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Monetary Policy Transmission in  
the Eastern Caribbean Currency Union

By Alla Myrvoda and Julien Reynaud

I N T E R N A T I O N A L M O N E T A R Y F U N D

**IMF Working Paper**

Western Hemisphere Department (WHD)

**Monetary Policy Transmission in Eastern Caribbean Currency Union**

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Authorized for distribution by Trevor Alleyne and Catherine Pattillo

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**Abstract**

This paper empirically investigates international and domestic monetary policy transmission mechanisms in the Eastern Caribbean Currency Union (ECCU). We assess interest rate pass-through of both the U.S. policy rate and the ECCU minimum saving deposit rate (MSR) into domestic interest rates through the interest rate channel. While economic theory suggests that the international pass-through should be high in small open economies with fixed exchange rates and open capital accounts, our findings, based on regression analysis, point to a low long-run pass-through coefficient of the U.S. interest rate. The domestic transmission channel, however, is found to operate through changes in the MSR. The results hold for different interest rates (deposit and lending) and are supported by survey-based findings.

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## Glossary

ECCB	Eastern Caribbean Central Bank
ECCU	Eastern Caribbean Currency Union
GFC	Global Financial Crisis
IFS	IMF's International Finance Statistics
MSR	Minimum Saving Deposit Rate
WEO	IMF's World Economic Outlook
XCD	Eastern Caribbean Dollar

## I. INTRODUCTION

**The inability to simultaneously opt for an open capital account, a fixed exchange rate regime, and monetary autonomy is a central postulate in international macroeconomics known as the “impossible trinity”.** Accordingly, countries may choose only two of the three options of the impossible trinity (see Obstfeld, Shambaugh and Taylor, 2004, for an historical perspective). In many ways, the choice of the policy mix, or the policy constraint, is fundamental to the conduct of macroeconomic policy and economic stability, especially for small open economies (Ghosh and Ostry, 2009). The literature has mostly focused on estimating international<sup>2</sup> and the domestic interest-rate channels of monetary policy transmission to gauge the existence of the trilemma empirically.

**The contribution of this paper is to investigate empirically both the *international* and *domestic* interest-rate channels in the ECCU.** Our findings based on panel regression analyses point to a low long-run international pass-through coefficient of the U.S. interest rate, falling short of the average for countries with fixed exchange rates. ECCU retail interest rates, however, are found to respond to changes in the minimum saving deposit rate (MSR). The paper also relies on survey-based evidence and examines potential causes of limited monetary policy transmission in the ECCU and concludes that both macro-economic and bank-level factors play a role in interest rates transmission and capital market development.

**The remainder of the paper is structured as follows.** section II presents some background and stylized facts about the ECCU, focusing on the conduct of monetary policy in the union. Section III provides analysis of the *international* transmission channel, of the U.S. interest rates into domestic rates, and section IV provides an assessment of *domestic* monetary policy transmission in the ECCU. Section V concludes.

## II. LITERATURE REVIEW AND STYLIZED FACTS

### *Literature Review*

**Analyzing international and domestic monetary policy transmission channels has been the main route of testing the trilemma empirically.** Recent studies examining the global transmission of interest rates include Frankel et al. (2004), Shambaugh (2004) and Bleaney et al. (2013). Using data over 1970-1999, Frankel et al. (2004) found that interest rates in levels adjust more slowly under floating rates, but that in the long run there is full transmission whatever the regime. Shambaugh (2004) examined the transmission of interest rate changes in annual data for 155 countries over the period 1973-2000 and found that the transmission of interest rate changes is found to be weakest for non-pegs with capital controls, and strongest for pegs without capital controls, followed by non-pegs without capital controls. The transmission is also quite strong for pegs with capital controls. Using data for 126 countries from 1990, Bleaney et al. (2013) found that countries with credible pegs without capital controls follow foreign interest rates closely.

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<sup>2</sup> Also referred as international monetary policy spillovers.

**Factors influencing domestic monetary policy transmission channels vary depending on countries' income levels.** Since advanced economies are often characterized by developed capital and asset markets, strong links to international capital markets, and more flexible exchange rate regimes, their monetary policy tends to transmit through all four channels of monetary policy: interest rate, credit availability, asset price, and exchange rate. Studies that include more developed economies often find a close to hundred percent pass-through of policy rates to retail lending rates (Saborowski and Weber, 2013; De Bondt, 2002). Emerging and developing economies – characterized by less sophisticated markets for fixed-income securities, equities, and real estate, imperfect links to international capital markets, and less flexible exchange rate regimes, such as the Eastern Caribbean Currency Union (ECCU) – often have inactive exchange rate and asset price channels. Since banks tend to be the largest intermediaries in these economies, the bank lending channel is likely to be more effective (Mishra and Montiel, 2012).

**There is a growing empirical literature on monetary policy transmission in small states.** For the Pacific Island economies, Dunn et al. (2011) show a low degree of pass-through of policy rates to commercial bank interest rates but with varied magnitude across countries. Thus, while in Papua New Guinea and Vanuatu commercial bank deposit and lending rates respond to changes in monetary policy stance, the estimates for Fiji, Solomon Islands, and Tonga are very low. Findings of Kendall (2001) using data for the Bahamas, Barbados, Belize, Guyana, Jamaica, and Trinidad and Tobago, point to very heterogenous responses of lending rates to changes in monetary policy in terms of magnitude and duration. Positive shocks to the discount rate implied weak and fast-dissipating effects on bank lending, while positive shocks to the required reserve ratio had negative effects on bank lending in all countries, but Trinidad and Tobago. Ramlogan's study on Trinidad and Tobago (2007) shows that the credit channel is more important in transmitting impulses from the financial to the real sector. Estimations by Haughton and Iglesias (2012) for six Caribbean economies, including Barbados, Guyana, Haiti, Jamaica, Trinidad and Tobago, and St. Lucia, point to the presence of a complete pass-through of 90-day treasury bill rate to lending interest rates for St. Lucia and Trinidad and Tobago only, meanwhile the transmission to deposit rates is assessed incomplete. Using their results, the authors also conclude that St. Lucia and Guyana lending rates display downward adjustment rigidity which is indicative of collusive pricing (Haughton and Iglesias, 2012).<sup>3</sup>

### *Stylized Facts about Monetary Policy in the ECCU*

**Eastern Caribbean States have a long common monetary history dating back to the 1950s.** The eight members of the ECCU (Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines which are independent states, and Anguilla and Montserrat which are British Overseas Territories) have continued to share a

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<sup>3</sup> This study, however, does not consider the role of the MSR in the ECCU.

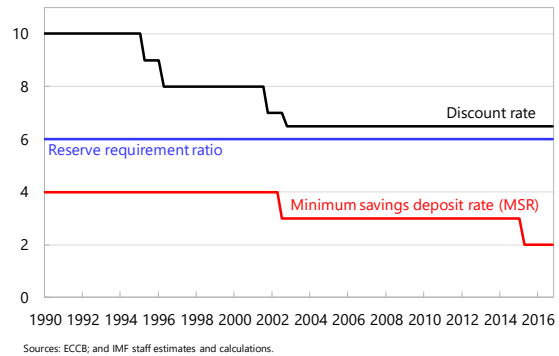
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common central bank since 1983, the Eastern Caribbean Central Bank (ECCB)<sup>4</sup>, and a common currency which has been pegged to the U.S. dollar at XCD\$2.70=US\$1 since 1976.<sup>5</sup>

**The ECCB operates as a *quasi-currency board***, whereby lending to its members is limited by the ECCB Agreement Act and 60 percent of its monetary demand liabilities<sup>6</sup> are required to be backed with foreign exchange reserves. While operationally the ECCB targets 80 percent of reserve coverage, in practice this ratio has remained above 90 percent since the early 2000s. The ECCU capital account has been progressively liberalized since the mid-1990s but some legal and regulatory restrictions remaining in place. An example of the remaining legal and regulatory restrictions includes alien land holding licenses (Rose and Wendell, 2013), and the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions).

**Historically, the ECCB has adjusted its key interest rates on few occasions.** While the Central Bank's mandate is to maintain monetary stability, which includes both price and foreign exchange stability, its mission statement also includes preserving the integrity of the banking system to stimulate growth and development of the member states. To comply with the mandate, the ECCB has four instruments at its disposal: reserve requirements, open market operations, the discount rate, and foreign exchange reserves.<sup>7</sup> Its operational framework also allows the use of credit allocation to priority sectors (identified as such by the ECCB) as well as differentiating reserve requirements by deposit type. Ultimately, the ECCB can also lend to its member states during economic crisis.<sup>8</sup> In practice, the ECCB has pursued a very passive monetary policy (text chart). The discount rate has been adjusted only four times and has remained at 6.5 percent over the last

**ECCB Monetary Policy Instruments**  
(In percent)



<sup>4</sup> The ECCB is responsible for monetary policy, liquidity management, maintenance of the payment system, and banking sector regulation and supervision. It was established on October 1, 1983, as part of the Treaty of Basseterre establishing the Organization of Eastern Caribbean States.

<sup>5</sup> Prior to that, the countries operated under the British Caribbean Currency Board since 1950, and started sharing their currency, the Eastern Caribbean Dollar (EC\$) in 1965 under the Eastern Caribbean Currency Authority, with a peg to the British Pound at EC\$4.80=GBP1.

<sup>6</sup> Demand liabilities include currency in circulation and commercial banks' reserves.

<sup>7</sup> See Randall (1998) for a discussion of ECCB policy tools.

<sup>8</sup> A portion of the distributable profits are retained at the ECCB as fiscal reserves to lend to countries facing difficult economic conditions (Fiscal Tranche II). As agreed by the Monetary Council in 2002, access to these resources is conditional on the signing of a letter of intent with the IMF to implement a program designed to correct the fiscal imbalance (Rose and Wendell, 2013).

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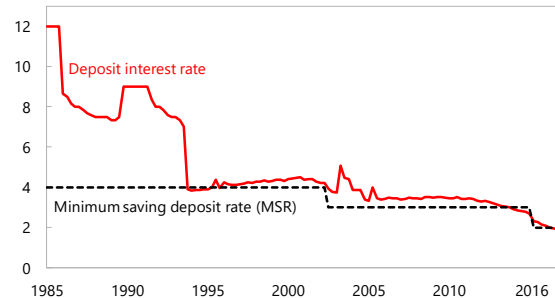
15 years. Meanwhile, the reserve requirement ratio has remained at 6 percent since the inception of the ECCB, and the MSR has been adjusted twice.

**The MSR has become increasingly binding over the last two decades.** Historical data

show that at the inception of the MSR at 4 percent in mid-1980's, the ECCU deposit interest rates were sufficiently high to render the benchmark not binding. Since the mid-1990s, the MSR has become more binding. Saving deposits carrying up to 3 percent interest rate as a share of total saving deposits increased from 46 percent at end-2003 to 96 percent by end-2015<sup>9</sup>. Two MSR reductions have taken place – initially to 3 percent in 2002 and subsequently to 2 percent in 2015 (text chart). The MSR applies to EC dollar-

**ECCU: Deposit Interest Rates**

(In percent<sup>1</sup>)



Sources: ECCB; IMF, IFS, staff estimates and calculations.

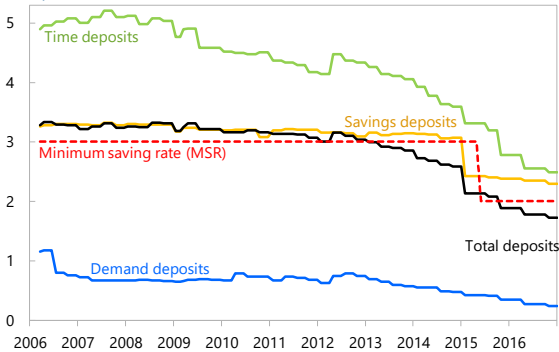
<sup>1</sup>Deposit rate defined as maximum rate offered by commercial banks on three-month time deposits, weighted by deposit amounts.

denominated saving deposits placed in commercial banks. Their share has constituted about half of commercial banks' liabilities to the private sector over the last decade (Figure 1).

**Figure 1. ECCU Commercial Banks: Interest Rates and Deposit Composition**

**ECCU: Weighted Average Interest Rates**

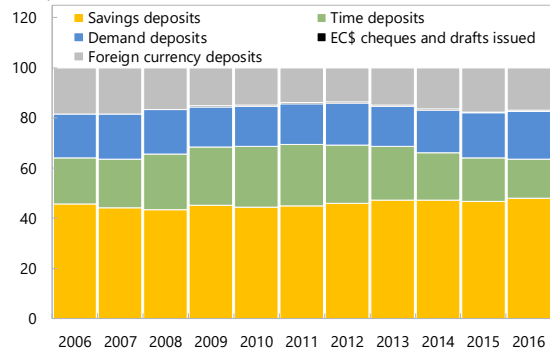
(In percent)



Sources: ECCB; and IMF Staff estimates and calculations.

**ECCU Commercial Banks: Liabilities to Private Sector**

(In percent of total)



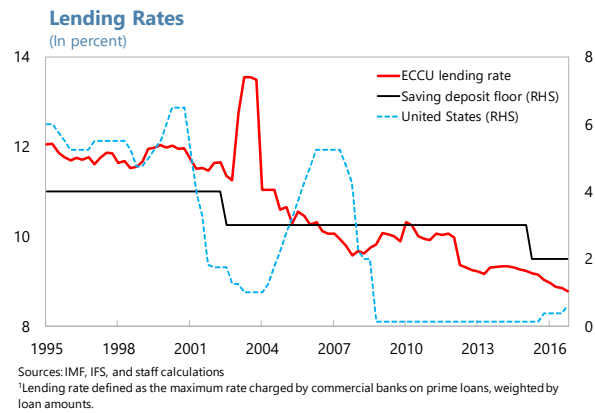
Sources: ECCB; and IMF staff estimates and calculations.

**The MSR could contribute to a misallocation of resources since it sets a lower bound on saving deposit interest rates.** The MSR has provided several benefits to the ECCU, primarily in the form of stable returns for savers (text chart). But it may have contributed to several disadvantages, which are also exacerbated by the challenging global banking conditions. Economic literature indicates that the misallocation of resources may be evidenced by cases where the MSR is circumvented using other financial intermediaries or offshore financial sector operations in parallel to the domestic banking sector. Polius (2002)

<sup>9</sup> At end-2015 also includes deposits carrying less than 3 percent interest, since the MSR was reduced effective May 2015 from 3 to 2 percent.



argues that the level of savings is not influenced by the existence of the MSR, but the MSR may increase the cost of investment and therefore result in a less than optimal level of investment in the long run. As indicated by Mounsey and Polius. (2015), several studies have alluded to the possible impact of the MSR on operational costs in the banking sector. He also suggests that the MSR in a protracted downturn is distortionary on market outcomes in the banking sector, and can be harmful to the banking sector and the wider economy, impeding banks' response in an optimal manner (IMF, 2017). Ultimately, the MSR may have a distribution effect equivalent to a transfer of income from lenders (who must face higher borrowing costs, everything else equal) to borrowers (who benefit from deposit rates above equilibrium rates). Anecdotal evidence indicates that immediately after the inception of the MSR several indigenous banks continued to offer saving deposits to corporate clients. More recently, however, banks began to actively pursue a narrower definition of eligibility for the MSR by limiting availability of saving deposits solely to individuals and households and redirecting corporate funds into other deposit instruments.



### III. INTERNATIONAL MONETARY POLICY TRANSMISSION PASS-THROUGH ESTIMATES

#### A. Channels of Transmission

**Foreign interest rates can affect the domestic economy through several channels:**

- **Interest rate channel:** This is usually viewed as the dominant transmission channel, which embodies a direct effect of the base interest rates on domestic retail interest rates, i.e. the (uncovered and real) interest rate parity theory.<sup>10</sup>
- **Interest rate gap channel:** This channel shows the impact on the domestic economy when the foreign interest rate may not only move the domestic rate directly, but may also change expectations of the risk premium resulting in a change in the spread between foreign and domestic rates.
- **Exports-to-base channel:** If a country is economically dependent on the base country, changes in exports to the base country may be the primary channel of transmission.

<sup>10</sup> For economies with fixed exchange rates, the base interest rate is defined as the interest rate prevailing in the country that domestic currency is pegged to; for economies with flexible exchange rates, global interest rates (proxied by U.S. interest rates) are taken as a base.

- **Capital flows channel:** This mechanism suggests that an increase in base interest rates would shrink the pool of capital available outside the base country because more base country funds would stay at home.
- **Exchange rate channel:** Per this mechanism, an increase in the base interest rate will potentially move exchange rate, thus, affecting the economy.

**The focus of this paper is on the interest rate channel.** Relatively low non-FDI capital flows in the ECCU, driven by non-interest incentives, and the exchange rate peg would render the capital flows and exchange rate channels ineffective, while estimating the effect of the interest rate gap channel proves to be difficult due to data limitations. Since the exports to base channel has been studied (IMF, 2005; IMF, 2013)<sup>11</sup>, we choose to focus on the interest rate channel.

## B. Data and Model

**The extent of co-movement of domestic and foreign interest rates is determined by several factors.** First, a higher degree of financial integration of the domestic economy into global capital markets, and, thus, lower barriers to international capital flows, would arguably increase the speed and the strength of the interest rate transmission. Second, the intensity of real integration between the base and domestic economies – and by the same token similarity of shocks, which include financial and climatic – would also tend to align foreign and domestic interest rates movements.<sup>12</sup>

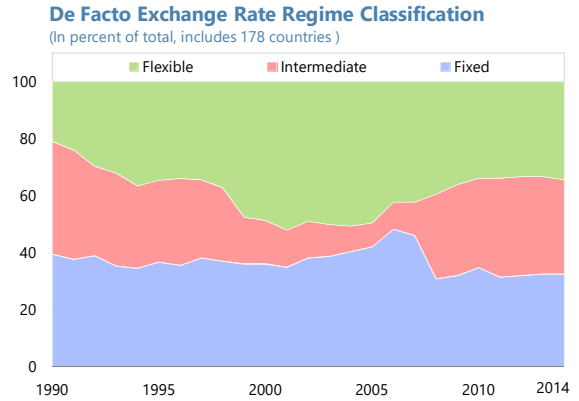
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<sup>11</sup> The economic argument of this transmission mechanism appears to conform to the tight economic integration of the ECCU and the U.S. primarily through the tourism sector developed since the early 2000s, given that the U.S. is the primary market of origin of the ECCU tourists. Thus, an increase in the U.S. policy rate would provide a cooling effect for the U.S. output, lowering demand for the ECCU tourism exports, and ultimately curbing the ECCU economic growth. Thus, changes in U.S. monetary policy would be transmitted to the ECCU output, largely through tourism exports, remittances and FDI, without a significant effect on domestic monetary conditions. ECCU real GDP growth indeed tracks closely U.S. economic growth.

<sup>12</sup> Alignment in climatic shocks would lead to similar business cycles and potentially to comparable monetary policy response, hence, arguably resulting in stronger co-movement in foreign and domestic interest rates.

**The empirical assessment of the pass-through of the base country short-term interest rates into domestic retail lending rates relies on an unbalanced panel of 178 economies.**

All data are in annual frequency covering the period of 1990-2014. In line with economic literature, we use short-term money market rates as the base country interest rates, since the pass-through mechanism is expected to take effect within the same period. We use de facto exchange rate regimes from IMF, AREAER database, which are classified into *fixed* (arrangements with no legal tender, currency boards and currencies pegged to a single currency), *intermediate* (pegged to a basket, managed floating), and *flexible* (floats and free floats) categories (text chart).



We use standard panel regression analysis, as in Frankel et al. (2004), with fixed effects to assess the elasticity of domestic lending interest rates to global interest rates or base country interest rates for fixed exchange rate regimes. The model is specified as follows:

$$r_{i,t}^{lc} = f_i + br_{t-1}^* + c'X_{i,t} + e_{i,t}$$

Where  $r_{i,t}^{lc}$  is the nominal domestic lending interest rates of country  $i$  at time  $t$ ,<sup>13</sup>  $f_i$  are country-specific effects;  $r_{t-1}^*$  is the short-term money market or T-bill interest rates of the base country for fixed regimes or global interest rates proxied by the U.S. interest rate for flexible regime economies.  $X_{i,t}$  defines a set of control variables, such as capital account barriers; inflation differential; periods of hyperinflation; exchange rate fluctuations; and banking, sovereign default, and debt restructuring crisis episodes (Table 1). Variables on interest rates and exchange rate fluctuations are defined as the first log-difference. Data are largely taken from IMF's World Economic Outlook and International Finance Statistics (IFS); and World Bank's World Development Indicators. Capital controls are measured using the Ito-Chinn index. Episodes of banking crisis, debt restructuring, and sovereign default are taken from Laeven and Valencia (2012).

**Table 1. Control variables for the International Pass Through Estimation**

Control variables	Linkage	Expected sign
Capital controls index (Ito-Chinn)	Higher capital control weakens the transmission channel	(-) higher capital controls → lower interest rate co-movement

<sup>13</sup> Log-difference is defined as first difference of  $\ln(1+i/100)$ , where  $i$  is interest rate.

Inflation differential	Some variation in nominal interest rates could reflect variation in inflation differentials	( - ) larger inflation differential → lower interest rate co-movement
Nominal bilateral exchange rate change	Exchange rate changes insulate the economy from interest rate volatility	( - ) more interest rate volatility → lower interest rate co-movement
Binomial variables: - hyperinflation - banking crises - sovereign default crises - debt restructuring crises	Control for specific episodes.	

### C. Results

**Results of the empirical analysis suggest that countries with less flexible exchange rate regimes display higher levels of transmission.** The idea of the impossible trinity appears to hold in our sample (Table 2). Countries with more flexible exchange rate regimes tend to have more independent monetary policy and hence lower pass-through of global interest rates into domestic retail rates. Under more rigid exchange rate regimes, however, domestic interest rates tend to be more sensitive to world interest rates or base currency interest rates in the case of fixed regimes. Thus, the estimated full sample pass-through coefficient for fixed exchange rate regimes is 0.48; for intermediate regimes 0.43; for flexible exchange rate regimes 0.32. The difference between the estimated coefficients for fixed and intermediate regimes narrows when the samples is restricted to emerging market economies only.

**Table 2. Model Estimates**  
Estimated Sensitivity of Domestic Retail Lending Rates to Base Country Interest rates

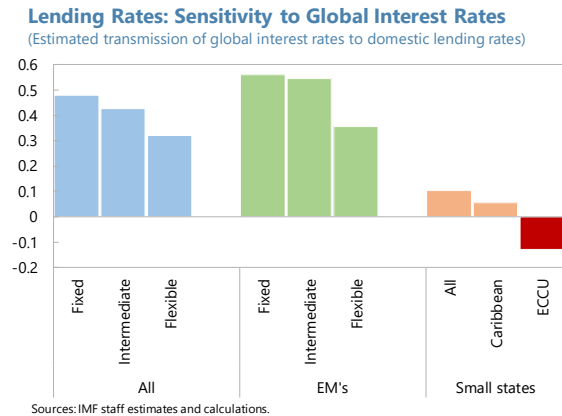
	Full sample			Emerging economies			Small states		
	Fixed	Intermediate	Flexible	Fixed	Intermediate	Flexible	All	Caribbean	ECCU
Base interest rate $t_{-1}$	0.48 *	0.43 ***	0.32 ***	0.56 *	0.54 ***	0.36 **	0.10 ***	0.06	-0.13 ***
Hyperinflation dummy	0.06	-0.01	-0.12	0.06	-0.01	-0.12	0.04	-0.01	...
Crisis dummy	-0.01 ***	0.02	0.02	-0.01 ***	0.02	0.04	-0.01	-0.01	-0.01 *
Inflation differential	0.00 ***	0.00	0.00 ***	0.00 ***	0.00	0.00 **	0.00	0.00	0.00
Exchange rate	-0.10 *	0.03	0.03	-0.10 *	0.05	0.04	0.02	0.10	...
Capital account openness	0.00	0.00	-0.03 *	0.00	0.00	-0.03 *	0.00	0.00	0.00
Constant	0.00 ***	-0.01 ***	-0.01 ***	0.00 ***	-0.01 **	-0.02 ***	0.00 ***	0.00 ***	0.00 ***
Observations	443	429	979	392	308	689	646	299	138

Sources: IMF staff estimates and calculations.

<sup>1</sup> Dependent variable is the first log-difference; base interest rate is lagged log-difference of short term money market or T-bill interest rate of the base country for pegged and intermediate regimes or US interest rate; hyperinflation dummy flags episodes with inflation greater than 50 percent; inflation differential from pegged country inflation; exchange rate taken as differenced log of nominal exchange rate; capital account openness is taken as differenced Ito-Chinn index.

\*\*\* Statistical significance at  $\alpha=1\%$ , \*\*  $\alpha=5\%$ , and \*  $\alpha=10\%$ .

**Estimates suggest limited transmission to the ECCU.** To assess the transmission of the U.S. interest rates to the ECCU lending rates, the model was estimated on the subsample of ECCU economies (text chart).<sup>14</sup> The elasticity of domestic lending rates with respect to the U.S. interest rate was estimated small and with a negative sign for the ECCU subsample. The diverging trends between the gradual decline of the U.S. policy rate and the relatively stable ECCU lending rates over a large part of the sample period could potentially explain the negative sign. This contrasts with the findings for small states and the Caribbean subsamples, where the estimated coefficient is small but positive. Due to the exchange rate peg and the absence of hyperinflation episodes, the exchange rate and hyperinflation dummy variables were omitted from the estimation. The coefficient on the dummy variable signifying banking, sovereign default, and debt restructuring crisis episodes is found to be statistically significant in the ECCU subsample. The results suggest that the interest rate transmission is lower during crisis episodes. Inflation differential and capital account openness are estimated to be statistically insignificant. Overall, limited U.S. interest rate pass-through suggests a weak interest rate channel and potentially important “export to base” channel, which bypasses domestic interest rates altogether.



**Those results should be interpreted with care.** Mishra and Montiel (2012) argue that “facts on the ground”, i.e. the limited development of the domestic financial system in the early transition period, may indeed be an important factor affecting the result of studies estimating the strength of the transmission channel. We touch on those issues in the next section.

#### IV. DOMESTIC MONETARY POLICY TRANSMISSION PASS-THROUGH ESTIMATES

**The limited international pass-through of the U.S. interest rates into domestic interest rates would suggest a high degree of domestic monetary policy independence.** In this section, we test empirically the domestic monetary policy transmission channels on deposit and lending rates using different interest rates (deposits and lending), and different methods (ADL and event study). We also provide some insights on the institutional and structural factors influencing the monetary transmission channels.

##### A. Channels of Transmission

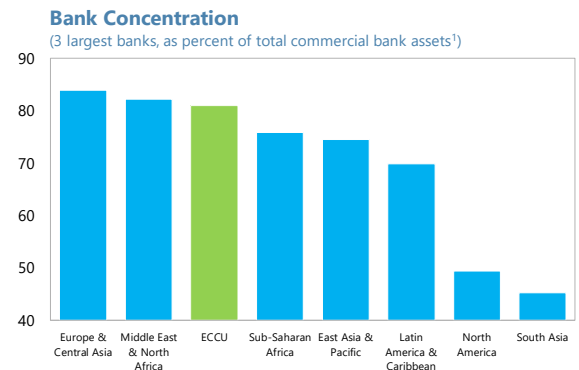
**Economic literature identifies several main channels of domestic monetary policy transmission from the interest rate instrument to domestic economy.** The structure and

<sup>14</sup> Alternative specifications with interaction terms also produce qualitatively and quantitatively similar (and statistically significant) results.

characteristics of the financial systems affect the effectiveness and the scope of transmission. The channels of transmission can also complement or contradict one another. While most studies consider the transmission from short-term policy rates to retail rates, we also scrutinize the relevance of these channels to the transmission from the MSR to retail rates in the ECCU context.

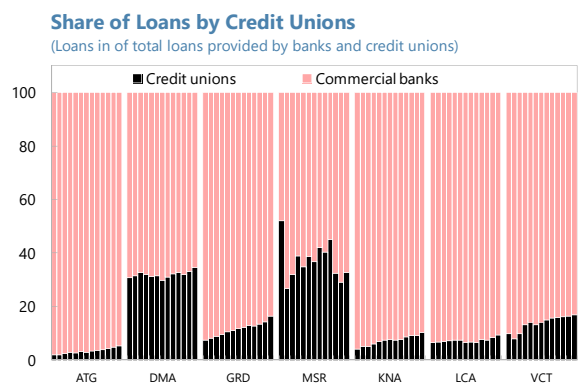
**The interest rate channel:** This channel is often regarded as the main transmission mechanism of monetary policy. Specifically, any changes in the policy rate cause movements in market rates (money market, treasury bills), starting with short maturities and transmitting to longer maturities through the yield curve. Changes in the market rates are then passed through to commercial lending and deposit rates, affecting savings, investment, and consumption decisions, and therefore aggregate demand and ultimately prices. The response of lending and deposit rates to changes in money market rates often depends on competition, alternative domestic funding sources, capital and money market depth, liquidity conditions, and operating costs:

- *Credit market competition* improves the response of retail rates, while in concentrated markets it is often slow and asymmetric (IMF, 2004). In the ECCU, the elevated commercial bank concentration relative to other regional averages (text chart) – as measured by the share of top three banks’ assets – may promote interest rate stickiness, effectively restraining the interest rate transmission to lending rates. Higher competition for well-established clients among financial intermediaries after the global financial crisis, however, could have potentially improved the interest rate transmission to some extent.



Sources: ECCB; World Bank, Global Financial Development Database; and IMF staff estimates and calculations. 1/ 2014 or latest available.

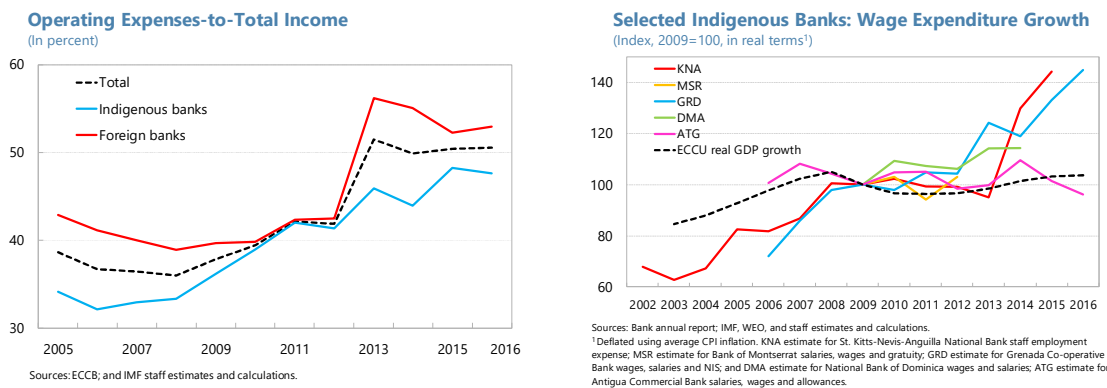
- *Availability of other sources of financing* for households and enterprises – such as non-banks or security markets – limits the monopolistic power of banks and helps improve competition leading to an acceleration and strengthening of the transmission mechanism. In addition to increased competition for well-established clients among banks, active participation of credit unions in credit intermediation in some countries, such as Dominica and St. Vincent and the Grenadines, has increased competition (text chart).



Sources: World Council of Credit Unions; IMF, IFS, and staff calculations.

- *Excess liquidity* in the banking system reduces required short-term funding needs for banks, and lowers the speed of adjustment of retail interest rates. Accumulation of excess liquidity in the ECCU banking system neutralizes the transmission of the ECCB discount rate to retail rates. In the case of the MSR, however, changes to the lower bound on savings deposits would arguably affect retail interest rates directly, bypassing the traditional money markets channel.
- *Higher operating costs* in the banking system may reduce the transmission of monetary policy to retail rates, as banks may choose to absorb a portion of saved funds in profits or to cover operating costs, e.g., rising personnel costs (Figure 2). More recently, the risk of withdrawal of CBRs has compelled regional banks to increase their operating costs by raising spending on staff training, more stringent information gathering, and installation of due diligence platforms to minimize the risk of CBR withdrawal (Alleyne et al., 2017).

**Figure 2. Commercial Banks' Operating Costs**



**The credit availability channel:** This channel occurs when changes in the monetary policy stance affect the quantity of available credit, irrespective of interest rates. This transmission occurs either through the *bank lending channel*, where banks' capacity to lend is affected by changes in the monetary policy stance, or through the *balance sheet channel*, where monetary policy affects firms' capacity to borrow due to net worth adjustments (IMF, 2004). Banking sector health and weak financial conditions exacerbated by structural deficiencies may significantly impede banks' ability to respond to changes in the monetary policy stance. For example, in the ECCU, high NPLs, low profitability, and instances of bank undercapitalization after the global financial crisis could limit the strength of the credit availability channel. Low profitability may have contributed to making lending rates sticky downward, as banks are more likely to absorb a portion of the reduction in the MSR to increase profits and repair balance sheets. Information asymmetry due to the absence of a credit bureau, and relatively high contract enforcement costs – associated with debtor-friendly foreclosure and insolvency regulations – further restrain this channel of monetary policy transmission.

**The exchange rate channel:** This channel transmits monetary policy through exchange rates, which alter international competitiveness of domestic goods and services. Saborowski and Weber (2013) find that exchange rate flexibility – along with lower excess liquidity, and NPL ratios, and more developed financial systems, – accounts for the higher pass-through of changes in policy rate to retail rates in more developed economies. They find that a policy rate change translates nearly one for one into changes in retail lending rates in developed markets, while developing economies experience about 30-45 percent of interest rate pass-through. In line with the literature, the quasi-currency board arrangement of the Easter Caribbean dollar diminishes the effectiveness of this transmission channel in the ECCU.

**The asset price channel:** This channel materializes when changes in the monetary policy stance affect asset prices, particularly of equity and collateral. Consumption and investment adjustment through the wealth effect cause changes in aggregate demand. Therefore, capital markets depth increases the strength of transmission. Composition of financial portfolios of households and enterprises also affects the transmission. This occurs because higher degree of saving intermediation through the domestic banking system – which implies lower level of diversification into securities – inhibits the impact and intensity of the asset price channel (IMF, 2004). In the ECCU, since commercial banks dominate its financial system, households’ and corporates’ portfolio composition is biased toward banks, especially given the history of steady returns provided by the MSR. This, jointly with the shallow activity in the markets for fixed-income securities, equities, and real estate, inhibits the effectiveness of the asset price channel.

**Against this backdrop, this paper examines the interest rate transmission through the interest rate channel.** While credit availability may play a significant role, asset price and exchange rate channels remain weak in the ECCU context, as discussed above.

## B. Data and Methodology

**We rely on De Bondt’s (2002) marginal cost pricing model.** This model is based on the underlying theory that money market rates reflect marginal or opportunity cost of funds as banks rely on them for short-term financing (Gigineishvili, 2011). The long-run equilibrium relationship can be formalized using the following markup pricing model:<sup>15</sup>

$$i^R = \alpha + \beta * i^M, (1)$$

where  $i^R$ ,  $i^M$  are retail (deposit and lending) and policy interest rates, respectively;  $\beta$  is the long-run pass-through coefficient, and  $\alpha$  is the markup. In the conditions of perfect market competition and complete information availability, prices would equal marginal costs, leading to full interest rate transmission ( $\beta = 1$ ). Information asymmetry and imperfect competition, however, would contribute to an incomplete pass-through ( $\beta < 1$ ).

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<sup>15</sup> For details, see Gigineishvili (2011), and Espinosa-Vega and Rebucci (2003).



The following error-correction process describes the out-of-equilibrium adjustment:

$$\Delta i_t^R = \mu + \rho(i_{t-1}^R - \alpha - \beta i_{t-1}^M) + \gamma \Delta i_t^M + \varepsilon, \quad (2)$$

where  $\rho$  is the speed of adjustment, and  $\gamma$  is the short-run pass-through coefficient. By substituting  $\Delta i_t = i_t - i_{t-1}$  and adding more short-run dynamics we obtain the following autoregressive distributed lag (ARDL) form:

$$i_t^R = \theta + \sum_{k=0}^P \beta_k i_{t-k}^M + \sum_{k=1}^Q \alpha_k i_{t-k}^R + \varepsilon, \quad (3)$$

where  $\beta_k$  coefficients are short-run interaction elasticities,  $\alpha_k$ 's reflect persistence of retail interest rates.

$$\text{Long-run pass-through} = \frac{\sum_{k=0}^P \beta_k i_{t-k}^M}{(1 - \sum_{k=1}^Q \alpha_k i_{t-k}^R)} \quad (4)$$

Since the markup theory implies that the relationship between market and retail rates should be positive, the following conditions must be satisfied (3):

- 1) The cumulative impact of market on retail rates should be positive  $\sum_{k=0}^P \beta_k i_{t-k}^M > 0$ ;
- 2) To ensure convergence of retail rates  $\sum_{k=1}^Q \alpha_k i_{t-k}^R < 1$ .

**This analysis relies on an unbalanced data set of 76 countries.** Data include 11 advanced and 61 emerging market and developing economies and are collected from the IMF's International Finance Statistics (IFS) and World Economic Outlook; supplemented by the World Bank's World Development Indicators and Haver Analytics. For the ECCU countries, the preference was given to the IFS series in lieu of the data received directly from the ECCB due to longer time horizon, which extend back to the 1980s<sup>16</sup>. IFS lending interest rate series are defined as the maximum rate charged by commercial banks on prime loans, weighted by loan amounts; while the IFS deposit interest rates are defined as the maximum rate offered by commercial banks on three-month time deposits, weighted by deposit amounts. For the overlapping periods, however, IFS lending and deposit interest rate data broadly coincide with the weighted interest rate data provided by the ECCB. Taking first differences for empirical estimation minimizes series' discrepancies stemming from the slight definition divergence of the two sources. Data availability varies by country; the overall sample is in quarterly frequency from 1980 to 2017Q1. The study considers a relatively long period due to few instances of changes in key policy interest rates in the ECCU, such as ECCB discount rate and the MSR. All variables were differenced to remove unit roots.

**The transmission of four interest rates to retail rates is analyzed.** To evaluate the ECCU monetary policy transmission, we analyze the pass-through of *four* interest rates into domestic retail rates: the MSR, the U.S. policy rate, the ECCU discount rate, and the Canadian policy rate. The ECCU discount rate was included due to its regard as the main official policy rate. The Canadian policy interest rate was included to assess whether

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<sup>16</sup> ECCB times series begin in 2006. Using this series would exclude from the analysis effects of the change in the MSR that took place in 2002.

Canadian monetary policy affects retail interest rates offered by Canadian banks' subsidiaries and branches in the ECCU.

**Equation (2) was estimated for the ECCU countries, and then compared to other regions and country groups.** Lag length selection for comparator groups was guided by the short-term nature of monetary policy instruments. This is the case in many countries, and typically implies a relatively fast transmission of policy rates into retail rates. Thus, following the literature, equation (2) was individually estimated for each country in the sample imposing one quarter lag structure to ensure comparability across countries.<sup>17</sup> For the ECCU countries, however, longer term consideration was guided by the lag-length selection criteria and an adjusted model specification with 6 lags was selected as the main model for the ECCU for consistency purposes.<sup>18</sup> The ECCU model also includes a dummy variable flagging the second half of 2003 when deposit and lending rates spiked due to exogenous factors. Few cases – where the estimation failed to meet the necessary conditions for convergence (3) – were removed from the calculation of averages. Long-run coefficients were obtained using equation (4). Estimated results of ADL(2,6) regression using the MSR as the monetary policy instrument are summarized in appendix Table A1.

### C. Interest Rate Pass-Through Estimation Results

#### *Deposit Rate Pass-Through Assessment*

**ECCU deposit interest rates are more sensitive to the MSR than to the U.S. policy rate and fall broadly in line with the Advanced Economies average.** Models with the ECCB discount rate as the policy variable failed to satisfy conditions (3) and converge for several ECCU economies. This can be explained by very few changes as noted above, as this rate historically has only been modified four times and has remained constant for the last 15 years. The transmission of Canada's monetary policy interest rate to the ECCU was estimated at virtually zero. Main results of transmission of the U.S. policy rate and the MSR into retail rates are displayed in Figure 3. As suggested by the model, and supported by findings in section III, the U.S. policy interest rate has limited pass-through into local interest rates. The average long-run elasticity of deposit rates with respect to the MSR is estimated at about 0.85, suggesting that a one-percentage point downward change in the MSR would lower deposit rates by about 0.85 percentage points over the long-run. This contrasts with the average long-run pass-through coefficient from the U.S. policy rate, which averages at about 0.03 over the long run.

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<sup>17</sup> Also suggested by Akaike information criteria for a number of countries in the sample.

<sup>18</sup> The choice of the alternative model for ECCU with 6-quarter lags was largely guided by the Akaike information criteria (AIC). Although optimal lag selection varies by regression type and by jurisdiction, a uniform lag is applied to all regressions for comparability. Similar lag length selection results reported by BIC criteria. Meanwhile, ADL(1,1) for the global sample is in line with the AIC lag selection for many countries in the sample and conforms with the literature. For instance, Dunn et al. (2011) rely on a model with one-month lag; Gigineishvili (2011) estimated a model with two-months lag.

**The estimated pass-through coefficients vary significantly across the ECCU member countries** (Figure 3). The strongest pass-through coefficient was estimated at 1.6 for St. Lucia and 1.2 for Dominica. On the other side of the spectrum, the coefficient for St. Vincent and the Grenadines was estimated at 0.25.

#### *Lending Rate Pass-Through Assessment*

**Estimates suggest that, historically, changes in the MSR have had a larger effect on lending rates than adjustments in the U.S., and Canada's policy and the ECCB discount rates.** Similar to the analysis with deposit interest rates, the models with the ECCB discount rate and Canada's policy rate failed to converge and satisfy condition (3). Results based on models with the U.S. policy rate and the MSR, however, show that changes in the MSR have had far greater implications for lending interest rates (Figure 5).

**Average estimated MSR pass-through into lending rates in the ECCU is broadly on par with the comparator country averages.** The behavior of local interest rates in response to changes in the policy rates is assessed using the same methodology as the one used for deposit rates. The results based on a uniform model with one lag show that average ECCU lending rate pass-through falls below the full sample average, and those for Caribbean, small states, Emerging and Developing economies, Latin America, and Advanced Economies subsamples. The adjusted model with 6 lags, however, points to the long-term transmission of the MSR to lending rates coefficient close to Emerging and Developing Economies.

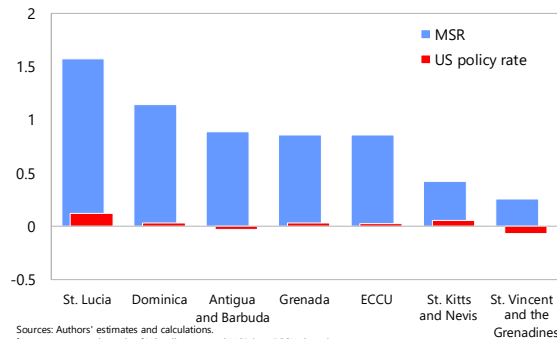
**Estimated coefficients also vary across the ECCU** (Figure 5). Dominica, followed by St. Kitts and Nevis, have shown the highest transmission of changes in the MSR to retail lending rates, with the estimated long-term coefficients of 0.7 and 0.6, respectively. The lowest transmission into lending rates is assessed for Grenada, where the pass-through coefficient is 0.1. Overall, estimates indicate that a one percentage point decline in MSR would lead to 0.4 percentage point decline in lending rates across the ECCU on average.

**Figure 3. Estimated Long-Run Pass-Through of Into Retail Interest Rates**

Results point to a greater long-term pass-through of MSR than U.S. policy rate to deposit....

**Pass-Through to ECCU Deposit Interest Rates**

(In percent, from US policy rate and the ECCU MSR<sup>1</sup>)

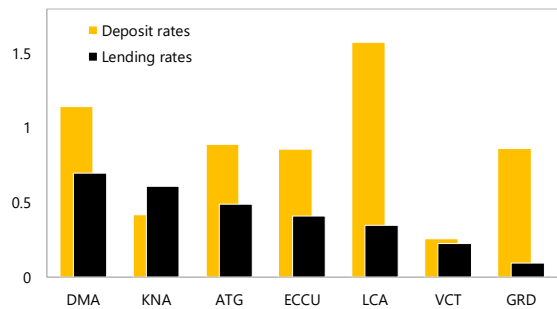


Sources: Authors' estimates and calculations.  
<sup>1</sup> Long-term pass-through of US policy rate and MSR into ECCU deposit rates. MSR = minimum savings deposit rate. Average for ECCU.

Pass-through from changes in the MSR has been greater for deposits than for lending interest rates.

**Pass-Through from MSR**

(In percent, pass-through from MSR to lending and deposit rates)

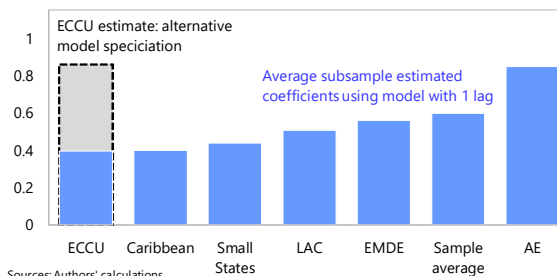


Sources: Authors' estimates and calculations.  
<sup>1</sup> Long-term pass-through from MSR into ECCU lending and deposit rates. MSR = minimum savings deposit rate. Average for ECCU.

Results of the main model, however, indicate that the transmission of the MSR into deposit rates is largely on par with the advanced economies average.

**Policy Rate Pass-Through to Deposit Rates**

(Ratio, model-based estimate with 1 lag<sup>2</sup>)

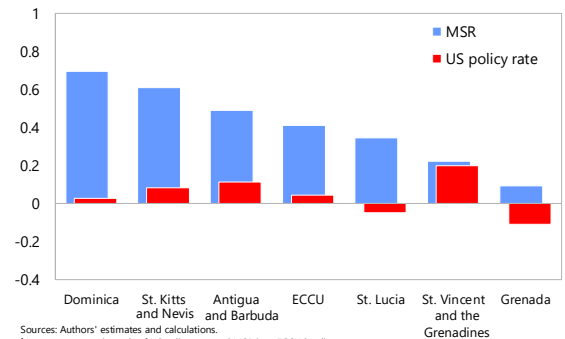


Sources: Authors' calculations.  
<sup>1</sup> ECCU average of 6 independent member states; Caribbean small states includes 11 economies; small states (16); LAC = Latin America and Caribbean (22); EMDE = Emerging and Developing Economies (61); AE = Advanced Economies (11); sample average is based on the overall sample of 76 economies.  
<sup>2</sup> ADL model estimates with 1 lag reported for comparability of results. Dashed line for ECCU indicates estimated coefficient from ADL model with 6 lags, as determined by the optimal lag selection criteria.

... and lending interest rates.

**Pass-Through to ECCU Lending Interest Rates**

(In percent, from US policy rate and the ECCU MSR<sup>1</sup>)

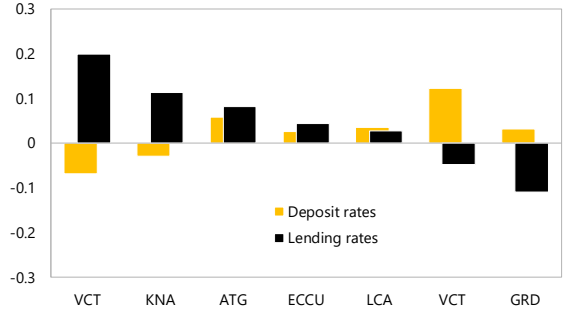


Sources: Authors' estimates and calculations.  
<sup>1</sup> Long-term pass-through of US policy rate and MSR into ECCU lending rates. MSR = minimum savings deposit rate. Average for ECCU.

While the transmission of the U.S. policy rates is inconsistent across the ECCU countries.

**Pass-Through from US Policy Rate**

(In percent, pass-through from US policy rate to ECCU lending and deposit rates)

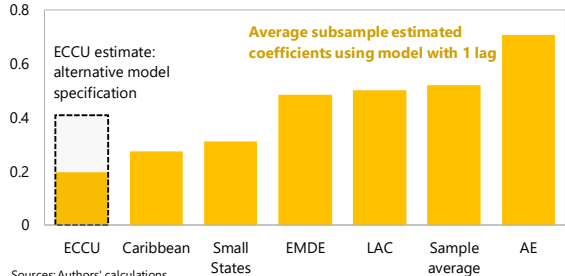


Sources: Authors' estimates and calculations.  
<sup>1</sup> Long-term pass-through from US policy rate into ECCU lending and deposit rates. MSR = minimum savings deposit rate. Average for ECCU.

Meanwhile, the transmission of MSR into lending rates is largely in line with the transmission of policy interest rates in emerging and developing economies.

**Policy Rate Pass-Through to Lending Rates**

(Ratio, model-based estimate with 1 lag<sup>2</sup>)



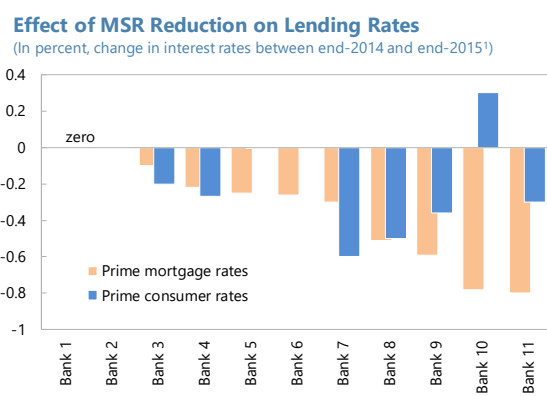
Sources: Authors' calculations.  
<sup>1</sup> ECCU average of 6 independent member states; Caribbean small states includes 11 economies; small states (13); LAC = Latin America and Caribbean (20); EMDE = Emerging and Developing Economies (50); AE = Advanced Economies (11); sample average is based on the overall sample of 63 economies.  
<sup>2</sup> ADL model estimates with 1 lag reported for comparability of results. Dashed line for ECCU indicates estimated coefficient from ADL model with 6 lags, as determined by the optimal lag selection criteria.

## D. Alternative Assessment of Pass-Through to Lending Rates: Survey Analysis

**Data limitations in the ECCU warrant cautious interpretation of the estimated monetary policy transmission coefficients.** Deposit and lending interest rate data used in this analysis effectively constitute implicit deposit/lending interest rates on the stock of deposits/loans. In the case of deposits, a steady growth of deposit flows over the last two decades has accelerated the reflection of changes in the offered rates on the official average deposit interest rate statistics. On the credit side, however, limited new loan issuance in the last four years, as credit stock has continued to decline, has restrained the transmission of offered interest rates in the official data on lending rates.

**As an alternative, a survey of the ECCU banks was conducted to assess the transmission of the May 2015 change in the MSR.** To test the hypothesis that the sluggish loan issuance has limited the transmission of lower interest rates to the official interest rate statistics, several commercial banks were surveyed to gather data on marginal interest rates on *new* loans pre- (end-2014) and post-MSR reduction (end-2015).<sup>19</sup> Responses included 11 banks, constituting 48 percent of the ECCU banking sector assets as of end-2016.

**The results of the survey indicated that a large portion of the decline in the MSR in May 2015 was transmitted into lower prime mortgage rates and, to a lesser degree, into prime consumer lending rates.** Responding banks reported passing through to prime consumer mortgage rates between 10 to 80 bps of the 100 bps decline in the MSR, pointing to a significant transmission to lending interest rates offered to well-established clients (text chart). Survey results appear to confirm the hypothesis that limited loan issuance impedes the reflection of reduced interest rates to well-known clients in the official statistics.



## E. Contributing Factors to the ECCU Monetary Policy Transmission: Panel Model Estimation

**Economic literature identified several factors that either restrain or accelerate the transmission of monetary policy.** The determinants of interest rate pass-through has received some attention over the recent years, thanks to the development of consistent cross-country series related to the structure of financial sectors. Notably, the work of Beck et al. (2000), and the recent update by Čihák et al (2012), has allowed the development of a robust database on Financial Development and Structure Dataset (Beck et al., 2015). Gigineishvili (2011) provides a concise literature review distinguishing among micro- and macro-

<sup>19</sup> Data were collected in the context of IMF's engagement with the member states (see ECCU Staff Report, 2015 and 2016 for details).

economic determinants. Typical macroeconomic determinants of interest rate transmission are related to the overall performance of the country in which banks operate. Good economic performance and more flexible exchange rate regime are found strongly correlated to higher pass-through. Macroeconomic aggregates include GDP per capita, GDP growth, inflation, capital mobility, and money market developments. Microeconomic determinants often refer to the financial institutions and sector characteristics. These typically include banks' excess liquidity, excess capital, rigidity of bank funding, interest rate risk, portfolio diversification, nonperforming loans, and operating costs. Excluding these factors from the model may have weakened the results presented earlier due to model misspecification.

**To supplement the analysis, a cross-country model is used to account for the ECCU-specific factors that may affect monetary policy transmission.** As previously discussed, several characteristics could potentially weaken the interest rate transmission in the ECCU, including high banking concentration, excess liquidity, weak financial conditions, and structural financial market deficiencies. Increased competition for well-established clients after the global financial crisis, however, may have improved this transmission. In this context, a supplementary panel data model was estimated to assess the pass from of the MSR and US policy rates into retail rates while accounting for some ECCU-specific characteristics.<sup>20</sup>

The basic country-level regression for *deposit* interest rates is given by:

$$\Delta i_{i,t}^{Deposit} = \alpha + \beta_1 \Delta i_t^{MSR} + \beta_2 \Delta i_t^{US\ policy\ rate} + \beta_3 \sum_k C_{i,t} + u_i + \varepsilon_{i,t} \quad (5)$$

where,  $\Delta i_{i,t}^{Deposit}$  denotes the first difference of deposit interest rates for country  $i$  at time  $t$ ;  $\Delta i_t^{MSR}$  denotes change in the MSR;  $\Delta i_t^{US\ policy\ rate}$  identifies changes in US policy rate;  $u_i$  denotes country fixed effects; and  $C_{i,t}$  identifies a set of ECCU-specific factors that could contribute to the magnitude and the speed of monetary policy transmission. These include:

- *Banking sector concentration*, measured by the Herfindahl-Hirschman Index.<sup>21</sup> Several merges and acquisitions of regional banks in recent years increased banking sector concentration. This higher bank concentration could lead to lower deposit rates and higher lending rates.
- *Excess liquidity*, measured by banks' excess reserves held at the ECCB in percent of total deposits and by the ratio of liquid-to-total assets. Significant accumulation of liquidity in the banking system may have put downward pressure on deposit and lending interest rates.

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<sup>20</sup> Data limitations prevent accounting for structural financial market deficiencies in the model, such as absence of credit bureaus, collateral registries, etc.

<sup>21</sup> Due to limited bank-level data, the Herfindahl-Hirschman index is only available for 2011-2016. Increased competition between banks and credit unions is not incorporated into the analysis due to lack of consistent data.

- *Banking sector capitalization* (capital adequacy ratio and tier 1 ratio). Banks with better capital positions may be more inclined to offer higher deposit and lower lending rates to their clients, and to pass on a reduction in the MSR.
- *Bank asset quality* (NPLs and provisioning for NPLs). Poor banking sector health – legacy of the Global Financial Crisis – may contribute to lower pass through the MSR reduction, as banks may choose to absorb a portion of saving from lower MSR to clean up their books.

*Banking sector efficiency*, measured by the ratio of operating costs-to-non-interest expenses, and operating expenses-to-total expenses). Growing operating costs – in part driven by global trends, such as the withdrawal of correspondent banks – may lower banks’ efficiency and decrease the magnitude of interest rate pass-through to retail rates.

The basic country-level regression for *lending* rates is given by:

$$\Delta i_{i,t}^{Lending} = \alpha + \beta_1 \Delta i_t^{Deposit} + \beta_2 \Delta i_t^{US\ policy\ rate} + \beta_3 \sum_k C_{i,t} + u_i + \varepsilon_{i,t} \quad (6)$$

where,  $\Delta i_{i,t}^{Lending}$  denotes changes in lending interest rates for country  $i$  at time  $t$ ;  $\Delta i_{i,t}^{Deposit}$  denotes the changes of deposit interest rates;  $\Delta i_t^{US\ policy\ rate}$  identifies changes in US policy rate, and  $C_{i,t}$  identifies a set of ECCU-specific factors that could contribute to the magnitude and the speed of monetary policy transmission (same as in equation 5). Models (5) and (6) are estimated with country fixed effects using an unbalanced panel for the 6 independent ECCU economies covering period from 1985 to 2016. Interest rate data are taken from the IMF’s IFS statistics, macroeconomic indicators are derived from the IMF’s World Economic Outlook, while other ECCU variables are largely sourced from the ECCB. Some control variables are only available for shorter time periods, which restricts samples. Since we use data of annual frequency, only contemporaneous interest rate variables are used in the estimation as we assume that interest rate transmission occurs within the same period. First differences are taken to remove unit roots. Results are reported in Appendix Table A2 and should be interpreted with care given the limited amount of data available for the ECCU members.

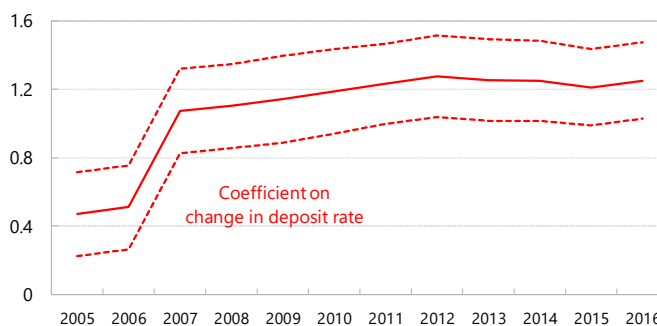
**Panel regressions support the earlier finding that ECCU deposit rates are more sensitive to the MSR than to the U.S. policy rate.** Controlling for several factors, the model suggests that a decline (increase) in the MSR by 1 ppt on average leads to about 0.5 ppt decline (increase) in deposit interest rates. The coefficients on the US policy rate and the ECCB discount rate, however, are not statistically significant. The results are robust to the inclusion of control variables and coverage of shorter periods, as some control variables are only available for few recent years (Appendix Tables A2). The main findings suggest that asset quality deterioration is associated with lower deposit interest rates and an increase in capital buffers and profitability appears to be associated with higher deposit interest rates

offered to clients in the following year. The remaining control variables – while having the expected sign – are not statistically significant.

**Changes in domestic interest rates in turn affect lending interest rates.** Estimates, based on the entire sample of 1989 – 2016, suggest that a 1 ppt decline (increase) in deposit rates leads to about 0.46 ppt decline (increase) in lending rates, *ceteris paribus*. Consequently, the results of the two models suggest that one percentage point decline in the MSR would lead to about ½ ppt decline in deposit rates and about ¼ ppt decline in lending rates, holding other factors constant.<sup>22</sup> Higher credit growth to private sector and larger loan-to-deposit ratios are associated with lower lending interest rates. Similarly, an increase in excess liquidity also appears to put downward pressure on lending rates. Higher NPLs and operating costs, however, increase lending rates.

**The sensitivity of the lending rate to changes in deposit rates has increased over time.** Regressions based on 15-year rolling window subsamples point to a significant increase in the sensitivity of lending rates to changes in deposit rates, when also controlling for changes in the US policy rate and excess liquidity in the ECCU banking system (text chart). Results based on the 2001-2016 subsample indicate that a 1 ppt decline in deposit rates on average is associated with 1.2 ppt decline in lending rates. Regressions based on more recent data not only show a higher response of lending rates to changes in deposit rates, but also appear to have a better model fit, as evidenced by larger R-squared statistic.

**15-Year Rolling Window: Beta Coefficients**  
(Dependent var. change in lending rates; rolling coefficient on change in deposit rate)



Sources: Authors' calculations.

<sup>1</sup> Rolling window panel regression estimation. Dependent variable change in lending rates; independent variables include change in deposit rates, change in US policy rate, and lagged ratio of bank excess reserves to total deposits. Dashed lines indicate 95% confidence bands. Estimate coefficient for 2005, for instance, was generated based on 1990-2005 subsample.

<sup>22</sup> This is a conservative interpretation of results, as the coefficient estimated over shorter periods suggests a full transmission of changes in deposit rates to lending rates. Hence, a 1 ppt decline in the MSR would lead to ½ ppt decline in deposit rates, and about ¼ ppt decline in lending rates (discussed in next paragraph).



## V. CONCLUSIONS

**This paper empirically investigates the *international and domestic* monetary policy transmission mechanism in the ECCU through the interest rate channel.** The paper provides empirical assessment of the transmission mechanisms of changes in the U.S. and Canada's policy rates, the ECCU discount rate, and the Minimum Saving Rate (MSR) to retail deposit and lending interest rates in the ECCU. Results point to low level of estimated long-run pass-through coefficient of the U.S. interest rate, falling short of the average for countries with fixed exchange rates. No evidence of significant transmission from the U.S. and Canada's policy rates, as well as the ECCB discount rate, to retail rates was found. However, the results point to significant pass-through from the MSR to deposit rates, and some transmission to lending rates. The findings are supported by a survey-based assessment. Finally, potential factors that impede or promote monetary policy transmission in the ECCU are also examined.

**The findings support a limited degree of monetary policy independence in the ECCU.** Indeed, changes in the MSR can affect deposit and eventually lending rates, therefore implying that the MSR could be used more actively to adjust monetary policy in accordance with policy objectives. For instance, the current situation of high NPLs, low banking sector profitability, declining credit growth to private sector, and growing operating costs warrant looser monetary policy, which could be accomplished through a further reduction in the MSR. This temporary reduction in the MSR would help ease monetary conditions, support credit recovery, and potentially improve economic growth.

### Appendix Table A1. Regression Results Transmission of Minimum Saving Deposit Rate to Retail Interest Rates

	Angtigua and Barbuda	Dominica	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
<b>Dependent variable: D. Deposit rate</b>						
Deposit rate <sub>t-1</sub>	-0.0460 (0.626)	-0.110 (0.235)	-0.103 (0.268)	-0.230** (0.0173)	-0.137 (0.106)	0.0702 (0.435)
Deposit rate <sub>t-2</sub>	-0.0248 (0.792)	-0.282*** (0.00282)	-0.240** (0.0104)	0.0433 (0.650)	-0.149* (0.0715)	-0.283*** (0.00220)
MSR	0.0923 (0.752)	0.138 (0.486)	0.244 (0.443)	0.127 (0.649)	0.279 (0.445)	0.0586 (0.715)
MSR <sub>t-1</sub>	0.0965 (0.741)	0.259 (0.189)	0.374 (0.241)	0.220 (0.431)	0.316 (0.388)	0.324** (0.0458)
MSR <sub>t-2</sub>	-0.0469 (0.873)	0.213 (0.284)	0.144 (0.652)	0.121 (0.665)	0.00834 (0.982)	-0.0630 (0.699)
MSR <sub>t-3</sub>	0.0320 (0.925)	0.105 (0.649)	-0.0391 (0.915)	-0.386 (0.237)	0.627 (0.140)	-0.0119 (0.950)
MSR <sub>t-4</sub>	0.281 (0.405)	0.236 (0.299)	0.169 (0.643)	0.111 (0.732)	-1.010** (0.0181)	0.0693 (0.709)
MSR <sub>t-5</sub>	0.120 (0.722)	0.183 (0.418)	0.0671 (0.854)	0.223 (0.493)	0.561 (0.193)	0.0510 (0.783)
MSR <sub>t-6</sub>	0.380 (0.196)	0.137 (0.485)	-0.00993 (0.975)	-0.0139 (0.960)	1.596*** (7.40e-05)	0.313* (0.0530)
Time dummy	0.585* (0.0862)	0.257 (0.256)	0.261 (0.473)	0.474 (0.146)	1.238*** (0.00456)	0.217 (0.247)
Constant	-0.0534 (0.187)	-0.0280 (0.295)	-0.0363 (0.401)	-0.0444 (0.247)	-0.0546 (0.278)	-0.0323 (0.146)
Observations	121	121	121	121	121	121
R-squared	0.054	0.121	0.084	0.118	0.349	0.162
<b>Dependent variable: D. Lending rate</b>						
Lending rate <sub>t-1</sub>	-0.200** (0.0246)	-0.0743 (0.342)	-0.256*** (0.00672)	-0.0129 (0.887)	-0.210** (0.0175)	-0.206** (0.0292)
Lending rate <sub>t-2</sub>	-0.0435 (0.599)	-0.234*** (0.00331)	-0.0458 (0.627)	-0.104 (0.254)	-0.128 (0.140)	-0.0118 (0.900)
MSR	0.0236 (0.947)	0.161 (0.538)	0.00354 (0.992)	0.238 (0.294)	0.0246 (0.963)	-0.00226 (0.994)
MSR <sub>t-1</sub>	0.00269 (0.994)	-0.0521 (0.842)	0.630* (0.0852)	0.148 (0.515)	0.00505 (0.992)	0.0787 (0.778)
MSR <sub>t-2</sub>	0.282 (0.424)	0.138 (0.596)	-0.207 (0.573)	-0.0729 (0.748)	0.0362 (0.945)	0.126 (0.652)
MSR <sub>t-3</sub>	-0.514 (0.214)	0.0277 (0.927)	-0.313 (0.462)	-0.874*** (0.00130)	-0.619 (0.313)	-0.364 (0.260)
MSR <sub>t-4</sub>	0.326 (0.432)	0.179 (0.551)	0.259 (0.538)	0.524* (0.0574)	0.204 (0.740)	0.279 (0.390)
MSR <sub>t-5</sub>	0.391 (0.344)	0.294 (0.330)	0.355 (0.401)	0.366 (0.187)	0.739 (0.229)	0.109 (0.737)
MSR <sub>t-6</sub>	0.747** (0.0363)	1.719*** (1.50e-09)	1.048*** (0.00465)	0.834*** (0.000344)	2.308*** (2.69e-05)	0.568** (0.0438)
Time dummy	1.387*** (0.00112)	0.509* (0.0923)	0.601 (0.157)	0.749*** (0.00765)	1.751*** (0.00582)	0.393 (0.221)
Constant	-0.0527 (0.277)	0.00850 (0.810)	-0.0169 (0.733)	-0.0249 (0.422)	-0.0605 (0.402)	-0.0323 (0.396)
Observations	121	121	121	121	121	121
R-squared	0.235	0.345	0.175	0.338	0.270	0.129

Source: IMF staff estimates and calculations.

<sup>1</sup>MSR signifies minimum saving deposit rate. Results of ADL(2,6) model. P-values presented in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Interest rate variables are taken in first differences. T-n refers to lagged variables. Time dummy flags interest rate volatility in the second half of 2003 due to exogenous factors.

### Appendix Table A2. Panel Regressions Results

Dependent variable: Model:	Change in Deposit Rates							Change in Lending Rates							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Change in ECCU MSR	0.444* (0.0687)	0.415* (0.0878)	0.524* (0.0815)	0.482* (0.0865)	0.543*** (4.24e-05)	0.411*** (4.65e-05)	0.382*** (0.000141)								
Change in US policy rate	0.0880** (0.0314)	0.0940** (0.0280)	-0.0617 (0.271)	-0.0627 (0.260)	-0.0275 (0.230)	0.485 (0.375)	-0.340 (0.220)	-0.109** (0.0239)	-0.125** (0.0136)	-0.109** (0.0242)	-0.0534 (0.380)	-0.0526 (0.355)	-0.0412 (0.474)	-0.0892 (0.172)	-0.000248 (0.996)
Change in US policy rate * Excess reserves						-0.0696* (0.0843)									
Change in ECCU discount rate		-0.262 (0.206)							0.253 (0.295)						
Change in deposit rate								0.446*** (2.19e-07)	0.461*** (1.11e-07)	0.452*** (2.91e-07)	1.222*** (0)	1.343*** (0)	1.347*** (0)	1.299*** (0)	1.092*** (5.70e-05)
Private credit growth									-0.00891 (0.293)	-0.00899 (0.304)			-0.0196 (0.192)		
Private credit growth <sub>t-1</sub>														-0.0242* (0.0869)	
Change in HFI (industry concentration)						-3.80e-05 (0.812)	-2.55e-05 (0.880)								
Change in excess reserves		-0.0725** (0.0190)	-0.0339 (0.303)	-0.0329 (0.314)	-0.0187 (0.194)		-0.0119 (0.308)			-0.00510 (0.892)					
Change in ROE			0.000313 (0.678)		0.000154 (0.670)										
Change in ROA <sub>t-1</sub>														-0.0844 (0.388)	
Change in NPL ratio <sub>t-1</sub>			-0.0503** (0.0466)	-0.0490** (0.0493)											
Change in NPL ratio										0.00678 (0.795)					
Change in Tier 1 ratio <sub>t-1</sub>					2.66e-06 (1.000)										
Change in loan-to-deposit ratio												-0.0362*** (0.00851)	-0.0306 (0.157)		
Change in liquid-to-total assets ratio <sub>t-1</sub>														-0.0120 (0.608)	
Change in operating expenses-to-non-interest expense ratio <sub>t-1</sub>															0.00494 (0.507)
Constant	-0.123* (0.0623)	-0.137** (0.0445)	-0.0645 (0.408)	-0.0687 (0.371)	-0.0727** (0.0363)	-0.159*** (1.67e-05)	-0.144*** (0.000264)	-0.0542 (0.460)	0.0426 (0.678)	0.0169 (0.868)	0.0241 (0.762)	-0.0445 (0.583)	0.0739 (0.518)	0.120 (0.282)	0.0205 (0.801)
Number of observations	170	170	84	84	74	36	36	173	173	173	90	80	80	84	74
R-squared	0.047	0.092	0.140	0.138	0.300	0.681	0.655	0.159	0.170	0.164	0.584	0.573	0.589	0.639	0.231
Number of countries	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Approximate coverage:															
start date:	1989	1989	2004	2004	2006	2011	2011	1989	1989	1989	2002	2004	2004	2004	2006
end date:	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016

Source: Authors' calculations.

P-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Regression results on unbalanced annual panel data. Includes independent ECCU members. MSR = ECCU minimum saving deposit rate. Excess reserves defined as banks' excess reserves held at the ECCB, in percent of total deposits. HFI = Herfindahl-Hirschman Index, higher number signifies greater industry concentration. ROA = return on assets. NPL = non-performing -to-total assets ratio. CAR = capital adequacy ratio, defined as qualifying capital in percent of risk-weighted assets.

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