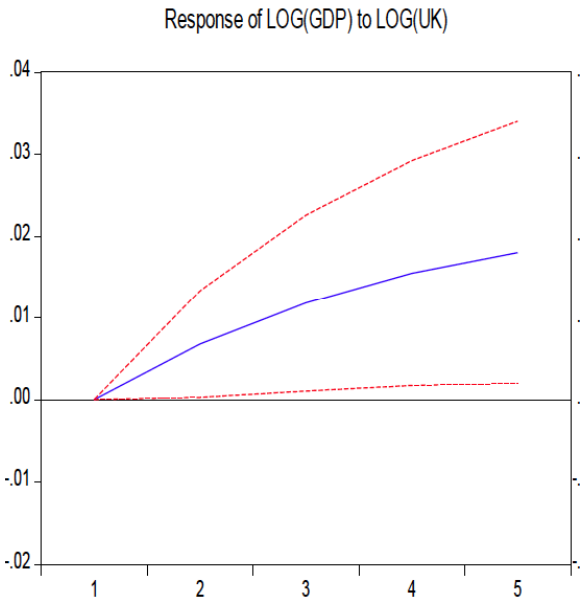


CFA Central 2016-2020 (France)

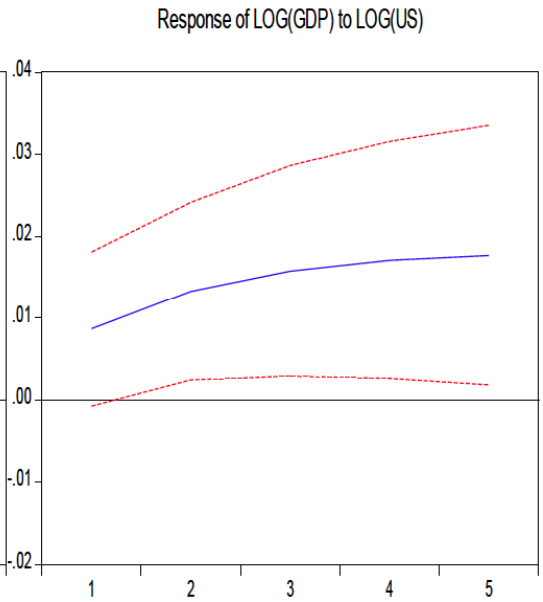


Responses of ECCU's Per Capita Income to Shocks in Equity Prices

2016-2020 (UK)



ECCU 2016-2020 (US)



REFERENCES

Agbor, Julius. 2012. "The Future of the CEMAC CFA Franc." Policy Paper 2012-06. The Brookings Institution Washington DC.

Cashin, Paul, Mario Dehesa, Pablo Druck, Rupa Duttagupta, Hunter Monroe, Nkunde Mwase, Koffie Nassar, Emilio Pineda, Yan Sun, and Evridiki Tsounta. 2008. *Eastern Caribbean Currency Union: Selected Issues*. Washington, DC: International Monetary Fund.

Demirgüc-Kunt, Asli. and, Enrica Detragiache. 1998. "The Determinants of Banking Crises in Developing and Developed Countries." *IMF Staff Papers* 45:81–109. https://doi.org/10.2307/3867330

Dixon, Hugo. 2011. "Can Europe's divided house stand? Separating Fiscal and Monetary Union." *Foreign Affairs* 90(6): 74-82.

Frankel, Jeffrey and Andrew Rose. 1998. "The endogeneity of optimum currency criteria." *Economic Journal* 108: 1009-1025. https://doi.org/10.1111/1468-0297.00327

Gulde, Anne-Marie. and Charalambos Tsangarides,. 2008. "The CFA Franc Zone: Common Currency, Uncommon Challenges". International Monetary Fund, Washington DC.

Hadjimichael, Michael. and Michael Galy. 1997. "The CFA Franc Zone and the EMU."International Monetary Fund Working Paper.

Hamilton, James. 1994. *Time Series Analysis*. Princeton: Princeton University Press.

International Monetary Fund. 2011. Euro Area Policies: Spillover Report 2011, Washington DC, accessed November 19, 2016 http:// www.imf.org/external/pubs/ft/scr/2011/cr11185.pdf

International Monetary Fund. (2011). Euro Area Policies: Spillover Report for the 2011 Article IV Consultation and Selected Issues. Washington, DC: International Monetary Fund.

Kaminsky, Graciela and Carmen Reinhart. 1999. "The Twin Crises: Causes of Banking and Balance-Of-Payments Problems." *The American Economic Review* 89: 473−500. https://doi.org/10.1257/aer.89.3.473

Magee, Christopher. 2008. "New measures for trade creation and trade diversion." *Journal of International Economics* 75:349-362. https://doi.org/10.1016/j.jinteco.2008.03.006

Masson, Paul and Catherine Pattilo. 2001. *Monetary Union in West Africa (ECOWAS): Is it desirable and how could it be achieved?* Washington, DC: International Monetary Fund.

Meade, James. 1958. "The Balance of Payments Problems of a Free Trade Area." *Economic. Journal* 67:379-96. https://doi.org/10.2307/2227357

Meade, James. 1955. *The Theory of Customs Union. Amsterdam*. Holland: North-Holland

Metzler, Allan. 1995. "Monetary, Credit (and other) Transmission Processes: A Monetarist Perspective." *Journal of Economic Perspectives* 9:49-72. https://doi.org/10.1257/jep.9.4.49

Mishkin, Frederic.1996. "The Channels of Monetary Transmission: Lessons for Monetary Policy." National Bureau of Economic Research. Working Paper 5464.

Mundell, Robert. 1961. "A Theory of Optimum Currency Areas." *American Economic Association* 51(4): 657-665.

Perkins, Dwight, Steven Radelet, and David Lindauer. 2006. *Economics of Development* 6th ed. New York: WW Norton.

Pesaran, Hashem and Yongcheol Shin. 1998. "Generalized Impulse Response Analysis in Linear Multivariate Models." *Economics Letters* 58:17-29. https://doi.org/10.1016/S0165-1765(97)00214-0

Sapir, André. 2011. "European Integration at The Crossroads: A Review Essay on The 50th Anniversary of Bela Balassa's Theory of Economic Integration." *Journal of Economic Literature* XLIX(4):1200-1229. https://doi.org/10.1257/jel.49.4.1200

Schipke, Alfred, Aliona Cebotari, and Nita Thacker. 2013. The Eastern Caribbean Economic and Currency Union: Macroeconomics and the Financial System. Washington,DC: International Monetary Fund.

Scitovsky, Tibor. 1958. Economic Theory and Western European Integration. Stanford: Stanford University Press.

Stiglitz, Joseph. 2016. The Euro: How a Common Currency Threatens The Future of Europe. New York: WW Norton.

Tobin, James. 1969. "A General Equilibrium Approach to Monetary Theory." *Journal of Money, Credit, and Banking* 1:15–29. https://doi.org/10.2307/1991374

Viner, Jacob. 1950. *The Customs Union Issue*. New York: Stevens and Sons.

Warburton, Christopher. 2012. "The Limits of Monetary Treaty." *World Economics* 13(2): 99-123.

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