



CENTRAL AFRICAN ECONOMIC AND MONETARY COMMUNITY (CEMAC)

SELECTED ISSUES

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CENTRAL AFRICAN ECONOMIC AND MONETARY COMMUNITY (CEMAC)

SELECTED ISSUES

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CEMAC: WHY IS ECONOMIC GROWTH LAGGING AND WHAT CAN BE DONE ABOUT IT?¹

During the last two decades, the average growth of the Economic and Monetary Community of Central Africa (CEMAC) has been slower than the sub-Saharan African (SSA) average. Given that many CEMAC countries aspire to reach emerging country status within the next two decades, this paper, using a growth accounting approach, identifies the main components of growth and analyzes the differences with respect to comparator countries. Results of the analysis show that convergence of CEMAC countries toward emerging market levels has stalled, while some lower-income, faster-growing economies have been catching up. Decomposing growth by contributing factors, we find that total factor productivity has had a negative impact on CEMAC's growth.

A. Introduction

1. This paper compares CEMAC countries' growth performance with that of comparator countries. Specifically CEMAC countries are compared with SSA countries; SSA emerging markets; SSA frontier economies; and a group of selected Asian countries.^{2,3} Although CEMAC's average per capita income is higher than the average of SSA countries and of SSA frontier markets, because of abundant oil resources, CEMAC's per capita GDP growth has been slower than in comparator countries.

2. Improving CEMAC's productivity requires, among others measures, addressing its challenging business climate and promoting a more diversified economy with a stronger private sector. Because CEMAC lags behind its peers in terms of structural competitiveness and governance, this paper assesses the impact of reforms in specific areas of the World Bank's "Doing Business" indicators. This is done through an analysis whereby the CEMAC countries catch up with benchmark groups in specific areas of the business climate. By comparing how the regional ranking would improve overall with various scenarios of catching up, this paper identifies which reforms would provide the highest gains in improving the business climate. The last part of the paper analyzes

¹ Prepared by José Gijon, Boriana Yontcheva, and Zaki Dernaoui

² We compare CEMAC's growth profile with a group of 41 sub-Saharan African (SSA) countries, 10 African frontier economies (African FEs), eight West African Economic and Monetary Union (WAEMU) countries, five African emerging countries (African EMs) and 8 Asian countries with similar levels of income (Asian peers). SSA countries are: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic (CAR), Comoros, Congo Republic, Democratic Republic of Congo (DRC), Côte d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, and Zambia. WAEMU countries are: Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo. African EM countries are: Botswana, Cape Verde, Namibia, Seychelles, and South Africa. African FEs are: Ethiopia, Ghana, Kenya, Mauritius, Mozambique, Nigeria, Senegal, Tanzania, Uganda, and Zambia. Asian peers are: Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, and Vietnam.

³ We use four comparators, but most of CEMAC's benchmarks in this paper are set with respect to African FEs, the group of countries, which is the main "emergence" reference for CEMAC authorities.

channels through which ongoing shortcomings in the business climate undermine gains in the overall competitiveness of CEMAC economies.

3. This paper makes three contributions to the analysis of long-term productivity in CEMAC. The first one is the scope as we compute production functions for all SSA countries. Second, the accounting methodology in growth rates allows us to make cross-country and cross-region comparisons. Third, we identify the areas of weaknesses with respect to business climate and competitiveness, and the areas for most effective reforms.

B. Growth Facts

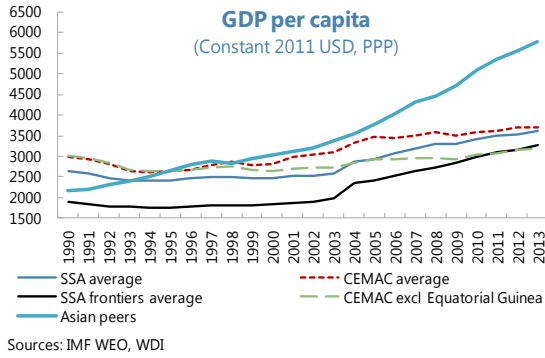
4. Per capita GDP growth in CEMAC has been slower than in most SSA countries. Although average per capita income in SSA, African FEs, and Asian peers has risen steadily, average per capita GDP in CEMAC has grown more modestly since the early 2000s (Figure 1, upper left panel). Moreover, a country disaggregation shows that the high average CEMAC per capita growth largely stems from the oil boom in Equatorial Guinea (Figure 1, upper right panel) which started in the mid-1990s. CEMAC experienced a convergence process toward SSA EM income levels from the mid-1990s to the mid-2000's when its average GDP per capita grew faster than in EMs. However, since 2005, and despite high oil prices until recently, the convergence process has stalled. As a consequence, the per capita income gap has remained at about 30 percent of the SSA EM income level. At the same time, faster-growing, lower-income SSA FEs have been catching up (Figure 1, middle left panel). In 2000-13, the average per capita real GDP growth in CEMAC was 1.4 percentage points slower than in the SSA frontier countries. (Figure 1 middle right panel). This comparison shows an even larger decrease when excluding Equatorial Guinea and considers the five other CEMAC countries' (henceforth the "CEMAC 5"; Figure 1 middle right panel); this implies the convergence was largely due to the oil sector.

5. GDP growth in the CEMAC has been highly volatile and dependent on oil. With the exception of the Central African Republic (CAR), CEMAC economies remain mainly driven by the oil sector; this explains the region's higher-than-average growth volatility. (Figure 1, bottom panels). Oil sector performance explains the very rapid per capita growth in Equatorial Guinea and the severe contraction of the Gabonese economy in 1999.⁴ Moreover, the disparity in per capita GDP across CEMAC countries is relatively high and has been widening in the last two decades. While in the early 1990s the regional average per capita GDP was about 20 percent of the average in the two richest countries (Equatorial Guinea and Gabon), in 2013 this ratio was around 16 percent.

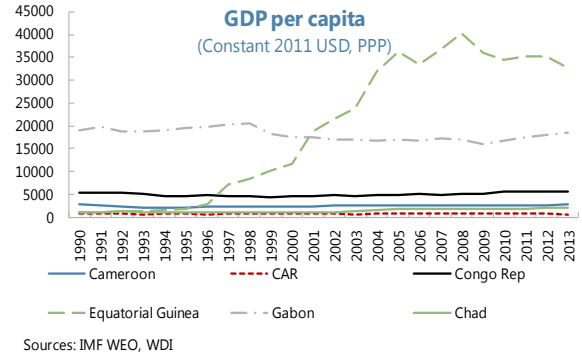
⁴ Gabon underwent a severe economic recession in 1999. Real GDP contracted by 9.6 percent, reflecting a drop in oil output (by 11.4 percent) and an estimated 8.9 percent decline in real non-oil GDP (Gabon 2000 Country Report 00/203). The sharp contraction in activity in the non-oil sector was due to drastic cuts in the public investment program, a weakening performance of the public corporate sector, and a wait-and-see attitude of the private sector.

Figure 1. CEMAC: Growth Profile, 1990–2013

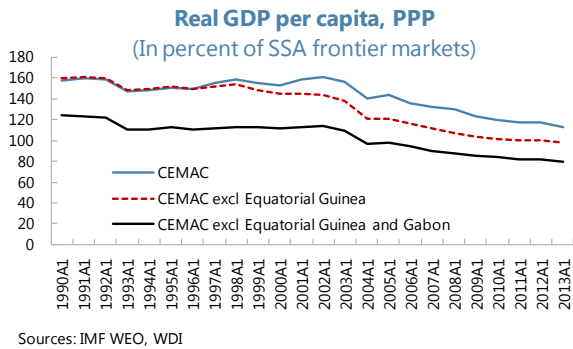
Average per capita GDP growth in CEMAC was slower than in most comparator countries in the past two decades.



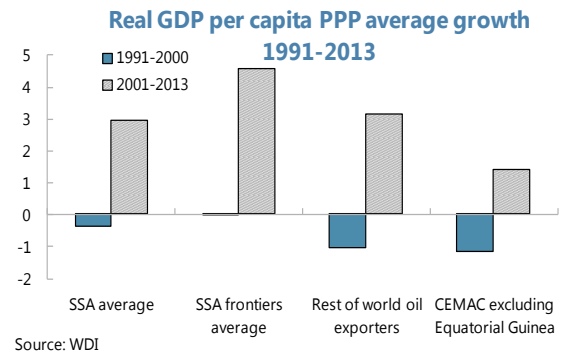
However, there were important disparities among CEMAC countries.



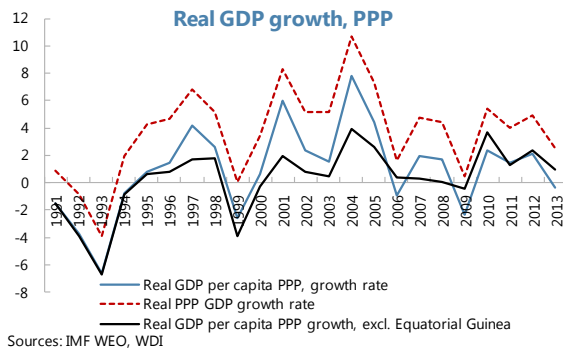
With the exception of Equatorial Guinea, the income differential with frontier economies declined from 160 percent to 100 percent because of the faster growth in frontiers economies.



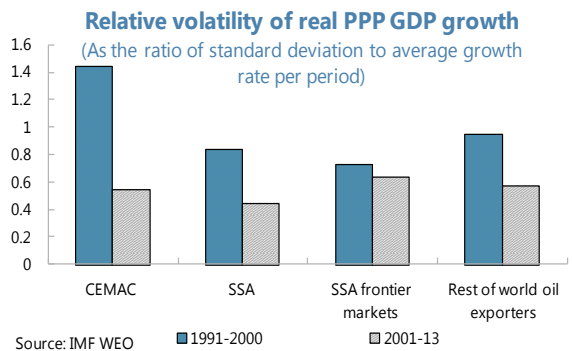
CEMAC's per capita GDP growth was slower than in frontier markets or the SSA average and the gap widened in the last decade.



The growth rate has been volatile, reflecting oil price volatility.



Volatility in CEMAC was higher than in peer countries, but in line with other oil producers.



C. Growth Accounting and Productivity in the CEMAC

Methodology

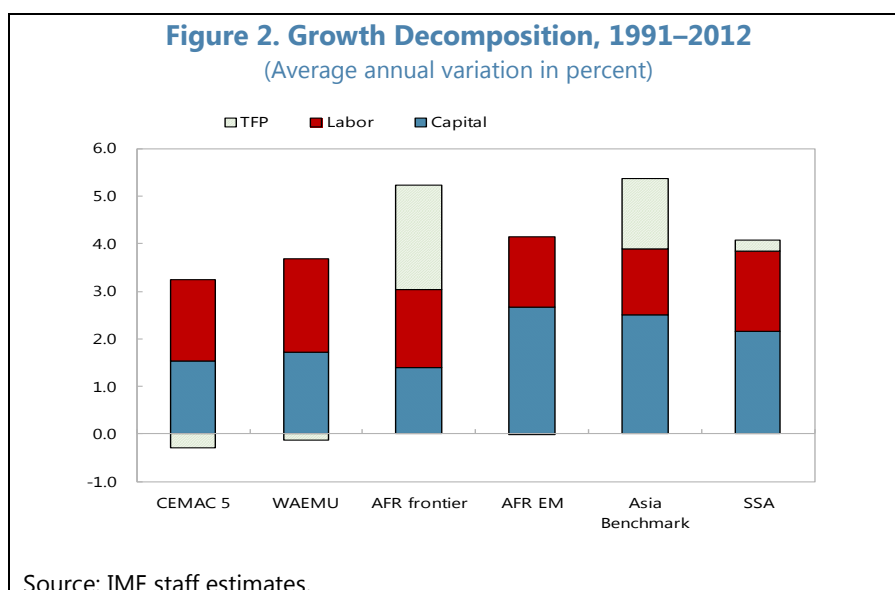
6. The analysis is based on a GDP growth decomposition of 41 SSA countries and a group of 8 Asian peer countries to identify the sources of economic growth and explain income differentials with peers. Based on Solow (1957), we assume a Cobb-Douglas production function, constant returns to scale, and perfect competition where output can be written as:

$$Y_i = A_i K_i^\alpha H_i^{(1-\alpha)}$$

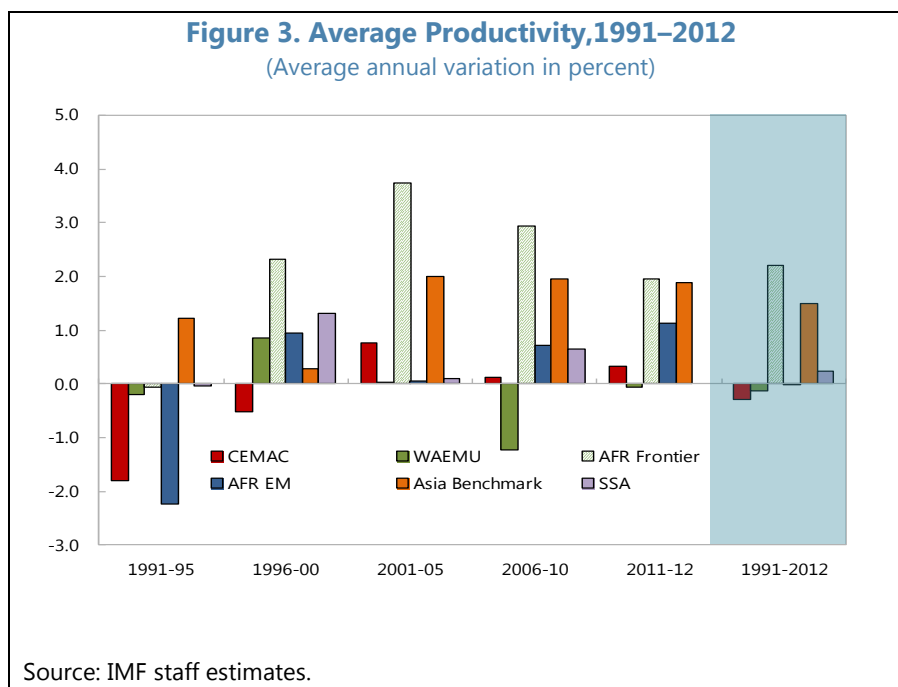
where K_i and H_i are respectively physical and human capital stocks, and A_i is interpreted as total factor productivity (TFP, also referred to as productivity) in country i with $\alpha=0.4$.⁵ We use the World Bank World Development Indicators (WDI) database for labor force and the IMF World Economic Outlook (WEO) database for physical capital and real GDP growth rates. We then derive TFP using the above formula.

Results

7. In this section, we present the results of growth decomposition in 1991-2012. Figure 2 presents the growth decomposition of CEMAC (i.e., all CEMAC members except Equatorial Guinea), the SSA average, WAEMU countries, African FEs, African EMs, and Asian peers. Over the last two decades, average annual GDP growth in CEMAC was about 3 percent. Labor contributed to roughly 1.5 percent of the total GDP growth. Capital investment raised growth by 1.7 percent while the decrease in TFP exercised a negative effect of -0.3 percent on regional growth (Figure 3).



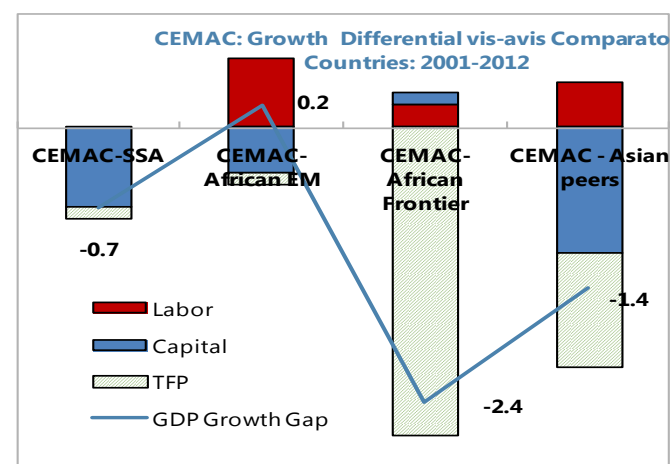
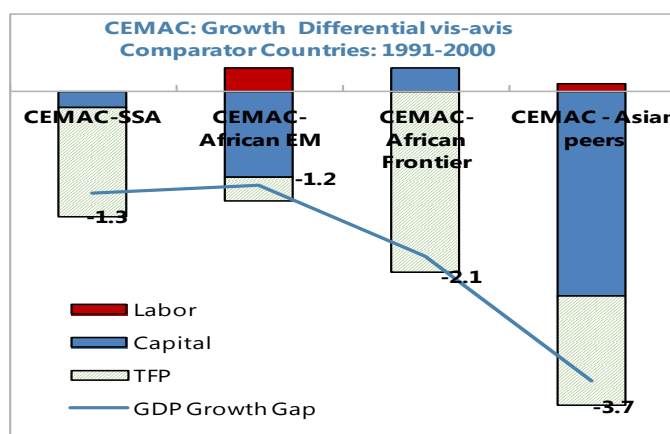
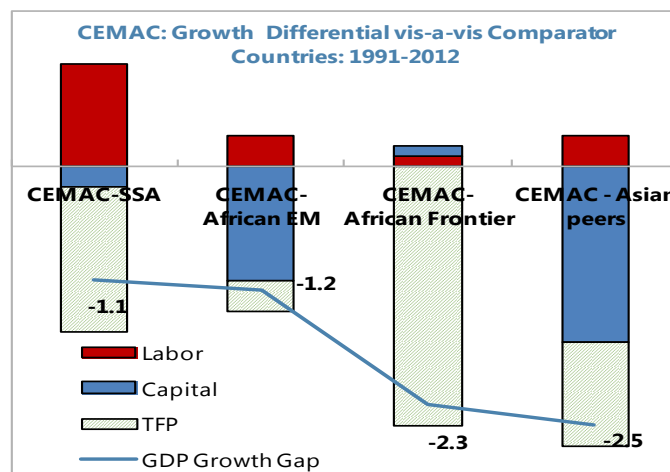
⁵ The value for α used is based on work on growth accounting in developing countries (IMF Working Paper 04/176) and is relevant to all countries in the sample.



8. Compared with the benchmark country groups, CEMAC's growth was slower. CEMAC had the slowest average growth over the period and it was also the region with the largest negative contribution of TFP growth, partly offsetting the input of labor and the increase in capital. In particular, Figure 4 and Annex Table 1 show that:

- CEMAC's growth was 1 percent slower than the SSA average over the whole period. The main drivers of the gap were mostly lower productivity gains and lower capital contribution. The negative TFP contribution explains about three quarters of the gap in the first decade (1991–2000), while lower capital investment caused the entire gap in the second period (2001–12).
- Compared to Asian peers, growth in CEMAC was 2.5 percentage points slower and the difference was explained both by less capital contribution (-1.7 percentage points explaining about 60 percent of the gap) and lower productivity (-1 percentage point difference).
- Compared to SSA frontier markets, the gap in terms of productivity is striking. In spite of higher capital and labor inputs, the negative contribution of TFP is dragging GDP growth down.
- Raising TFP in the CEMAC to the level of the SSA frontier markets or the Asian peers would have lifted GDP by 2.5 and 1.0 percentage points, respectively, in the period covered by this analysis (1991–2012).

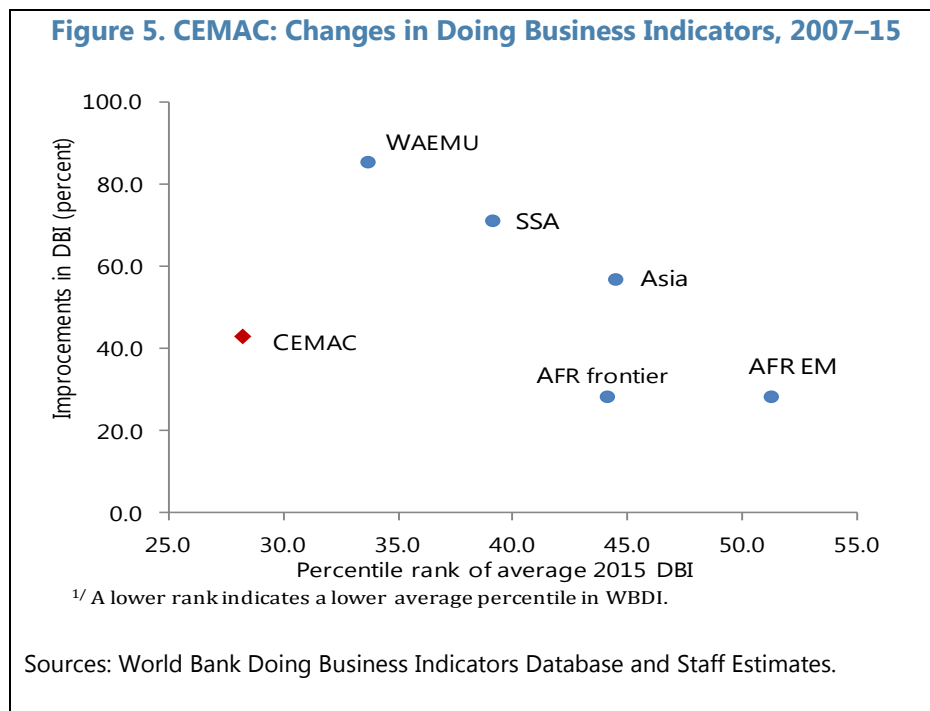
Figure 4. CEMAC: Differences in Growth and Factor Decomposition, 1991–2012
 (Average annual variation in percent)



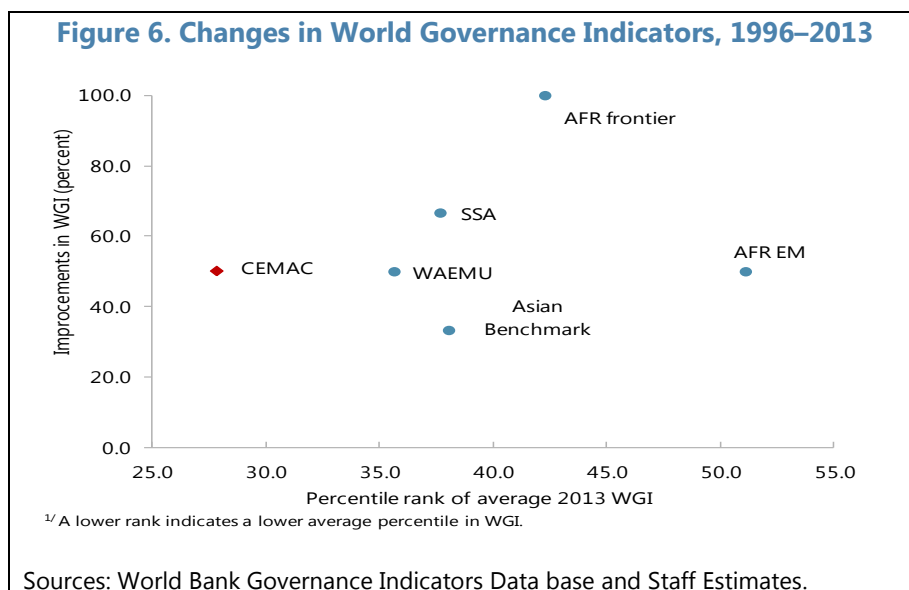
Source: IMF staff estimates.

D. Improving CEMAC's Growth Potential

9. One explanation for CEMAC's negative TFP contribution to growth could be its challenging business climate and governance. Empirical analysis using firm survey data have established the links between poor business climate and low productivity in developed and developing countries (Bastos et al., 2004, Eifert et al., 2005, Lall et al., 2005). CEMAC countries lag behind other SSA countries in terms of the quality of the business climate—this is shown by indicators on perceived corruption (Transparency International); ease of doing business (World Bank); or governance (World Economic Forum). Figure 5 compares the 2015 Doing Business rankings and the evolution of the indicators between 2007 and 2015 for CEMAC and its benchmark groups. It shows that CEMAC has the lowest rankings, behind most of the benchmark groups. Between the 2014 and 2015 rankings, four CEMAC countries regressed, one kept its ranking (Chad), and one advanced by one position (Congo).

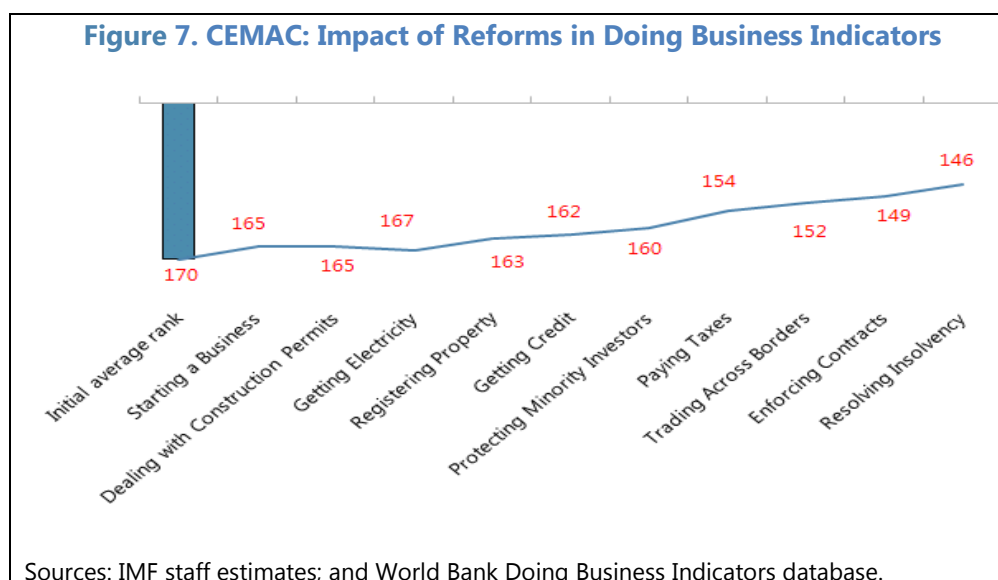


10. Empirical research also suggests that weak governance may hamper productivity (Ndulu and O'Connell, 1999). In the case of CEMAC, weak governance indicators and lack of improvement may have also impacted productivity. Figure 6 presents the changes in the World Bank's governance indicators and shows that CEMAC continues to score below the other groups, with limited progress shown. For example, Figure 6 shows that CEMAC ranks in the bottom 28 percent in the World Governance Indicator Ranking, and has only made improvements in 50 percent of its governance indicators between 1996 and 2013. Conversely, African FEs are ranked much higher at about 43 percent and made improvements in 100 percent of their indicators. That means that CEMAC should have made a lot more progress (e.g., adopt more aggressive reforms) to catch-up with comparator groups of countries.



11. Facilitating trade and payment of taxes would significantly improve the business climate.

To assess the impact of selected reforms, we set each CEMAC doing business indicator to the average level of the African FEs. Figure 7 shows that CEMAC's average ranking would improve by 24 positions if it managed to reach the average level of indicators of African FEs. This implies that the region has a considerable margin to implement business-friendly reforms. In particular, it has room for improvement in paying taxes, facilitating trade, improving contract enforcement, property registration and resolving insolvency (Figure 8). Paying taxes and trading across borders are two areas of particular weakness in the region. On average, it takes 572 hours per year in CEMAC versus 304 in SSA countries to pay business taxes, and the waiting time is of 40 days for exports and 50 days for imports. Reforms in these areas would yield the highest benefits in terms of better rankings.



12. The impact of reforms can vary substantially at the individual country level. For example, a reform in procedures to start a business in Equatorial Guinea would bring the country 20 positions ahead of its current rank, whereas the impact is only 2 ranks in the Congo. Table 1 below shows that for CEMAC countries, the areas where reforms would be the most efficient are those pertaining to trading across borders, paying taxes, starting a business, and resolving insolvency. Table 1 summarizes the impact of doing business reforms by business climate indicator and by CEMAC country.

Table 1. CEMAC: Potential Improvements in Doing Business Indicators

Initial average rank	Starting a Business	Dealing with			Registering Property	Protecting		Trading Across Borders	Enforcing Contracts	Resolving Insolvency
		Construction Permits	Getting Electricity	Getting Credit		Minority Investors	Paying Taxes			
CEMAC	4	0	-2	4	1	2	5	3	2	4
Cameroon	0	5	-8	9	3	2	12	3	8	0
Central African Rep	1	0	1	0	1	0	1	1	1	1
Chad	1	0	0	0	0	0	3	4	0	0
Congo Rep	2	-1	2	2	0	2	3	9	2	1
Equatorial Guinea	20	-1	-3	2	2	6	11	0	-2	20
Gabon	1	-2	-1	10	1	3	2	-1	4	1
Min	0	-2	-8	0	0	0	1	-1	-2	0
Max	20	5	2	10	3	6	12	9	8	20

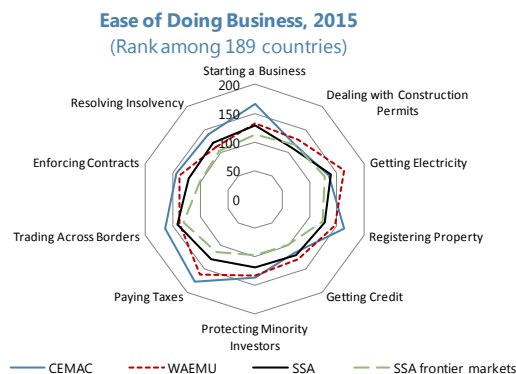
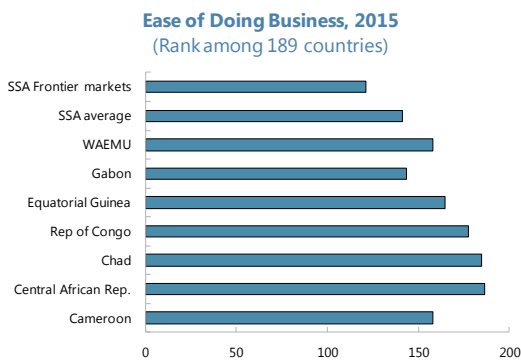
Note: This table shows potential improvements with respect to the average of the Doing Business Indicators of African FEs.

Sources: IMF staff estimates; and World Bank Doing Business Indicators database.

Figure 8. CEMAC: Governance and Business Climate Profile

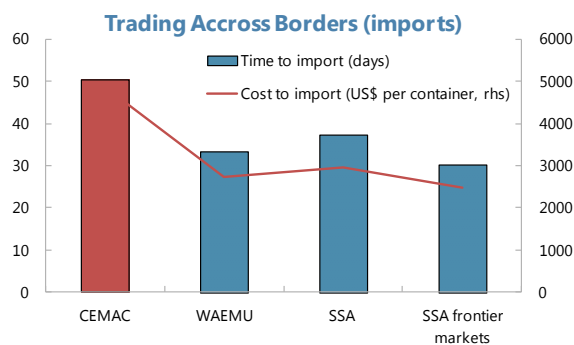
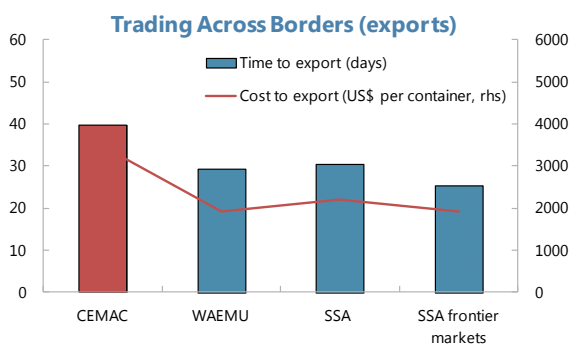
The business environment in CEMAC is among the most challenging in SSA.

There is significant room for improvement in facilitating starting a business, trading, easing tax payment, and property registration.



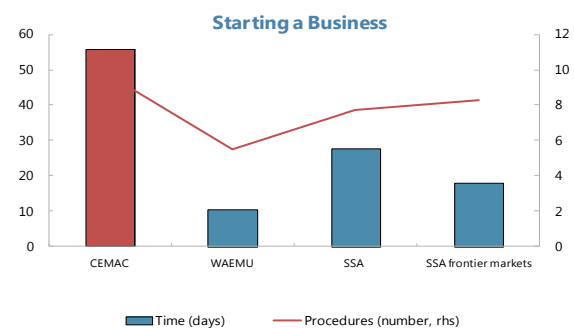
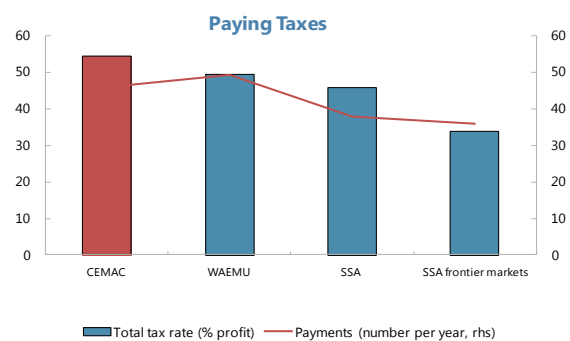
Trading across borders is an area of particular weakness...

... with the longest average waiting times for exports and imports.



Registering property is a costly and lengthy process.

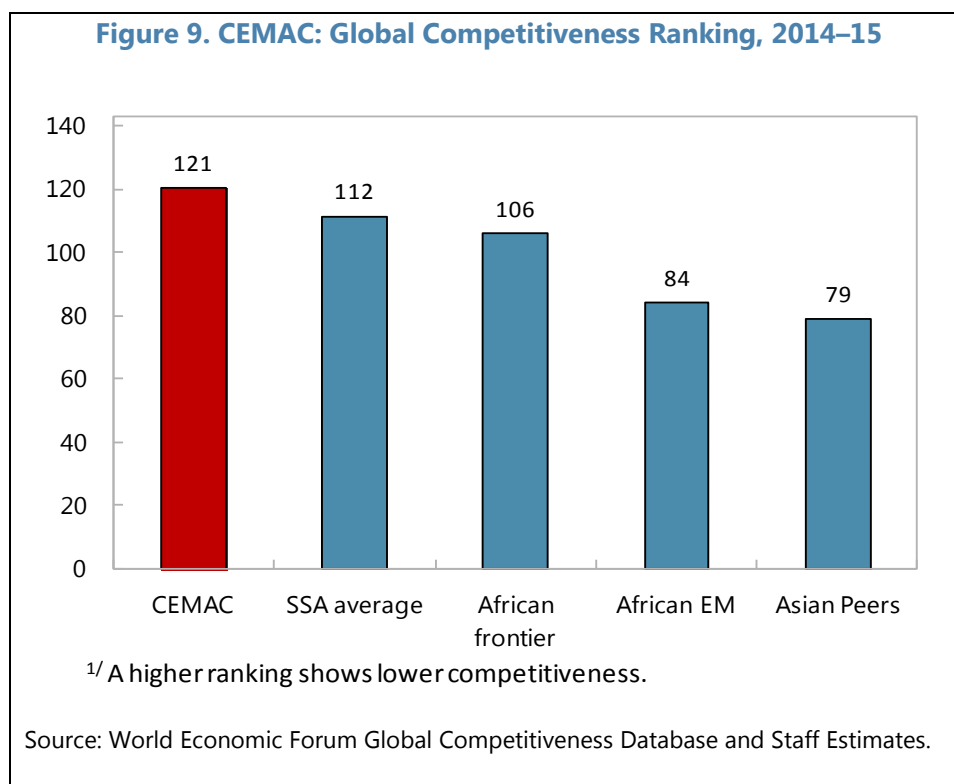
Starting a business is also lengthy and cumbersome.



Source: World Bank Doing Business Indicators Database.

E. CEMAC's Competitiveness Challenge

13. CEMAC's limited progress in business climate reforms most likely had an impact on its overall competitiveness. As mentioned in previous sections, several studies have identified the relationship between the business climate and productivity. Moreover, the World Economic Forum has developed a competitiveness index closely related to country productivity.⁶ The 2014-15 World Economic Forum (WEF) Global Competitiveness Index (GCI) ranks three CEMAC members (Cameroon, Chad, Gabon) respectively 115, 142, and 105 of 143 countries. The CEMAC average rank would be 121 of 143 countries. Figure 9 shows that the region has the lowest competitiveness ranking of all our benchmark groups.



⁶ The World Economic Forum's Global Competitiveness Report empirically tests the validity of its Global Competitiveness Index and tests its relationship with country productivity (WEF, 2015 b).

14. The WEF classification suggests that if CEMAC is to reach higher levels of growth, it must increase productivity while ensuring sufficient physical factor accumulation. Based on the WEF's categorization of economic development,⁷ assimilating the average of Cameroon, Chad, and Gabon to a synthetic CEMAC country, this latter would probably be considered a "transition economy." Hence, the region should be moving from the less developed economic structure (Stage 1 economies in WEF's classification) to emerging or frontier status (Stage 2 economies). For the WEF, this means that "basic competitiveness requirements"⁸ account at least for 50 percent of the assessment of CEMAC's overall competitiveness. To move from Stage 1 to Stage 2, the basic requirements need to be met, such as the level of infrastructure or the quality of institutions must be able to support productivity gains. This demands structural reforms in the efficiency of tax administration, investment, education, and enhanced competition in domestic markets.

15. Figure 10 shows that CEMAC has significant room to improve its competitiveness. CEMAC ranks low with respect to comparator groups on basic requirements (institutions, infrastructure, education, and training) and on efficiency enhancers (efficiency of the goods market and financial market development). The difference is especially striking with respect to African FEs, where CEMAC is at the bottom of most of these key competitiveness factors. CEMAC only performs well in terms of the macroeconomic environment because of its relatively low inflation performance.

16. In addition to the WEF, other indicators indicate CEMAC's relatively weak competitiveness. Figure 11 presents the evolution of CEMAC's real effective exchange rate (REER), and non-oil exports between 1995 and 2013 compared to the average of African FEs. It shows a fall in non-oil CEMAC exports, which was coupled with an appreciation of the REER. Conversely, the average of the African FEs has a significant increase in (non-oil) exports despite an appreciation of the REER similar to that of CEMAC. Therefore, even if the appreciation of the REER in CEMAC was partly due to economic fundamentals, deeper structural reforms could have supported greater productivity gains and the diversification of regional export sectors.⁹

⁷ The WEF considers three levels of economic development: Stage 1 (low income, factor-driven economy) whose competitiveness relies on basic economic requirements such as institutions, infrastructures, macroeconomic environment, health and primary education. Stage 2 (middle income, efficiency-driven economies) where efficiency enhancing issues related to a more advanced economic structure, such as higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, and market size. Stage 3 (advanced economies or innovation-driven economies), where basic requirements and efficiency issues are less relevant, but the level of innovation and business sophistication are essential for competitiveness. In addition to the three stages of economic development, the WEF classifies certain countries as transitioning from one stage to the next. For example, most oil producers in developing countries are considered in transition from Stage 1 to Stage 2 at different speed levels (see WEB, 2015).

⁸ The GCI assesses competitiveness based on twelve pillars grouped in three main categories: (1) *basic requirements* (which include four pillars: institutions, infrastructures, macroeconomic environment, and health and primary education); (2) *efficiency enhancers* (which include six pillars: higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, and market size); and (3) *innovation and sophistication factors* (which include two pillars: business sophistication and innovation).

⁹ See Chapter 4 of the IMF's WEO (April 2013) "Breaking Through The Frontier: Can Today's Dynamic Low-Income Countries Make It?"; and Mengistae and Pattillo (2004).

Figure 10. CEMAC: Global Competitiveness Index, 2014–15

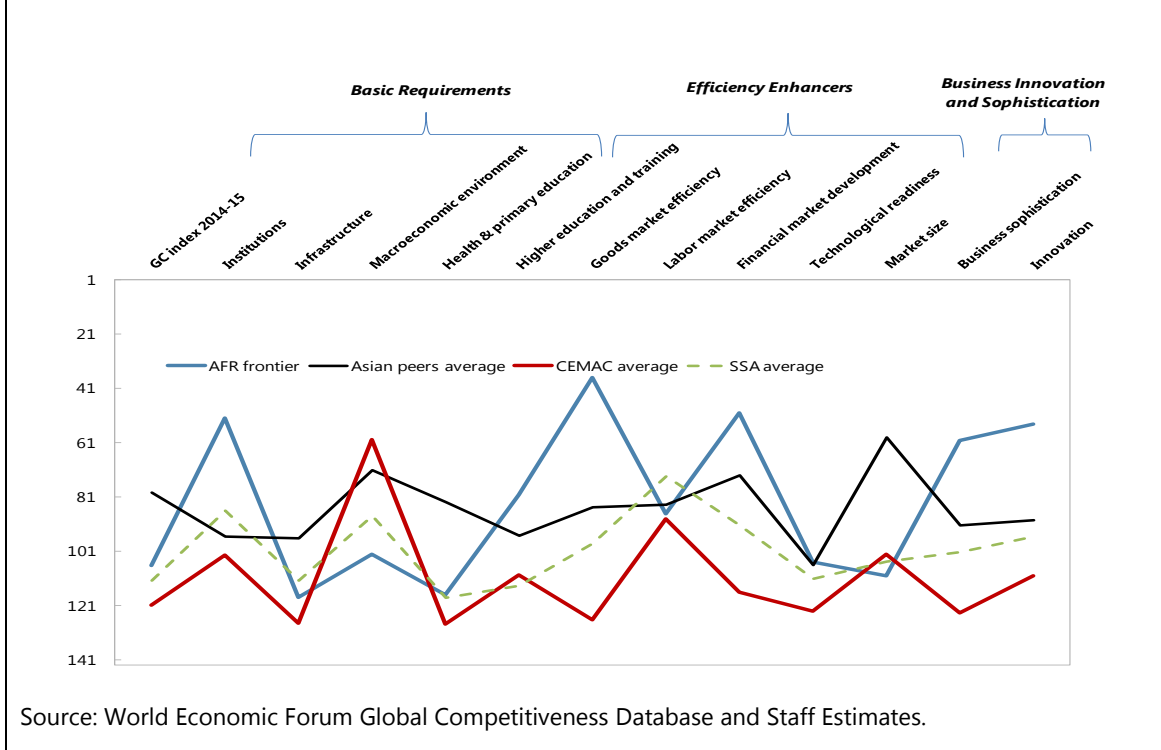
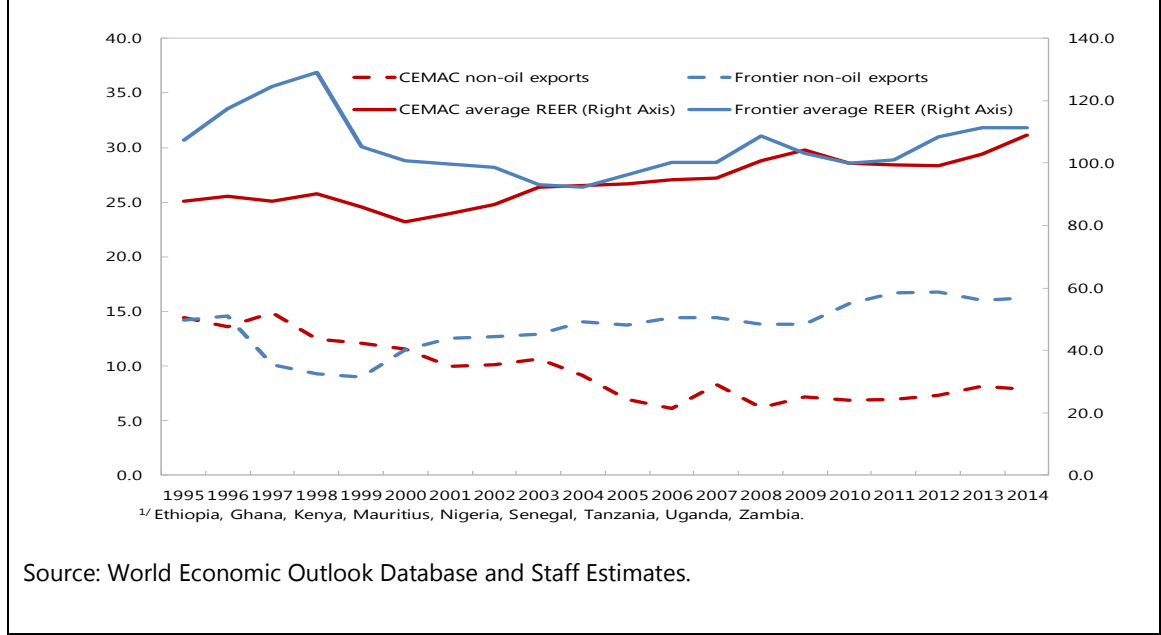


Figure 11. CEMAC: Non-oil Exports and Exchange Rates, 1995–2013
(2010=100)



F. Conclusion

- 17. In spite of benefiting from oil wealth in the last two decades, CEMAC's growth was slower than the SSA average.** Moreover, if we exclude Equatorial Guinea whose growth path is linked to its recent—and very large—oil boom, CEMAC's growth is notably slower than that of African FEs and Asian peers.
- 18. Looking at growth factors, the main explanatory factor is the negative contribution of TFP to CEMAC's growth.** Policies to reduce the productivity gap with African FEs could yield up to 2.5 percentage points of additional annual growth.
- 19. To reduce the productivity gap, CEMAC should address its challenging business climate and weak governance.** Important reform gains would be obtained by focusing on (i) facilitating trade across borders; and (ii) simplifying tax payments.
- 20. CEMAC's limited progress in business climate reforms probably had an impact on its overall competitiveness.** The long-term objective should be more ambitious reforms to resume the convergence trend with leading comparator economies to improve standards of living, ensure the structural transformation of the region, and facilitate the reduction of oil dependency.

Annex 1. CEMAC: Differences in Growth and Factor Decomposition, 1991–2012

(Average annual variation in percent)

	GDP growth	PPP GDP per capita	Physical Capital	Labor	TFP
CEMAC – SSA countries					
1991-2012	-1.1	-1.4	-0.6	0.0	-0.5
1991-2000	-1.3	-0.9	-0.2	0.0	-1.0
2001-2012	-0.7	1.1	-0.7	0.0	-0.1
CEMAC – African EMs					
1991-2012	-1.2	0.0	-1.1	0.3	-0.3
1991-2000	-2.8	-0.4	-2.1	-0.2	-0.5
2001-2012	0.2	0.3	-0.4	0.6	-0.1
CEMAC – African FEs					
1991-2012	-2.3	-1.4	0.1	0.1	-2.5
1991-2000	-2.1	-0.3	0.3	0.0	-2.3
2001-2012	-2.4	-2.3	0.1	0.2	-2.7
CEMAC – Asian peers					
1991-2012	-2.5	-3.3	-1.7	0.3	-1.0
1991-2000	-3.7	-4.0	-2.6	0.1	-1.4
2001-2012	-1.4	-2.8	-1.1	0.4	-1.0

Source: IMF staff estimates.

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CEMAC: MACROFINANCIAL LINKAGES AND THE EFFECTIVENESS OF MONETARY POLICY¹

The oil price slump of 2014/15 has important implications for macroeconomic policy in the Monetary and Economic Community of Central Arica (CEMAC), in particular with regard to the external balances and the conduct of monetary policy. In the present conjuncture, declining external reserves and lower domestic liquidity provides an opportunity to strengthen liquidity management to enhance monetary policy transmission. Because of CEMAC's fixed exchange rate regime, domestic liquidity management, in addition to its impact on monetary transmission, plays an important role in maintaining external reserves at levels consistent with the sustainability of the exchange rate peg. The purpose of this paper is to assess the effectiveness of monetary policy transmission in CEMAC using vector autoregression models (VARs). Results show that, in line with internal studies undertaken by the BEAC, the interest rate channel of monetary transmission is ineffective. Conversely, the expansion of the monetary base affects inflation.

A. Monetary Policy Transmission Mechanisms

1. The link between monetary policy and interest rates in the economy is complex and depends on the financial characteristics of each economy. Although long-term interest rates are generally viewed as having more of an impact on economic decision making, monetary authorities are generally more successful in influencing short-term rates than in driving long-term rates. Short-term money-market rates are mainly influenced by central banks' monetary policy actions, notably liquidity management operations. However, the effectiveness of such policy actions can be limited when the central bank operates in a context of a structural surplus of liquidity that, for a number of reasons, it is not able or willing to sterilize. This is particularly true in CEMAC. High petroleum revenues since 2005 have led to a large accumulation of the central bank's (BEAC) net foreign assets and to a massive injection of liquidity into the domestic financial market that the BEAC did not sterilize, leading to sizeable amounts of excess reserves in the banking sector (Figure1).

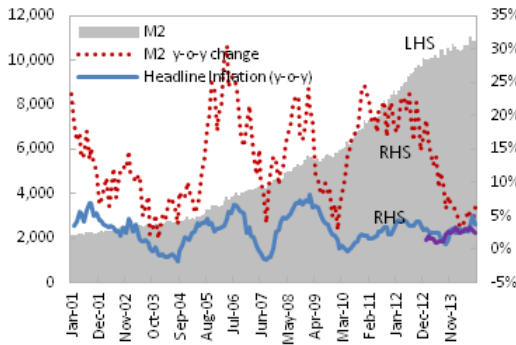
2. Excess liquidity has stymied the emergence of an interbank market, hence depriving BEAC of an effective vehicle for its market-based liquidity management operations. The result is the central bank's inability to influence short-term rates. The combination of weak liquidity management (leading to large excess reserves) and underdeveloped government securities markets has resulted in an impaired monetary transmission mechanism through the interest rate channel, and in particular the inability of monetary policy impulses to be transmitted to commercial bank rates through the yield curve. Furthermore, the persistent excess liquidity in the banking system acts as an implicit tax on financial intermediation and hinders financial deepening.

¹ Prepared by Mariam El Hamiani Khatat. The author would like to thank BEAC's staff for the quality of the discussions on monetary transmission in CEMAC and for sharing related forthcoming working papers.

Figure 1. CEMAC: Monetary Developments and BEAC Balance Sheet, 2000–14
(Billions of CFA francs)

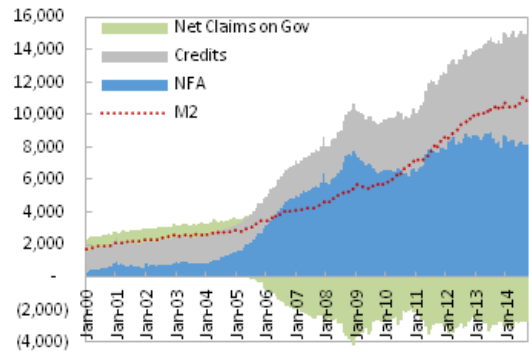
Since 2004, inflation has been contained, but money growth has been rapid...

Money, Inflation, and Core Inflation



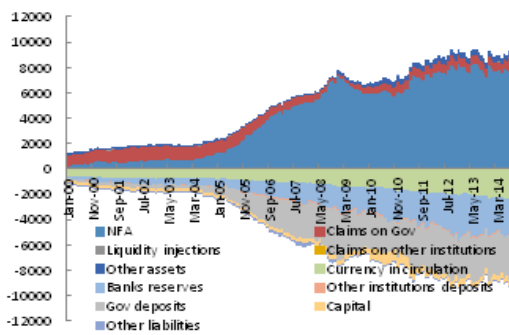
...mainly driven by foreign reserves developments.

Money and its Counterparts



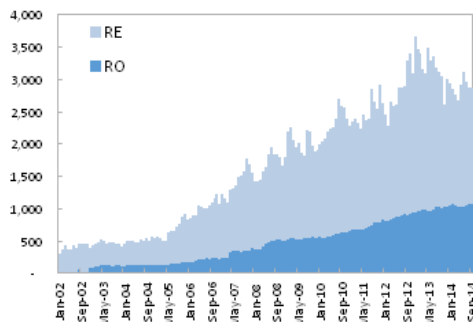
The size of BEAC's balance sheet has almost quadrupled...

BEAC Balance Sheet



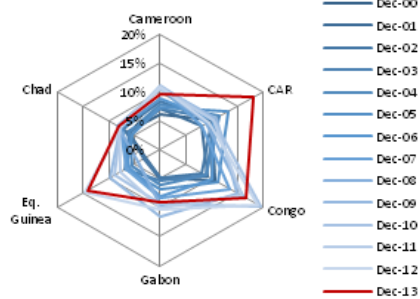
Because foreign reserves are the main drivers of the monetary base...

Required Reserves and Excess Reserves



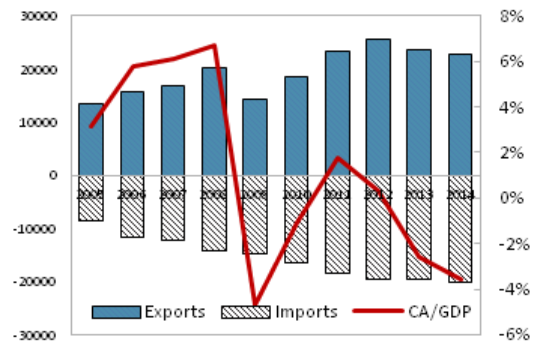
...and monetary expansion has been recently mainly driven by three countries.

Monetary Base - in percent of GDP



...the latter is expected to shrink if the current account shock persists.

Current Account Developments



3. In fixed exchange rate regimes, central banks' ability to conduct monetary policy is constrained. Central banks' scope for policy action may also be constrained by capital flows responding to interest rate differentials, although in CEMAC, this has been less evident. Against this backdrop, and to support the exchange rate peg, BEAC has to take into consideration the need to maintain an adequate level of international reserves, which in turn has implications for the stance of monetary policy.

B. Foreign Reserves and Monetary Base Developments

4. CEMAC's economy is vulnerable to exogenous shocks and its banking system to liquidity shocks. Oil proceeds represent a significant part of governments' revenues, which in turn significantly impact systemic liquidity. In the absence of appropriate sterilization mechanisms and unwillingness of banks to participate in interbank operations because of credit risk consideration, banks end up holding large excess reserves and the allocation among banks may not be optimal. In this environment, exogenous adverse shocks may have an impact on systemic liquidity by draining liquidity out of the system, thus exposing weaker banks to possible liquidity crunches in the absence of an effective interbank market.

5. As with previous shocks, the 2014/15 oil price slump has had a significant impact on CEMAC's external position. Before 2009, positive current account surpluses led to a significant expansion in BEAC's balance sheet and a concomitant increase in systemic liquidity, stemming from unsterilized government expenditures in local currency, originating from natural resource revenues in foreign currency. CEMAC experienced current account reversals in 2009 and in 2012, which appear to be lasting in the context of low oil prices. In 2015, CEMAC's current account deficit is expected to widen to 5.8 percent of GDP. The decline in external reserves is likely to lead to a contraction in the monetary base.²

6. Although BEAC's liquidity injections remain relatively small compared to the size of its balance sheet, banks' reserves have increased significantly since 2004. Between January 2004 and September 2014, high oil prices resulted in large government revenues, which resulted in a four-fold increase in BEAC's balance sheet and a significant increase in liquidity. However, the recent oil slump has not had yet the opposite effect. Although adverse current account developments have led to a decline in excess reserves, the banking system remained overly liquid in September 2014, when excess reserves represented 211 percent of reserve requirements. This situation is mainly explained by autonomous factor trends, in particular government expenditures originating from revenues in foreign exchange and the modest volume of BEAC's monetary operations.

7. Although excess liquidity has not affected price stability, it constrains financial market development and the effectiveness of market-based monetary policy instruments. In the recent period, inflation has hovered around the 3 percent regional convergence criterion, despite a significant monetary expansion (close to 15 percent a year on average in 2004–13) and unsterilized excess

² The monetary base is defined as currency in circulation and financial institutions' deposits at the BEAC.

liquidity. This is attributable to the exchange rate peg to a low-inflation zone, combined with administered prices for social goods and energy products.

C. Monetary Base and Transmission

8. We assess the effect of a monetary base expansion on prices by estimating two VAR models. The first model assesses the effect of a change in BEAC's main policy rate on inflation, and the second, the impact of a quantitative monetary policy shock on inflation. Because of the unavailability of quarterly GDP data, credit is used as an indicator of economic activity, even if it is more volatile than GDP and is not stationary. To address the non-stationarity issue, a Hodrick-Prescott filter is used.

- **The first VAR model's results show no statistically significant impact of BEAC's main policy rate on inflation.** The variables considered in the first model are the "TIAO;"³ the cyclical component of the year-on-year change in credit to the economy (HPCYCLECREDITPC); and year-on-year inflation (INFLATION). The main variable to shock is the TIAO. The model is estimated for the period 2001Q2–2014Q3. It is identified according to the following order of variables: TIAO, HPCYCLECREDITPC, and INFLATION. The impulse response functions show that the impact of the TIAO is only significant at a 10 percent confidence level. When adding oil prices⁴ and the dollar/euro exchange rate⁵ as independent variables to the model to control for their effects, the TIAO's impact on inflation remains statistically insignificant (Figure 2).
- **The second VAR model's results show that a monetary base expansion impacts inflation.** The variables considered in the model are the year-on-year change in the monetary base (M0PC); the cyclical component of the year-on-year change in credit to the economy (HPCYCLECREDITPC); and year-on-year inflation (INFLATION). The main variable to shock is M0PC. The model is estimated for the period 2001Q2–2014Q3. It is identified according to the following variables order: M0PC, HPCYCLECREDITPC, and INFLATION. The impulse response functions show that inflation increases by about 1 percent after four quarters following an 8 percent shock on the monetary base. The effect of the monetary base shock is persistent and statistically significant at the 5 percent confidence level (Figure 3).

9. Recent research undertaken by BEAC confirms weak monetary policy transmission through the interest rate channel.⁶ In a forthcoming working paper analyzing the effects of monetary policy on economic activity and inflation, BEAC authors estimate three structural VAR models for each CEMAC country. With the first model, they find that the interest rate transmission is weak. The

³ TIAO: « Taux d'intérêt des appels d'offres à 7 jours » is the BEAC's main policy rate, that is the rate of its seven-day auctions offered to banks.

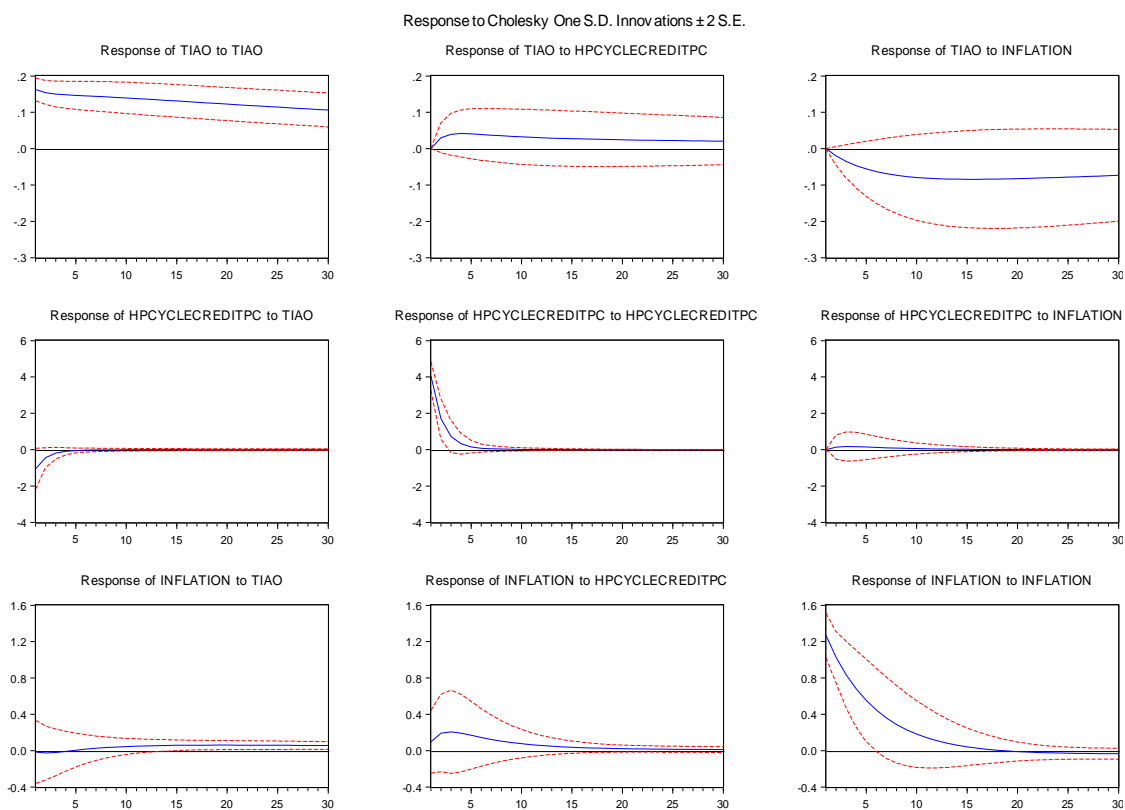
⁴ For oil prices, we use the percentage change of the simple average of three crude oil spot prices (Dated Brent, West Texas Intermediate, Dubai Fateh) computed in U.S. dollars per barrel, taken from the IMF's World Economic Outlook (WEO) database.

⁵ U.S. dollars per euro, period average, WEO database.

⁶ Jacques Landry Bikai and Guy Alberty Kenkouo (forthcoming).

transmission mechanism is barely existent in the Central African Republic, Chad, Gabon, and Equatorial Guinea. In Cameroon, a shock to the TIAO has a statistically significant, but an overall weak effect on economic activity that lasts for four quarters; however, the shock has no effect on prices. With the second model, the authors find that a positive shock to the monetary base has a positive effect on growth that lasts for five quarters. Using a panel VAR model, the authors further confirm the weakness of the transmission mechanisms in CEMAC—shocks to the TIAO and to money supply have no significant effect on activity and prices.

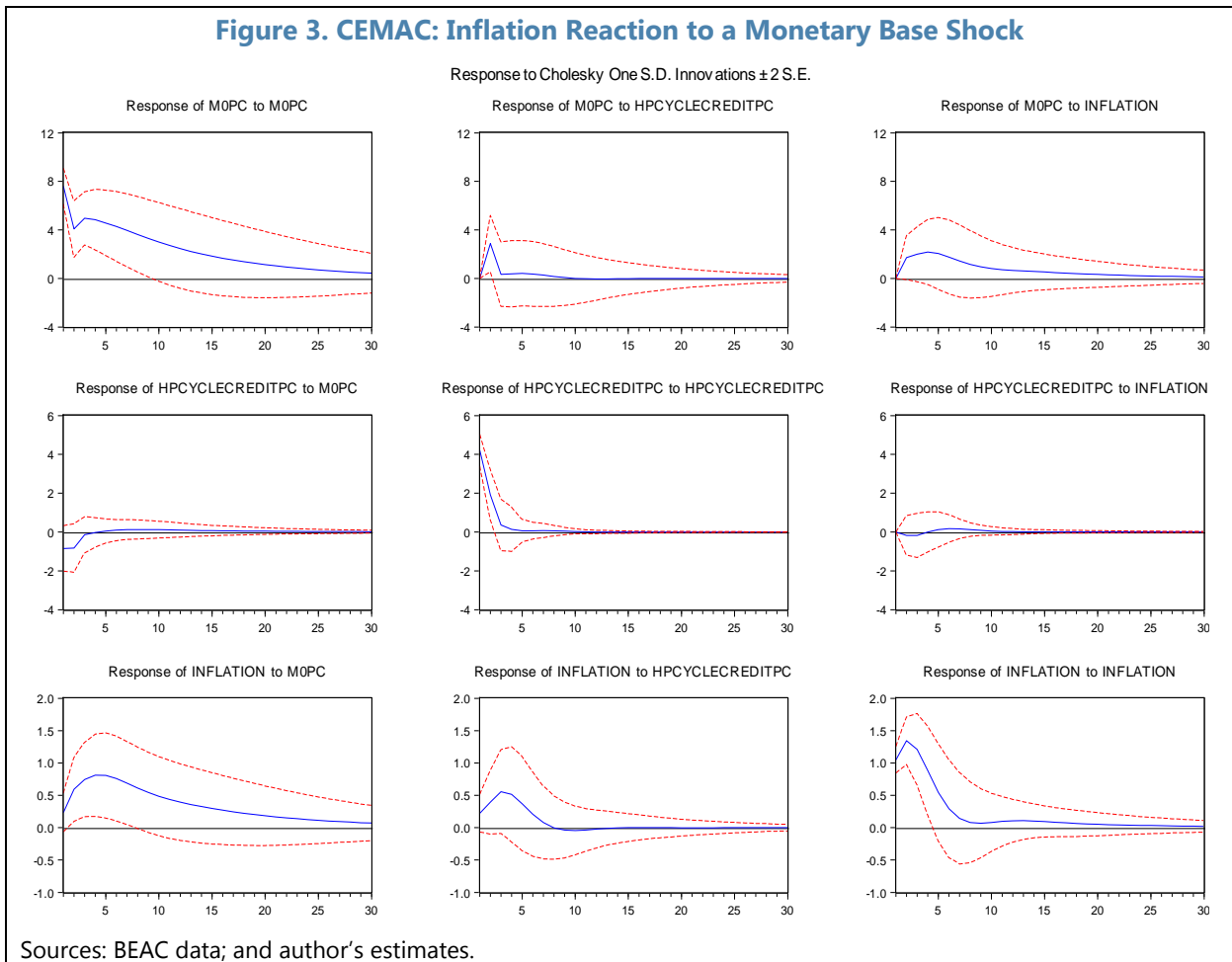
Figure 2. CEMAC: Inflation Reaction to a Policy Rate Shock



Sources: BEAC data; and author's estimates.

D. Conclusion

10. This paper finds that changes in the BEAC’s policy rate have no impact on prices but changes in the monetary base do affect inflation. Therefore, with falling oil prices, a policy-induced expansion in the monetary base would lead to higher inflation and a real exchange appreciation. Since the exchange rate cannot adjust, it could also lead to higher import volumes, a worsening of the current account balance, and falling reserves, which over time could reduce excess liquidity. This new policy context provides an opportunity for the BEAC to undertake a monetary framework reform to boost the effectiveness of its monetary policy instruments.



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CEMAC: FINANCIAL INCLUSION, GROWTH, AND INEQUALITY¹

Small and medium-size enterprises (SMEs) are typically engines of growth and employment creation. To expand, they need financing. A cross-country survey of enterprises indicates that fewer SMEs in the Central African Economic and Monetary Community (CEMAC) have access to bank credit than in other emerging and developing countries. Collateral requirements for firms to obtain loans in CEMAC are nearly 18 percent higher than in the rest of sub-Saharan Africa (SSA). Similarly, bank intermediation costs are high in CEMAC. The lack of credit registries is one of the contributing factors. Policies aimed at lowering collateral requirements, reducing firms' participation costs, and lowering intermediation costs could increase firms' access to credit and would significantly boost their activity. Lower collateral requirements and intermediation costs would mainly benefit firms that are already in the financial system (the "haves"). Lower participation costs would benefit all firms (including the "have-nots"). In addition, the additional economic growth resulting from greater financial inclusion would expand the tax base. This could support higher pro-poor and pro-growth government spending.

A. Background

1. Access to financial services is a key driver of sustained growth and poverty reduction.

In low- and middle-income countries, shallow financial systems hold back growth. Companies and households need bank accounts to conduct basic financial transactions and to build precautionary savings. They also need access to credit on reasonable terms to operate and expand. Firms, particularly SMEs, are typically engines of growth and employment creation. They employ a large share of the workers in developing countries (Ayyagari, Demirgüç-Kunt, and Maksimovic, 2011). Moreover, there is a relationship between financial inclusion and inequality, as significant parts of the population tend to have fewer economic opportunities owing to restricted access to financial services.

2. Financial sector development and inclusion is lagging in CEMAC. Drawing on responses to a cross-country World Bank survey of enterprises,² Figures 1 and 2 compare a range of financial access indicators for firms in the CEMAC to those of firms in regional and global peer countries. The data show that CEMAC countries, on average, are characterized by:

- The highest loan collateral requirements compared to peers. This reflects banks' uncertainty about loan repayments and enforcement of contracts and imposes an important borrowing constraint on firms.

¹ Prepared by Adrian Alter, Dalia Hakura, and Cameron McLoughlin, with support from Azanaw Mengistu.

² Enterprise Surveys (<http://www.enterprisesurveys.org>), World Bank Group.

- A relatively high interest rate spread (the difference between lending and deposit rates) reflecting insufficient information about borrowers.
- The lowest proportion of firms with access to credit, with CEMAC countries underperforming considerably relative to peers in Sub-Saharan Africa and other emerging and developing countries.
- Particularly low access to credit by small and medium enterprises (SMEs) in the CEMAC region relative to similarly sized firms in other emerging and developing countries.

3. Access to lines of credit in CEMAC is limited and the banking sector's contribution to firms' investment appears limited (Figure 2). Enterprise surveys indicate that although 90 percent of firms possess a bank account, only 20 percent of them access a loan or line of credit on average in CEMAC, well below the average (34.7 percent) of emerging and developing economies. Nearly 70 percent of loans in CEMAC require a collateral. In addition, the value of the collateral, on average, significantly exceeds the value of the loan, pointing at problems with the liquidation of collaterals.

4. CEMAC also provides limited access to financial services (Figure 3). A cross-country survey³ of adult saving, borrowing, and payment behavior indicates that access to bank branches and automatic teller machines in CEMAC is restricted, as compared to the average in SSA and elsewhere. Moreover, the banking system in CEMAC remains underdeveloped with relatively low deposit-to-GDP and loan-to-GDP ratios, as well as smaller numbers of depositors and borrowers. This relatively low utilization of financial services in CEMAC is prevalent across all age groups (Figure 4).⁴

5. Low levels of financial access and the lack of development of the financial system in CEMAC are reflected in the main deposits and payment methods used in the region (Figure 5). As the number of bank branches is low, bank account holders in CEMAC tend to use bank agents (rather than tellers) more frequently to make deposits. The limited use of more advanced payment methods (checks, electronic payments, credit/debit cards) in CEMAC also illustrates the underdevelopment of the financial system.

6. Although the ability to save in CEMAC is on par with the SSA average, the use of loans for everyday needs is widespread and points to substantial unmet demand for bank financing (Figure 6). The CEMAC-wide average of survey respondents who indicated they were able to save in the past year is comparable to that of SSA. Yet, the use of loans to pay for health bills, educational fees, or emergencies is on average more prevalent in CEMAC than in comparator countries.

³ Financial Access Survey, IMF.

⁴ Global Financial Inclusion (Global Findex) Database, World Bank Group.

B. Constraints on Financial Inclusion

7. A micro-founded general equilibrium model developed by Dabla-Norris et al. (2015) is used to examine the most binding financial constraints on growth, productivity, and inequality in CEMAC countries (Box 1). The model is calibrated to capture the specific features of firms in CEMAC. These calibrations reflect CEMAC-specific data for 2009 on the fraction of firms with credit, the economy-wide nonperforming loan (NPL) ratio, and the spread between deposit and lending rates.⁵ The findings of the analysis can help to guide between different financial sector policies in order to achieve desirable goals. The results for CEMAC are compared with the results from the model, calibrated to six other developing countries, comprising three low-income countries and three emerging ones.

Overview of Data (2009)

Target moments:	
Savings (percent of GDP)	29.7
Collateral (percent of loan value)	157
Firms with Credit (percent of total)	19.7
Non - Performing Loans (percent of loans)	8.1
Interest Rate spread (percentage points)	11.8

Sources: Enterprise Surveys; World Bank and IMF Staff calculations.

8. The relaxation of the constraints on different aspects of financial inclusion is found to have beneficial effects on growth, productivity, and inequality. Based on the above model calibration, the effects of relaxing individually each of the three constraints (on financial participation, capacity to lend, bank efficiency—Box 1) are assessed on GDP, productivity, interest rate spreads, income inequality, percent of firms with credit, and the NPL ratio, respectively. These results for CEMAC are compared against those obtained for other countries in Table 1.

Table 1. CEMAC: Gains from Relaxing Constraints on Financial Inclusion

	Participation Cost ψ			Borrowing Constraint λ			Intermediation Cost χ		
	GDP (% change)	Total Factor Productivity (% change)	Gini (Change)	GDP (% change)	Total Factor Productivity (% change)	Gini (Change)	GDP (% change)	Total Factor Productivity (% change)	Gini (Change)
CEMAC	4.81	4.35	-0.0256	14.89	22.34	0.0038	2.72	1.55	0.0087
Uganda	5.79	5.76	-0.0210	18.05	11.01	-0.0029	0.69	0.33	0.0014
Kenya	5.76	7.99	-0.0324	13.02	9.39	-0.0155	1.17	0.36	0.0065
Mozambique	12.73	11.53	-0.0292	10.4	4.97	0.0206	0.62	0.25	0.0023
Malaysia	8.74	10.69	-0.0713	4.51	2.97	0.0060	0.86	0.23	0.0007
Philippines	2.69	3.52	-0.0170	21.17	16.38	-0.0337	0.92	0.38	0.0023
Egypt	6.81	11.8	-0.0630	7.9	6.66	0.0031	0.42	0.19	0.0021

Sources: Dabla-Norris et.al. 2015 and IMF Staff calculations

⁵ The performance of CEMAC against its peers along many of these dimensions has been outlined above.

Box 1. CEMAC: Assessing Constraints on Financial Inclusion

The model of Dabla-Norris et al. (2015) permits the examination of the different constraints on financial inclusion and the general equilibrium effects of relaxing these constraints on growth, productivity, and inequality.

In the model, agents differ from each other in wealth and talent and can choose to become entrepreneurs or supply laborers for wages. Workers are paid the equilibrium wage, while entrepreneurs have access to a technology that uses capital and labor for production. In equilibrium, only talented individuals with a certain level of wealth choose to be entrepreneurs, while less talented individuals or those who are wealth-constrained choose to be workers.

Agents also face financial frictions across three dimensions:

- **Participation costs** (ψ) which limit access to credit, in particular for smaller and poorer entrepreneurs. This relates to factors, such as physical distance to banks or automated teller machines (ATMs), the documentation required for opening or maintaining an account, or applying for a loan, and the use of electronic payments and new technologies that influence the cost to firms of participating in the financial system.
- **Intermediation costs** (χ) and inefficiencies due to asymmetric information between banks and borrowers, which result in growing deposit-lending spreads, as banks have to monitor their clients. Also, limited bank competition can increase inefficiencies and raise intermediation costs.
- Imperfect enforceability of contracts which result in high **collateral requirements** and thus smaller collateral leverage ratios (λ).

In the model, increasing financial inclusion impacts growth and inequality through two different channels. Firstly, it tends to increase the optimal level of capital among entrepreneurs already participating in the market. Secondly, the relaxation of financial constraints permits new entrepreneurs to access the market. Both of these channels tend to increase GDP. However, the first channel tends to increase inequality, while increasing access to credit markets tends to reduce inequality, as more businesses are able to access credit. The extent to which each of these constraints on financial inclusion is binding depends on country-specific characteristics. The relaxation of each constraint has important effects on GDP, productivity, inequality, and financial stability.

Moreover, each of these constraints on financial inclusion may be associated with different aspects of the policy environment. High collateral requirements often result from poor legal, regulatory, and institutional frameworks that fail to adequately protect property and creditor rights and hence discourage lending. Elevated participation costs tend to reflect poor rates of access to banking and financial services. High intermediation costs often stem from a lack of public information on borrowers, for example through credit bureaus or credit registries. The model therefore permits quantification of policy options for improving the different aspects of financial inclusion and illustrates the tradeoffs associated with different financial sector policies.

9. Increasing financial access by lowering participation costs could increase the fraction of firms with access to credit substantially.

Lower credit participation costs increase investment by enabling more firms to have access to credit, and more capital to be invested in production. Moreover, fewer funds would be wasted in unproductive contract negotiations freeing up more capital for investment. Total factor productivity (TFP) also increases as capital is more efficiently allocated among entrepreneurs. In this case, income inequality decreases, as lower participation costs disproportionately benefit constrained workers and entrepreneurs who hitherto did not have access to credit. It allows them to invest capital into production thereby reducing income inequality.

10. Lowering collateral constraints is the most effective method to increase output, a result which is similar to results obtained for other SSA countries, such as Uganda and Kenya.

In particular, by lowering the collateral requirements for bank lending, firms can borrow and invest more easily, which in turn increases output and productivity, as firms can operate at a larger scale. Addressing borrowing constraints would mainly allow firms that are already in the financial system and that have relatively higher income to borrow more. New small firms would continue to find it difficult to acquire credit. As a consequence, the relaxation of credit constraints may lead to a marginal increase in inequality. However, to the extent that banking supervision is weak and commercial courts work slowly and unpredictably, the relaxation of credit constraints and the resulting increased bank lending could lead to an increase in NPLs. Therefore, there is a tradeoff between growth and financial stability that needs to be carefully managed.

11. Reducing intermediation costs could have a stronger effect on GDP and productivity in CEMAC countries than in other low-income and emerging countries.

Lowering intermediation costs has a smaller effect on GDP and productivity than relaxing collateral constraints and lowering participation costs. Interest rate spreads follow an inverted V curve, as two opposing forces are in play. The decline in the cost of borrowing induces entrepreneurs to increase bank borrowing. This tends to push up the share of NPLs and thereby increases the interest rate spread. At the same time, provided there is adequate competition in the banking system, lower intermediation costs decrease the interest rate spread by definition. Inequality would tend to increase as more efficient intermediation would disproportionately benefit firms, which have borrowed more.

12. The expected paths of growth, productivity and inequality that arise from enhanced financial inclusion differ by the type of financial constraint.

Starting from the initial position of CEMAC (bold diamond in Figures 7–9; it moves to the right along the curve, as the constraint is relaxed), lowering participation and collateral constraints would induce steady increases in GDP, TFP, and the percent of firms with credit. The expected paths of inequality are however more varied. In CEMAC, a reduction in participation costs is disproportionately more beneficial for constrained workers and entrepreneurs without access to credit, which enables relatively poorer agents to earn a higher income, driving down the Gini coefficient. Relaxation of collateral constraints tends however to slightly increase inequality, as talented entrepreneurs can take more leverage and increase their profits. Increasing intermediation efficiency disproportionately benefits highly leverage firms, which already have higher income than workers, thus slightly increasing inequality.

C. Policy Implications

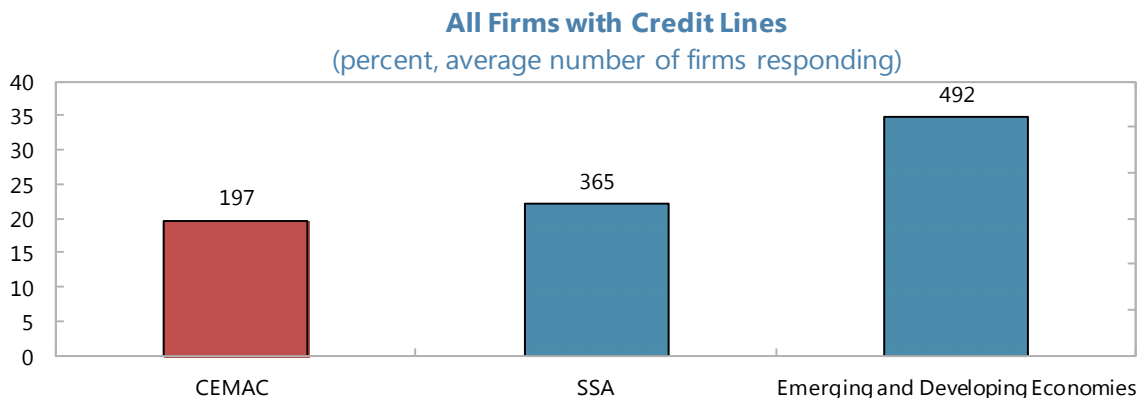
13. The governments of CEMAC countries can play an important role in raising output and efficiency gains by relaxing financial frictions. The biggest gains for growth and productivity would come from relaxing borrowing constraints. Concretely, this could involve strengthening the protection of creditors' rights, regulating the conduct of banks, and putting in place recourse mechanisms to protect borrowers. Firms would benefit from a stronger legal and regulatory framework for banks and the private sector.

14. Reducing the cost of participating in the financial sector is also important for harnessing growth and productivity gains. This could be achieved, for example, through reducing transactions costs and documentation requirements, increasing bank competition, and increasing bank penetration and the offering of low-fee bank accounts. Enhancing information sharing can also be expected to provide important benefits. In this regard, the government and the monetary authorities (BEAC and COBAC) can set standards for disclosure and transparency, promote credit-information-sharing systems and collateral registries, and educate and protect consumers.

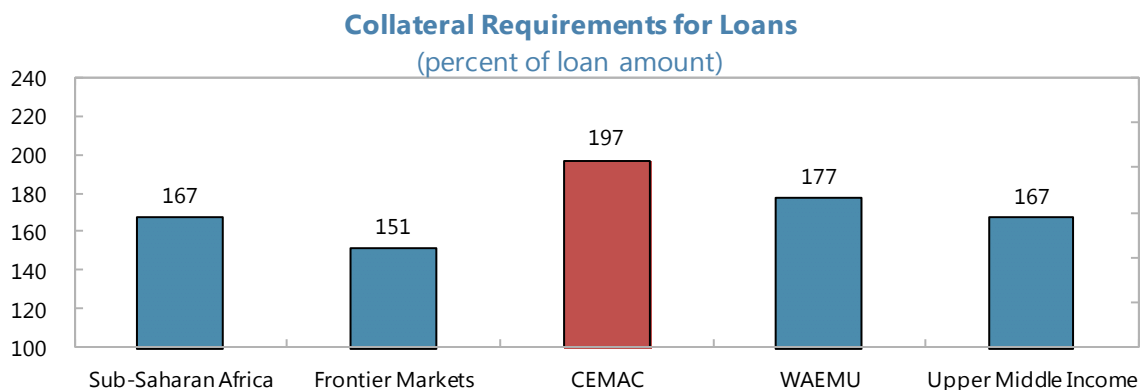
15. Increased inequality could be addressed through government redistribution. Lowered borrowing constraints and increased financial intermediation efficiency could lead to greater inequality, as firms, which are already in the financial system, would initially likely benefit the most. However, the resulting additional economic growth expands the tax base thereby providing an opportunity for the government to raise more revenue. These funds could be used to support higher pro-poor and pro-growth government spending. Provided this is supported by ongoing reforms to increase the quality of government spending, this could put the economy on a virtuous trajectory with higher and more-equitable growth.

16. The monetary authorities can also play an important role in supporting financial inclusion. Mechanisms can be set up to monitor financial inclusion to support actions taken at the national level. Financial supervision should be strengthened in tandem with deepening financial inclusion to promote benefits and manage the associated financial stability risks. Indeed, the increased bank lending associated with the relaxation of credit constraints could lead to an increase in NPLs to the extent that banking supervision is weak and commercial courts work slowly and unpredictably.

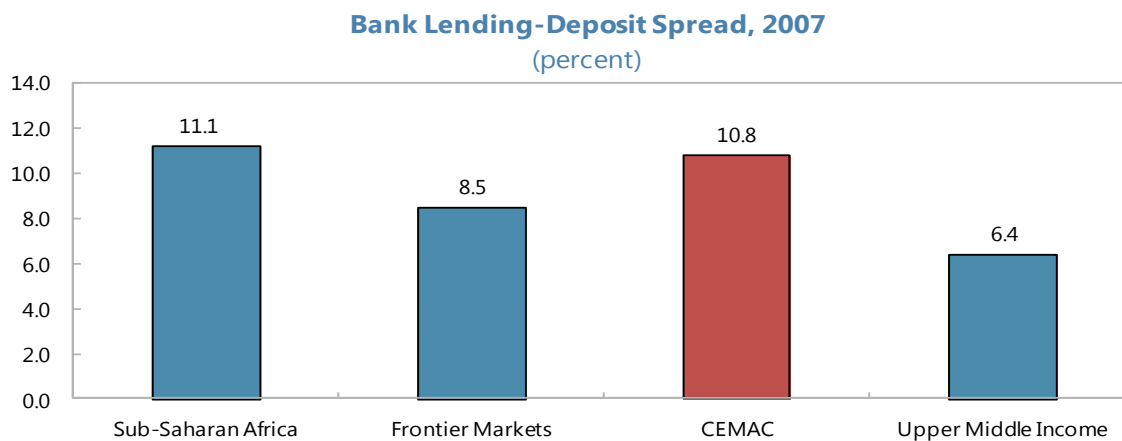
Figure 1. CEMAC: Benchmarking Financial Inclusion, 2005–11



Note: For Republic of Congo, the data is as of 2009. For the remaining countries, we take the latest available data from Enterprise Surveys.

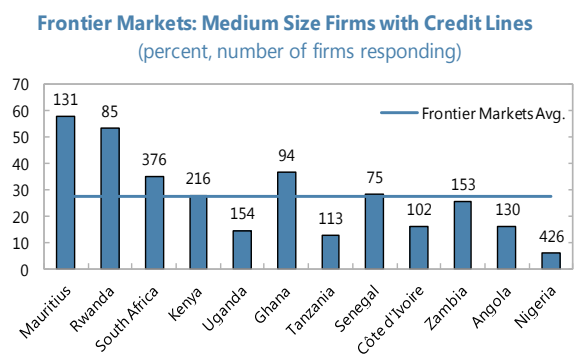
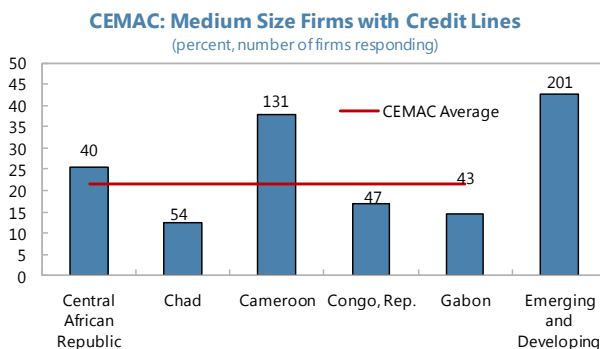
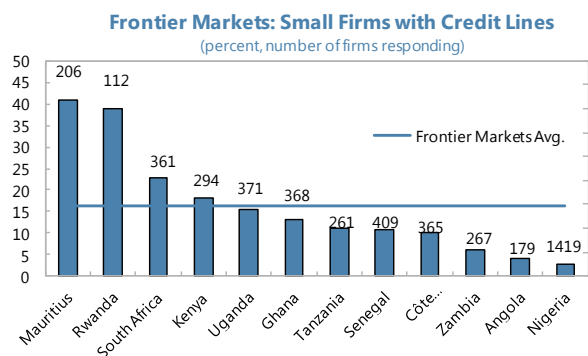
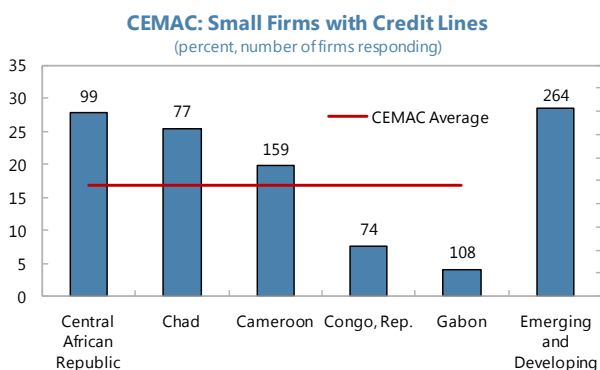
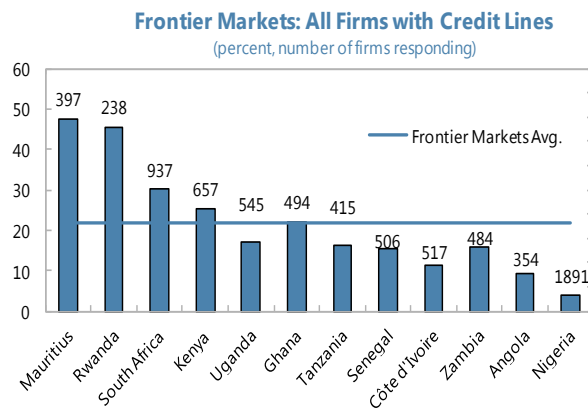
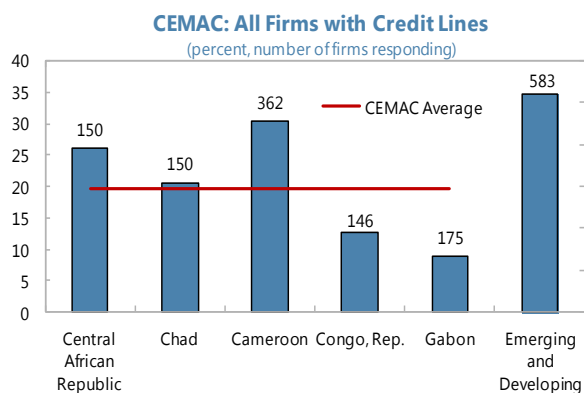


Note: For Republic of Congo, the data is as of 2009. For the remaining countries, we take the latest available data from Enterprise Surveys. The average is weighted by the number of firms in each country.



Sources: World Bank, Enterprise Surveys; and IMF Staff calculations. CEMAC average excludes Equatorial Guinea.

Figure 1. CEMAC: Benchmarking Financial Inclusion, 2005–11 (Concluded)

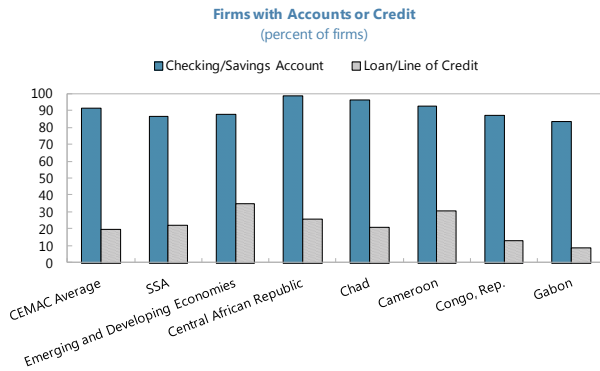


Sources: World Bank, Enterprise Surveys; and IMF Staff calculations.

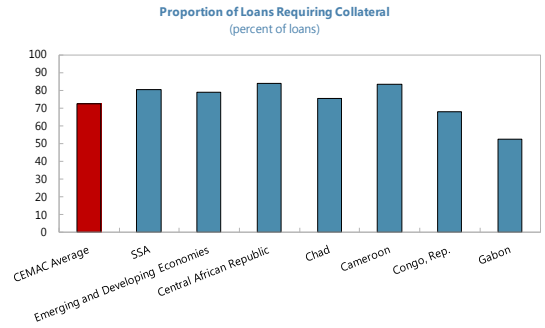
Note: For Republic of Congo, the data is as of 2009. For the remaining countries, we take the latest available data from Enterprise Surveys. CEMAC average excludes Equatorial Guinea.

Figure 2. CEMAC: Financing of Firms

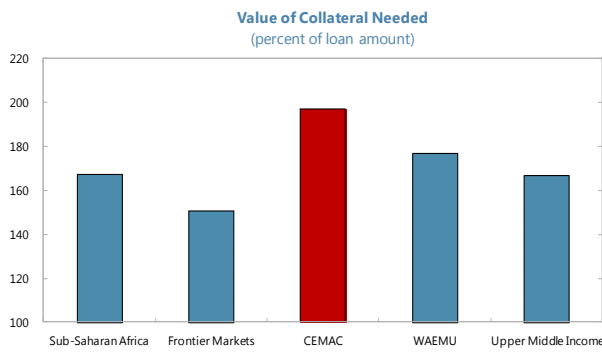
Although most firms have an account at a bank, access to credit is low.



Seventy percent of loans require collateral on average.

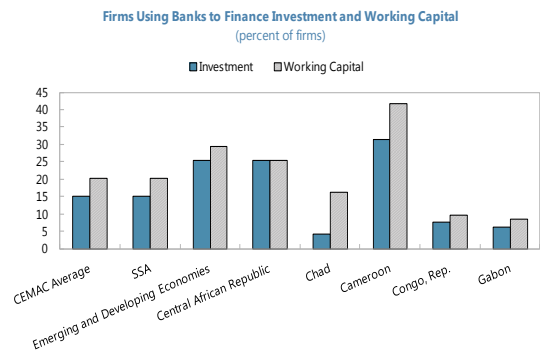


The value of collateral on average significantly exceeds the value of loans.

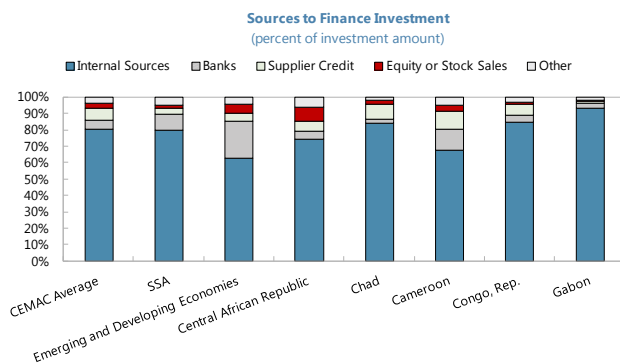


Note: Average weighted by the number of firms in each country.

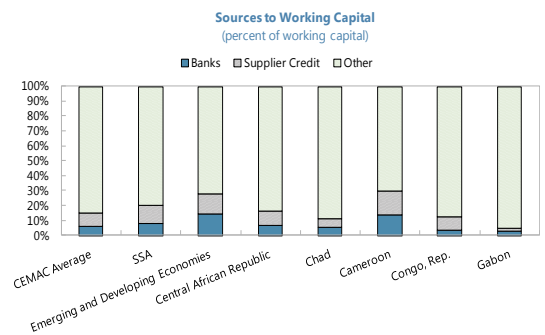
A low proportion of firms use banks to finance investment and working capital, compared with other emerging and developing countries.



Most investment financing comes from internal sources.



The amount of financing contributed by banks is relatively small.

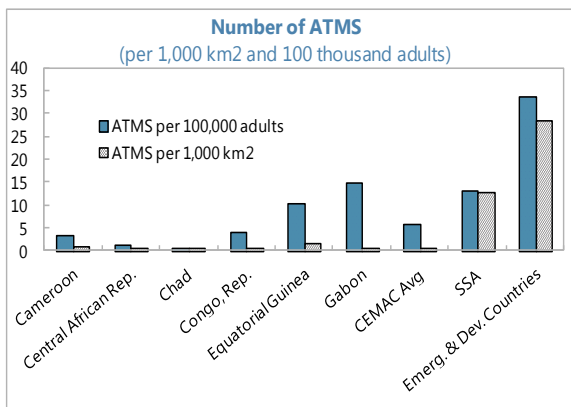


Sources: World Bank, Enterprise Surveys; and IMF Staff calculations.

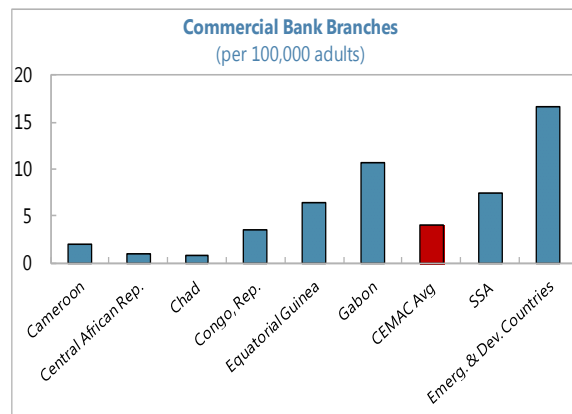
Note: For Republic of Congo, the data is as of 2009. For the remaining countries, we take the latest available data from Enterprise Surveys. CEMAC average excludes Equatorial Guinea.

Figure 3. CEMAC: Financial Access, 2013

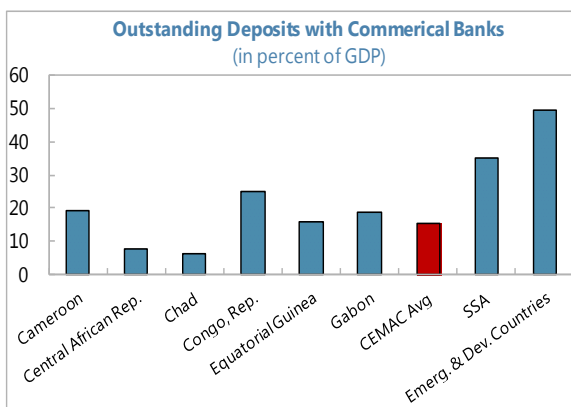
CEMAC lags behind regional peers in access to ATMs.



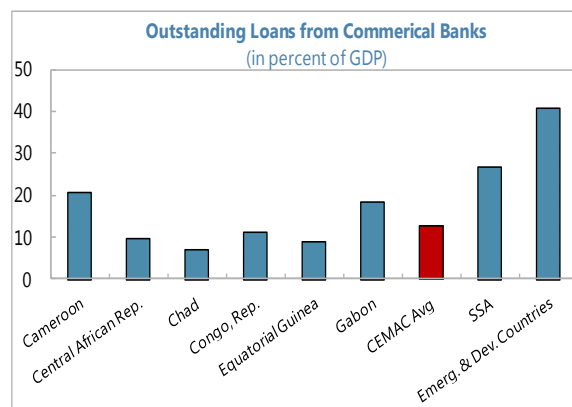
...as well as bank branches.



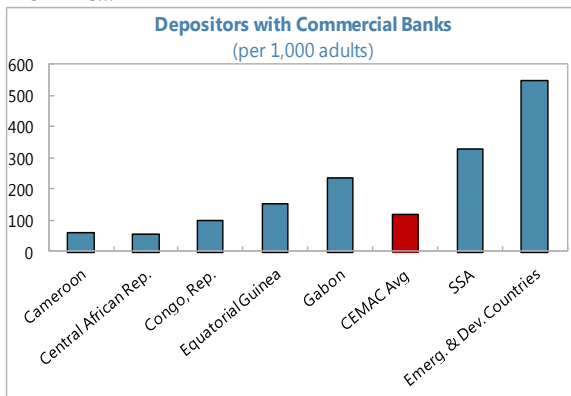
The banking system in CEMAC is relatively shallow when measured by deposits...



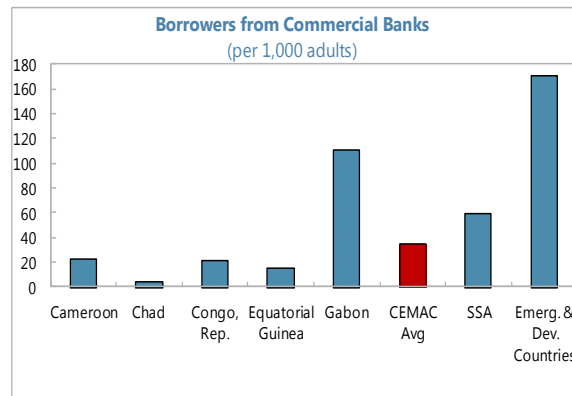
...as well as by loans.



Utilization of deposit services with banks is relatively poor in CEMAC...



...as is resource to loans.

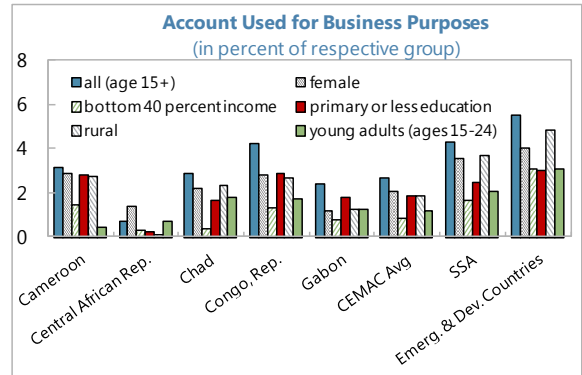
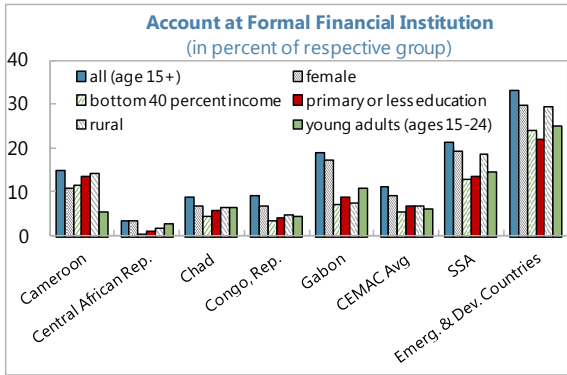


Sources: Financial Access Survey, IMF and IMF staff calculations.

Figure 4. CEMAC: Demographical Characteristics of Financial Access, 2011

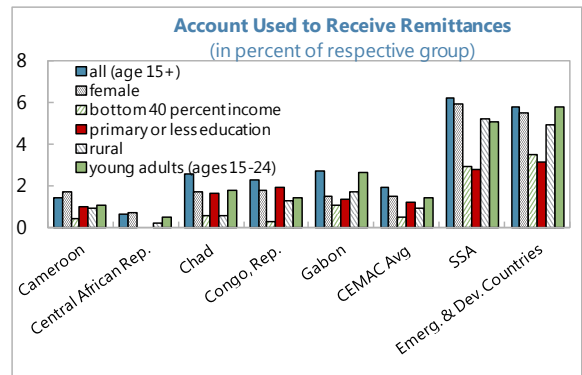
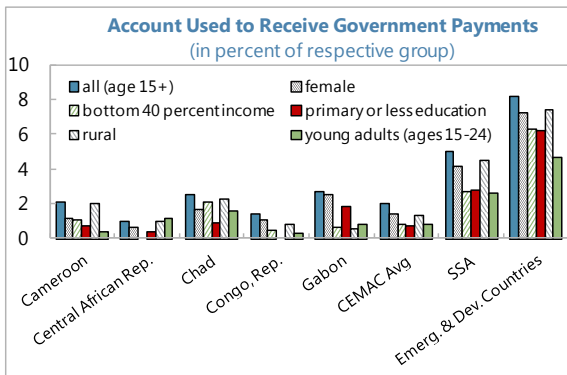
CEMAC is characterized by relatively poor financial access across all demographic groups.

Business use of formal financial services is relatively weak in CEMAC.



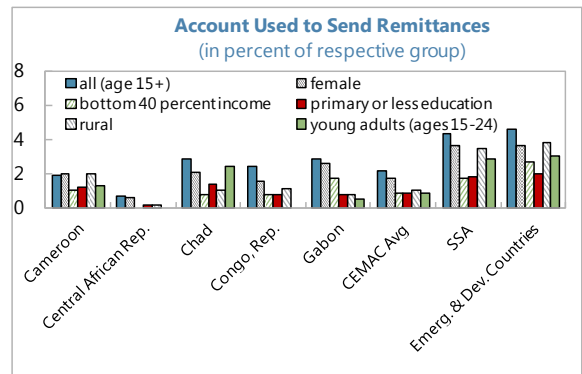
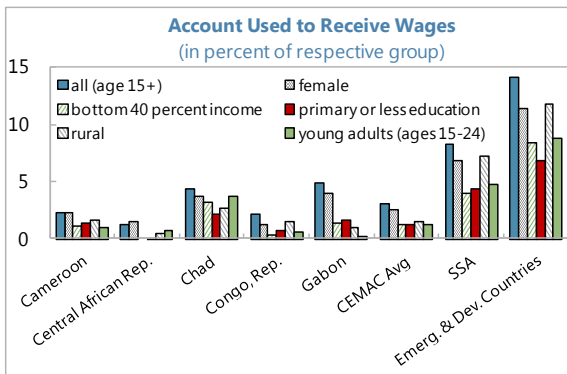
Bank accounts tend to be used relatively less in CEMAC for receiving government payments....

...as well as remittances.



Wages tend to be intermediated less through the formal financial sector in CEMAC....

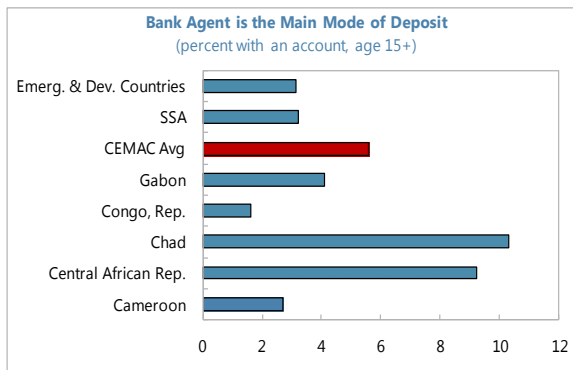
...and are used less for remittance payments than in comparators



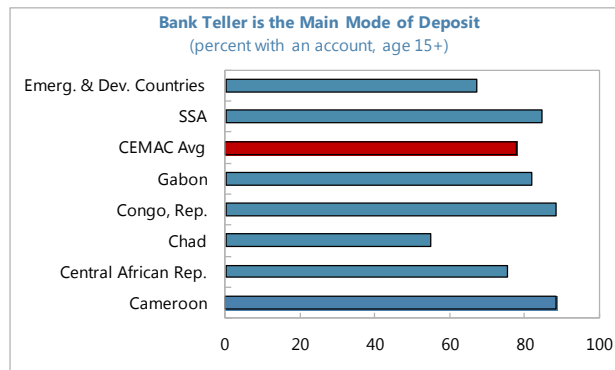
Source: World Bank, Findex 2011.

Figure 5. CEMAC: Deposit and Payment Modes, 2011

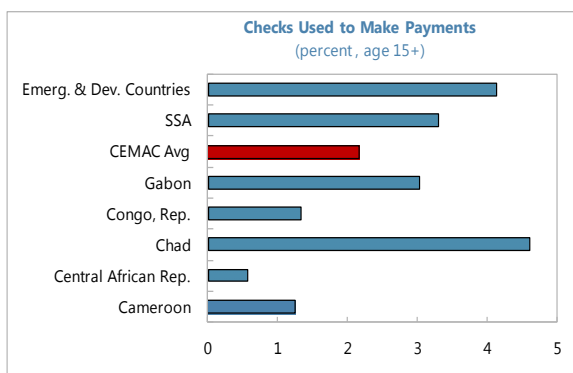
A relatively high use of bank agents in CEMAC indicates comparatively poor access to financial services...



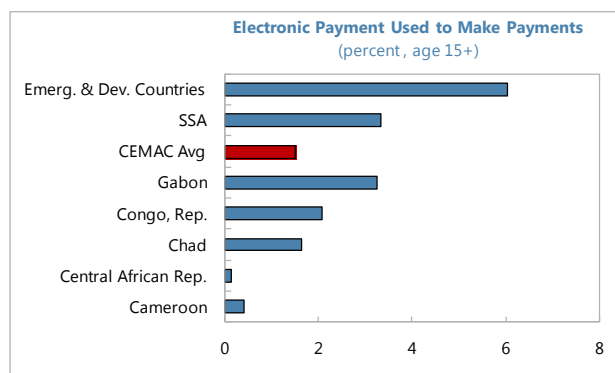
...reflected in the comparatively low use of bank tellers, compared to SSA.



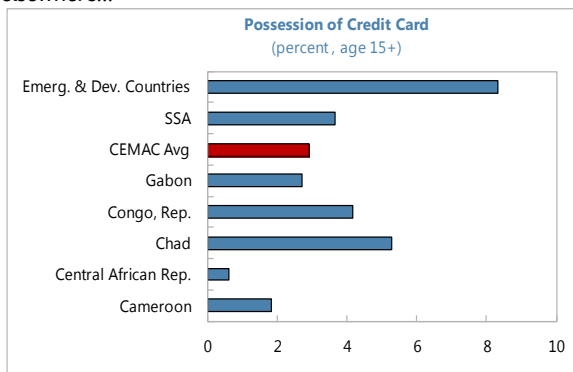
Relatively low use of checks in CEMAC reflects an underdeveloped financial system...



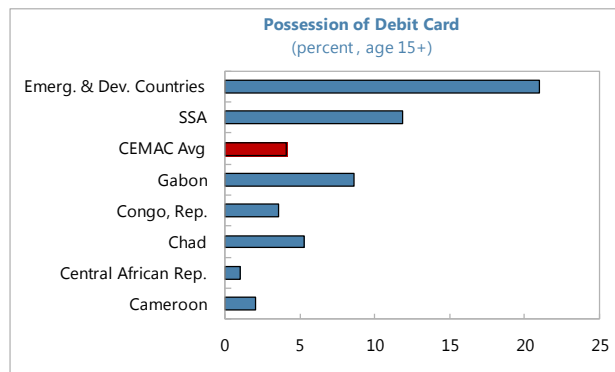
...also shown in the limited use of electronic payments.



Credit cards are not as widespread in CEMAC as elsewhere...



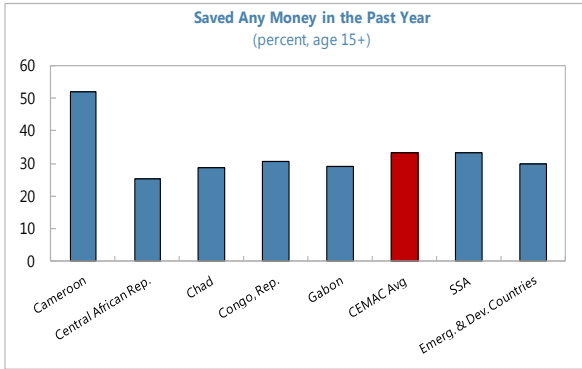
...and the same goes for debit cards.



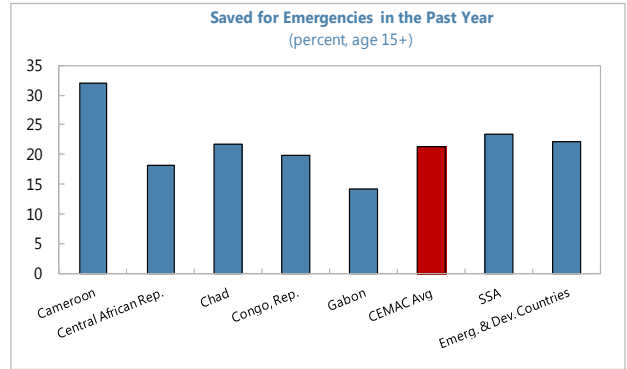
Source: World Bank, Findex 2011.

Figure 6. CEMAC: Use of Loans, 2011

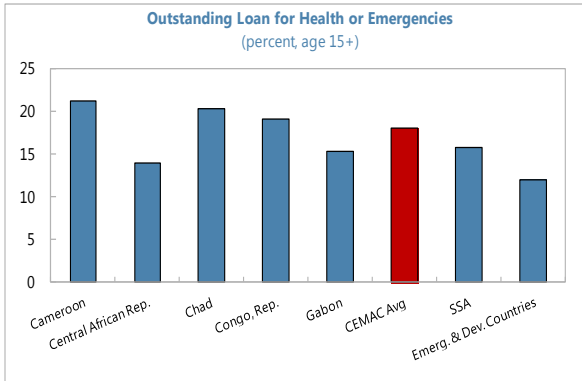
The savings rate in CEMAC is on par with the SSA average...



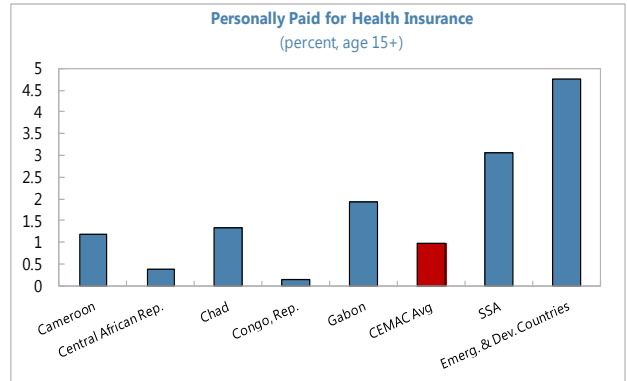
...but savings for emergencies in CEMAC are comparatively lower.



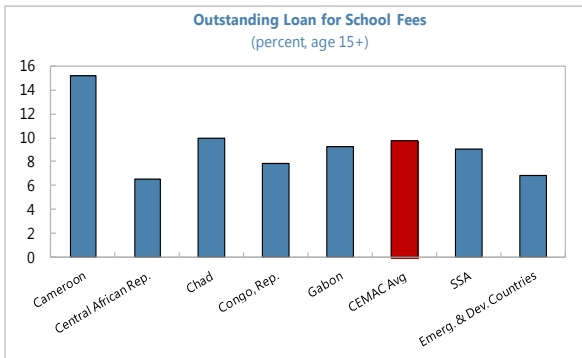
Loans are more frequently used for emergency purposes in CEMAC...



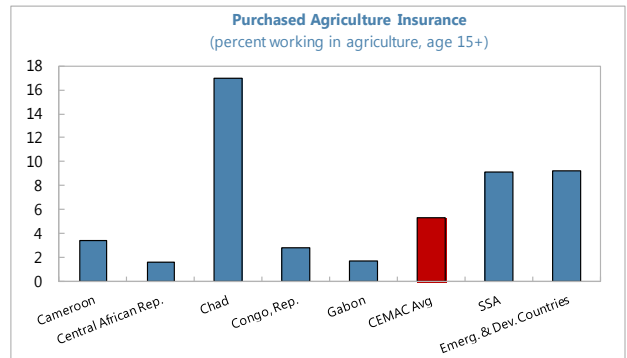
...and households in the region tend to be unable to personally pay for healthcare.



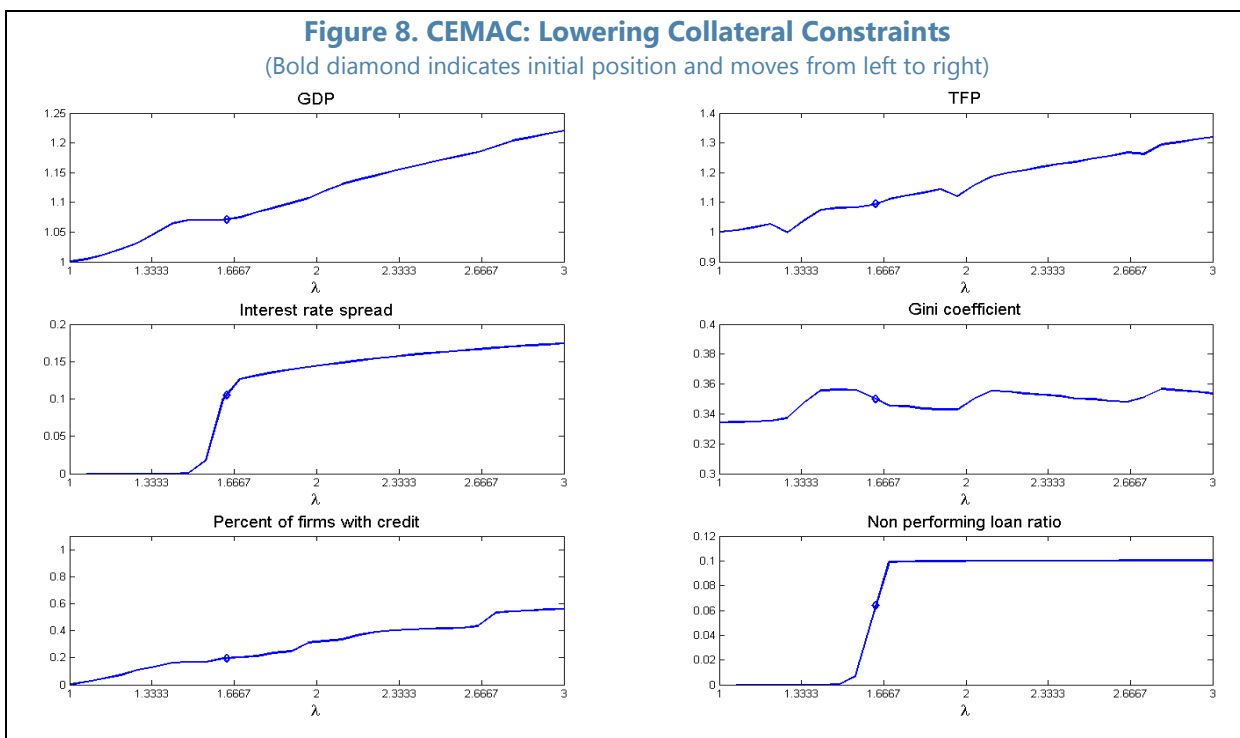
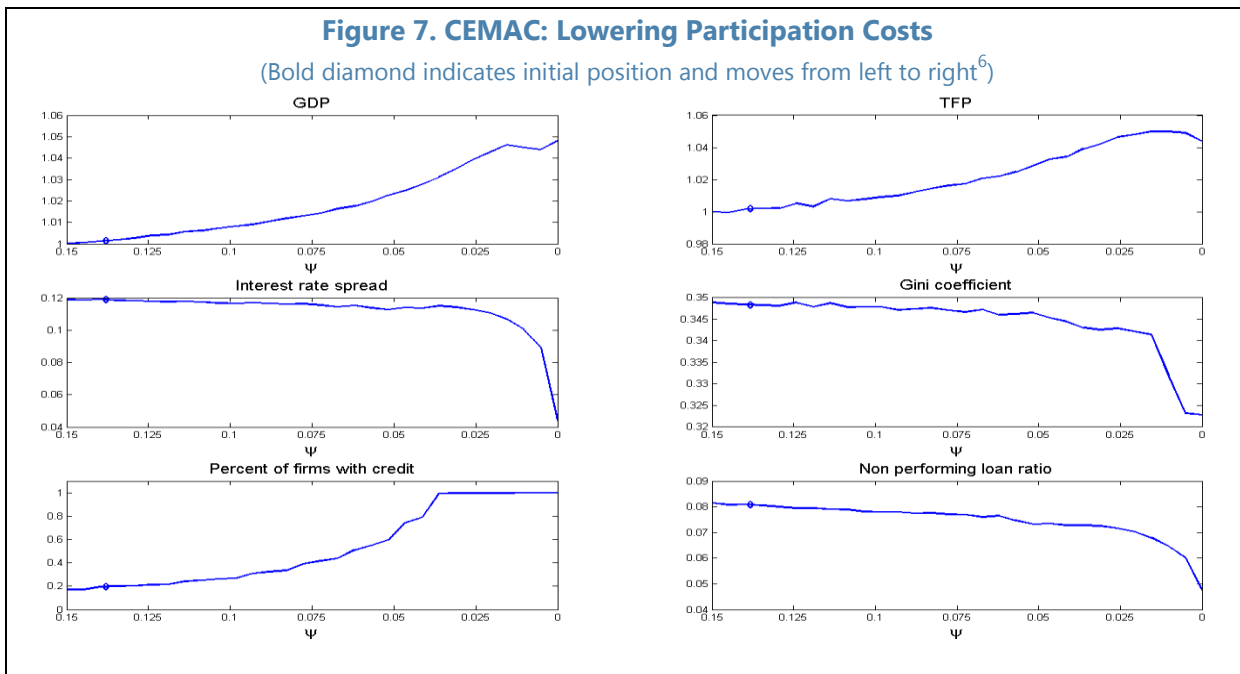
Loans tend to be used in CEMAC to pay for education.



The ability to personally pay for agriculture insurance is comparatively low.

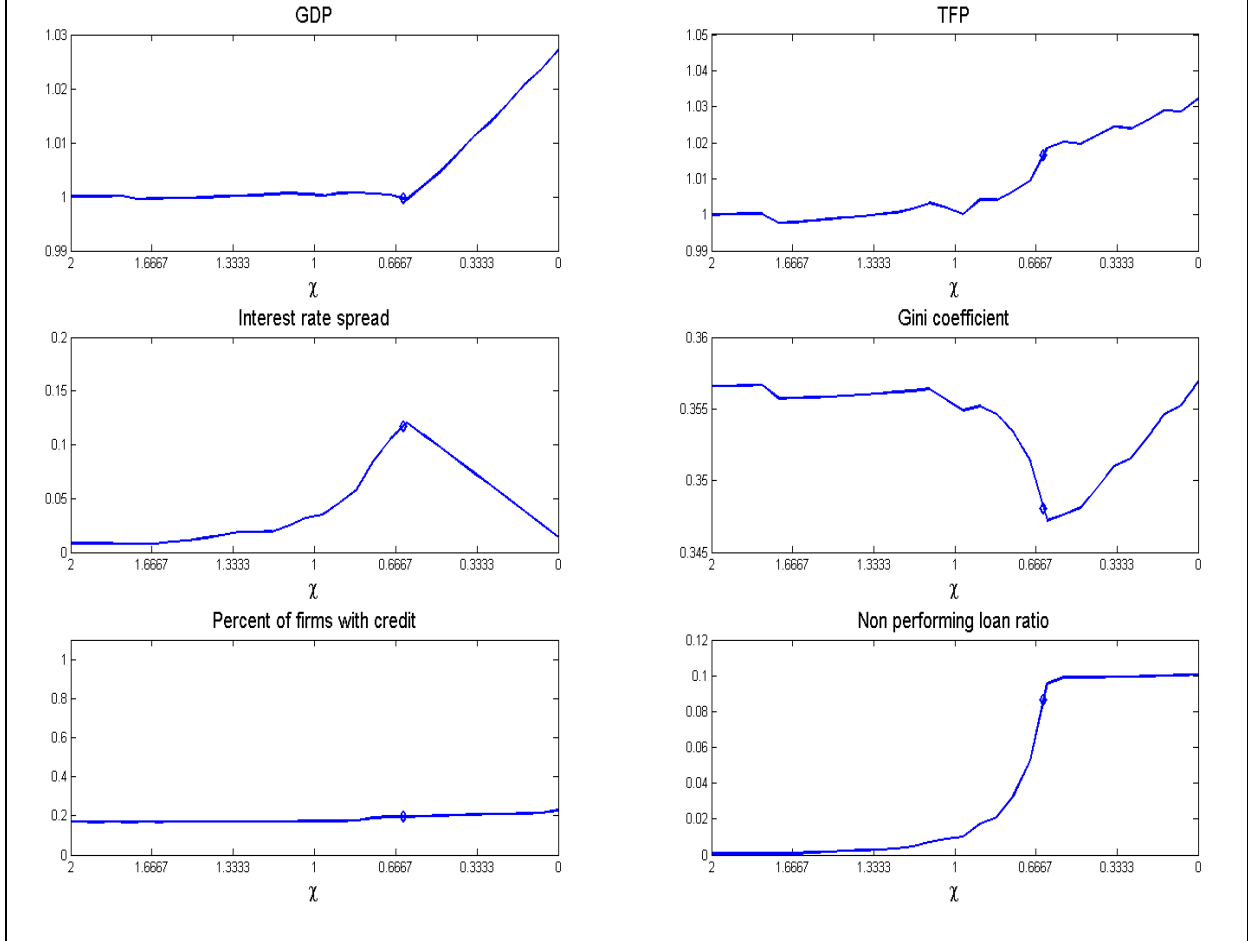


Source: World Bank, Findex 2011.



⁶ In Figures 7–9, the bold diamond indicates the initial position of CEMAC in relation to the respective constraints on financial inclusion. The blue line traces the path of each response variable to the relaxation of the relevant constraint on financial inclusion.

Figure 9. CEMAC: Lowering the Cost of Intermediation
 (Bold diamond indicates initial position and moves from left to right)



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CEMAC: THE IMPACT OF OIL PRICES ON NON-OIL GROWTH¹

This paper aims to strengthen the analytical basis for the study of the economic impact of the recent oil-price shock on the Economic and Monetary Community of Central Africa (CEMAC) countries.² The analysis, performed with the use of dynamic panel regressions, reveals a strong link between oil-price volatility and non-oil GDP growth in the oil-producing CEMAC countries. The empirical relationship is significant in statistical and in economic terms, and appears to be stronger in CEMAC than within other oil-producing countries. Subsequently, the regression coefficients are used to derive the impulse responses of non-oil GDP growth in CEMAC countries to the recent oil-price shock in the short to medium term. Finally, the analysis suggests that the impact of oil-price volatility on non-oil GDP growth is only partially intermediated by the concomitant change in government spending with other important channels being at play.

A. Introduction

- 1. Oil production is the key economic activity and a main source of foreign exchange and government revenues for five countries in CEMAC.** Government oil revenues increased from 16 percent of all revenues in 1994 to a peak of 70 percent in 2008, before dropping to 58 percent in 2014. Oil dependency varies among CEMAC producers, which are at different stages of their oil sector development. In Cameroon, which is CEMAC's smallest oil producer, production peaked more than 20 years ago, while in Chad, production started just over a decade ago and is currently on the rise. Congo showed a relatively steady output throughout the period under study. In Equatorial Guinea and Gabon, the CEMAC's first and third largest oil producers, respectively, production is now entering a declining stage (Box 1).
- 2. CEMAC's high dependency on oil has made its economies vulnerable to oil price shocks.** This vulnerability manifested itself in the aftermath of the 1998 and the 2008 oil price shocks and is evident in the difficulty CEMAC oil producers experience in adjusting their policies to the current oil price slump, which started in the second half of 2014.
- 3. Part of this difficulty rests in that the link between oil price volatility and non-oil GDP growth is not well understood.** This implies that the policy response (in most cases, fiscal tightening) may have side effects that are hard to foresee or quantify. This paper uses dynamic panel regression analysis to estimate the impact of oil price volatility on non-oil GDP growth, which could help to design appropriate policy responses to the current shock. The analysis also examines the role government spending plays as a transmission channel. The latter appears less effective, or at least less

¹ Prepared by Samson Kwalingana, Azanaw Mengistu, Nérée Noumon, Gonzalo Salinas, and Jaroslaw Wieczorek.

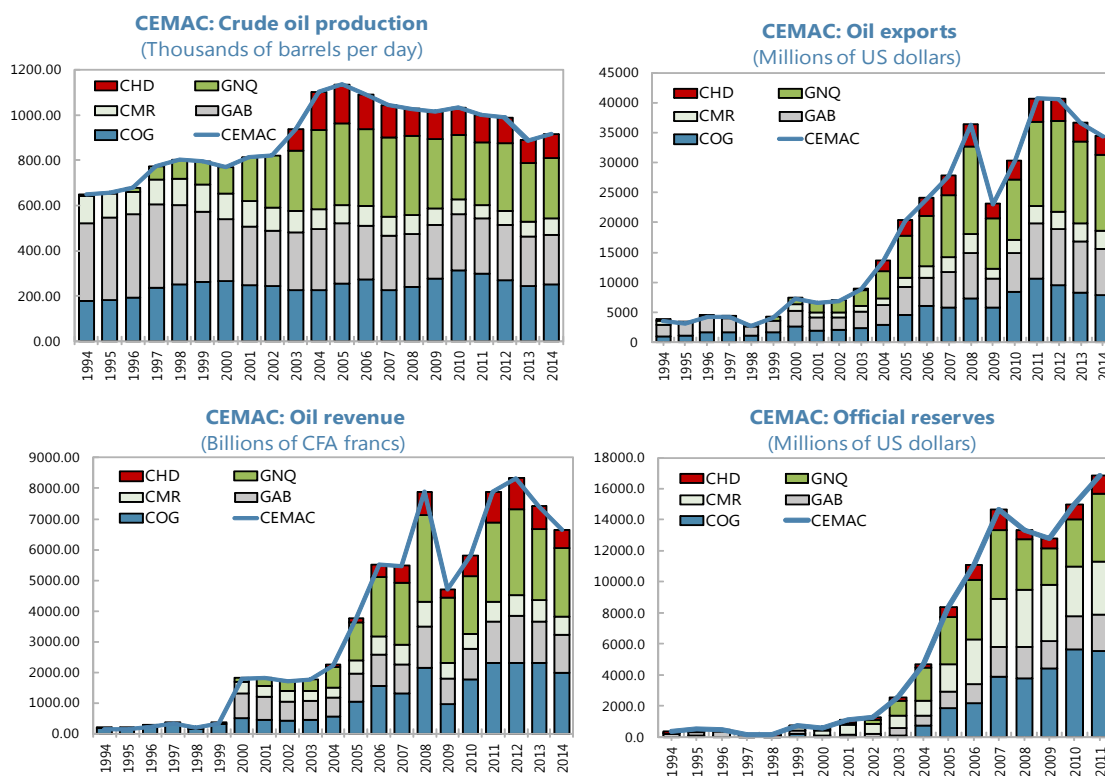
² For the purpose of this paper, unless otherwise indicated, CEMAC refers to its five oil-producing members, namely Cameroon, Chad, Congo (Republic of) Gabon, and Equatorial Guinea. The sixth CEMAC member, the Central African Republic, is not an oil producer.

direct, than is commonly believed, when compared to other channels through which oil-price volatility affects non-oil economic activity.

Box 1. CEMAC: Key Economic Facts 1994–2014

The history of oil production has been shaped by the increase in the number of oil producers from an initial three to the current five. In 1994, Cameroon, Congo, and Gabon were the three oil producers of the region, jointly producing about 650 thousand barrels of oil per day (bpd). The number of oil producers gradually increased with Equatorial Guinea and Chad joining in 1995 and 2003, respectively. Over time, the volume of oil production has expanded in Equatorial Guinea and Chad, and declined in Cameroon. The regional production peaked at 1.14 million bpd in 2005 and has been on a downward trend since then, amounting to 915 thousand bpd in 2014.

Over the last two decades, the increasing revenue from oil provided CEMAC with the resources needed to promote economic growth and build resilience. The characteristics of CEMAC economies have evolved significantly since 1994 with oil being the main factor in this change. CEMAC used to be a homogenous group of low-income countries. Two members (Equatorial Guinea and Gabon) became middle-income countries in the mid-2000s and the former acquired a high-income status toward the end of the last decade. With the CEMAC's international reserves increasing from US\$0.5 billion in 1994 to US\$15 billion in 2013, the region has also gained the ability to cushion its path through an oil shock, but it has yet to achieve a greater degree of economic diversification and reduce its dependency on oil revenues.

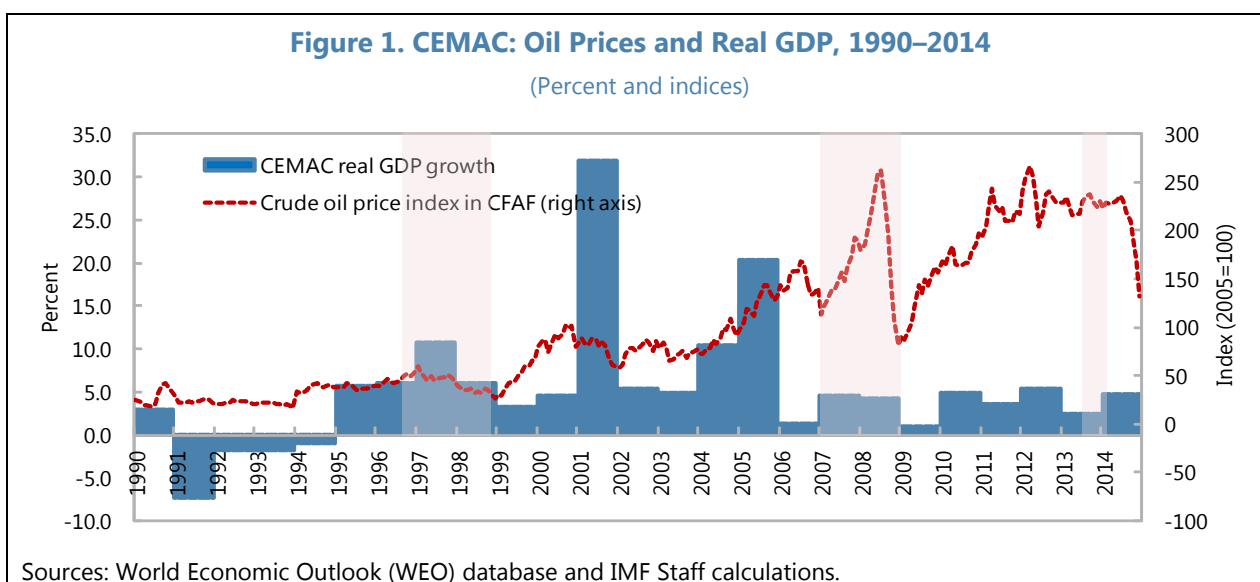


Sources: World Economic Outlook (WEO) database; and IMF Staff calculations.

B. Stylized Facts of the Economic Impact of Oil-Price Volatility

4. Economic activity in CEMAC was highly affected by the two previous major oil price shocks.³

During the first shock (in 1996–98), oil prices dropped by 55 percent between November 1996 and December 1998. During the second shock (in 2008) they dropped by 67 percent between July and December (Figure 1). Oil exports and government revenues from oil contracted sharply as a result of the falling oil prices (Figure 2). In these episodes, real GDP growth declined from 10.8 percent in 1997 to 3.2 percent in 1999 and from 4.2 percent in 2008 to 1.0 percent in 2009 (Figure 3). In both episodes, there was a considerable impact on non-oil GDP, although oil production and investment were broadly unaffected. The impact on non-oil GDP was particularly sharp as a result of the 1998 shock, with the CEMAC non-oil GDP growth turning negative in 1999, reflecting a sharp non-oil GDP contraction in the Congo and Gabon.



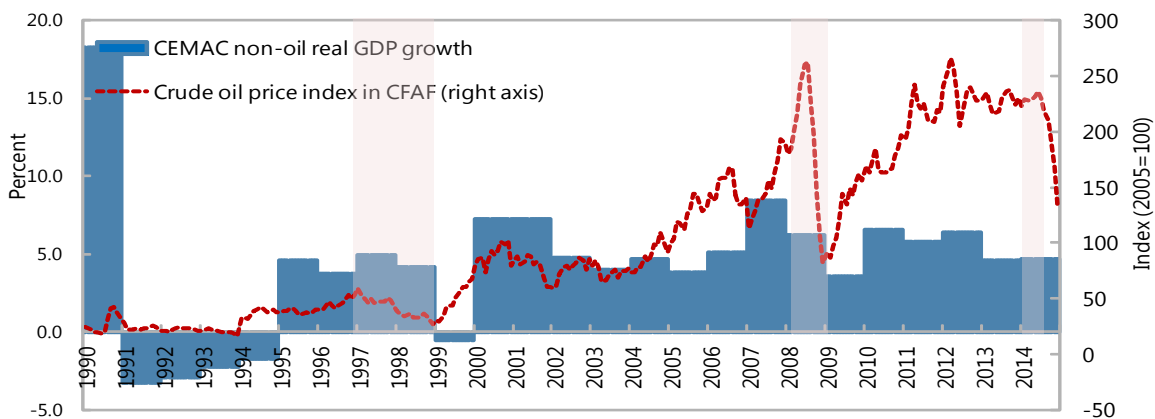
5. The economic impact of the oil price shocks has been broadly similar across CEMAC countries, although with some degree of heterogeneity.

Following the 1998 shock, Congo and Gabon experienced a drop in overall GDP and an even larger drop in non-oil GDP. Cameroon, with the more diversified economy of the three, experienced only a minor deceleration in both overall and non-oil GDP growth. In 2008, only the economies of Cameroon and Congo were largely unaffected by the oil price shock. In Congo, this was because oil production increased in the year following the shock, offsetting the impact of the fall in oil prices. In Cameroon, which has to a large extent diversified away from oil and is less of an oil exporter than it used to be, the effect of the oil-price shock on government revenue and spending (e.g., fuel subsidies) largely canceled out and the non-oil activity was not significantly affected by the shock.

³ Following the convention applied in the IMF's African Regional Economic Outlook of April 2015, the term "oil-price shock" refers to oil price slump of more than 50 percent. Other noteworthy oil price drops, but below the 50 percent threshold, occurred from November 2000 to January 2002 (42 percent) and from July 2006 to May 2007 (18 percent).

Figure 2. CEMAC: Oil Prices and Non-Oil Real GDP, 1990–2014

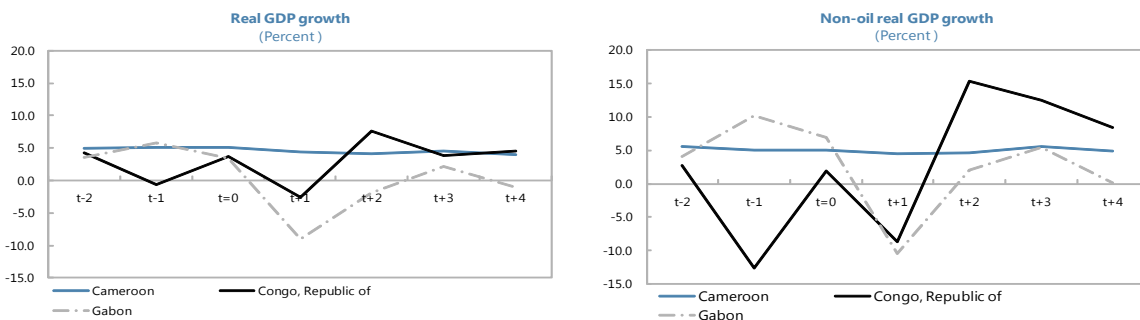
(Percent and indices)



Sources: World Economic Outlook (WEO) database; and IMF Staff calculations.

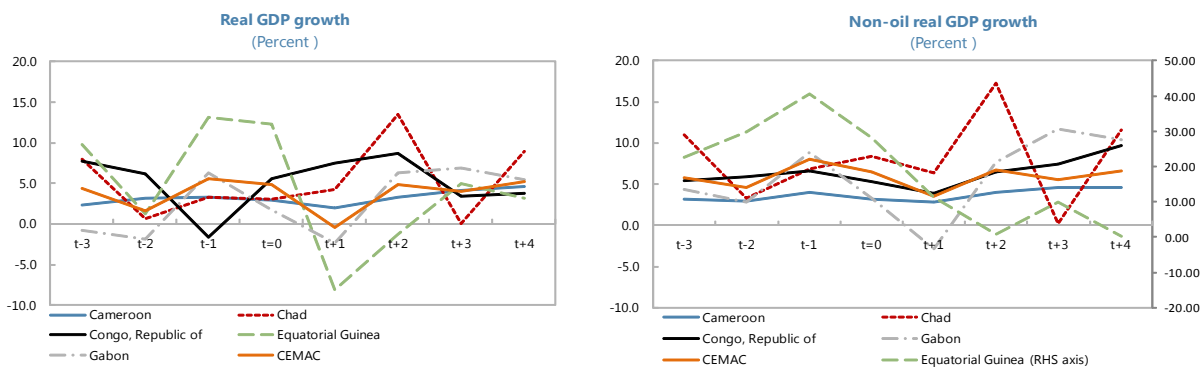
Figure 3: CEMAC: GDP Growth During Oil-Price Shock Episodes

1998 Oil-Price Shock



Note: "t=0" refers to 1998.

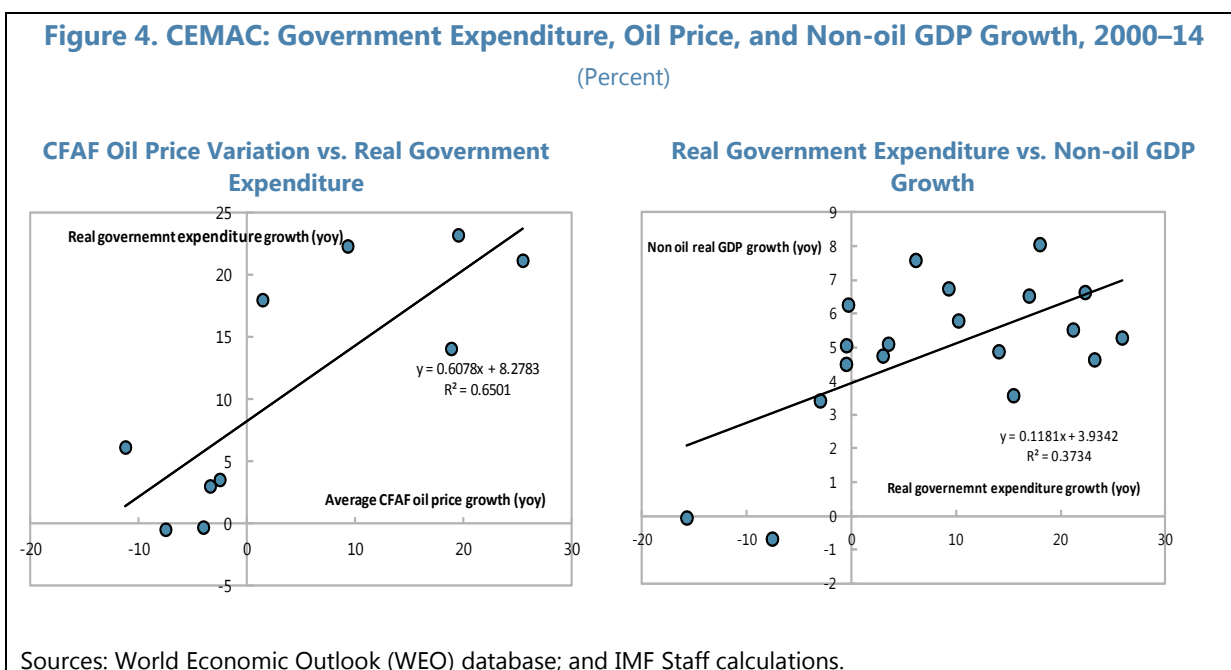
2008 Oil-Price Shock



Sources: World Economic Outlook (WEO) database and IMF Staff calculations.

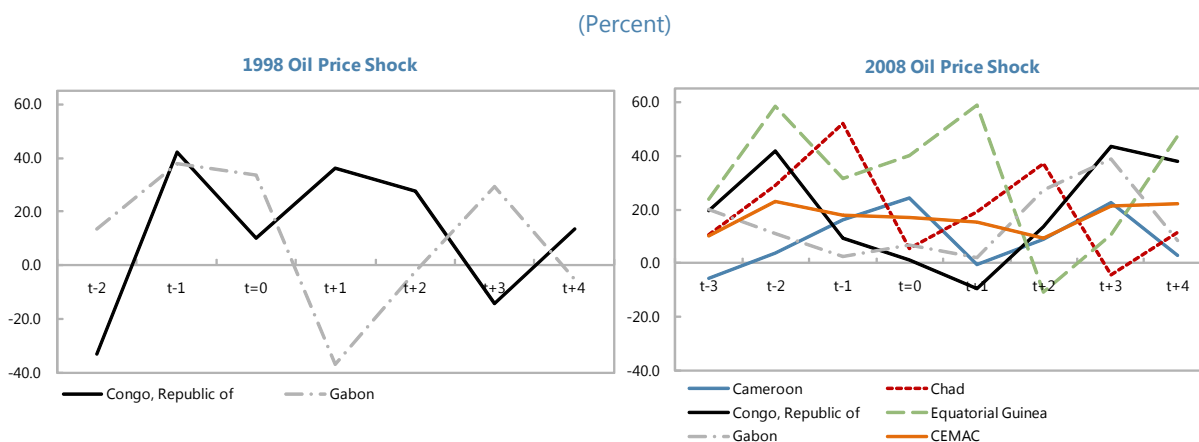
Note: "t=0" refers to 2008.

6. There is some evidence that changes in government expenditure has been an important transmission channel of oil-price volatility to the non-oil economy in recent years. With oil being a major source of government revenues and government being a major player in non-oil economic activity, it may be expected that changes in oil prices would lead to changes in the level of government revenues and, to the extent that these changes affect also government expenditure, they would also affect non-oil economic activity. Indeed, changes in oil prices have been positively correlated with CEMAC-wide real government expenditure; in turn, the latter has been correlated with non-oil real GDP growth although this correlation has been somewhat weaker, yet still significantly positive (Figure 4). This suggests that government spending may have been an important channel of transmission of oil-price changes to non-oil economic activity in CEMAC.



7. However, the government expenditure channel did not operate similarly during the two oil price shocks. During the 1998 episode, there was a sharp contraction in government expenditure in the countries that experienced a parallel decline in non-oil economic activity (Congo and Gabon), whereas, during the 2008 episode, some countries (Chad and Equatorial Guinea) did not reduce their spending levels (Figure 5). Chad and Equatorial Guinea had seen an unprecedented increase in their oil revenues immediately prior to the oil shock and kept increasing public spending by drawing on buffers accumulated in the previous years (Box 2). Yet, in both countries non-oil GDP growth declined markedly. A possible further factor leading to the differences in government expenditure contraction in 1998 and 2008 may have been the level of debt. While in 1998 most countries were highly indebted, with limited buffers and no access to additional borrowing, in 2008 most countries had already benefited from debt relief, which allowed some of them to implement countercyclical policies.

Figure 5. CEMAC: General Government Expenditure Growth in Real Terms, 1998–2008

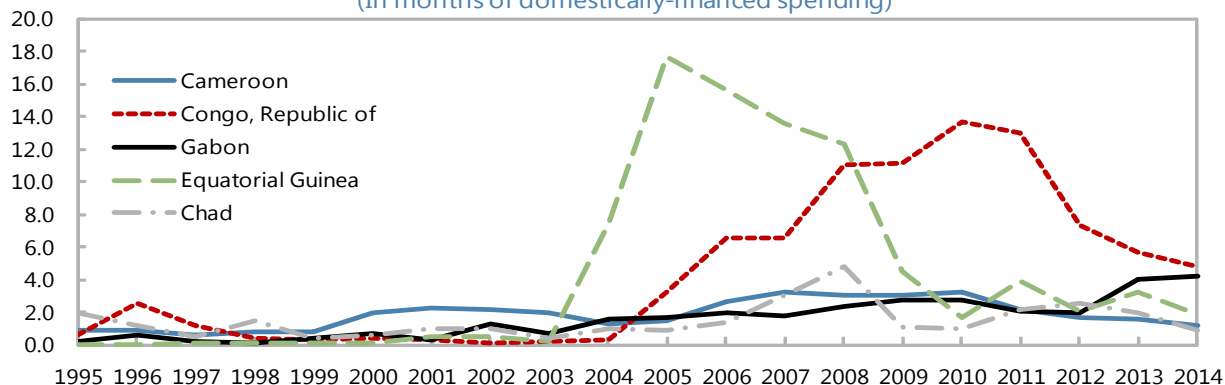


Sources: World Economic Outlook (WEO) database; and IMF Staff calculations.

Box 2. CEMAC: Evolution of Fiscal Buffers

Most CEMAC countries managed to build sizeable fiscal buffers starting in the mid-2000s, but had a tendency to deplete them rapidly during crisis episodes. During the 1998 crisis, all three oil producers (and the other non-oil producers) drew down their already low fiscal reserves, but these were not sufficient to support government expenditure beyond the very short term. All the countries in the region entered the millennium with usable government deposits amounting to less than two months of domestically financed expenditure. The commodity price boom in the early to mid-2000s allowed them to increase their buffers to at least three months of domestically financed expenditure by 2007. However, the 2008 crisis led most of them (Congo being the notable exception) to draw down their deposits again and left them with buffers largely depleted. Declining buffers since the 2008 oil-price shock have been caused in part by self-financed investment programs in most CEMAC countries. The resulting low buffers have amplified CEMAC countries' vulnerability to the recent oil-price shock.

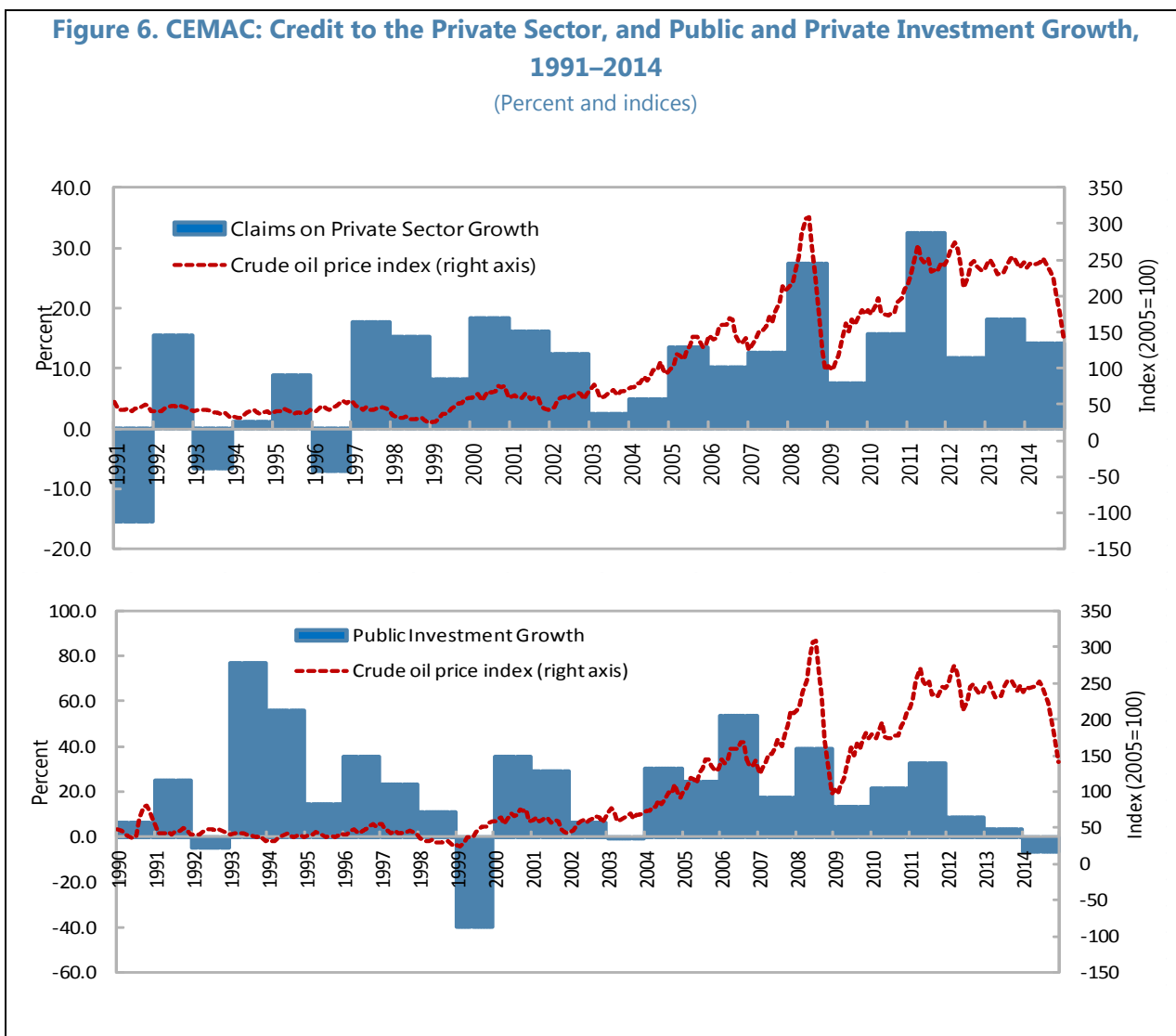
CEMAC: Government Deposits at the BEAC, 1995-2014
(In months of domestically-financed spending)



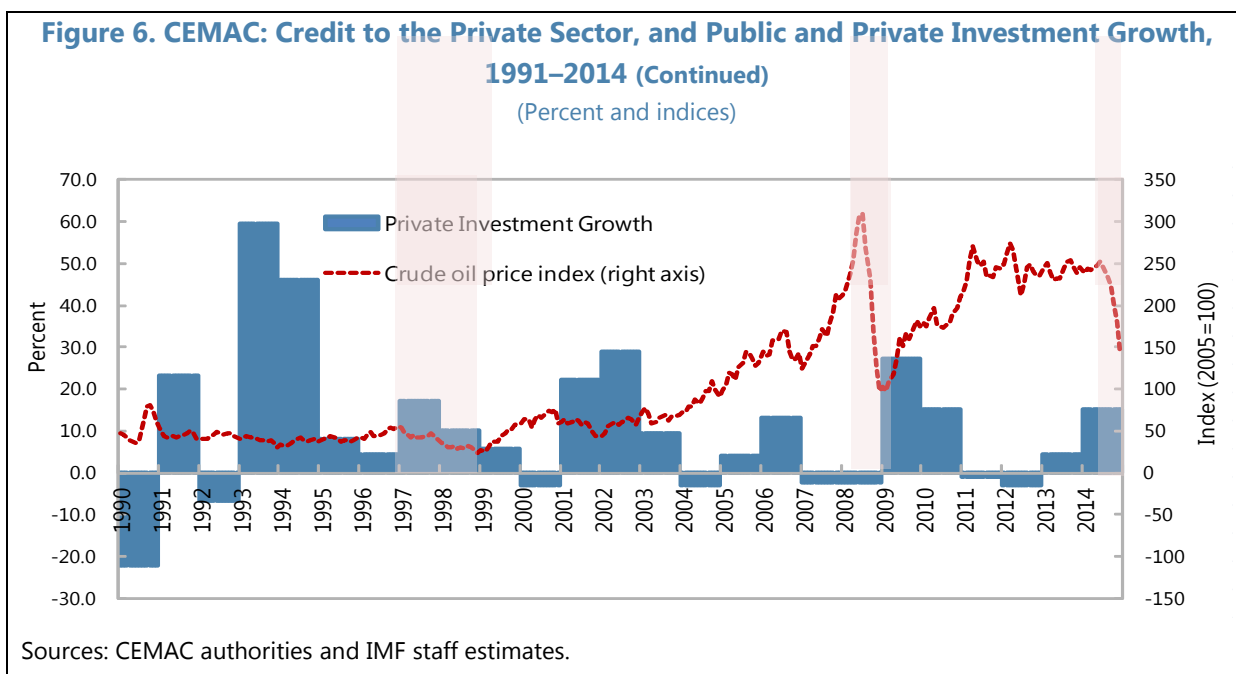
Sources: World Economic Outlook (WEO) database; and IMF Staff calculations.

8. The credit channel appears to have played a very limited role in transmitting oil-price signals.

Credit to the private sector appears to have been synchronized with oil price fluctuations, but it did not translate into higher private investment needed to spur non-oil growth (Figure 6). Although government investment in the CEMAC was highly correlated with oil price fluctuations, the extent of crowding out in downturns is likely to have been limited, because of the limited reliance of enterprises on bank financing.⁴ The increase in credit in boom periods went mainly to firms with activities linked to public investment projects, given that private investment remained subdued in 1994–2014. This implies that non-oil sector growth was mainly driven by activities linked to public investments projects, and not to autonomous private sector investments.



⁴ Limited access to finance is well known in CEMAC and is due to many structural factors (see companion CEMAC country and Financial Sector Assessment reports).



9. The lack of an important government transmission channel in the 2008 episode suggests that other links between the oil and non-oil sector may be at play in CEMAC countries. This contradicts the common perception that the oil sector operates in an enclave. This issue will be revisited in the following sections.

C. Panel Regressions on the Economic Impact of Oil Price Changes

10. Panel regressions provide more refined evidence of the impact of oil price changes on non-oil GDP growth in CEMAC. Two sets of dynamic panel regressions were run to assess the impact of oil price fluctuations on economic activity and government expenditure. These results have been subsequently compared to the results of regressions performed on other oil-exporting countries across the world. The regressions have the following general specification:

$$Y_{i,t} = \beta_1 * Y_{i,t-1} + \beta_2 * WD_{i,t} + \beta_3 * OS_{i,t} + \varepsilon_{i,t}$$

11. An oil shock (OS) is the independent variable of primary interest. A shock is defined in line with IMF (2012), as the percentage change in international oil price multiplied by the share of oil exports in GDP, where the latter is the moving average of its values in the preceding three years. The specification allows for including up to two lags of this independent variable. The regressions were run on three sets of dependent variables (Y): real GDP growth, real non-oil GDP growth, and real government spending growth. The specification used also controls for the changes in the world demand (WD) that could affect domestic economic activity.

12. Data, drawn from the International Finance Statistics database, cover the period 1970–2014. The observation-years for the individual countries, which were not producing oil at the time of observation, were omitted. Regressions were run using standard dynamic panel techniques and specifications using random and fixed effects. The results proved robust to changes in the regression

techniques. For brevity's sake, only the results from the Arellano-Bond dynamic panel-data estimation, which encompasses both fixed and random effects, are documented below.

13. The results confirm a significant impact of oil-price fluctuations on all three dependent variables. The strength and the significance of the impact vary across the three variables and are generally consistent with the intuitions derived from casual data observation. The impact of the oil-price shock on real non-oil GDP growth is particularly strong and more robust than on the other two dependent variables.

- **The impact of an oil-price shock on real GDP growth is statistically significant contemporaneously and up to a one-year lag** (Table 1). Based on the estimated coefficients, a “composite” CEMAC country with oil exports equivalent to 50 percent of its GDP (the average among the CEMAC oil-exporting countries), facing a 27 percent decline in the oil price (approximately the expected decline in the average international oil price in CFA terms between 2014 and 2015) would see its real GDP growth reduced by approximately one percentage point in the year of the shock and by two percentage points in the first year after the shock, after which the impact recedes and loses statistical significance (Figure 7).

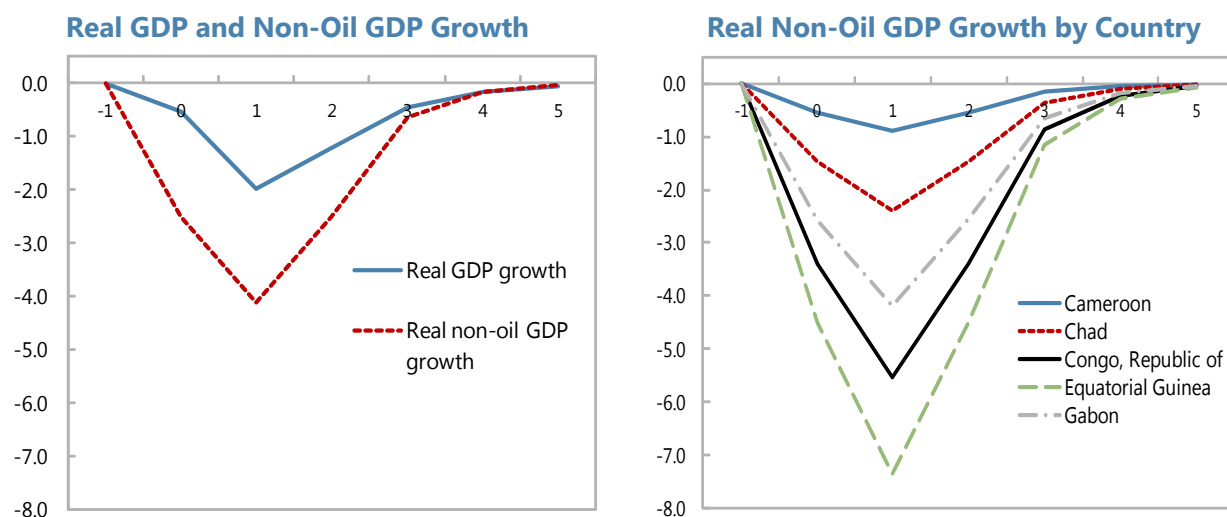
Table 1. CEMAC: Oil Shock Effect on Selected Aggregates¹

	Real GDP growth	Real non-oil GDP growth	Real government spending growth
1-year lagged dependent variable	0.3812*** (0.0485)	0.2552*** (0.06)	0.0823*** (0.01)
World real GDP growth	1.0022*** (0.38)	0.9698*** (0.30)	2.5982*** (0.63)
Oil shock	0.0398** (0.02)	0.1865* (0.11)	0.2668*** (0.08)
1-year lagged oil shock	0.1317*** (0.05)	0.2567*** (0.06)	0.2320*** (0.07)
2-year lagged oil shock	0.0336 (0.04)	0.1082* (0.06)	-0.2422*** (0.05)
Constant	-0.8592 (0.86)	-1.183 (1.10)	-1.1555 (2.77)
Number of observations	149	122	94
LR-Elasticity of Oil Shock	0.15	0.44	0.24

* p<0.10, ** p<0.05, *** p<0.01. Standard errors in parentheses.

¹Arellano-Bond dynamic panel-data estimation.

Figure 7. CEMAC: Real GDP and Non-Oil GDP Growth Response to Oil Price Shock¹
(Percent)



Sources: CEMAC authorities; and IMF staff estimates.

¹The shock is a 27 percent decline in oil price (the projected magnitude of the 2014 to 2015 decline in domestic currency), assuming that exports-to-GDP ratio is 50 percent (CEMAC average).

- The estimated impact of an oil shock on non-oil growth is twice as large, significant throughout three consecutive years, and robust across several regression techniques (Table 2). The estimated coefficients imply that a country with oil exports equivalent to 50 percent of GDP hit by a 27 percent decline in the oil price sees a reduction in non-oil GDP growth of 2.5 percentage points in the year of the shock and 4 percentage points in the following year. It fades to about 2 percentage points in the subsequent year, but remains statistically significant. An approximate magnitude of the shock at its peak (t+1), scaled by the oil-exports-to-GDP ratio, ranges from less than one percentage point in the case of Cameroon to over seven percentage points in the case of Equatorial Guinea (Figure 7). The impact of an oil price shock on non-oil GDP growth being stronger and more significant than the impact on overall GDP growth is consistent with the earlier observations suggesting that oil production levels in CEMAC countries have not been significantly affected by oil price changes.

Table 2. Oil Shock Effect on Non-Oil Real GDP Growth

	Random Effects	Fixed Effects	Dynamic Panel Data 1/ ^{1/}	System-GMM 2/ ^{2/}
1-year lagged dependent variable	0.3430*** (0.0800)	0.2552*** (0.08)	0.2552*** (0.06)	0.2635*** (0.07)
World real GDP growth	0.8441 (0.66)	0.9698 (0.65)	0.9698*** (0.30)	0.8596 (0.61)
Oil shock	0.2005*** (0.06)	0.1865*** (0.06)	0.1865* (0.11)	0.2489*** (0.05)
1-year lagged oil shock	0.2483*** (0.06)	0.2567*** (0.06)	0.2567*** (0.06)	0.2649*** (0.05)
2-year lagged oil shock	0.10 (0.06)	0.1082* (0.06)	0.1082* (0.06)	0.1201** (0.05)
Constant	-1.2458 (2.39)	-1.183 (2.36)	-1.183 (1.10)	-1.2017 (2.25)
Number of observations	127	127	122	127
LR-Elasticity of Oil Shock	0.79	0.70	0.70	0.78

* p<0.10, ** p<0.05, *** p<0.01; Standard errors in parentheses.

^{1/} Arellano-Bond dynamic panel-data.

^{2/} System Generalized Method of Moments.

- **Finally, the results confirm the existence of a significant impact of oil prices on real government expenditure.** Nonetheless, in this case the estimated long-run elasticity is lower than the long-run elasticity of non-oil GDP growth with respect to oil prices and is not robust to a modification of the estimation technique. In a hypothetical (composite) CEMAC country with oil exports equivalent to 50 percent of GDP, real government expenditure growth was reduced by 3.6 percentage point of GDP in the year of the shock, and by a further 3.1 percentage point in the first year after the shock, while an increase of 3.2 percentage point could be expected in the second year after the shock. This impact is lower than the impact on non-oil growth and not statistically significant when using other panel regression methods (including System Generalized Method of Moments). The weaker link between the oil price and government expenditure may reflect the fact that real government expenditure remained relatively stable in the context of the 2008 oil price shock, as described in Section B.

14. A broad cross-country comparison shows that non-oil economic activity in CEMAC seems to be more sensitive to oil-price changes than in other oil-exporting countries.⁵ This result holds even though the specification controls for the relative size of the oil sector (Table 4). The coefficients on real GDP growth and non-oil real GDP growth have the same sign but are lower and statistically less significant than in the CEMAC; the impact on non-oil GDP growth is insignificant, and the impact on

⁵ For the list of the non-CEMAC countries included in the analysis see Table 3.

the overall GDP growth becomes significant after two years, which probably reflects scaling up or down of oil-related investments in response to positive or negative oil price signals. Interestingly though, the impact of oil price fluctuations on government expenditure in non-CEMAC oil exporters is more significant, especially in high-income (mostly Middle-Eastern) countries.⁶

Table 3: Non-CEMAC Oil-Exporting Countries¹

Lower Middle Income	Upper Middle Income	High Income Non-OECD
Nigeria	Algeria	Bahrain
South Sudan	Angola	Brunei Darussalam
Yemen	Azerbaijan	Kuwait
	Iran	Oman
	Iraq	Qatar
	Kazakhstan	Saudi Arabia
	Libya	Trinidad and Tobago
	Turkmenistan	United Arab Emirates
	Venezuela	

¹ Economies are categorized as oil-exporting countries when their oil-export earnings exceeded 50 percent of total exports on average between 2009 and 2014. Oil is defined by the Standard International Trade Classification (SITC) code 3, which includes mineral oils, lubricants, and related materials

Source: IMF World Economic Outlook of April 2015, Statistical Appendix.

Table 4. Non-CEMAC: Oil Price Effect on Selected Variables¹

	Real GDP growth	Real non-oil GDP growth	Real government spending growth
1-year lagged dependent variable	-0.06530 (0.1585)	-0.0703*** (0.00)	-0.0305 (0.10)
World real GDP growth	1.1047*** (0.21)	-1.6584 (2.42)	0.819 (0.94)
Oil shock	0.0175 (0.03)	-0.0091 (0.08)	0.4042*** (0.12)
1-year lagged oil shock	0.05 (0.08)	(0.08) (0.18)	0.3704** (0.15)
2-year lagged oil shock	0.1007** (0.05)	0.1022 (0.13)	0.3313* (0.20)
Constant	-0.3827 (0.97)	15.6734 (14.30)	-0.2912 (3.63)
Number of observations	548	303	330
LR-Elasticity of Oil Shock	0.07	-0.09	0.80

* p<0.10, ** p<0.05, *** p<0.01. Standard errors in parentheses.

¹Arellano-Bond dynamic panel-data estimation.

⁶ There may be differences in public sector coverage between CEMAC and non-CEMAC countries, as some general government expenditure may be carried out by some large public companies in some CEMAC countries without this being recorded in the budget. We considered these potential differences to be relatively small.

15. Although further analysis confirms the existence of the link between government expenditure and non-oil GDP, its economic significance appears to be weak. An oil-price shock is normally associated with the reduction in government expenditure in CEMAC countries, because of lower oil revenues. This effect is especially strong in the absence of sufficient fiscal buffers. The analysis shows that the change in government expenditure appears to have a statistically significant impact on non-oil GDP growth, for up to one year, but the related coefficient is small and therefore of low economic significance (Table 5). These results are corroborated by Granger causality tests (Table 6). Nevertheless, no strong inferences can be made out of these results bearing in mind the potential small sample bias and the bias that could result from the omission of potentially significant variables, given the use of very simplified regression specifications. It should be noted, however, that the evidence of a direct link between oil and non-oil activities unrelated to the government channel has already been established in other SSA countries, for example in Nigeria.⁷

Table 5. CEMAC: Effect of Real Government Spending Growth on Real Non-Oil GDP Growth¹

	Real non-oil GDP growth
1-year lagged dependent variable	0.3537*** (0.0665)
Real government spending growth	0.0484** (0.02)
1-year lagged	0.0773*** (0.02)
2-year lagged	0.0033 (0.01)
Constant	3.4050*** (0.79)
Number of observations	93
LR-Elasticity of Oil Shock	0.07

* p<0.10, ** p<0.05, *** p<0.01. Standard errors in parentheses.

¹Arellano-Bond dynamic panel-data estimation.

⁷ The March 2015 Selected Issues Paper on Nigeria (15/85) establishes a strong link between oil price movements and non-oil GDP growth not only through government expenditure (a transmission channel that appears to have weakened in recent years), but also through private disposable income.

Table 6. CEMAC: Granger Causality Test: Government Spending and Non-Oil Growth

Panel A: Choice of the optimal lag for Granger causality test

Information Criterion	No lag	One lag	Two lags	Optimal lag
AIC	12.2	11.6	12.2	1
HQIC	12.1	11.4	11.9	1
SBIC	12.3	11.8	12.5	1

Note: AIC stands for Akaike information criterion, HQIC for Hannan-Quinn information criterion, SBIC for Schartz Bayesian information criterion.

Panel B: Causality test using the optimal lag

Dependent variable	Expenditure growth	Non-oil GDP growth
Non-oil GDP Growth, lagged	1.429* (0.719)	0.729*** (0.166)
Expenditure growth, lagged	0.00817*** (0.00213)	0.00169** (0.0157)
Constant	3.496 (4.253)	0.927 (1.232)
Observations	18	18
R-squared	0.140	0.404
Dependent lags	1	1
Independent lags	1	1
F-test	F(1, 61)= 3.95 Prob > F =0.0655	F(1, 61) =8.27 Prob > F =0.0116
Causal inference	Causality	Causality

Robust standard errors are in parentheses. ***p<0.1, ** p<0.05, * p<0.1.

D. Conclusion

16. This paper establishes a strong link between oil price movements and non-oil GDP growth in CEMAC countries. Impulse response estimates, based on regression analyses of the link between oil price changes and non-oil activity in CEMAC countries should therefore be taken into account in policy formulation in the wake of an oil price shock, like the one currently affecting the region.

17. The strong and significant impact of oil price changes on CEMAC non-oil activity and the relatively weak results of the regressions related to the government transmission channel corroborate findings based on the stylized facts. The high sensitivity of non-oil GDP growth to changes in oil price, even when government expenditure is not much affected (as was the case in the context of the 2008 oil-price shock), is of particular interest. It implies that the direct channel through which oil-price fluctuations are transmitted to the non-oil economy is significant, contradicting the common perception of the oil sector operating in an economic enclave. The links that bypass the government expenditure channel could include the behavior of private contractors of oil companies, the consumption by oil sector employees, the liquidity supply to the banking sector as well as other, informal, liquidity channels. This is an area for further exploration.

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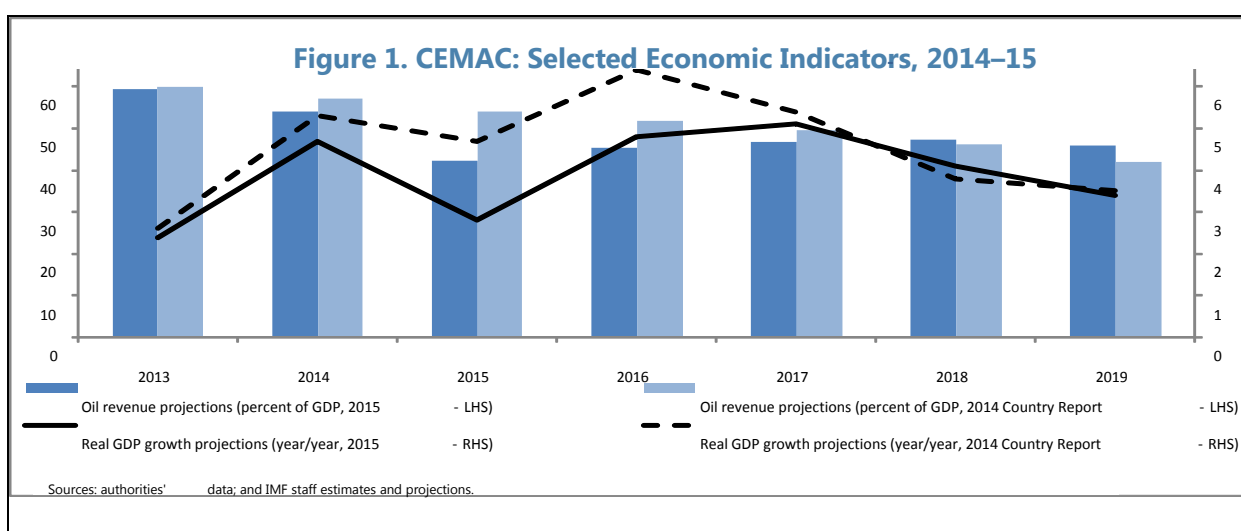
CEMAC: APPLICATION OF A DEBT-INVESTMENT-GROWTH MODEL¹

The fall in the price of crude oil since July of 2014 has an important impact on CEMAC, since five of the six member countries are net oil exporters. An application of a debt-investment-growth (DIG) model confirms the importance of the shock, and shows that robust growth and sustainable macroeconomic balances require policy adjustments. These include measures to enhance the impact of public expenditure, to scale back said expenditure, and to generate additional revenue. The application of the DIG model also points to the difficulty in maintaining an effective stock of public capital when public expenditure must be reined in.

A. Introduction

1. This paper assesses the sustainability of public investment, growth, and public debt in the context of the precipitous fall in oil prices since mid-2014. It builds on the chapter entitled “Public investment scaling-up, growth, and debt dynamics” (IMF 2014), itself based on the DIG model developed by Buffie, Berg, and Zana (2012; Box 1), with an update of key exogenous variables (Box 2), a new analysis of the impact of policy adjustments on key economic variables (Box 3), and a discussion of policy options.

2. The oil price slump has a dramatic effect on economic and fiscal prospects for CEMAC, with looming challenges in the medium term. Growth is now slated to fall by up to 2 percentage points in 2015 relative to medium-term projections from a year ago (Figure 1); and oil revenue is projected to fall by more than 10 percentage points of the new, more modest GDP projections. This change in circumstances raises issues of fiscal and external sustainability that may be addressed, in part, by policy adjustments.



¹ Prepared by Jean van Houtte, with assistance from Matteo Ghilardi.

Box 1. CEMAC: Key Features of the Model

The debt-investment-growth (DIG) model is a computable general equilibrium model that offers an alternative to the classic “financial programming” model. It is inherently different in that growth is an endogenous variable, and thus offers interesting insights on the dynamics between investment, growth, and debt after initial conditions are specified.

- The model features three production sectors: (i) the oil sector; (ii) the sector producing non-oil internationally traded goods; and (iii) the non-traded goods sector. The oil sector is modeled as a yearly endowment that is exported, and the proceeds of which are shared between the government, households, and extracting firms. The other two sectors are modeled as a Cobb-Douglas production function involving public capital, private capital, and labor.
- Households comprise savers and non-savers. Savers can invest in government bonds, and may borrow at significant rates in an international financial market.
- Governments can decide to spend in the form of transfers to households or public investment, and must pay interest on borrowings. Their resources comprise external concessional borrowing, external non-concessional borrowing, domestic borrowing, grants, and a consumption tax.

Public capital is expanded by yearly capital expenditure, but is discounted by an efficiency factor that accounts for leakages of public resources.

Box 2. CEMAC: Initial Conditions

Initial conditions for the model in “year zero” mirror closely CEMAC’s circumstances in 2013. The initial levels of some of the important variables that will determine sustainability are either CEMAC-specific, or calibrated to low-income countries. They are as follows:

- a. an initial public debt level of 30 percent of GDP, split equally between domestic debt, external concessional debt, and external commercial debt;
- b. interest rates on domestic debt and external non-concessional debt are 6 percent and 8 percent, respectively;
- c. foreign grants are limited to 1 percent of GDP;
- d. the consumption tax rate is 15 percent;
- e. public investment spending is 12 percent of GDP;
- f. the public investment efficiency level is 40 percent;
- g. the financial return on public capital is 20 percent;
- h. the ratio of non-savers to savers is 1.5;
- i. capital’s share in the value added of the tradable sector is 40 percent;
- j. capital’s share in the value added of the non-tradable sector is 55 percent;
- k. value added in the non-tradable sector is 49.4 percent; and
- l. the ratio of imports-to-GDP is 30.5 percent.

Box 3. CEMAC: The Model's Output Variables

The various scenarios that follow are each accompanied by eight graphs that illustrate the profile of relevant variables. These variables have been selected to highlight the important dimensions of sustainability (fiscal and external), the trade-offs between sustainability and poverty alleviation, and meaningful transmission mechanisms by which changes in assumptions affect policy objectives. The variables are summarily discussed below.

"Scaling Up" - displays the values of investment spending for all CEMAC governments, as a percentage of CEMAC GDP.	"Tax Rate" – shows the actual percentage of the value of consumption that is captured by governments in the form of a tax.
"Oil Revenues" – represents the value of revenues from oil for all CEMAC governments, as a percentage of CEMAC GDP.	"Public Effective Capital" - shows the increase over year zero of the actual public capital formed from public investment spending.
"Private Capital" – shows the increase over year zero of the actual private capital formed.	"Real per Capita GDP Growth" - illustrates year-on-year increases of GDP per capita (i.e., real GDP growth net of population growth).
"Current Account Deficit" – refers to the external current account deficit in percent of GDP, an important indicator of external sustainability.	"Total Public Debt" – is the main indicator of fiscal sustainability; it is preferred to the fiscal deficit over longer projection periods because it factors in amortization patterns.

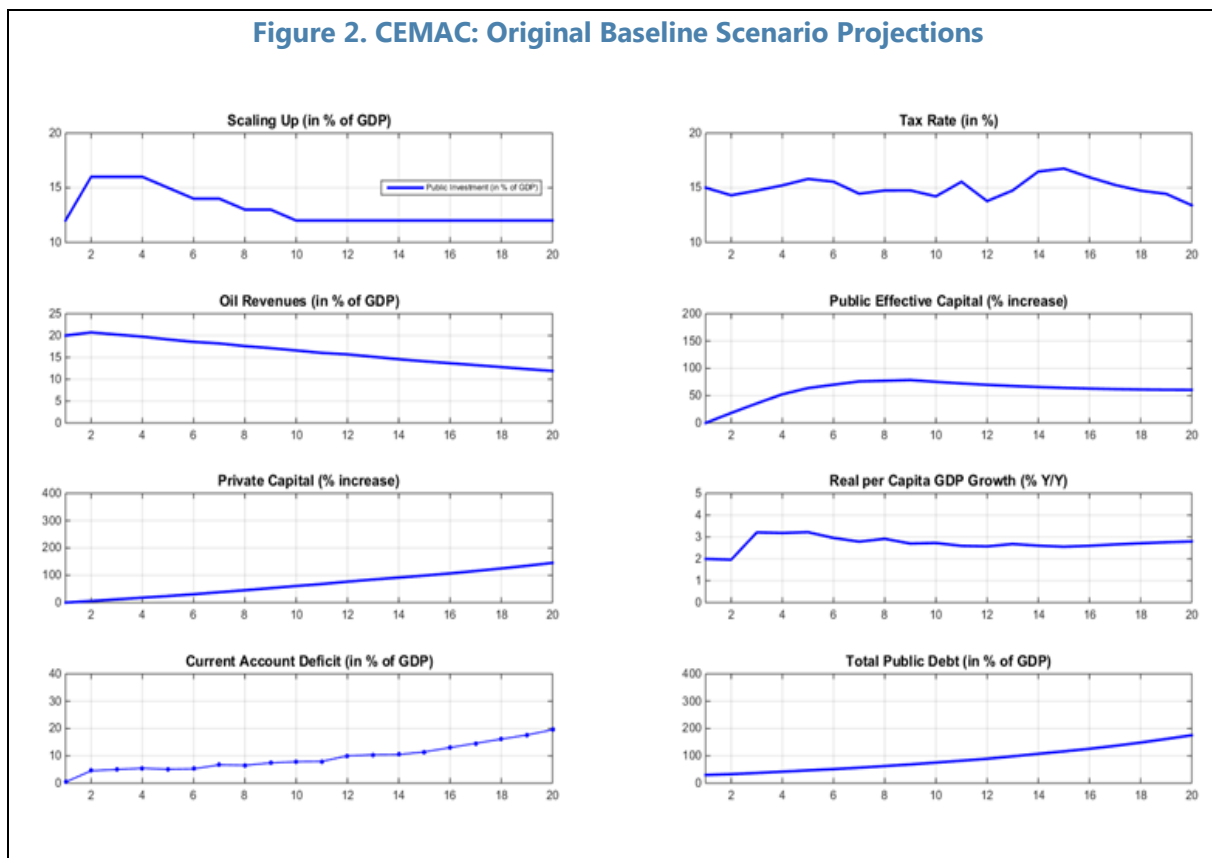
B. Baseline Scenarios—A Shift in the Outlook

The Original Baseline Scenario: "What the future looked like a year ago"

3. The original baseline scenario is a close approximation of the scenario used in the appendix to the 2014 CEMAC Country Report (IMF 2014). It is predicated on five important trends: (i) a profile for public investment spending that spikes at 16 percent of GDP in 2014 and gradually declines to 12 percent by 2020; (ii) debt financing of all public investment spending, less 4 percentage points of GDP; (iii) a flat consumption tax rate of 15 percent; (iv) stable current spending relative to GDP; and (v) crude oil revenue reflecting a gradual volume decrease, and the June 2014 IMF World Economic Outlook (WEO) price projections, when the price of oil was expected to ebb only slightly from its high level of more than US\$110 per barrel.

4. Until mid-2014, the macroeconomic outlook for the region was sustainable (Figure 2). Growth per capita was to pick up sharply with the scaling up of investment spending, and as private capital formation increased, growth per capita was to continue at a slightly lesser, but still commendable, rate in the long run. In the medium term (up to 2020; year 7 on the horizontal axis), overall public debt was to increase only gradually to under 50 percent of GDP, which is less than the CEMAC convergence ceiling of 70 percent, despite an assumption of consistently low consumption taxes. Almost as important, the effectiveness of new public capital was to increase sharply and remain strong over time, despite a small dip between years 10 and 14.

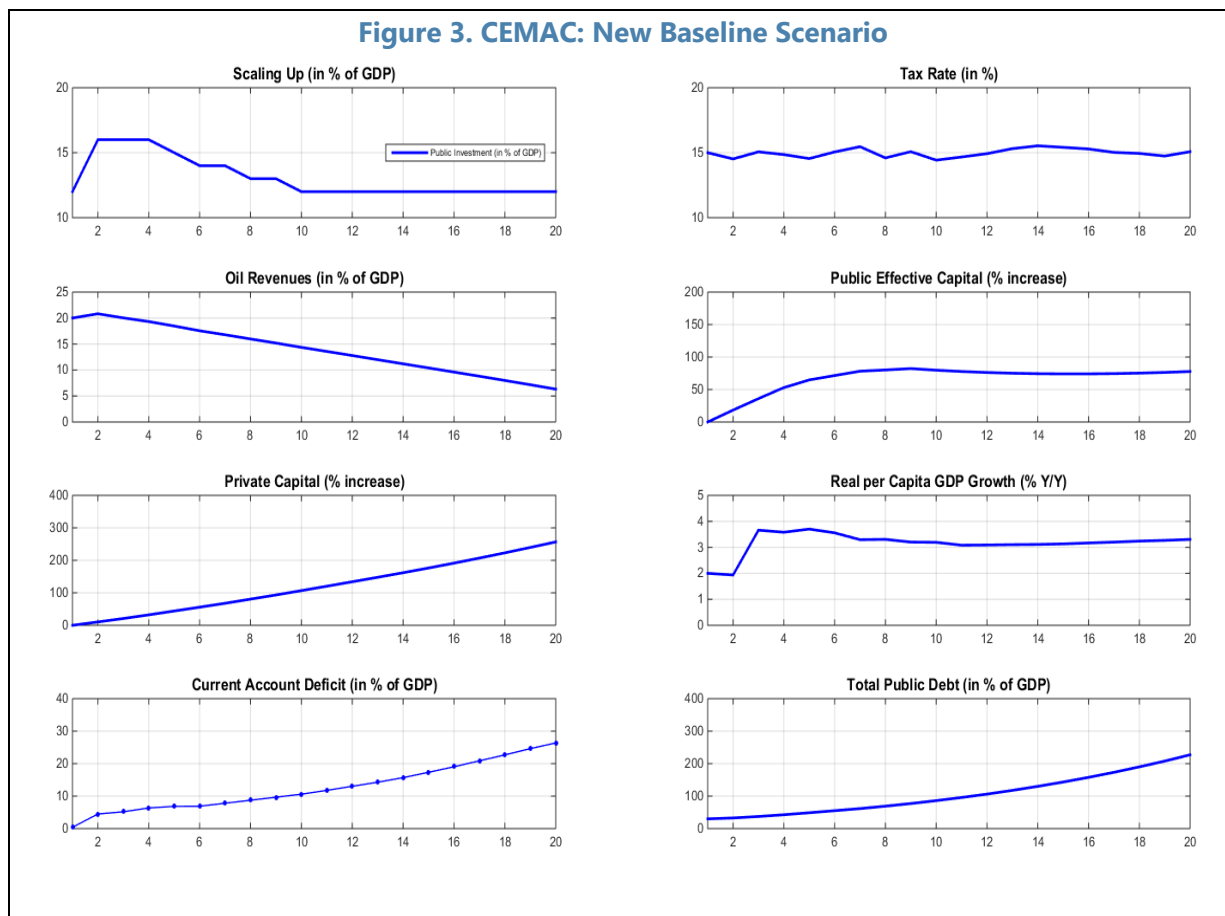
Figure 2. CEMAC: Original Baseline Scenario Projections



The Current Baseline Scenario: "The New Reality"

5. The current baseline scenario retains all the assumptions from the original baseline scenario, with the exception of oil revenue, which is now set to fall by 40 percent for any given year relative to the baseline scenario, on account of the international oil price shock (Figure 3). This adjustment is consistent with the oil price projections from the WEO of April 2015. The fall in oil revenue is completely offset by external non-concessional borrowing.

6. In the absence of any policy adjustment, the fall in oil revenue causes the macroeconomic outlook to become unsustainable. Total public debt increases faster, especially in the medium term, when it exceeds 50 percent of GDP within 5 years, and the external current account deficit evolves in the same manner. However, the shift of the budget financing burden from oil revenue to external debt releases domestic resources that allow for private capital to accumulate faster, and raises growth per capita marginally over time.



C. Reform Scenarios—Mapping a Path to Sustainable Development

Reform Scenario #1: “Improved Public Investment Efficiency”

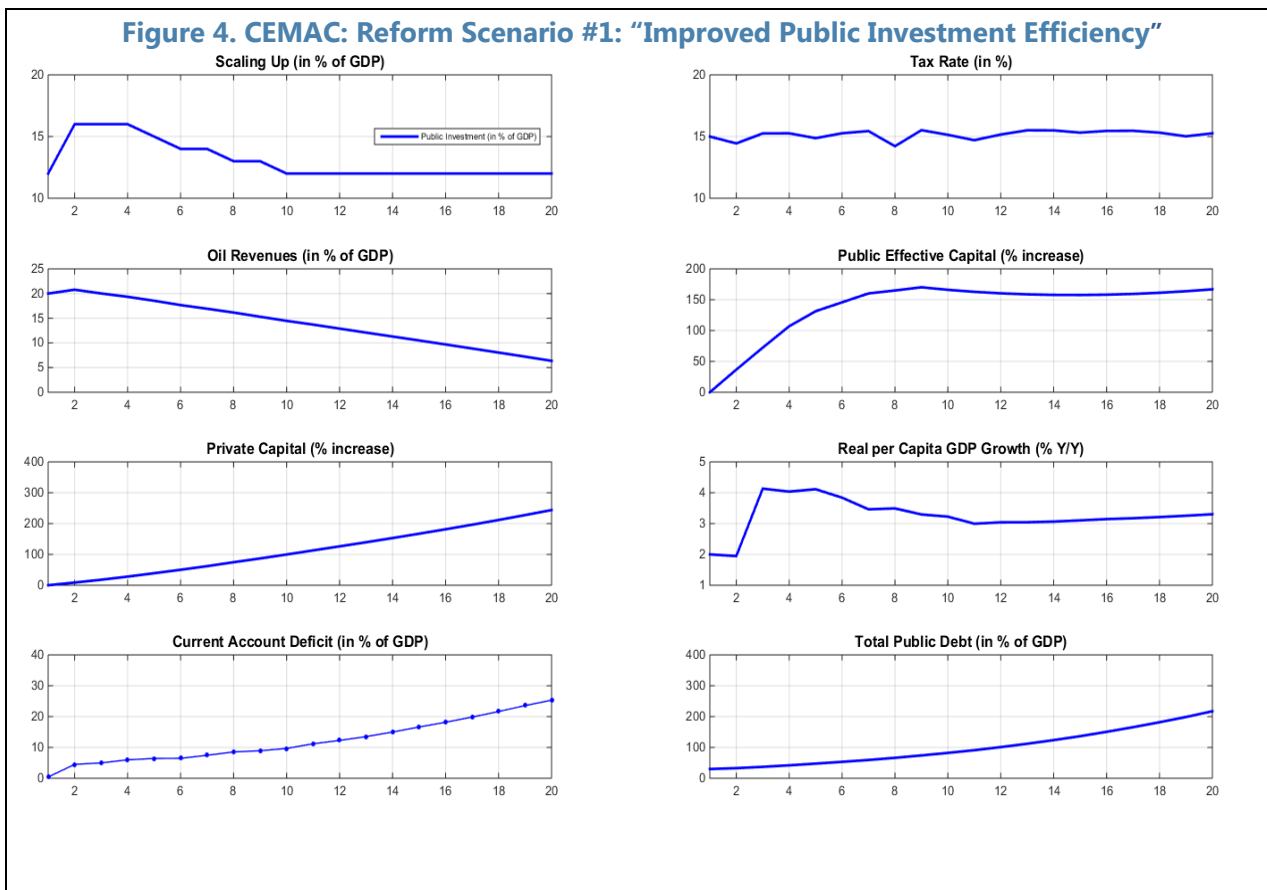
7. The government has an array of policy tools to improve macroeconomic sustainability. One method is to improve the efficiency of public spending with the help of new assessment tools.² Under this scenario, the efficiency of spending increases from 40 percent to 80 percent,³ a level that is common in faster developing economies (Figure 4).

8. This reform affects growth more than fiscal balances. Effective public capital accumulation almost doubles, which contributes to a marginal improvement in growth per capita; but it does not affect the profile of public debt meaningfully, especially in the medium term, since the tax rate is set at

² IMF staff has developed a new Public Investment Management Assessment (PIMA) tool to this effect.

³ Pritchett (1996) estimates that public capital accumulation in less developed countries can be less than 50 percent of public investment; he also finds that “factor accumulation,” including public capital formation, routinely exceeds 80 percent in other economies.

15 percent by design; and the tax base (i.e., consumption) is undermined by a higher propensity to allocate resources to private capital, which is stimulated by higher levels of public capital.

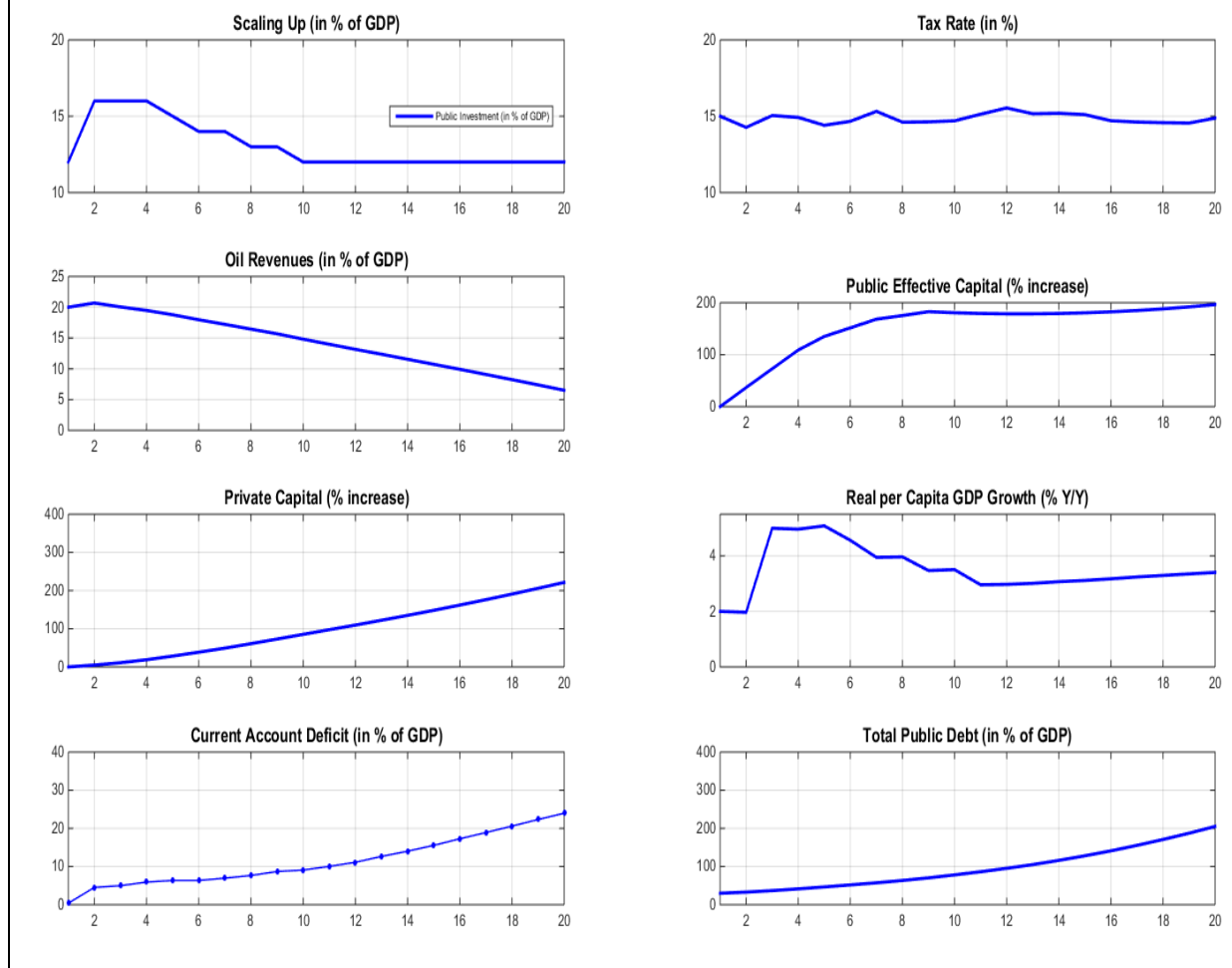


Reform Scenario #2: “Improved Efficiency and Return on Public Investment”

9. Governments can choose to improve income from new public infrastructure, which is originally set at a low level of 20 percent in this model. A new higher return of 40 percent could come from selecting public investments that can generate a cash flow, and charging higher user fees for these investments, such as roads, bridges, dams, or port concessions (Figure 5).

10. The main effect of this policy adjustment is, as with the previous reform, to enhance growth more than fiscal balances. Public debt accumulation in this scenario is somewhat lower. A higher return on public investment gradually increases the effectiveness of public capital, thus helping to sustain the level of productive public capital. Debt sustainability remains doubtful for the same reason as in the previous scenario: the tax rate is broadly constant, and the tax base does not grow as fast as the overall economy, because faster private capital formation is crowding out consumption.

Figure 5. CEMAC: Reform Scenario #2: “Improved Efficiency and Return on Public Investment”

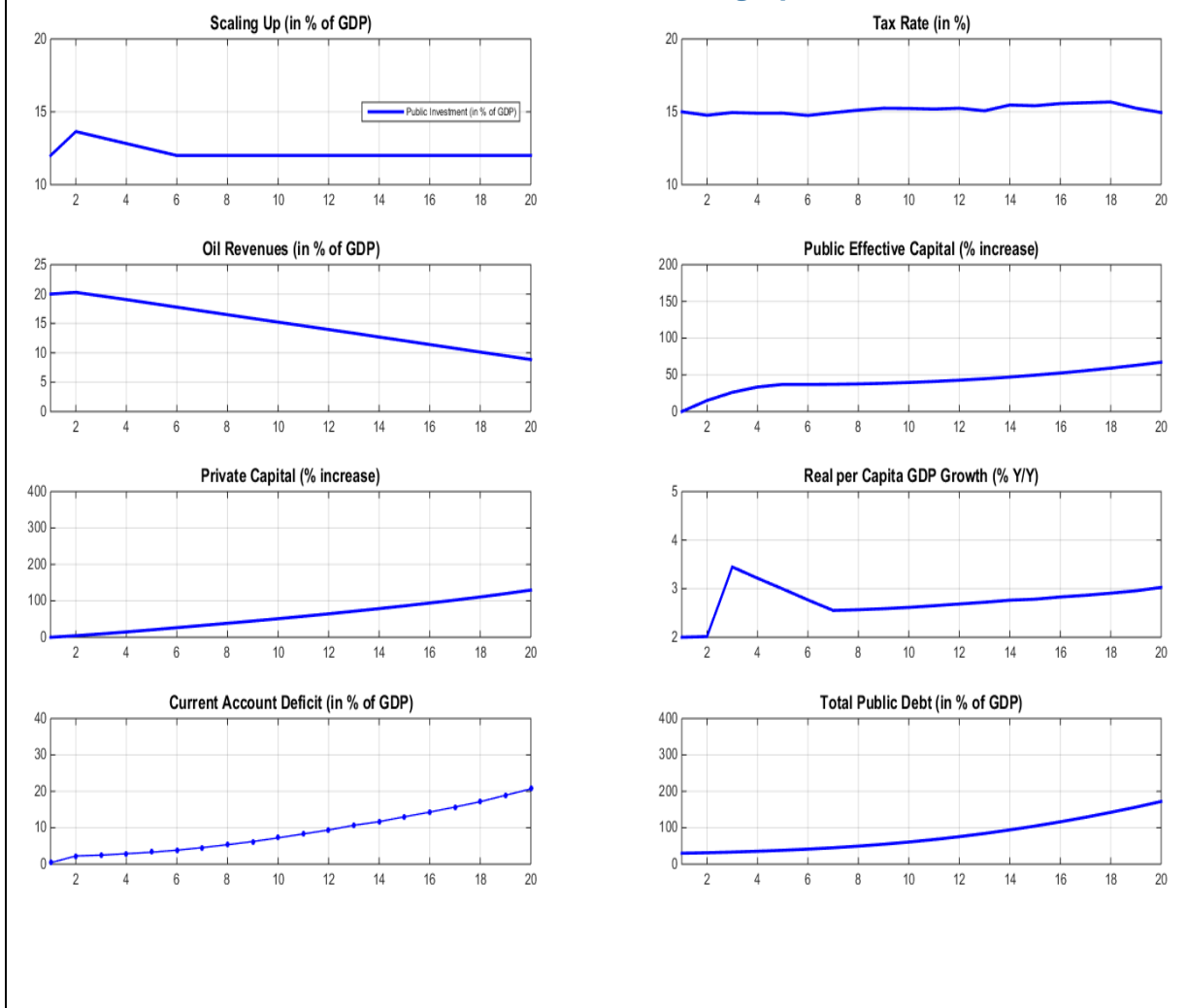


Reform Scenario #3: “Improved Efficiency and Return on Public Investment, with Lower Scaling Up of Investment”

11. This scenario is the first to introduce an adjustment to a variable that affects fiscal sustainability directly. The previous reform scenario is now complemented with the assumption of a limited scaling up in the near term. The increase in public investment is divided by two (e.g., for 2014, public investment is lowered from 16 percent of GDP to 14 percent of GDP starting from a level of 12 percent of GDP the year before). It is worth noting that this remains a “scaling up” scenario, with public investment at consistently high levels of more than 10 percent of GDP (Figure 6).

12. This scenario has a strong positive effect on debt sustainability in the medium term. Total public debt reaches only 40 percent of GDP by 2019. In the long term, however, debt dynamics are again dominated by the severe shortfall in oil revenue. Real GDP growth per capita is lower during the scaling up period owing to lower public expenditure, but it maintains a favorable, consistently increasing profile beyond the years of the scaling up.

Figure 6. CEMAC: Reform Scenario #3: “Improved Efficiency and Return for Public Investment and Low Scaling Up”

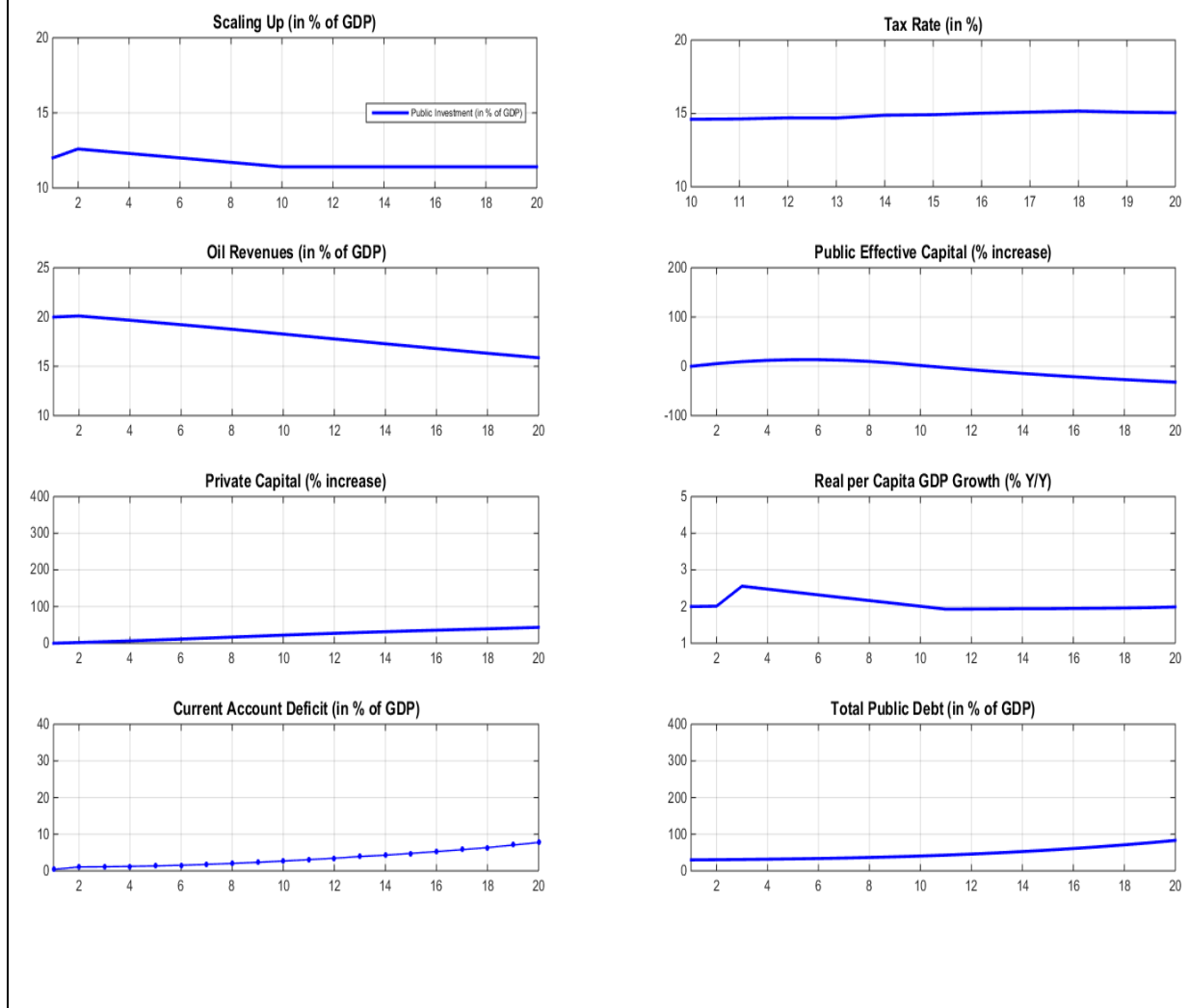


Reform Scenario #4: “Improved Efficiency and Return on Public Investment, with a Gradual Scaling Down of Investment and a Marginal Tax rate Increase”

13. This scenario includes two new adjustments: (i) a permanent dip in investment to 11 percent of GDP after a more limited scaling up; and (ii) a gradual increase in the rate of consumption taxes (from 15 percent to 16 percent; Figure 7).

14. The additional adjustments have a dramatic and favorable effect on sustainability. The rise in the tax rate has a more significant effect over time, when the oil revenue shortfall becomes more pronounced, thus offsetting much of the latter’s effect on debt accumulation. In this scenario, however, the higher tax burden causes a noticeable crowding out of private investment; and lower public investment undermines the marginal production of private capital. Both of these developments dampen economic growth per capita over time. Importantly also, effective public capital dips slightly over time.

Figure 7. CEMAC: Reform Scenario #4: “Improved Efficiency and Return for Public Investment with a Gradual Scaling Down and a Marginal Tax Rate Increase”



D. Conclusion and Policy Options

15. The various iterations of the DIG model for CEMAC show that certain policy tools have a significant direct effect on growth per capita, with indirect consequences on fiscal balances. The most important among these variables is the efficiency of public investment, which, when doubled, prompts a jump in the rate of growth per capita by around one percentage point within five years. Other variables have a strong direct impact on fiscal balances, with a knock-on effect on growth per capita. These variables are the magnitude of the scaling up of investment, and the consumption tax rate. It is worth flagging that a lower level of volatility in public investment (i.e., a lesser “hump” in the scaling up profile) also leads to a more stable stock of effective public capital.

16. CEMAC governments may exercise a degree of control over these policy variables.

Improving the efficiency of public spending points to reform areas that include public procurement and financial management, which are currently weak in CEMAC. Moreover, efficiency improvements are as much a matter of project selection as process administration. Coherent project selection in times of

expenditure restraint becomes all the more important, and underscores the need for upstream mechanisms to identify the projects that offer the best value for money and the greatest complementarity with other projects. Enhanced regional coordination between member states in the selection and building of infrastructure projects is an avenue to be explored in this context.

17. Scaling down public investment plans must be part of the policy adjustments in the near term to ensure sustainability. The pursuit of ambitious, pre-shock investment plans, at the time of a precipitous collapse in oil prices, is unsustainable. Fiscal conservation measures on expenditure should extend beyond the initial the scaling-up period, because oil revenue levels continue their downward trend. It should be noted that that even the final, more conservative reform scenario leaves enough fiscal space for significant public investment spending (more than 10 percent of GDP).

18. An upward adjustment of consumption tax rates (such as that of the value-added tax) could be considered. A small increase (e.g., half a percentage point) has a big impact, especially because it applies to the broader tax base that comes with higher growth per capita.

19. Finally, CEMAC authorities would benefit from securing alternative, less expensive sources of financing than borrowing at commercial rates. Although all scenarios assume that financing shortfalls would be met with external non-concessional debt, it should be understood that any effort to enhance the concessionality of financing would ease the burden of reform in other policy areas.

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