International Journal of Business and Management
www.ccsenet.org/ijbm
Vol. 5, No. 1
January 2010

# Interest Rate Pass-through in the Central African Economic and Monetary Community (CAEMC) Area: Evidence from an ADRL Analysis

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**Abstract**

This paper examines the monetary transmission mechanism in the countries of the Central African Economic and Monetary Community (CAEMC). Specifically, we focus on the very first step of this mechanism namely the interest rate pass-through from short-term interest rates towards long-term rates. Using an autoregressive distributed lag (ADRL) model, we show that there is evidence of a very low and incomplete long-run pass-through from the policy rate to the deposit rate. It appears also that the lending rate exhibits a huge overshooting effect in reaction to the changes in the policy rate. When splitting our time span in two interest rate cycles, we show that there is evidence of an interest rate cycle asymmetry.

**Keywords:** Monetary transmission mechanism, Pass-Through, Interest rates overshooting effect, ADRL model

## 1. Introduction

Since the mid-1970s, the evolution of monetary policy in most countries has been a steady increase in market orientation. In practice, this has meant the removal of direct controls, reductions in reserve requirements, an increasing emphasis on interest rates as an operating target, and a shortening of the maturity of rates directly involved (see BIS, 1997, for a survey of monetary policy "tactics"; and Borio, 1997, for a survey of central bank operating procedures).

Meanwhile, monetary policy has been a Mecca of economic research as many economists has put pen to paper in an attempt to scrutinize its effects on the real economy. The monetary transmission mechanism describes the ways in which monetary policy impacts aggregate demand and prices by influencing the investment and consumption decisions of firms, households, and financial intermediaries. Although the neoclassical view of the long-run neutrality of money appears to be widely accepted, monetary policy is thought to influence economic activity in the short to medium term through changes in interest rates or money supply, either because of the presence of nominal price rigidities (Keynes view) and/or owing to a number of wealth, income, and liquidity effects, and by its impact on inflationary expectations (Dabla-Norris and Floerkemeier, 2006). Christiano et al. (1996), based on their study of the US economy, argue that monetary actions impact on the real sector with an average delay of 4 months and their effect can last up to 2 years. This finding is also borne out in Romer and Romer(1989). Another salient feature of monetary policy put forth in a number of studies (Bernanke, Gertler and Gilchrist, 1994; Hubbard, 1994; Bernanke and Gertler, 1995), is that small changes in short-term interest rates could result in large changes in output (amplification effect, or the financial accelerator effect). Although the specific classification varies at times, the following six channels of monetary policy transmission are generally distinguished: (1) interest rate channel; (2) bank lending channel; (3) balance sheet channel; (4) asset price channel; (5) exchange rate channel; and (6) expectation channel (Note 1). Of all these channels, the interest rate channel seems to be the most important. As noted by Isakova((2008), the role of interest rate pass-through is crucial, since it represents a potentially important transmission channel, and because other channels of the monetary transmission mechanism are related to its performance . The monetary authority sets policy rates; these affect short-term money markets rates, which in turn influence medium to long-term market rates, bank retail rates, etc. Borio and Fritz (1995) argue that "bank lending rates are a key, if not the best 'indicator of the marginal cost of short-term external funding in an economy". Households and firms take out bank loans in order to finance consumption and investment expenditures. Therefore, the price of bank loans is crucial in the determination of final demand and consequently inflation in an economy. However, not only bank lending rates but also bank deposit rates are important, as they influence the saving versus consumption(and the saving vs. investment) decisions of economic agents. To shed more light on this issue, Biefang and Howells (2002) argue that the first link in the chain, in all monetary regimes, is the link between official rates and market rates. For these authors, it is not the rate at which the central bank supplies liquidity to the domestic banking system that changes demand pressure. It is how agents react to changes in the rates on loans charged by banks, to changes in asset values that flow from a different rate of discount, to changes in the rate that they

earn on their savings, and so on. According to them, all monetary regimes that use interest rates as the operating target must naturally assume a fairly ready link between official and market rates. Clearly, without satisfactory knowledge of how changes in official rates connect with market rates it is impossible to know what change in official rates is necessary to achieve a given result.

After a long period of financial repression spanning from 1973 to 1990, the monetary authority in the Central African Economic and Monetary Community (CAEMC) came to recognize the necessity to move to a more liberalized financial system. Thus as from 1990, direct instruments were abandoned in favor of indirect instruments and the implementation of a monetary programming. The new deal of monetary policy was also accompanied by a vast banking reform and the launching in 1994 of the monetary market in which the central bank plays an important role. The central bank has been assigned the objective of monetary stability. The central bank actions are based on a bank liquidity control through a refinancing policy and the imposition of reserve requirements. Since then, the central bank has been manipulating among other instruments, the policy interest rate (the rate at which commercial banks are allowed to borrow at the discount window) in order to stabilize the economy in the region.

The focus of this paper is therefore on the first step of the monetary transmission mechanism: the interest rate pass-through from short-term interest rates towards long-term rates. Using monthly data from 1990 to 2007 in an autoregressive distributed lag framework, we show that there is evidence of incomplete pass-through from the policy rate to the deposit banking rate and the loan rate in the countries of the CAEMC. Moreover, our results indicate a huge overshooting effect of the loan rate to changes in the policy rate.

The rest of the paper is structured as follows: in section 2, we reassess the concept of interest rate pass-through through its two stages and explore some reasons why it might be incomplete. Section 3 is devoted to an overview of the empirical literature. In section 4 we describe our empirical methodology and our data. Empirical results are provided in section 5 while section 6 concludes.

## 2. Interest Rate Pass-through.

### *2.1 The two stages*

The literature on the pass-through to retail rates distinguishes between the “cost of funds approach” and the “monetary policy approach” (Sander and Kleimeier, 2004).

The cost of funds approach (De Bondt, 2005) focuses on the “price-setting decision” of banks. As describe by Kapwil and Scharler (2006), the cost of funds mainly reflects the opportunity costs that arise for a bank that issues loans and the financing costs for a bank that takes in deposits. The cost of funds is the best way to describe how changes in the market rates influence bank deposit and lending rates. In general, several factors make sure that market rates are passed onto retail rates. For loan rates, the link to market rates is secured by the fact that banks rely on the money market to fund (short-term) lending. This is in the same vein that deposit rates, which represent the cost of loans, should be reflected in loan rates. At the same time, yields on government securities can be viewed as opportunity costs for banks. This helps maintain the link between, for instance, government bond yields and loan rates of longer maturity.

The connection between market rates and deposit rates is warranted by the possibility that households and the non-financial corporate sector can hold their financial assets not only in bank deposits, but also in government securities of comparable maturity (kapwil and Scharler, 2006). In addition, banks can rely on the money market instead of deposits for funding loans, which can also lead to an equalization of deposit and money market rates.

In contrast to the cost of funds, the monetary policy approach is interested in the effect monetary policy has on retail rates and includes no other explanatory variables. It focuses solely on the question of how closely retail rates follow policy rates. For Egert, Crespo-Cuaresma, and Reininger (2007), the assumption of a stable yield curve makes it possible to take a shortcut looking directly at the relationship between policy rates and retail (deposit and loan) rates.

### *2.2 Reasons for incomplete interest rate pass-through*

A vast literature on the pass-through to retail interest rates (Cottarelli and Kourelis, 1994; Mojon, 2000; Angeloni and Ehrmann, 2003; De Bondt et al., 2005) documents that bank interest rates are characterized by a lower variance than money market rates. This means that banks typically do not fully adjust retail rates when market rates change. Therefore, banks are no neutral conveyors of monetary policy. A number of explanations are given to justify why retail rates do not track money market rates closely. One potential explanation is that the limited pass-through may be interpreted as an implicit contract between the bank and its customers, which arises as a consequence of long-term relationships (Berger and Udell, 1992; Allen and Gale, 2004). That is, banks with close ties to their customers offer relatively stable retail interest rates in order to insulate the customers from volatile market rates. Moreover, a limited interest rate pass-through may also be the consequence of adjustment costs (e.g. Hannan and Berger, 1991; Hofmann and Mizen, 2004), like labor costs, computing costs and notification costs. This is contained in a set of hypotheses developed by Hannan and Berger (1991) which deal with asymmetric rigidity. Hannan and Berger (1991) examine whether interest rate rigidity is

different when rates are increasing or decreasing. In their model of deposit rates they propose two competing hypotheses. On the one hand, they argue that greater rigidity in deposit increases could arise from the collusive pricing behavior of banks. Such arrangements may break down if prices are changed, thus banks consider the cost of breakdown before adjusting prices. The expected costs are higher for deposit rate increases relative to decreases, because of increasing payments to depositors. Thus, deposit rates will be relatively more rigid when they are increasing. On the other hand, Hannan and Berger (1991) also propose an alternative argument for greater rigidity in deposit rate decreases. As they argue, if banks perceive that an important cost to them of changing the deposit rate comes from the negative reaction of customers, they will be reluctant to decrease deposit rates- hence greater downward rigidity. Scholnick (1996) names these two competing arguments the "collusive" and the "customer reaction" hypotheses. He thinks that those arguments can be extended by relating the discussion to lending rates. In this case, the collusive hypothesis would be supported by evidence of greater rigidity in lending rate decreases as banks would expect higher costs from the breakdown of collusive arrangements if lending rates were lowered. Alternatively, evidence of rigidity in lending rate increases would support the adverse customer reaction hypothesis.

A number of authors also argue that the financial structure of the economy might influence the monetary transmission mechanism (Mojon, 2000; Dabla-Norris and Floerkemeier, 2006). Related to this view is the Hannan and Berger (1991) symmetric hypothesis which concerns differences between banking firms in different markets areas. This is stated as follows: "…to the extent that firms(banks) in more concentrated markets exhibit price conjectures as a result of greater recognized interdependence, operation in a more concentrated market implies … greater price rigidity. To the extent that a larger customer base results in more customers changing deposit quantities in response to a price change, a larger customer base is likely to be associated with less price rigidity". Their argument is that the greater the degree of interdependence between banks, because of the high market concentration, the greater the reluctance to adjust deposit rates after exogenous changes to the wholesale rate. This is because of the perception that deposit rate changes may lead to adverse reactions from the other banks which may affect their own supply of deposit. Such a feature is likely to happen in Central Africa where the banking sector is still very concentrated. On the other hand, banks in highly competitive markets will be less concerned about the perceived behavior of other banks, which implies lower interest rate rigidity in response to exogenous shocks.

Another explanation for a limited pass-through to retail rates is related to asymmetric information and moral hazard. Kapwil and Scharler (2006) argue that banks have an incentive not to raise interest rates by too much, because borrowers who accept a higher rate are likely to be of poor quality. If borrowers take up a loan at a high rate, they are more likely to choose riskier projects, decreasing the expected value of the amount paid back. It is also observed that macroeconomic conditions, like rapid economic growth and higher inflation rates can enable bank to easily pass on changes in the interest rate to their lending and deposit rates faster(Egert, Crespo-Cuerasmaan Reininger, 2007). By contrast, higher interest rate volatility weakens the interest rate pass-through, given that banks wait longer before changing their rates.

Lastly, Kapwil and Scharler(2006) think that in a varying interest rate environment, banks can also change other components of a loan or deposit contract, such as collateral requirements, fees, etc.

**3. An Overview of the Empirical Literature on Interest Rate Pass-Through**

Before going into further detail regarding the empirical study of the interest rate pass-through in the CAEMC, it seems useful to overview the available empirical results obtained so far. Those results mainly concern studies in the Euro area and the United Stated, while there is also an increasing interest of the issue in emerging and developing countries.

Mizen and Hofmann (2002) seek to uncover how the official base rate affects deposit and mortgage rates of commercial banks and building societies in the UK. Using monthly data for 1986-1999, the estimations indicate that there is complete pass-through from base rates to deposit rates. By contrast, changes in the base rate feeds into mortgage rates only in an incomplete manner. Results also reveal the existence of asymmetries in the adjustment process towards the estimated long-term relationship, which connects the base rate and the retail rates.

A number of papers suggest that financial spreads are useful indicators of real activity (Stock and Watson, 1989; Davis, 1992; Davis and Henry, 1993). Relying on this argument, Biefang and Howells (2002) state that the price of bank loans would be better represented as a spread term showing the difference between the costs of bank finance versus nonbank alternatives. Based on the empirical case of the United Kingdom, they note that individuals are affected by monetary policy because a change in official rate means "they face new rates of interest on their savings and debts...Furthermore, higher interest rates (current and expected) tend to reduce asset values, and lower wealth leads to lower spending. Therefore, in their study, they focus directly on the behavior of three spreads in response to changes in the official rate. As they admit themselves, this is less likely to be done, for interest rates are generally integrated of order one and also tend to cointegrate pair-wise. Thus, they estimate pair-wise cointegrating relationships between the interest rates that are part of the spread and the Treasury Bill Rate (TBR), considered as the proxy for the official rate, then discuss after the effects of changes in TBR on the spread terms. The study shows evidence of a complete pass-through from the TBR to

three key market rates since 1986 (Short Bond Rate, Deposit Rate and a Lending Rate proxied by the three-month LIBOR). The authors then conclude that this makes it difficult for the Bank of England to induce lasting changes in relative rates, in pursuit of its monetary objectives, by any change in its official rate.

Other early studies on the transmission mechanism of monetary policy assumed immediate and complete pass-through of changes in official rates to retail bank rates (for example, Bernanke and Gertler, 1995; Kashyap and Stein, 2000; Altunbas et al., 2002). However, the full pass-through found by these authors is in contrast with other studies, which usually give evidence concerning the incompleteness of the pass-through with which base rates are transmitted to bank deposit or lending rates.

Mojon(2000) considers 6 Euro zone countries, namely Belgium, France, Germany, Italy, the Netherlands and Spain. The transmission from the money market to retail rates is analyzed by means of a VAR model. A score of different rates are used for the retail deposit and lending rates during the period 1979 to 1998. The pass-through turns out to be incomplete and seems rather sluggish, especially for rates of higher maturity. When splitting the time span into two interest rate cycles, Mojon (2000) shows that with the exception of Belgium, there is evidence of an interest rate cycle asymmetry. Furthermore, and more importantly, there is evidence of strong heterogeneity among countries. It is shown that the pass-through is the strongest in the Netherlands followed by Germany, France and Italy, whilst in Spain and Belgium, Changes in the money market rates are transmitted only partly into deposit and lending rates.

Similarly to Mojon (2000), Donnay and Degryse (2001) also make use of the VAR technique and set out to estimate the pass-through between the money market rate on the one hand, and several bank lending rates for households and firms and government bonds rates, on the other, for a set of 12 EU countries from 1980 to 2000. The estimation carried out using monthly data indicates an incomplete pass-through except for short-term bank lending rates. Government bonds and long-term rates for households react fairly smoothly. On average, the pass-through seems the most important for Spain, Italy, Greece and the Netherlands, while one half of the changes in money market rates are reflected in deposit and lending rates in Ireland, Belgium, Portugal, Austria and the UK. Results for France, Germany and Finland are somehow in between these extremes.

An overview of the empirical research on the pass-through from policy rates to retail rates is found in Kapwil and Scharler(2006). In their paper, the two authors summarize the empirical findings of the literature on the immediate and long-term pass-through, distinguishing between the euro area and the U.S.A (Note 2). In the euro area, the authors find that the adjustment of retail rates to changes in money market rates does need some time and does not occur instantaneously, as the immediate pass-through is smaller than the long-term pass-through. Both deposit rates and lending rates follow this feature. Another common finding in the euro area is that the immediate pass-through seems to be below 0.55 in all cases. This means that only half of the change in money market rates is immediately passed through to retail interest rates. For the long-term pass-through the range of estimates is bigger. However, the results seem to suggest that with only few exceptions, the long-term pass-through is below 1 and, thus, not complete. This indicates that banks in the euro area insulate their customers from volatile money market rates by absorbing part of changes. Therefore, it appears plausible that the euro area (a bank-based) economy experiences smoother business cycles than a more market-based system, as for instance the U.S.A. In fact, in contrast to the euro area, estimates for the pass-through in the U.S.A. seem to be higher than in the euro area, and most of the studies suggest that the pass-through to U.S. retail rates is nearly complete in the long-run.

If the literature about the interest rate pass-through focuses more on industrialized economies, there are some authors who are interested in emerging countries. In their study related to the interest rate pass-through in New EU Member States, Crespo-Cuaresma, Egert and Reininger(2004) show that the null hypothesis of complete pass-through cannot be rejected for any interest rate in Poland. On the contrary, there is evidence of incomplete pass-through in Hungary for the deposit rates (both the short and long-term) and the yield on the 5-year government bond. There is also some evidence of an overshooting effect observed in the interbank money market rate, but this effect is quantitatively tiny and only marginally significant. The results for the Czech Republic give evidence of incomplete pass-through for all rates except for the interbank money rate.

Isakova (2008) focuses on three CIS economies in Central Asia namely Kazakhstan, the Kyrgyz Republic and Tajikistan. In the case of Kyrgyzstan, he demonstrates that there is nearly a complete pass-through to interbank money rates and also the average household deposit rates, while lending rates and Lombard rates overshoot the policy rate. He explains this phenomenon by the overreaction of creditors to rising interest rates in the economy in order to hedge their credit risks in the face of uncertainty and underdeveloped financial markets. For Kazakhstan, Isakova(2008) shows that all interest rates exhibit an overshooting effect in reaction to the changes in the policy rate. Moreover, the 1998 financial crisis in Russia might have had a significant effect on the economy of Kazakhstan. This is illustrated by the presence of cointegration relationships between different interest rates and the policy rate. Finally, results for Tajikistan are contradictory, as no cointegration is established between the central bank's refinancing rate and the deposit and lending rates.

Having overviewed this vast existing literature, it is now time to turn on more empirical issues.

## 4. Data Description and Empirical Methodology

As the previous section has shown, the research aiming at assessing the monetary transmission mechanism in general and the interest rate pass-through in particular remains scarce, if nonexistent in Central Africa (Note 3). The aim of this study, which sounds as a premise, is then to go inside the "black box" of the monetary policy of the "Banque des Etats de l'Afrique Centrale" (B.E.A.C), the central bank of the six countries forming the CAEM.C, namely Cameroon, the Central African Republic, Chad, the Republic of Congo, Gabon and Equatorial Guinea. We are interested in this study, in the relationship between the policy rate on one hand, and the deposit and lending rates on the other hand. The empirical issues concerning the interest rate pass-through in those countries are the following:

- Is there evidence of complete pass-through from the official rate to markets rates, like the deposit and loan rates to non-banks? That is, do retail rates react one-to-one to changes in the key policy rate in the long-run? If so, does this long run relationship act as an attractor to the dynamics of retail interest rates?
- Is there evidence of asymmetric adjustments to the equilibrium depending upon the direction of change in the policy rate? Stated otherwise, is there evidence of any change in the elasticity between the deposit and lending rates, and the official rate over the whole period?

### *4.1 Data description*

The data used are monthly times series per annum interest rates in percentage points from 1990.1 to 2007.12. The source of the data is the International Financial Statistics CD-ROM published by the International Monetary Funds. We set the starting time on January 1990, the year which marks substantial changes in the conduct of monetary policy in the CAEMC area. Although the inter-bank money market was launched in 1994, interest rates on this market are still to be disclosed. As noted by kapwil and Scharler (2006), monetary policy rates and short-term money markets rates usually move together. Therefore, money market rates are often used as proxies for policy rates. However, policy rates are constant for long time periods and change only when policy decisions are taken, which makes them less suitable for econometric purposes. Unfortunately In our case, we were unable to apply such a feature, due to the fact that money market rates are unavailable. Moreover, interest rates are harmonized in the six countries of our study, that is, the same lending and deposit rates are applied in the six countries by the banking system. In fact, the lending rate, as it appears in the IFS database, is the maximum debtor rate, while the deposit rate is the minimum creditor rate, all fixed by the Governor of the central bank. Consequently, we chose not to apply a country-by-country study, relying only on the global data from the monetary authority which in fact are identical in all the member states. Actually, those rates are only indicators of what commercial banks can apply as rates in their operations, not the real cost of credit or the actual deposit rate applied by various commercial banks in the sub-region. Nevertheless, as those are the only data available, we use them in our study. Specifically, we consider as the policy rate variable, the rate offered by the central bank to second-tier banks for their refinancing process. That is, the so-called TIAO (taux d'interet d'appel d'offre).

The deposit rate is as we said, the minimum creditor rate, TCM (taux crediteur minimum).

The lending rate is the maximum debtor rate, TDM (taux debiteur maximum).

Descriptive statistics of those data are displayed in Table.1.

A rapid glance at this table tells us that there is evidence of lower variation of our data, as standard deviations are very low. Table 1 also indicates that the average spread between the lending rate and the deposit rate is quite high (13%) in the CAEMC. Moreover, if there is evidence of a high pair-wise correlation between the policy rate and the deposit rate (94%), on the contrary, there is no apparent correlation between the policy rate and the lending rate. Our empirical results might tell us more on these issues. Finally, the evolution of the policy rate reveals two main periods: one period of increasing rates from 1990.1 to 1994.5, and one period of decreasing rates from 1994.6 to 2007.12. Fig.1 shows the evolution of the three interest rates for the whole sample period.

### *4.2 Methodological Approach: Econometric Framework*

In this study, we use the methodology proposed by Crespo-Cuaresma et al. (2004). This methodology consists in representing the relationship between the policy rate and a given market rate as an autoregressive distributed lag (ARDL) model such as

$$i_t^m = \alpha_0 + \sum_{j=1}^{p} \alpha_j i_{t-j}^m + \sum_{k=0}^{q} \beta_k i_{t-k}^p + \varepsilon_t \qquad (1)$$

Where $i_t^m$ is the market interest rate, $i_t^p$ is the policy rate and $\varepsilon_t$ is a white noise disturbance with a constant variance $\sigma_\varepsilon$. Equation (1) can be rewritten using the lag operator as

$$A(L)i_t^m = \alpha_o + B(L)i_t^p + \varepsilon_t \quad (2)$$

Where

$$A(L) = 1 - \sum_{j=1}^{p} \alpha_j L^j \quad and \quad B(L) = \beta_0 + \sum_{k=1}^{q} \beta_k L^k$$

The long-run relationship implied by this parameterization is given by

$$i^m = \frac{\alpha_0}{A(1)} + \frac{B(1)}{A(1)} i^p \quad (3)$$

The error correlation (EC) representation of (1) can be written as

$$\Delta i_t^m = \delta_0 + \sum_{j=1}^{p-1} \mu_j \Delta i_{t-j}^m + \sum_{k=0}^{q} K_k \Delta i_{t-k}^p + \gamma\left(i_{t-1}^m - \lambda i_{t-1}^p\right) + \varepsilon_t \quad (4)$$

Where there is a one-to-one mapping between the parameters in (4) and in (1). The term in brackets acts as an attractor, and represents the long run equilibrium (i.e.$\lambda = B(1)/A(1)$). In fact, λ shows by how much the retail rate changes in reaction to a change in the policy rate by 100 basis points after all adjustments have taken place. Meanwhile, when estimating equation (4), one might also be interested in the immediate pass-through, which is given by $K_0$. It gives the reaction of retail rates to a change in the policy rate within the same time period. Kapwil and Scharler (2006) argue that a high long-run pass-through might be due to high direct effects passed through from the policy rate to retail rates or a high persistence in the retail rates. If λ is equal to 1, the pass-through is said to be complete in the long run and changes in the policy rate are to the full extent transmitted to retail rates.

All the data series were subject to the unit root test through the Augmented Dickey-Fuller and Phillips-Perron procedures. Results of this test are reported in Table 2. Due to the existence of a unit root in the autoregressive representation of all the series included in the analysis, $\gamma$ can be interpreted as the speed of adjustment to the cointegration relationship given by equation (3). Several methods have been proposed in the literature to estimate the parameters in (4), starting with the seminal contributions by Engel and Granger (1987) and Johansen (1988, 1995). Another approach, suggested by Wickens and Breusch(1988), implies obtaining estimates for the parameters in (4) directly from the OLS estimates of (1). This is the approach we use in this study. Crespo-Cuaresma et al. (2004) indicate that similar results are obtained if the Bewley(1979) transformation of (1) is used to retrieve the long run responses of the market interest rates to the policy rate.

## 5. Empirical Results: The Interest Rate Pass-through in the Central African Economic and Monetary Community (CAEMC)

Table 3 presents the estimates of λ and γ (the long run multiplier and the speed of adjustment, respectively) for the deposit and lending rates, using the "TIAO" as the policy rate. The lag length of the ADRL models was chosen as the pair that jointly minimizes the Schwartz Bayesian criterion (SBC) and the Akaike information Criterion (AIC), setting a maximum of twelve lags for each variable. Isakova(2008) indicates that the more an identified model fits the data, the lower the AIC and the SBC will be. As the fit of model improves, the AIC and SBC will approach$-\infty$. Results are based on models including one of the market rate (the deposit rate or the lending rate) and the policy rate. We also include in Table 3, the value $K_0$ which gives the reaction of retail rates to a change in the policy rate within the same time period. For each specification, full interest rate pass-through, corresponding to the restriction λ=1 in (4), was tested (Note 4).

The first finding is that the adjustment of the deposit rate to changes in the policy rate seems to occur instantaneously, as the estimate of the immediate pass-through is not too different from that of the long-term pass-through for this retail rate. On the contrary, the adjustment of the lending rate to changes in the policy rate does need some time, for the immediate pass-through is largely smaller than the long-run pass-through. Secondly, one can already predict the magnitude of the long-run pass-through estimates of the two rates, based on their immediate pass-through coefficients. As argued by Kapwil and Scharler(2006), immediate pass-through estimates are in some extent, indicators of the magnitude of the long-term pass-through estimates. Therefore, it can be presumed that the long-run pass through from the policy rate to the deposit rate might be weak and incomplete, while the long-run pass-through from the policy rate to

the lending rate might be high, due to their respective immediate pass-through. Another finding from Table 3 is the difference of the immediate pass-through of the deposit and lending rates. For the deposit rate, less than one half of the change in the policy rate is passed through the deposit rate within one month. On the other side, about 70% of the change in the policy rate can already be passed immediately to the lending rate.

As for the long-term pass-through, our results show that the estimate for the deposit rate is quite small and statistically different from 1. Thus, one can argue that banks in the CAEMC insulate depositors from volatile policy rates by absorbing part of the change. This low and incomplete pass-through from the policy rate to the deposit rate can be explained by the excess reserves of commercial banks in the CAEMC, which makes it more difficult for the deposit rate to follow increasing movements in the policy rate. Moreover, the absence of competition and the very high concentration of commercial banks also explain this feature. However, the 0.3398 level of the pass-through indicates that banks in some extent still need deposits to finance their loans.

A more interesting feature appears when considering the pass-through to the lending rate. Our results show that the lending rate exhibits an overshooting effect in reaction to the change in the policy rate. This effect is rather significant. That is, the lending rate changes by more than 600 basis points after a change of 100 basis points in the policy rate. This phenomenon could be explained by the overreaction of creditors to rising interest rates in the economy in order to hedge their credit risks in the face of uncertainty and under-developed financial markets. In the particular case of the CAEMC, it should be recalled that the Douala Stock Exchange (DSX) and the Central African stock Exchange in Libreville (Bourse des Valeurs Mobilieres de l'Afrique Centrale) both launched in 2003, are still only at their starting point with no real activity. In such a context, an increase of the monetary policy interest rate, which affects the cost of money, is unlikely to induce a switch from money to nonmoney assets. Investors can only rely on bank loan; otherwise, they turn to the shadow economy to raise money. Finally, as stated by Hannan and Berger (1991), the high concentration of the banking system in the region can also explain the reason why the lending rate overshoots the policy rate.

Our results also show that the estimate of the speed of adjustment for the specification including the lending rate and the policy rate although negative, is insignificant. On the contrary, this estimate is negative and significant at 10% in the specification including the deposit rate and the policy rate. This means that the equilibrium relationship acts as an attractor in the dynamics of the deposit rate.

Finally, in order to stress the potential asymmetry of the interest rate pass-through in the CAEMC, we divided our time span into two sub-periods corresponding to two interest rate cycles. The first sub-period runs from 1990.1 to 1994.5 and is characterized by increasing policy rate while the second sub-period spans from 1994.6 to 2007.12 and is a decreasing policy rate period. In each of these two sub-periods, we reapplied the empirical methodology presented in section 4.2. Our results (not reported) show that there is evidence of asymmetry in the adjustment of the lending rate (Note 5). The pass-through is lower ($\lambda$=0.353) during the first cycle of increasing policy rate while the lending rate overshoots the policy rate ($\lambda$=4.51) in the second sub-period of decreasing policy rate. The greater rigidity in lending rate increases in the first interest rate cycle could be explained by the "adverse customer reaction" hypothesis of Scholnick (1996). On the contrary, the greater rigidity in lending rate decreases during the second period could come from the "collusive" hypothesis of Scholnick(1996) because banks expect higher costs from the breakdown of collusive arrangements if the lending rates were lowered. The "collusive" and "customer reaction hypothesis" also apply in the case of the deposit rate. The fact that the deposit rate is rigid when increasing ($\lambda$=0.298) implies that banks avoid expected higher costs following a potential increase in the deposit rate. During the second sub-period, the pass-through becomes very low ($\lambda$=0.08) leading to a "customer reaction hypothesis".

## 6. Conclusion

This paper studies the monetary transmission mechanism in the CAEMC countries, focusing more on the very first step of this process: the interest rate pass-through from the policy rate to retail rates. Making use of the autoregressive distributed lag (ADRL) model we notice some interesting outcomes of this pass-through in the area of concern.

The first outcome is that the immediate pass-through to the lending rate is quite two times the one in the deposit rate. With this result, one can already predict the magnitude of the long-term pass-through, which might be higher for the lending rate and lower for the deposit rate.

A more interesting feature of our study is the outcomes in the long-term. Our results indicates that while the long run pass-through to the deposit rate is low and statistically different from 1, thus incomplete, the lending rate rather exhibit an overshooting effect in reaction to changes in the policy rate. The absence of competition in the banking sector, combined with the well established excess reserves situation of commercial banks in the region may help to explain the upward rigidity of the deposit rate. At the same time, the poor financial structure, characterized by the inefficiency of the two stock markets of the region may contribute to reinforce the preeminence of bank loans as the only debt instrument available to economic agents. In such a context, creditors may also overreact to rising interest rates in the economy in order to hedge their credit risks in the face of uncertainty and under-developed financial markets.

As for a possible asymmetry of the pass-through of policy rate changes, we do confirm that there is evidence of asymmetry in the pass-through from the policy rate to both the lending and the deposit rates. In our case where the time span was split into two sub-periods, this phenomenon is better known as "the interest rate cycle asymmetry" as termed by Mojon (2000). As we argue, this phenomenon might result from the collusive behavior of commercial banks, because retail rates adjustments induce supporting additional costs. But, "sanction" by customers can also prevent such adjustments by commercial banks.

Due to those shortcomings on the monetary transmission mechanism in the CAEMC area, some policy measures shall be useful. First, a more commitment must be taken to render effective, the two stock markets of the region, which existence is still on papers. This would enable the diversification of assets in the CAEMC and maybe slowdown the highest lending rate of the region. Second, although the control and supervision of the banking system are necessary, measures aiming at easing the settlement of more commercial banks in the CAEMC are also of importance. This may trigger competition between banks for retail deposits and maybe increase more the pass-through from policy rate to the deposit rate. Finally, as it has been demonstrated by Saxegaard(2006), excess liquidity weakens the whole monetary policy transmission mechanism in the CAEMC region. Therefore some policy measures aiming at reducing this excess liquidity must be implemented.

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**Notes**

Note 1. A complete expose of the monetary transmission mechanism can be found in Mishkin(1996).

Note 2. Studies include Mojon(2000), Anjeloni and Ehrmann(2003), Sander and Kleimeier(2004) de Bondt(2005), Kapwil and Scharler(2006), Kleimeier and Sander(2006) Sorensen and Werner(2006) for the Eura Area; Cottarelli and Kourelis(1994), Borio and Fritz(1995), Moazzami(1999), Sellon(2002), Angeloni and Ehrmann(2003), Kapwil and Scharler(2006), Kaufmann and Scharler(2006) for the U.S.A.

Note 3. An exception is the study of Saxegaard(2006) which analyzes the consequences of the excess liquidity on the effectiveness of monetary policy in Sub-Saharan Africa.

Note 4. As the null hypothesis of complete pass-through was rejected in the two specifications, results for the test are not reported in Table 2.

Note 5. We also used the generalization of the Error Correlation specification in equation (4), allowing for an asymmetric behavior of the speed of adjustment, as proposed by Crespo-Cuaresma et al. (2004). This generalization can be given by the expression,

$$\Delta i_t^m = \delta_0 + \sum_{j=1}^{p-1} \mu_j \Delta i_{t-j}^m + \sum_{k=0}^{q} K_k \Delta i_{t-k}^p +$$

$$I\left(\Delta i_{t-1}^p < 0\right)\gamma_1 (i_{t-1}^m - \lambda i_{t-1}^p) + [1 - I\,(\Delta i_{t-1}^p < 0]\gamma_2 (i_{t-1}^m - \lambda i_{t-1}^p$$

Where I (•) is a Heavyside function taking value one if the argument is true and zero otherwise. This specification allows for two speeds of adjustment to the long-run relationship (corresponding to $\gamma_1$and$\gamma_2$) depending on whether the adjustment follows a negative or positive change in the key policy rate. A simple test for symmetry is then given by the F-test for equality of $\gamma_1$ and $\gamma_2$. A rejection of the null would indicate that the speed of adjustment to the long-run equilibrium is significantly different for increases and decreases of the policy rate. When adopting this specification, we were unable to reject the null hypothesis of symmetry adjustment for the two retail rates (deposit rate and lending rate). Those results are available on request.

Table 1. Descriptive Statistics

| | Mean | Median | maximum | minimum | Std. Dev. |
|---|---|---|---|---|---|
| Policy rate | 0.079438 | 0.075 | 0.14 | 0.0525 | 0.02236 |
| Deposit rate | 0.057338 | 0.05 | 0.09 | 0.0425 | 0.013055 |
| Lending rate | 0.186551 | 0.18 | 0.22 | 0.15 | 0.024947 |

**Correlation Matrix**

| | DEP_RATE | POLICY_R | LENDING_R |
|---|---|---|---|
| DEP_RATE | 1.000000 | 0.944693 | -0.188091 |
| POLICY_R | 0.944693 | 1.000000 | -0.002680 |
| LENDING_R | -0.188091 | -0.002680 | 1.000000 |

Source: International Financial Statistics CD-ROM

Time Span: 1990: 1- 2007: 12

Table 2. Augmented Dickey-Fuller and Phillips-Perron Unit Root Tests

| Variables | ADF statistics | Order | PP Statistic | Order | Lag |
|---|---|---|---|---|---|
| Policy Rate | -11.23*** | 1 | -11.31*** | 1 | 14 |
| Deposit Rate | -16.18*** | 1 | -16.11*** | 1 | 14 |
| Lending Rate | -14.45*** | 1 | -14.45*** | 1 | 14 |

Note: All the test regressions were performed without a trend and a constant term. The ADF statistic is based on 14 lags. The critical value for the ADF and Phillips-Perron are from MacKinnon (1996). (***) indicates that the relevant null hypothesis is rejected at the 1% level.

Table 3. Long-run Responses and Adjustment Coefficients in the CAEMC area

$$Specification\ Estimated: \Delta i_t^m = \delta_0 + \sum_{j=1}^{p-1} \mu_j \Delta i_{t-j}^m + \sum_{k=0}^{q} K_k \Delta i_{t-k}^p + \gamma\left(i_{t-1}^m - \lambda i_{t-1}^p\right) + \varepsilon_t$$

| | λ | $\sigma_\lambda$ | $K_0$ | γ | $\sigma_\gamma$ | (p,q) |
|---|---|---|---|---|---|---|
| Deposit rate | 0.3398*** | 0.103 | 0.368*** | -0.036* | 0.020211 | (7,12) |
| Lending rate | 6.21*** | 0.357 | 0.673*** | -0.00216 | 0.00279 | (1,10) |

Notes: ***, **, and * stand for statistical significance at 1, 5 and 10 percent critical level respectively. No cointegration has been found between the policy rate and the lending rate.

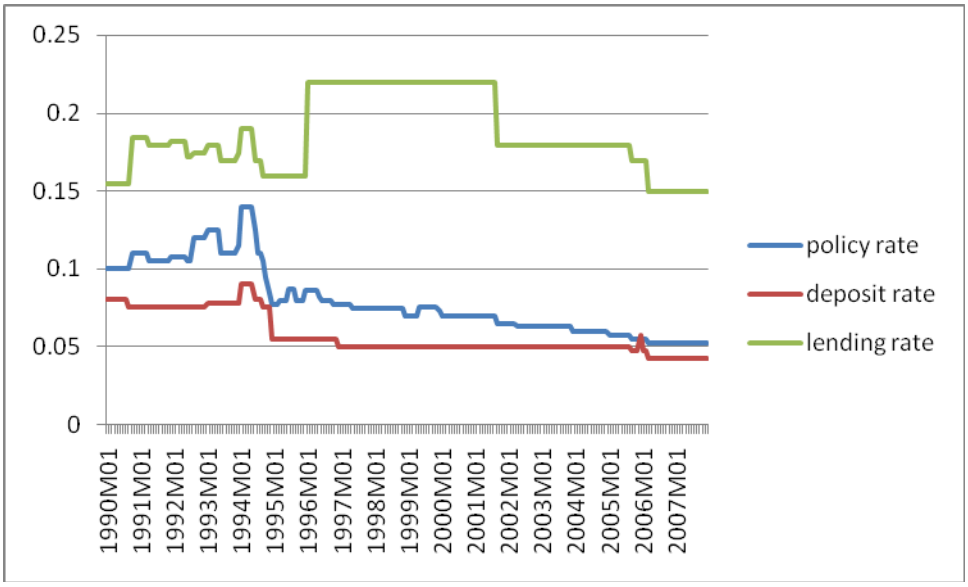


Figure 1. Interest rates in Central Africa

Time Period: 1990.1- 2007.12. Source: IFS CD-ROM