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Article

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Role of central bank independence on monetary integration and business cycle synchronization in the economic community of West African States

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ABSTRACT

This article examines the effects of monetary integration on the synchronization of the business cycle within ECOWAS (Economic Community of West African States) and contributes to the economic literature dealing with these aspects. First, the indicators of de facto and de jure central bank independence are considered to examine the role of central bank independence in the relationship between monetary integration and business cycle synchronization. Second, the ARDL error correction estimator is used to analyze both short- and long-run relationships and to address potential problems related to endogenous variables. Using panel data covering 105 country pairs from 1990 to 2020, the estimation results show a positive and statistically significant effect of monetary integration on the long-run synchronization of the business cycle. Regarding short-term synchronization, the conclusions are mixed. Overall, this study argues for the implementation of economic policy measures aimed, among other things, at complying with convergence criteria, strengthening trade agreements, and ensuring the independence of the central bank of the future monetary union.

IMPACT STATEMENT

This article demonstrates that monetary integration promotes long-term business cycle synchronization within ECOWAS, highlighting the importance of central bank independence. Using panel data and an ARDL method, it reveals significant effects of this integration while noting mixed results in the short term. The findings advocate for economic policies focused on convergence criteria, strengthened trade agreements, and central bank independence to enhance regional stability.

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Introduction

Monetary integration, which involves the coordination of monetary policy or the adoption of a common currency by several countries, aims to promote economic convergence and stability within a region or economic bloc (Corden, 1972). This process usually involves the removal of barriers to trade and capital movements and the coordination of economic policies to promote greater economic convergence between participating countries. The benefits of monetary integration include better capital allocation, higher growth potential, lower transaction costs, and greater price transparency (Baele et al., 2004).

The dynamic theory of economic integration, introduced by Balassa (1961) and further elaborated by Cooper and Massell (1965), emphasizes the dynamic effects of integration and recognizes that static analysis is not sufficient to fully capture these effects. Optimal currency area (OCA) theory, as outlined by De Grauwe and Mongelli (2005), identifies criteria for the formation of a monetary union, including similar inflation rates and business cycle synchronization (BCS), which are crucial for an effective common monetary policy (Ishiyama, 1975; Kenen, 1969; McKinnon, 1963; Mundell, 1961). BCS, a fundamental

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concept in macroeconomic analysis that refers to the tendency of different components of the economy to evolve similarly over time (Tapsoba, 2009; Zouri, 2020), plays a central role in this context (Diendere et al., 2024).

In addition, financial and monetary dynamics have a significant impact on the economic landscape. Rapid adaptation to shocks is crucial, with increased financial and monetary linkages facilitating the redistribution of capital through comparative advantage and promoting expanded trade opportunities (García-Herrero & Ruiz, 2008). Moreover, the transition from safe, low-return investments to higher-risk, high-return ventures leads to increased convergence of industrial structures amid widespread sectoral expansion (Heathcote & Perri, 2002; Schiavo, 2008). The deepening of financial and monetary linkages leads to increased BCS, driven by significant demand-side effects. For example, large investments by consumers from different countries in a particular stock market can trigger a simultaneous decline in demand for consumer and capital goods. At the same time, contagion effects through financial channels could amplify the cross-border effects of macroeconomic fluctuations (Kose et al., 2003).

In contrast, the institutional dimension of monetary integration, associated with concepts such as time inconsistency developed by Kydland and Prescott (1977), emphasizes the potential for reduced inflation bias through an independent central bank (CBI) (Backus & Driffill, 1985; Barro & Gordon, 1983). Due to time inconsistency, many developing countries, including those of the Economic Community of West African States (ECOWAS), opt for inflation-targeting monetary policy (Mahawiya et al., 2020).

The economic context is characterized by an expansion of the global money supply because of the measures taken to combat the economic crisis caused by the COVID-19 pandemic. In West Africa, inflation rose from an average of 9.7% in the period 2014–2020 to 12.7% in 2021 and 17% in 2022. In contrast to East Africa, where currencies are not pegged to each other, the West African Economic and Monetary Union (WAEMU) has a conventional currency pegging system, resulting in generally lower inflation rates. The rise in inflation in 2022 in West Africa and across the continent is primarily due to higher food and energy prices caused by the disruption of the global supply chain because of the Russian invasion of Ukraine. Many countries in West Africa are experiencing high inflation rates: inflation in Ghana rose with an average of 13% in the period 2014–2020 and from 10% in 2021 to 31.5% in 2022, from 12.1% and 11.9% to 26.1% in Sierra Leone, and from 12.3% and 17% in the same period to 18.8% in Nigeria. In addition, inflation in Burkina Faso rose from an average of 0.5% in the period 2014–2020 and 3.9% in 2021 to 14.4% in 2022, while prices in Mali rose from 0.5% and 3.9% to 9.7% in 2022 (African Development Bank, 2023).

In this context, the following question arises: What role does central bank independence play in the link between monetary integration and the synchronization of the business cycle in ECOWAS countries? The main objective of this study is to assess the relevance of the establishment of a monetary union within ECOWAS considering the effects of monetary integration on business cycle synchronization. The underlying hypothesis is that central bank independence has a positive and statistically significant effect on the relationship between monetary integration and BCS within ECOWAS countries. The authorities of the Economic Community of West African States (ECOWAS) launched the Economic and Monetary Cooperation Program (EMCP) to accelerate the introduction of a common currency. This program is based on a two-pronged approach that provides for the creation of an additional currency zone alongside the West African Economic and Monetary Union (WAEMU) and the expansion of the existing monetary union. The West African Monetary Zone (WAMZ), established in 2003, comprises countries such as Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone, while the second component aims to integrate the WAEMU countries with those of the newly created WAMZ within the framework of the EMCP.

This study is motivated by several factors. First, in a regional context where countries are seeking greater economic integration, it is crucial to understand how national monetary policies and coordination between central banks affect the BCS. Second, central bank independence is a key element of economic governance and its impact on regional economic convergence should be studied to inform future policy decisions. Finally, a better understanding of these dynamics can help identify potential challenges and formulate effective policies to promote economic stability and sustainable growth in the region.

It is worth noting that research on the relationship between monetary integration and BCS often focuses on the effects of monetary regimes such as inflation targeting, especially in developed countries (Delgado et al., 2020; Flood & Rose, 2010; Inoue et al., 2012; Rose, 2009). This research gap highlights

the need to investigate neglected aspects such as analyzing the effects of inflation differentials on the BCS, considering the role of central bank independence, and conducting both short- and long-term analyses (Camacho et al., 2006; Frankel & Rose, 1997; García-Herrero & Ruiz, 2008; Nzimande & Ngalawa, 2017). Conventional methods such as ordinary least squares and instrumental variables are limited in accurately assessing the impact of monetary integration on the BCS and the role of central bank independence in this relationship, which requires more robust analytical approaches.

This study aims to fill these gaps by examining both *de facto* and *de jure* central bank independence on a country-by-country basis to investigate the role of central bank independence in monetary integration and its relationship with the BCS. Furthermore, this study highlights the positive role of central bank independence in promoting monetary policy cooperation and coordination within ECOWAS member countries. An independent central bank is better placed to actively engage in coordination initiatives such as the harmonization of monetary policy and the implementation of common measures to cushion economic shocks, thus promoting economic convergence. In addition, the use of the ARDL estimator with error correction enables the dynamic analysis of the relationship between monetary integration and BCS in the short and long run, solving problems related to endogenous variables and improving estimation accuracy. Finally, this study proposes an analysis of the role of political instability in the relationship between monetary integration and business cycle synchronization in ECOWAS and provides insights into the complex interplay of factors affecting regional economic stability and growth.

The rest of the paper is structured as follows. The second section presents the stylized facts, while the third section is devoted to the literature review. The fourth section deals with the materials and methods, and the fifth section contains the main results and discussions. In the sixth section, robustness tests are performed. The paper ends with a conclusion.

Stylized facts on monetary integration

In this section, the dynamics of inflation which constitutes one of the main stylized facts of monetary integration will be presented. For this purpose, the ECOWAS is divided into a WAEMU area and a non-WAEMU area.

Inflation control in the WAEMU countries

Controlling inflation around the annual target of 3% is a key component of WAEMU's monetary policy. Despite the efforts of the monetary authorities to respect this objective, the dynamics of inflation have been characterized in recent years by moderate variability, linked to several factors, such as the introduction of the Common External Tariff (CET) in 2000, the increase in VAT on certain consumer goods, food shortages caused by drought and socio-political crises in Mali and Côte d'Ivoire. The Union's external dependence on energy and food also played an important role in these fluctuations. Figure 1 shows inflation trends within WAEMU countries.

From 2008 to 2018, inflation rates in the WAEMU member countries varied, although the overall trends remained similar. In 2008 and 2011, inflation spiked across the Union, reaching 7.4% and 3.9% respectively, mainly due to factors such as the food and energy crisis and the post-election crisis in Côte d'Ivoire. Subsequently, in 2012, some countries such as Benin, Mali, and Burkina Faso recorded inflation rates that were well above the convergence threshold of 3%. In 2017, inflation rose in some countries due to domestic factors, including rising rents, food prices, and local grain prices. Rents increased in most countries, particularly in Niger and Côte d'Ivoire, while local cereal prices skyrocketed due to declining production in Côte d'Ivoire and Senegal (BCEAO, 2017). Between 2015 and 2020, however, the inflation rate stabilized in all countries in the WAEMU countries.

Volatility and persistence of inflation in non-WAEMU countries

Figure 2 highlights inflation trend in the non-WAEMU countries over the period 1990–2020. The price dynamic within non-WAEMU countries remains relatively more unstable and inflation is more persistent.

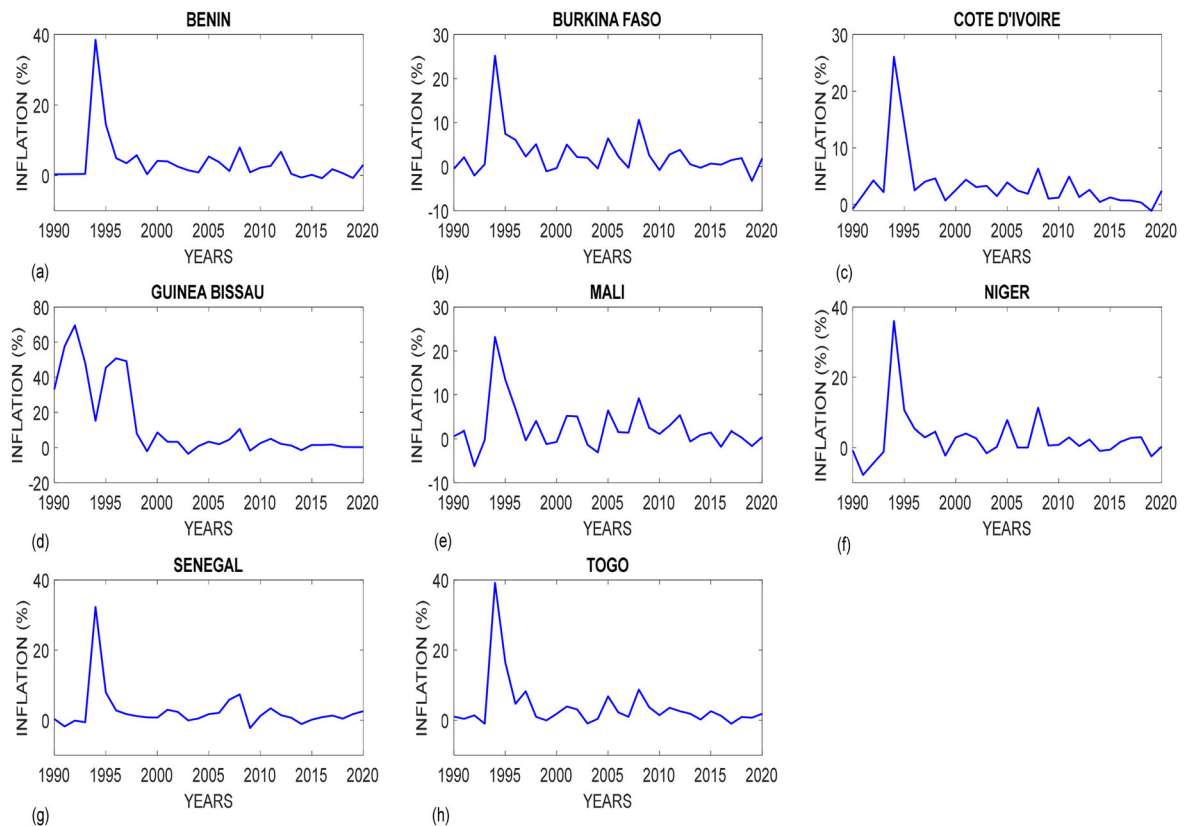


Figure 1. Inflation rates in WAEMU countries (%).

Source: Author based on data from the International Monetary Fund (IMF, 2022).

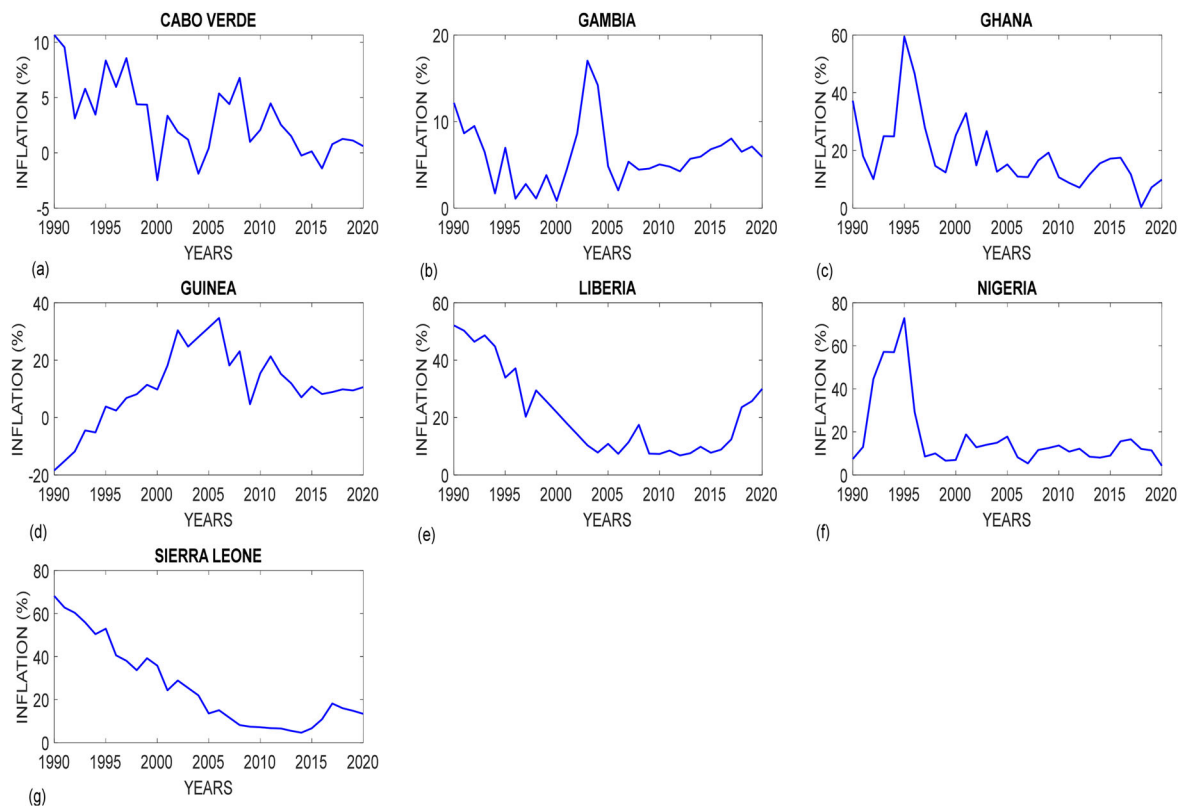


Figure 2. Inflation rates in non-WAEMU countries (%).

Source: Author based on data from the International Monetary Fund (IMF, 2022).

During this period, inflation in the entire WAMZ region fluctuated significantly from one year to the next, averaging 10.07%.

Each country in the region experienced significant fluctuations in inflation, with some countries managing to reduce their inflation rates over time, while others maintained high levels. Nigeria in particular experienced significant fluctuations, peaking at 72.84% in 1995, while Cabo Verde has consistently had relatively low inflation rates. The monetary cooperation agreement signed in March 1998 with Portugal allowed Cabo Verde to maintain price stability. Despite generally positive trends, some WAMZ countries have struggled with high inflation rates, reflecting underlying economic or monetary challenges. In 2020, Ghana recorded the highest inflation rate at around 9.89%, while Sierra Leone averaged 8.55% from 2010 to 2020. Various factors influence inflation rates, including monetary policies, fluctuations in commodity prices—mainly oil, demographic conditions, political instability, and country-specific economic and institutional policies.

Literature review

This section presents the theoretical and empirical literature on the relationship between monetary integration and BCS.

Theoretical literature

The traditional theory of economic integration, first presented by Viner (1950), examines the advantages, such as trade creation, and disadvantages, such as trade diversion, associated with integration. Viner (1950) assumes that trade creation increases welfare, while trade diversion decreases it. The dynamic theory of economic integration, developed by Balassa (1961), goes beyond this traditional view and shifts the focus to the dynamic effects, including increased competition, investment flows, economies of scale, technology transfer, and improved productivity. By eliminating exchange rate fluctuations, monetary integration facilitates trade between member countries, promoting specialization and diversification of markets. Building on this notion of dynamic effects, Balassa's (1961) theory focuses on broader economic integration. In contrast, monetary integration entails broader challenges, such as the loss of monetary sovereignty and the need for coordinated economic policies. These challenges should be considered when assessing the feasibility of a monetary union within the ECOWAS region. In addition, monetary integration can significantly affect the degree of specialization in international trade.

Regarding this influence on trade specialization, the two-country International Real Business Cycle (IRBC) model, as proposed by Backus et al. (1992) and Baxter and Crucini (1995) suggests that bilateral trade serves as a mechanism for resource transfer between countries in response to technological shocks and ultimately reduces output correlations. Conversely, Obstfeld (1994) finds that monetary integration encourages investment in high-risk projects, promotes specialization based on comparative advantage, and allows for more efficient resource allocation. Kalemli-Ozcan et al. (2001, 2003) also find that diversification of ownership through international financial markets improves the ability of regions and countries to absorb idiosyncratic shocks, thereby reducing the synchronization of business cycles between countries.

Beyond the impact on trade specialization, understanding the link between monetary integration, as measured by the similarity of inflation rates among countries, and the synchronization of business cycles is crucial for grasping the effects of monetary coordination on regional macroeconomic stability. The greater similarity in inflation rates between member countries could mean a convergence of monetary policies and better coordination of economic policies, ultimately favoring closer synchronization of business cycles. This enhanced synchronization can reduce macroeconomic asymmetries and increase resilience to external economic shocks, thereby strengthening regional stability (García-Herrero & Ruiz, 2008). In this perspective, several theoretical arguments link central bank independence and inflation using various mechanisms. The theory of time inconsistency, as elucidated by Backus and Driffill (1985) and Barro and Gordon (1983), is fundamental to understanding these mechanisms. Buchanan and Wagner (1977) and Kydland and Prescott (1977) echo the analysis of Barro and Gordon (1983), suggesting that central bank independence can reduce inflation expectations, thereby resulting in lower inflation. In the

same vein, monetary integration, and central bank independence have significant implications for economic welfare and policy outcomes. While traditional integration theories underscore trade benefits and disadvantages, dynamic integration theories emphasize advantages like improved productivity and specialization, specifically in monetary integration. However, these dynamics come with challenges, including losing monetary sovereignty and policy coordination, which are particularly relevant in the ECOWAS region. The analysis of the impact of central bank independence on inflation suggests that autonomous central banks can help maintain low inflation expectations, thereby dampening actual inflation. These insights underscore the importance of institutional design and policy decisions in shaping economic outcomes, urging policymakers to consider these dynamics when formulating economic development and stability strategies.

Empirical literature

This sub-section presents the empirical literature on the relationship between monetary integration and the synchronization of business cycles. It then focuses on the relationship between inflation targeting, monetary policy, institutions, and the synchronization of business cycles.

Inflation targeting and business cycle synchronization

Macroeconomic policy plays a crucial role in shaping the degree of business cycle synchronization (BCS). Economic authorities set policy frameworks to achieve trade, monetary, and exchange rate policy objectives. An important aspect of monetary policy is inflation targeting (IT), which has become a main strategy for stabilizing inflation, particularly in emerging markets, as more and more countries adopt this system (Schmidt-Hebbel & Carrasco, 2016). Proponents of inflation targeting hypothesize that it has a positive effect on the BCS as it allows central banks to regulate interest rates to maintain a stable level of inflation, thus improving the response of domestic output to external disturbances (Flood & Rose, 2010). Cho and Rhee (2015) examine the effectiveness of IT in stabilizing the real economy, focusing on advanced countries that adopted IT in the early 1990s. Based on monetary accounting methodology over the business cycle, they conclude that monetary policy has significantly reduced business cycle fluctuations since the introduction of IT.

Khan et al. (2020) show that IT has a positive impact on the BCS of South Asian countries both before and after the establishment of the South Asian Association for Regional Cooperation (SAARC), confirming the findings of Flood and Rose (2010). Delgado et al. (2020) also highlight that the adoption of IT improves BCS and emphasize the importance of credibility of announcements for cycle linkage. Moreover, their results suggest that the effects on synchronization are even more pronounced when economic agents exhibit long-term memory when assessing the credibility of inflation expectations.

In summary, macroeconomic policy, especially inflation targeting, influences the synchronization of business cycles. The introduction of IT enables the regulation of interest rates to keep inflation stable and improve the responsiveness of domestic output to external shocks. Research confirms the positive effect on the synchronization of business cycles and underlines the importance of the credibility of IT announcements. Then, this approach underlines its key role in economic policy formulation.

Monetary policy and business cycle synchronization

Asymmetric economic imbalances between nations are often due to differences in monetary policy management (Beck, 2013). In addition to the transmission effects of monetary disturbances, macroeconomic instability affecting member countries can also lead to asymmetric shocks (De Grauwe & S  n  gas, 2003). The propagation of these shocks from one area to another is assumed to influence the synchronization of the business cycle (BCS) differently. According to B  wer and Guillemineau (2006) and Dai (2014), countries that adopt a similar monetary policy stance tend to react similarly to monetary policy disturbances, which facilitates the transmission of symmetric disturbances and strengthens the BCS.

Conversely, in the event of macroeconomic disturbances affecting member countries with divergent monetary policy positions, countries pursuing a concerted monetary policy approach may have difficulties in dealing with these specific disturbances independently (B  wer & Guillemineau, 2006; Dai, 2014). Without monetary policy coordination, member countries could make individual adjustments to counter

these shocks (Fidrmuc & Korhonen, 2010). However, in a common currency area, such as the WAEMU and the CMA (Common Monetary Area) between 1960 and 2016, countries lack the flexibility to take individual monetary policy actions to respond to economic shocks affecting their economies (Mattera & Franses, 2023). Fankem and Mbese (2023) examine the potential for an African monetary union based on the synchronization of the business cycle between five Regional Economic Communities (RECs): the East African Community, the Economic Community of Central African States, the Economic Community of West African States, the Southern African Development Community, and the Arab Maghreb Union. Using a novel continuous wavelet approach, the analysis reveals heterogeneous synchronization patterns across time and horizons between RECs. Despite controlling for overlapping memberships in several RECs, the level of synchronization remains insufficient, suggesting that African countries may not yet be fully benefiting from a common monetary policy.

Mestre and Odry (2021) analyze the impact of the European Central Bank's (ECB) monetary policy on the BCS in Europe from 2000 to 2018. Using wavelets and dynamic panel estimation methods, they suggest that the ECB's unconventional monetary policy positively affects the BCS. In addition, fiscal policy can offset country-specific movements in business cycles (Beck, 2022). Despite initial differences in the business cycles of the member countries, Gammadigbe and Dioum (2022) find that a convergence of business cycles is likely within ECOWAS from 1990 to 2018. They emphasize the negative and non-significant influence of the similarity of the monetary base on the convergence of business cycles in ECOWAS, but a negative and significant influence within the WAEMU.

Research comes to different conclusions regarding the relationship between inflation differentials and business cycle synchronization. Frankel and Rose (1997) and Nzimande and Ngalawa (2017) find a positive and statistically significant effect of inflation differentials on BCS within the SADC countries, while García-Herrero and Ruiz (2008) observe a negative effect between Spain and the G-7 countries. However, Camacho et al. (2006) find no evidence for the influence of inflation differentials on the BCS within the European Union.

Huang et al. (2015) and Nguyen et al. (2020) show different effects of different inflation rates on the BCS in China and East Asia respectively. In addition, Inklaar et al. (2008) and Nzimande and Ngalawa (2017) suggest that monetary policy coordination, as measured by the similarity of short-term interest rates or inflation rates, is associated with greater BCS in the OECD and SADC regions.

To summarize, economic imbalances arise from divergences in monetary policy that affect the distribution of shocks. Cyclical synchronization depends on national responses to monetary policy disturbances, with similar monetary policy settings favoring synchronization. Unconventional monetary policy measures can increase synchronization, while monetary policy coordination can reduce it. The complexity of the interactions between inflation targeting, inflation differentials, and BCS underlines the importance of monetary policy coordination for greater economic harmonization.

Institutions and cyclic synchronization

The quality of institutions and governance are assumed to influence the synchronization of Business Cycles across countries. In a study conducted by Altug and Canova (2014), the relationship between institutions, culture, and business cycles was examined for a sample of 45 countries in Europe, the Middle East, and North Africa. Their findings show that better governance practices, particularly central bank independence, are associated with more robust business cycles.

For countries that have adopted IT regimes, maintaining the independence of their monetary policy is essential for developing closer interactions with the rest of the world. This is particularly important for emerging economies seeking to strengthen their relations with advanced economies. Without sufficient independence, these economies could experience economic desynchronization, leading to a misalignment of economic and trade agreements. Central bank independence is crucial for the synchronization of inflation and business activity. If a central bank is independent, it can make monetary policy decisions to ensure price stability without being influenced by short-term political considerations. This promotes a more stable and predictable monetary policy and contributes to a stronger BCS between countries.

Furthermore, the independence of the central bank ensures the stability of inflation, as it enables measures to be taken to combat inflation, even if these must be taken against the will of governments. Consequently, when a central bank is independent, it can ensure price stability, which in turn can

contribute to a more stable BCS between countries. In short, central bank independence is a crucial factor in the link between inflation and BCS. If a central bank is independent, it can maintain price and inflation stability and thus promote a more robust BCS at the international level. This analysis could be extended to compare the effects of different monetary policy regimes and levels of central bank independence on the BCS by using theoretical and empirical models, considering the de facto and de jure measures introduced in our study.

Materials and methods

This section presents an empirical modeling of the relationship between monetary integration and BCS. Empirical model, data, and its sources are presented.

Empirical model

In line with the theoretical framework of Babetskii (2005) and the analysis of institutional factors influencing BCS, relationship between the BCS and its main determinants can be defined as follows:

$$BCS_{ijt} = \alpha_0 + \beta_1 BCS_{ijt-1} + \beta_2 REER_{ijt} + \beta_3 TOPEN_{ijt} + \beta_4 SIZE_{ijt} + \beta_5 INFL_{ijt} + \beta_6 CBI_{ijt} + \beta_7 (INFL_{ijt} * CBI_{ijt}) + \varepsilon_{ijt} \quad (1)$$

The variables in the above model are calculated as follows:

Business cycle synchronization is calculated using the following formula:

$$BCS_{ijt} = -|txcr_{it} - txcr_{jt}| \quad (2)$$

where $txcr_{it}$ and $txcr_{jt}$ represent the real GDP growth rates of countries i and j in year t . Values close to zero indicate strong cyclical synchronization (Kebalo & Zouri, 2022; Zouri, 2020).

The variable capturing exchange rate variability is calculated as follows:

$$REER_{ijt} = |reer_{it} - reer_{jt}| \quad (3)$$

where $reer_{it}$ and $reer_{jt}$ indicate the logarithms of real effective exchange rates of countries i and j in year t . Variations in exchange rates can influence the tariffs of products traded within nations, which could affect their competitiveness on world markets and, consequently, their ability to align their business cycles (Böwer & Guillemineau, 2006).

The variable capturing economic size or $SIZE_{ijt}$ is determined as follows:

$$SIZE_{ijt} = \log(y_{it}) + \log(y_{jt}) \quad (4)$$

In this expression, $SIZE_{ijt}$ refers to the sum of the logarithms of countries i and j GDPs in year t . Larger economies can influence smaller economies through various channels, including trade, foreign direct investment, technology transfers, etc. (Pentecôte et al., 2015).

Trade openness ($TOPEN_{ijt}$) is calculated as the difference between countries i and j trade openness. The formula is as follows:

$$TOPEN_{ijt} = \left| \frac{M_{it} + X_{it}}{GDP_{it}} - \frac{M_{jt} + X_{jt}}{GDP_{jt}} \right| \quad (5)$$

In this expression, X_{it} and X_{jt} are the exports of countries i and j in year t . M_{it} and M_{jt} are countries i and j imports in year t . GDP_{it} and GDP_{jt} represent the GDP of countries i and j in year t . The intensity of trade between two countries is proportional to the probability of correlation between their business cycles, i.e., the more significant the trade, the more likely it is that the economies concerned will be affected by BCS (Beck, 2019).

The inflation differential is determined by the absolute difference in the inflation rates of countries i and j at time t using the following formula:

$$INFL_{ijt} = |\pi_{it} - \pi_{jt}| \quad (6)$$

where π_{it} and π_{jt} are countries i and j inflation rates at date t (Frankel & Rose, 1998; García-Herrero &

Ruiz, 2008; Nzimande & Ngalawa, 2017). The inflation rate is calculated using the Consumer Prices dataset from the IMF database.

The central bank independence variable is calculated from the following formula:

$$CBI_{ijt} = |CBI_{it} - CBI_{jt}| \quad (7)$$

CBI_{it} and CBI_{jt} are the de jure and de facto indicators for countries i and j , calculated by Garriga (2016) and used in research by Garriga and Rodriguez (2023). We use the variable “lvaw_garriga”, which is contained in their data set. The de facto indicator approximates the rate of change of central bank governors per year. The CBI’s de facto indicator ranges from 0 to 1. An index close to zero indicates a central bank dependent on political power, while a value close to 1 indicates a high degree of independence from political power.

Interaction variables are used to investigate the role of central bank independence in the relationship between monetary integration and BCS. The interaction between the inflation differential and the degree of central bank independence can change the effect of the inflation differential on BCS. A larger inflation differential can lead to greater desynchronization if central banks enjoy greater independence. In contrast, a larger inflation differential can lead to greater synchronization when central banks are less independent. Including this interaction allows us to capture these moderating effects and control for confounding factors. This approach is often used in econometrics to model complex relationships between variables, improving the accuracy of the results and strengthening the conclusions of the research.

The political instability indicator $PINST_{ijt}$ is calculated as follows:

$$PINST_{ijt} = |PINST_{it} - PINST_{jt}| \quad (8)$$

$PINST_{it}$ and $PINST_{jt}$ are the political instability indicators for countries i and j , respectively. These indices are calculated using the Political Stability and Absence of Violence/Terrorism, following Campos et al. (2023), and Ghanayem et al. (2023). This PSTAB index ranges from -2.5 to 2.5 . A first transformation allows this index to evolve between 0 and 5. A second transformation consists of calculating (5-PSTAB) to obtain the PINST indicator. This variable is used in the robustness analysis.

Our examination of the relationship between monetary integration and business cycle synchronization proceeds in four steps. In standard panel regression models, errors are often cross-sectionally correlated, implying that standard estimation methods can lead to inconsistent regressions and incorrect inferences. Then, we first implement the cross-sectional dependence (CD) test. Second, we check the order of integration of the variables and for the homogeneity of the coefficients. Third, we use panel cointegration tests to determine whether there is a long-run relationship between the variables. Next, we regress the long-run coefficients using the Pooled Mean Group (PMG) approach of Pesaran et al. (1999). For obvious reasons of saving space, we will not present here the different preliminary tests of cross-sectional dependence, unit root, and cointegration. For brevity, the standard ARDL model which provides short and long run coefficients, based on the PMG estimator, is as follows:

$$\begin{aligned} \Delta BCS_{ijt} = & \alpha_0 + \sum_{i=0}^p \beta_{1i} \Delta BCS_{ijt-1} + \sum_{i=0}^q \beta_{2i} \Delta REER_{ijt} + \sum_{i=0}^r \beta_{3i} \Delta TOPEN_{ijt} + \sum_{i=0}^s \beta_{4i} \Delta SIZE_{ijt} + \sum_{i=0}^t \beta_{5i} \Delta INFL_{ijt} + \sum_{i=0}^u \beta_{6i} \Delta CBI_{ijt} \\ & + \sum_{i=0}^v \beta_{7i} \Delta (INFL_{ijt} * CBI_{ijt}) + \beta_{8i} REER_{ijt-1} + \beta_{9i} TOPEN_{ijt-1} + \beta_{10i} SIZE_{ijt-1} + \beta_{11i} INFL_{ijt-1} + \beta_{12i} CBI_{ijt-1} \\ & + \beta_{13i} (INFL_{ijt-1} * CBI_{ijt-1}) + \varepsilon_{ijt} \end{aligned} \quad (9)$$

The Pooled Mean Group (PMG) estimator, proposed by Pesaran et al. (1999), leads to coefficient homogeneity in the long-term relationship (similar to a fixed-effects estimator) while allowing a diversity of coefficients to describe short-term dynamics. PMG estimators incorporate numerous lagged variables to solve the issue of endogenous variables (Pesaran et al., 1999).

Table 1. Descriptive statistics for variables.

Variables	Observations	Average	Std. deviation	Minimum	Maximum
BCS	3255	-0.049	0.061	-0.616	-5.68e-06
REER	3255	0.081	0.089	0	0.527
TOPEN	3255	0.214	0.177	0	0.961
SIZE	3255	9.783	0.459	8.65	11.253
INFL	3255	0.140	0.207	0	2.067
CBI	3255	0.118	0.110	0	0.410
PINST	3255	1.113	0.817	0	4.655

Source: Author.

Table 2. Matrix of correlation coefficients between variables.

	BCS	REER	TOPEN	SIZE	INFL	CBI	PINST
BCS	1						
REER	-0.022 (0.213)	1					
TOPEN	-0.020 (0.262)	-0.066 (0.000)	1				
SIZE	0.096 (0.000)	0.089 (0.000)	-0.030 (0.088)	1			
INFL	-0.018 (0.304)	0.261 (0.000)	-0.068 (0.000)	-0.149 (0.000)	1		
CBI	-0.100 (0.000)	0.130 (0.000)	0.073 (0.000)	-0.091 (0.000)	0.136 (0.000)	1	
PINST	-0.047 (0.008)	0.008 (0.000)	0.036 (0.039)	-0.006 (0.716)	0.154 (0.000)	-0.006 (0.750)	1

Notes: P-values in parenthesis.

Source: Author.

Variables and data sources

The study spans 31 years, from 1990 to 2020, to fully consider all ECOWAS protocols and agreements and to fully capture the evolution of macroeconomic variables. Considering the 15 countries, this results in 105 country pairs or 3,255 observations per variable. The data are available on the World Bank and KOF Swiss Economic Institute¹ websites. On this later website, we retrieved the variable “number of actual turnovers”, that appraises the central bank independence (CBI). The PINST indicator is calculated using data from the World Bank’s World Governance Indicators (WGI) political stability indicator.

Estimation results and discussion

In this section, all the technical elements required for the estimation will be presented. First, the descriptive statistics for the selected variables are presented, followed by preliminary tests. Finally, the results of estimations are discussed.

Descriptive statistics

The results of the variable statistics are shown in Table 1. The BCS has a mean value of -0.049 and a standard deviation of 0.061. The variable of interest is the inflation differential (INFL) with a mean value of 0.140 and a standard deviation of 0.207. Its minimum value is 0 and its maximum value is 2.067. The CBI indicator has a mean value of 0.118 and a standard deviation of 0.110. These results show that the BCS level in ECOWAS is low.

From the data presented in Table 2, variables such as BCS and CBI are negatively correlated with the dependent variable, which predicts the potential signs of their coefficients in future regressions. After reviewing the variables and examining the correlation matrix, it is essential to confirm the appropriateness of the estimation method by performing tests for independence and stationarity.

Preliminary tests

This sub-section presents some tests to specify the estimation technique. Firstly, we conduct a cross-sectional independence test. We perform a second-generation panel unit root test if panel cross-sectional dependency is detected. Subsequently, slope homogeneity and cointegration tests are conducted to determine the appropriate estimation technique.

Section independence tests

The cross-sectional independence error test comprises three components: (i) the LM test proposed by Breusch and Pagan (1980), (ii) the bias-adjusted LM test proposed by Pesaran et al. (2008) and (iii) the CD test introduced by Pesaran (2006). The null hypothesis is: $H_0: \text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$. This expression means that the null hypothesis (H_0) states that the covariance between the errors for two different cross-sectional units (i and j) is zero for all time periods (t), provided that i is different from j . In other words, this means that there is no correlation between the errors of different cross-sectional units for all time periods unless the cross-sectional units are the same ($i=j$). The data presented in Table 3 indicate a rejection of the null hypothesis of independence. Due to the presence of cross-sectional dependence, the second-generation stationarity test is used.

Second-generation stationarity test

The t-test for unit roots in heterogeneous panels with cross-sectional dependence is proposed by Pesaran (2006). Like the IPS test of Im et al. (2003), it relies on the mean of the individual DF or ADF t-statistics for each unit, assuming a null hypothesis of non-stationarity for all series. The standard DF or ADF regressions are augmented with cross-sectional averages to eliminate cross-dependence, and the critical values for the t-bar statistic are provided by Pesaran (2006), ensuring a standard normal distribution under the null hypothesis of non-stationarity. The results in Table 4 show that only the CBI variable is non-stationary and integrated with order 1, while the other variables are stationary.

Coefficient homogeneity test

This statistic allows testing slope homogeneity in panel data with extensive N and T dimensions, derived from the Swamey test of Pesaran and Yamagata (2008). It compares a restricted model under the assumption of slope homogeneity with an unrestricted model using ordinary least squares regression, with large test statistics indicating discrepancies and allowing rejection of the null hypothesis. It supports balanced and unbalanced panels, accounts for models with strictly exogenous regressors and AR(p) specifications, and accounts for non-normally distributed errors using Blomquist and Westerlund (2013) HAC test statistic, which is effective in situations with cross-sectional dependence and variable errors, according to simulations by Bersvendsen and Ditzén (2021). The null hypothesis of this test is the homogeneity of the panel coefficients. The results in Table 5 show that the panel coefficients are homogeneous:

Cointegration test

Cointegration tests for panel data sets include the tests by Kao (1999), Pedroni (1999, 2004) and Westerlund (2005). These tests examine the presence of cointegration in panel data, with the null hypothesis being that there is no cointegration between panels. The null hypothesis of this test is the absence of cointegration. The test results in Table 6 suggest rejecting the null hypothesis of no cointegration.

Table 3. LM test for section independence.

Test	Statistics	<i>p</i> -value
LM	2.4e + 04	0.000
LM adjusted	441.7	0.000
LM CD	106	0.000

Source: Author.

Table 4. Results of second-generation stationarity tests.

Variables	Stationarity I(0)	Stationarity I(1)
BCS	−3.440 (0.000)	–
REER	−2.770 (0.000)	–
TOPEN	−2.371 (0.000)	–
SIZE	−2.010 (0.000)	–
INFL	−3.260 (0.000)	–
CBI	−0.181 (1.000)	−2.029 (0.000)

Notes: *t*-statistics (*p*-values).

Source: Author.

Table 5. Results of the homogeneity test.

	Delta	<i>p</i> -value
Value	−0.394	0.693
Adjusted value	−0.448	0.654

Source: Author.

Table 6. Results of cointegration tests.

Tests	KAO	PEDRONI	WESTERLUND
Modified Dickey-Fuller t	−60.427 (0.000)		
Dickey-Fuller t	−35.222 (0.000)		
Dickey-Fuller increased t	−20.963 (0.000)	−25.584 (0.000)	
Modified non-adjusted Dickey-Fuller t	−86.292 (0.000)		
Dickey-Fuller unadjusted t	−37.819 (0.000)		
Modified Phillips-Perron t		−4.959 (0.000)	
Phillips-Perron t		−25.085 (0.000)	
Variance ratio			−8.089 (0.000)

Notes: *t*-statistics (*p*-value).

Source: Author.

Results and discussion

Monetary integration, CBI, and BCS

The results presented in Table 7 show that the error correction coefficient is negative and significant for all the regressions at a 1% significance level. This indicates that the variables included in the model converge towards a long-term equilibrium. In the short run, all coefficients associated with the inflation differential show a negative trend and are not statistically significant, except in the case of the regression (3). If there are significant differences in inflation rates between ECOWAS member countries, this may be due to fundamental differences in their economic and monetary policies. For example, a country with a high inflation rate might adopt an expansionary monetary policy to boost economic growth, while another country with a lower inflation rate might adopt a more restrictive policy to curb inflation. These divergences may be due to different levels of economic development, industrial structures, internal and external macroeconomic conditions as well as political and institutional preferences.

However, if these inflation differentials between ECOWAS member states are pronounced, this may pose a challenge for the short-term BCS. The resulting macroeconomic imbalances, such as different levels of inflation, can disrupt trade flows, investment, and coordinated monetary policy actions needed to maintain harmonious regional economic convergence. A negative and significant effect of inflation differentials on the short-term BCS within ECOWAS therefore likely indicates that these inflation differentials may affect the ability of member countries to achieve sustainable economic convergence and effective economic policy coordination. This underscores the importance of strengthening economic, monetary, and fiscal policy coordination within ECOWAS to promote closer economic convergence and better short-term BCS.

The coefficients relating to CBI are negative and statistically significant only in regression (4). This observation is partly due to the differences in monetary policy and instruments used by the central banks of each Member State. These divergences may limit the coordination and synchronization of monetary policy and lead to cyclical desynchronization. Furthermore, the negative coefficients associated with the CBI in the short run suggest that significant differences in the degree of central bank independence across countries lead to less synchronization of short-term business cycles. Specifically, if central banks have different degrees of independence, this can lead to different monetary policies across countries and disrupt the synchronization of business cycles. For example, if one central bank has greater autonomy in implementing its monetary policy than another, this could lead to different interest rates and different monetary policies, affecting the convergence of business cycles between countries. Consequently, a negative and significant effect of the central bank independence indicator difference on the short-term synchronization of business cycles may reflect potential challenges in coordinating economic and monetary policies between countries, especially in currency unions or free trade areas.

In the long run, the coefficients for the similarity of inflation rates are positive and statistically significant in all regressions, as is the case for the CBI variable. This suggests that 1% increase in the inflation differential

Table 7. Estimation results.

		(1)	(2)	(3)	(4)
		PMG	PMG	PMG	PMG
		De jure	De facto	De jure	De facto
Short run	ECT	−0.907*** (0.040)	−0.919*** (0.053)	−0.871*** (0.039)	−0.936*** (0.055)
	LD.BCS	0.028 (0.022)	0.051 (0.034)	0.009 (0.025)	0.089** (0.037)
	D.REER	0.107* (0.058)	0.052 (0.075)	0.109* (0.060)	0.107 (0.083)
	LD.REER	0.055 (0.067)	0.120 (0.093)	0.050 (0.068)	0.112 (0.104)
	D.TOPEN	−0.016 (0.014)	−0.007 (0.017)	−0.018 (0.014)	−0.022 (0.018)
	LD.TOPEN	−0.001 (0.013)	0.014 (0.013)	−0.001 (0.015)	0.007 (0.014)
	D.SIZE	1.233*** (0.190)	0.936*** (0.222)	1.263*** (0.184)	0.966*** (0.241)
	LD.SIZE	−0.418*** (0.116)	−0.421*** (0.144)	−0.372*** (0.129)	−0.550*** (0.177)
	D.INFL	−0.019 (0.026)	−0.029 (0.040)	−0.849* (0.448)	−0.020 (0.044)
	LD.INFL	−0.024 (0.025)	−0.030 (0.039)	−0.275 (0.267)	−0.012 (0.040)
	D.CBI	0.058 (0.076)	−0.012*** (0.002)	−0.093 (0.109)	−0.027** (0.012)
	LD.CBI	0.080 (0.214)	−0.004* (0.002)	0.055 (0.235)	−0.009** (0.004)
	D.(INFL*CBI)			5.451* (2.786)	0.234 (1.016)
	LD. (INFL*CBI)			2.191 (1.825)	0.064 (0.224)
	Constant	0.093*** (0.006)	0.036*** (0.005)	0.146*** (0.008)	0.081*** (0.007)
Long run	REER	−0.066*** (0.010)	−0.042*** (0.010)	−0.058*** (0.010)	−0.041*** (0.009)
	TOPEN	0.007 (0.006)	0.001 (0.006)	0.016** (0.006)	0.005 (0.005)
	SIZE	−0.017*** (0.005)	−0.009** (0.004)	−0.025*** (0.005)	−0.014*** (0.004)
	INFL	0.020*** (0.006)	0.023*** (0.006)	0.050*** (0.009)	0.026*** (0.006)
	CBI	0.034*** (0.013)	0.021*** (0.003)	0.073*** (0.017)	0.026*** (0.004)
	INFL*CBI			−0.189*** (0.056)	−0.041** (0.020)
	Observations	3045	2262	3045	2262

Notes: Standard errors in brackets; PMG = Pooled Mean Group.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: Author.

should improve the BCS from 0.02 to 0.05%. This result is consistent with previous research (Frankel & Rose, 1997; Nzimande & Ngalawa, 2017). Two possible mechanisms can explain this. First, differences in inflation rates between countries lead to price and wage adjustments at different rates, which favors the recovery of the trend growth rate after an economic shock. Second, inflation differentials allow the real exchange rate to adjust, thereby reducing competitiveness gaps within a currency union and improving BCS.

First, the differences in inflation rates between countries indicate different rates of price and wage adjustments. In the neo-Keynesian model of macroeconomic fluctuations, this adjustment makes it easier for an economy to regain its trend growth rate after a business shock. For example, after a positive demand shock, wages and prices are adjusted upwards, bringing the economy back to its trend growth rate. The analysis presented here shows that inflation differentials between countries imply that the adjustment mechanism promotes synchronization across countries. Second, inflation differentials between countries provide a mechanism for real exchange rate adjustments, thus bridging potential competitiveness gaps between members of the monetary union. Changes in the real exchange rate lead to changes in trade balances and thus to greater synchronization of business cycles.

Improved macroeconomic stability and macroeconomic policy coordination reinforce the positive relationship between the CBI and the BCS. A positive and significant effect of the difference in CBI indicators

on long-term business cycle synchronization within ECOWAS suggests that economies with more autonomous central banks are likely to benefit from improved monetary stability, coherent economic policies, and effective coordination among member countries. This greater independence could boost investor confidence, reduce economic uncertainty, and promote the convergence of long-term economic goals, contributing to greater synchronization of business cycles in the region, which in turn fosters deeper economic integration and sustainable growth.

The effects of CBI on the relationship between monetary integration and BCS appear to be positive in the short run, although not statistically significant, except for regression (3). However, in the long run, the interaction variable has a negative and significant effect on BCS, indicating a negative influence of CBI on the relationship between monetary integration and BCS. Specifically, a 1% increase in the interaction between the inflation differential and the CBI is associated with a 0.189 and 0.041% decrease in BCS.

To summarize, central bank independence has a long-term negative impact on the relationship between monetary integration and BCS. Conversely, the effects of monetary integration and central bank independence on BCS are positive and significant. In the short run, the interaction variable has a positive and significant effect on the BCS. An autonomous central bank provides short-term certainty and predictability to economic agents by prioritizing price stability, promoting better economic performance, minimizing disruptions, and improving business cycle synchronization. In the long run, however, the coefficient of the interaction variable can move in a negative direction and hinder the central bank's ability to adapt to changing economic conditions. If the central bank focuses solely on price stability, it may neglect other important economic factors such as economic growth and employment, which can lead to poorer economic performance and inadequate inflation control. In addition, the rigidity of monetary policy can limit the central bank's flexibility in responding to economic shocks, which can make the BCS.

The negative impact of central bank independence on the relationship between inflation similarity and BCS within ECOWAS could indicate shortcomings in the region's monetary policy and lead to economic disruption. Assume that central bank independence within ECOWAS is compromised. In this case, monetary policy could be influenced by political or budgetary considerations to the detriment of price stability objectives, which could lead to excessive price volatility and uncontrolled inflation and undermine economic stability in the region. In addition, the lack of monetary policy coordination within ECOWAS could encourage a desynchronization of the business cycle and disrupt regional economic dynamics.

Thus, while central bank independence can bring short-term benefits by strengthening the relationship between the inflation differential and the BCS, it could be detrimental in the long run by limiting the central bank's ability to adapt to economic developments. Consequently, independence and flexibility must be balanced to maximize the benefits of the BCS.

Robustness check

This section contains the results of the robustness tests. Firstly, the results for the interest rate spread differentials are presented, followed by the results for two ECOWAS zones: the WAEMU zone and the non-WAEMU zone.

Taking into account interest rate spread differentials

Table 8 shows the results of the regressions including interest rate spread differentials (IRSD) (Böwer & Guillemineau, 2006). If the interaction variable is considered, there is a negative effect in the short term, which is not significant in the regression (3) and (4) in Table 8. In the long term, the interaction variable has a positive and significant effect on cyclical synchronization in regression (3), but a negative and non-significant effect in regression (4).

The independence of central banks is crucial for ensuring price stability through monetary policy. Any breach of this independence, where policy is influenced by political or budgetary considerations rather than price stability, can lead to out-of-control inflation and disrupt the economy. This has a detrimental effect on the synchronization of business cycles and leads to economic uncertainty.

Table 8. Estimation results including interest rate spread differentials.

		(1)	(2)	(3)	(4)
		PMG	PMG	PMG	PMG
		De jure	De facto	De jure	De facto
Short term	ECT	−0.943*** (0.045)	−0.945*** (0.058)	−0.946*** (0.044)	−0.957*** (0.062)
	LD.BCS	0.061** (0.025)	0.083** (0.037)	0.046* (0.026)	0.107*** (0.038)
	D.REER	0.091 (0.062)	0.014 (0.076)	0.061 (0.060)	0.036 (0.078)
	LD.REER	0.056 (0.054)	0.114 (0.073)	0.049 (0.053)	0.114 (0.075)
	D.TOPEN	−0.006 (0.013)	−0.004 (0.018)	−0.012 (0.013)	0.000 (0.018)
	LD.TOPEN	0.005 (0.014)	0.023 (0.015)	0.002 (0.015)	0.027 (0.016)
	D.SIZE	1.252*** (0.193)	0.948*** (0.229)	1.240*** (0.195)	0.990*** (0.237)
	LD.SIZE	−0.448*** (0.120)	−0.419*** (0.150)	−0.316*** (0.122)	−0.446*** (0.165)
	D. IRSD	−0.519 (0.557)	−0.560 (0.521)	−0.771 (0.934)	−0.588 (0.469)
	LD. IRSD	0.096 (0.187)	0.621 (0.678)	0.222 (1.149)	0.839 (0.917)
	D.CBI	0.001 (0.069)	−0.011*** (0.003)	−0.377 (0.380)	−0.028 (0.036)
	LD.CBI	0.018 (0.201)	−0.003 (0.002)	−0.561 (0.595)	−0.016 (0.024)
	D.IRSD*CBI			−0.379 (5.126)	0.090 (0.260)
	LD.IRSD*CBI			−1.492 (7.796)	−2.023 (2.238)
	Constant	0.169*** (0.010)	0.097*** (0.009)	0.146*** (0.009)	0.117*** (0.010)
Long term	REER	−0.044*** (0.010)	−0.034*** (0.010)	−0.036*** (0.010)	−0.029*** (0.009)
	TOPEN	0.003 (0.006)	0.001 (0.006)	0.008 (0.005)	0.000 (0.005)
	SIZE	−0.024*** (0.005)	−0.015*** (0.004)	−0.023*** (0.005)	−0.017*** (0.004)
	IRSD	−0.065*** (0.019)	−0.064*** (0.018)	0.042* (0.025)	−0.043** (0.019)
	CBI	0.033*** (0.012)	0.022*** (0.003)	0.033 (0.027)	0.027*** (0.005)
	IRSD*CBI			0.097* (0.156)	−0.053 (0.034)
	Observations	3045	2262	3045	2262

Notes: Standard errors in brackets; PMG = Pooled Mean Group.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: Author.

Suppose, however, that the central bank exerts a stable and predictable influence on interest rates to adjust the money supply. In this case, it promotes economic growth and the synchronization of the business cycle by ensuring stable financing of economic activity. Consequently, the independence of the central bank in the relationship between the inflation differential and synchronization can have a negative impact on the synchronization of the business cycle. On the other hand, it can have a positive impact on the relationship between the interest rate differential and business cycle synchronization, thanks to its influence on the amount of liquidity available in the economy.

Taking into account the different ECOWAS zones

Table 9 shows the results of the robustness regressions for the WAEMU and non-WAEMU zones of ECOWAS. The analysis of the relationship between monetary integration and business cycle synchronization by country group shows different results. In the WAEMU zone, this relationship is negative and significant in the long run, while it is positive and significant in the non-WAEMU zone. In addition, the interaction variable between inflation and central bank independence is positive and significant for the WAEMU countries, but negative and significant for the non-WAEMU zone.

Table 9. WAEMU vs. non-WAEMU countries.

		WAEMU				Non-WAEMU	
		(1) PMG De jure	(2) PMG De facto	(3) PMG De jure	(4) PMG De facto	(5) PMG De jure	(6) PMG De jure
Short term	ECT	−0.939*** (0.086)	−0.902*** (0.064)	−0.890*** (0.061)	−0.913*** (0.061)	−0.942*** (0.097)	−0.974*** (0.079)
	LD.BCS	−0.003 (0.047)	0.002 (0.056)	−0.017 (0.037)	0.022 (0.065)	0.005 (0.063)	−0.000 (0.051)
	D.REER	−0.388** (0.152)	−0.239 (0.153)	−0.225 (0.148)	−0.169 (0.181)	0.126 (0.080)	0.056 (0.065)
	LD.REER	0.080 (0.270)	0.147 (0.252)	0.149 (0.279)	0.221 (0.273)	0.011 (0.102)	
	D.TOPEN	−0.006 (0.033)	−0.007 (0.038)	−0.004 (0.039)	−0.023 (0.035)	0.038* (0.021)	−0.010 (0.018)
	LD.TOPEN	−0.010 (0.027)	0.003 (0.030)	−0.024 (0.023)	0.012 (0.028)	0.044* (0.024)	
	L2D. TOPEN					0.056** (0.025)	
	D.SIZE	1.566*** (0.323)	1.508*** (0.312)	1.373*** (0.293)	1.603*** (0.329)	0.508 (0.549)	0.640 (0.533)
	LD.SIZE	−0.098 (0.204)	−0.306 (0.237)	−0.240 (0.230)	−0.433* (0.252)		
	D.INFL	−0.021 (0.089)	−0.033 (0.104)	−0.034 (0.386)	0.041 (0.112)	−2.463* (1.496)	0.005 (0.022)
	LD.INFL	−0.039 (0.076)	−0.047 (0.106)	0.371 (0.265)	0.038 (0.101)	−0.899 (1.023)	
	D.CBI	0.046** (0.022)	−0.010** (0.004)	0.015 (0.023)	−0.038 (0.036)	−0.168 (0.372)	0.450 (0.340)
	LD.CBI	0.062*** (0.022)	0.002 (0.004)	0.036* (0.020)	0.015* (0.008)		
	D.(INFL *CBI)			−0.108 (0.858)	0.852 (3.174)	15.519 (9.598)	
	LD.(INFL *CBI)			−1.046 (0.643)	−0.198 (0.662)	7.580 (7.038)	
	Intercept	−1.165*** (0.114)	−0.182*** (0.013)	−0.910*** (0.065)	−0.186*** (0.012)	0.633*** (0.065)	0.468*** (0.037)
Long term	REER	0.512*** (0.073)	0.143*** (0.053)	0.359*** (0.063)	0.104** (0.051)	−0.018 (0.023)	0.033* (0.019)
	TOPEN	0.033** (0.015)	0.030** (0.013)	0.043*** (0.014)	−0.001 (0.011)	−0.073*** (0.014)	−0.033*** (0.012)
	SIZE	0.123*** (0.016)	0.014** (0.007)	0.101*** (0.015)	0.015** (0.006)	−0.074*** (0.015)	−0.056*** (0.013)
	INFL	−0.097*** (0.025)	−0.030 (0.025)	0.432* (0.227)	0.125*** (0.024)	0.058*** (0.021)	0.024*** (0.009)
	CBI	−0.095*** (0.011)	0.018*** (0.007)	−0.080*** (0.014)	0.002 (0.010)	0.060* (0.031)	0.005 (0.021)
	INFL *CBI			0.993* (0.573)	0.518* (0.282)	−0.298*** (0.103)	
	Observations	812	812	812	812	588	609

Notes: Standard errors in parenthesis; PMG = Pooled Mean Group; ***p < 0.01; **p < 0.05; *p < 0.1.

Source: Author.

Setting an inflationary convergence threshold of 3% can lead to economic cycles becoming unbalanced due to suboptimality. For example, Côte d'Ivoire might have to increase its inflation rate to achieve a certain level of growth. In contrast, a threshold of 3% could be appropriate for the growth of the Togolese economy. Thus, an inflation threshold of around 3% could be a constraint for Côte d'Ivoire, which would favor growth in Togo.

Taking political instability into account

The results of the regressions including political instability are shown in Table 10. In the short run, the coefficient of the interaction variable between the inflation differential (INFL) and political instability (PINST) is positive but not significant. In the long run, however, it becomes negative and significant. These observations illustrate the detrimental effects of non-democratic changes of government on the relationship between inflation differential and business cycle synchronization, especially when they do not match in other countries in the long run.

Table 10. Taking political instability into account.

	VARIABLES	(1) PMG	(2) PMG
Short term	ECT	−0.920*** (0.024)	−0.912*** (0.025)
	D. REER	0.078 (0.050)	0.088* (0.052)
	D.TOPEN	−0.005 (0.011)	−0.005 (0.011)
	D.SIZE	1.132*** (0.171)	1.121*** (0.172)
	D.INFL	0.019 (0.016)	0.019 (0.065)
	D.PINST	−0.011*** (0.003)	−0.016*** (0.004)
	D.INFL*PINST		0.032 (0.052)
	Constant	0.128*** (0.005)	0.133*** (0.005)
	REER	−0.023** (0.009)	−0.020** (0.009)
	TOPEN	−0.005 (0.006)	−0.008 (0.006)
Long term	SIZE	−0.022*** (0.005)	−0.022*** (0.005)
	INFL	0.016*** (0.005)	0.033*** (0.010)
	PINST	0.007*** (0.001)	0.009*** (0.002)
	INFL*PINST		−0.014** (0.006)
	Observations	3150	3150

Notes: Standard errors in parenthesis; PMG = Pooled Mean Group.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: Author.

The main reasons for these changes of government include elections, political scandals, poor performance, and sustainability problems within multi-party governments. Regardless of their origin, these changes lead to instability and uncertainty among economic actors. The impact of these changes on local economic performance leads to desynchronization with other countries. However, when these changes of government occur simultaneously in two countries, the above-mentioned effects manifest themselves in both economies and adapt to the respective business cycles.

Furthermore, the results of the analysis show that the net effect of the political instability variable is positive overall in the long term, which confirms this hypothesis. In other words, more pronounced political coordination improves the synchronization of the business cycle, even though most government changes are generally unplanned or random. Electoral changes are more predictable.

Use of alternative estimation techniques

Table 11 shows the results of long-term regressions obtained using regression techniques such as Dynamic Ordinary Least Squares (DOLS) and Fully Modified Ordinary Least Squares (FMOLS). These linear regression methods offer the possibility of considering various elements, including the effects of temporal correlation and endogeneity due to the cointegration of variables. The conclusions drawn from the long-run regressions using FMOLS and DOLS techniques are generally congruent in terms of the direction and statistical relevance of the coefficients. The results show that the interaction coefficient formed between the inflation differential and central bank independence has a negative and statistically significant sign in the long-run regressions (1), (2), and (3). As for regression (4), the results indicate that central bank independence has a positive and significant impact on the relationship between the inflation differential and the BCS in the long run. Overall, these results are consistent with previous outcomes obtained, using the PMG estimator.

Table 11. Taking into account alternative estimation techniques.

Dependent variable	De jure		De facto	
	(1) FMOLS BCS	(2) DOLS BCS	(3) FMOLS BCS	(4) DOLS BCS
REER	−0.050*** (0.017)	−0.026 (0.024)	−0.034** (0.014)	0.013 (0.014)
TOPEN	0.016 (0.010)	0.042** (0.016)	0.026*** (0.008)	0.024*** (0.008)
SIZE	−0.018* (0.010)	0.033** (0.007)	0.095** (0.042)	0.041*** (0.006)
INFL	0.044*** (0.015)	0.093*** (0.023)	0.022** (0.009)	−0.021 (0.014)
CBI	0.050** (0.023)	0.099*** (0.033)	0.016*** (0.003)	0.002 (0.007)
INFL *CBI	−0.203*** (0.067)	−0.330*** (0.103)	−0.029* (0.017)	0.119** (0.050)
R-squared	0.080	0.789	0.145	0.827
Adjusted R-squared	0.032	0.338	0.082	0.457

Notes: Standard errors in parenthesis; PMG = Pooled Mean Group.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: Author.

Conclusion and implications

Monetary integration offers advantages, such as an optimal allocation of resources, but also disadvantages, such as the loss of autonomy of national monetary policy. The regressions suggest a positive and significant effect of monetary integration on the BCS, which is consistent with the literature (Frankel & Rose, 1997; Nzimande & Ngalawa, 2017). However, greater independence of the monetary union central bank can offset this loss and reinforce its credibility. Despite the persistent inflation volatility within ECOWAS, narrowing the inflation gap between countries promotes better synchronization of business cycles. Central bank independence has a positive and significant impact on this synchronization, even if it does not strengthen the relationship between inflation differentials and cycle synchronization. Several recommendations are made to ensure the success of monetary integration within ECOWAS.

Firstly, the establishment of robust surveillance mechanisms is essential. This includes the creation of a framework for monitoring inflation rates and economic cycles in the member countries. By regularly monitoring these indicators, policymakers can quickly identify discrepancies and proactively address emerging issues, thereby promoting greater regional stability.

Secondly, improving communication and coordination between central banks and economic policymakers is crucial. Improved cooperation can facilitate the exchange of important information on monetary and fiscal policy and promote better coordination of strategies and responses to economic fluctuations. Regional forums and meetings can serve as platforms for sharing insights, discussing common challenges, and formulating coordinated approaches to economic management.

Thirdly, the promotion of policy harmonization between member countries is essential for promoting convergence and synchronization of the business cycle. This means that countries are encouraged to pursue compatible monetary and fiscal policies to achieve common goals such as price stability and sustainable growth. By aligning policy frameworks, member states can improve the effectiveness of their policies and minimize potential cross-border spillover effects.

Fourthly, investment in institutional capacity is another crucial aspect in promoting the synchronization of the business cycle within the ECOWAS region. Strengthening the technical expertise and analytical skills of central banks and regulators can improve their ability to effectively assess and respond to economic developments. This can include training programs, capacity-building initiatives, and the introduction of advanced analytical tools to support evidence-based decision-making.

Finally, promoting transparency and accountability in economic policy is essential for building trust and confidence among stakeholders. By ensuring that policy decisions are based on objective data and communicated to the public in a transparent manner, public authorities can enhance their credibility and promote greater adherence to sound economic principles. Transparency promotes accountability

and enables stakeholders to assess the effectiveness of policies and hold policymakers accountable for their actions.

In summary, a multi-pronged approach that includes monitoring, communication, policy harmonization, institutional strengthening, and transparency is essential for promoting the synchronization of the business cycle and supporting sustainable growth in the ECOWAS region. By implementing these strategies, member countries can work together to overcome challenges and realize their shared vision of a more prosperous and resilient economic community. The benefits of integration should be shared fairly, with special consideration given to countries with weak and vulnerable economies. Well-developed and funded equalization mechanisms should be put in place to avoid fears of domination in the event of a monetary union. In addition, it would be crucial to strengthen existing trade agreements and develop new policies to promote regional integration to facilitate trade activities and reduce macroeconomic divergences between ECOWAS economies. The creation of the monetary union planned for 2027 requires the implementation of a common stabilization policy that will make it possible to eliminate macroeconomic divergences and strengthen regional integration.

Note

1. <https://kof.ethz.ch/en/data/data-on-central-bank-governors.html>.

Authors' contributions

Louis-Joel B. Diendere, Achille A. Diendere, and Jude Eggoh are involved in the conception and design, respectively the analysis and interpretation of the data, the drafting of the paper, the critical review for intellectual content, and the final approval of the version to be published. Louis-Joel B. Diendere, Achille A. Diendere, and Jude Eggoh agree to be responsible for all aspects of the work.

Disclosure statement

The authors report that there are no competing interests to declare.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, [a*], upon reasonable request.

References

- African Development Bank. (2023). *West African Economic Outlook 2023: Mobilizing Private Sector Financing for Climate and Green Growth* (p. 119). <https://www.afdb.org/en/documents/west-africa-economic-outlook-2023>
- Altug, S., & Canova, F. (2014). Do institutions and culture matter for business cycles? *Open Economies Review*, 25(1), 93–122. <https://doi.org/10.1007/s11079-013-9298-0>
- Babetskii, I. (2005). Les essais sur la transition et l'élargissement de l'Union européenne. Doctoral dissertation, Université Paris 1.
- Backus, D., & Driffill, J. (1985). Inflation and reputation. *The American Economic Review*, 75(3), 530–538.
- Backus, D. K., Kehoe, P. J., & Kydland, F. E. (1992). International real business cycles. *Journal of Political Economy*, 100(4), 745–775. <https://doi.org/10.1086/261838>
- Baele, L., Ferrando, A., Hördahl, P., Krylova, E., & Monnet, C. (2004). Measuring European financial integration. *Oxford Review of Economic Policy*, 20(4), 509–530. <https://doi.org/10.1093/oxrep/grh030>
- Balassa, B. (1961). *The theory of economic integration*. Richard D. Irwin, Inc.
- Barro, R. J., & Gordon, D. B. (1983). Rules, discretion and reputation in a model of monetary policy. *Journal of Monetary Economics*, 12(1), 101–121. [https://doi.org/10.1016/0304-3932\(83\)90051-X](https://doi.org/10.1016/0304-3932(83)90051-X)
- Baxter, M., & Crucini, M. J. (1995). Business cycles and the asset structure of foreign trade. *International Economic Review*, 36(4), 821–854. <https://doi.org/10.3386/w4975>
- BCEAO. (2017). *Rapport sur l'évolution des prix à la consommation dans l'UEMOA en 2017 et perspectives*. (p. 37). Direction de la recherche et de la statistique/Service de la statistique. <https://www.bceao.int/sites/default/files/2018-04/Rapport%20sur%20l%27%20C3%A9volution%20des%20prix%20%20C3%A0%20la%20consommation%20dans%20l%27UEMOA%20en%202017%20et%20perspectives.pdf>
- Beck, K. (2013). Determinants of business cycles synchronization in the European Union and the Euro Area. *Equilibrium*, 8(4), 25–48. <https://doi.org/10.12775/EQUIL.2013.025>
- Beck, K. (2019). What drives business cycle synchronization? BMA results from the European Union. *Baltic Journal of Economics*, 19(2), 248–275. <https://doi.org/10.1080/1406099X.2019.1652393>
- Beck, K. (2022). Macroeconomic policy coordination and the European business cycle: Accounting for model uncertainty and reverse causality. *Bulletin of Economic Research*, 74(4), 1095–1114. <https://doi.org/10.1111/boer.12334>
- Bersvendsen, T., & Ditzen, J. (2021). Testing for slope heterogeneity in Stata. *The Stata Journal: Promoting Communications on Statistics and Stata*, 21(1), 51–80. <https://doi.org/10.1177/1536867X211000004>
- Blomquist, J., & Westerlund, J. (2013). Testing slope homogeneity in large panels with serial correlation. *Economics Letters*, 121(3), 374–378. <https://doi.org/10.1016/j.econlet.2013.09.012>
- Böwer, U., & Guillemineau, C. (2006). *Determinants of business cycle synchronisation across euro area countries*. EBC Working Papers. No. 587. European Central Bank. <https://www.econstor.eu/bitstream/10419/153021/1/ecbwp0587.pdf>
- Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The Review of Economic Studies*, 47(1), 239. [10.2307/2297111](https://doi.org/10.2307/2297111)
- Buchanan, J. M., & Wagner, R. E. (1977). *Democracy in deficit: The political legacy of Lord Keynes*. Academic Press.
- Camacho, M., Perez-Quiros, G., & Saiz, L. (2006). Are European business cycles close enough to be just one? *Journal of Economic Dynamics and Control*, 30(9–10), 1687–1706. <https://doi.org/10.1016/j.jedc.2005.08.012>
- Campos, N., Glebkina, E., Karanasos, M., & Koutroumpis, P. (2023). Financial development, political instability, trade openness and growth in Brazil: Evidence from a new dataset, 1890–2003. *Open Economies Review*, 34(4), 831–861. <https://doi.org/10.1007/s11079-022-09684-4>
- Cho, D., & Rhee, D.-E. (2015). An assessment of inflation targeting in a quantitative monetary business cycle framework: Evidence from four early adopters. *Applied Economics*, 47(32), 3395–3413. <https://doi.org/10.1080/00036846.2015.1016206>
- Cooper, C. A., & Massell, B. F. (1965). Toward a general theory of customs unions for developing countries. *Journal of Political Economy*, 73(5), 461–476. <https://doi.org/10.1086/259070>
- Corden, W. M. (1972). *Monetary integration*. International Finance Section, Princeton University Princeton.
- Dai, Y. (2014). *Business cycle synchronization in Asia: The role of financial and trade linkages*. ADB Working Paper No. 139. October, 2014 Series on Regional Economic Integration, Asian Development Bank. <https://www.econstor.eu/bitstream/10419/109631/1/wp-139.pdf>
- De Grauwe, & P., Mongelli, F. P. (2005). *Endogeneity of optimum currency areas. What brings countries sharing a single currency closer together*. ECB Working Paper Series, 468, European Central Bank, Frankfurt.
- De Grauwe, P., & SÉNÉGAS, M.-A. (2003). *Monetary Policy in EMU When the Transmission Is Asymmetric and Uncertain*. Monetary Policy and International Finance, CESifo Working Paper No. 891, CESifo https://www.econstor.eu/bitstream/10419/76355/1/cesifo_wp891.pdf

- Delgado, C., Araya, I., & Pino, G. (2020). Business cycle synchronization: Is it affected by inflation targeting credibility? *SERIEs*, 11(2), 157–177. <https://doi.org/10.1007/s13209-019-00206-z>
- Diendere, L.-J. B., Diendere, A. A., & Eggoh, J. (2024). Examining the impact of intraindustrytrade on business cyclealignment within the ECOWAS. *International Journal of Development Issues*. <https://doi.org/10.1108/IJDI-12-2023-0304>.
- Fankem, G. S. G., & Mbesa, L. C. F. (2023). Business cycle synchronization and African monetary union: A wavelet analysis. *Journal of Macroeconomics*, 77, 103527. <https://doi.org/10.1016/j.jmacro.2023.103527>
- Fidrmuc, J., & Korhonen, I. (2010). The impact of the global financial crisis on business cycles in Asian emerging economies. *Journal of Asian Economics*, 21(3), 293–303. <https://doi.org/10.1016/j.asieco.2009.07.007>
- Flood, R. P., & Rose, A. K. (2010). Inflation targeting and business cycle synchronization. *Journal of International Money and Finance*, 29(4), 704–727. <https://doi.org/10.1016/j.jimonfin.2010.01.004>
- Frankel, J. A., & Rose, A. K. (1997). Is EMU more justifiable ex post than ex ante? *European Economic Review*, 41(3-5), 753–760. [https://doi.org/10.1016/S0014-2921\(97\)00034-2](https://doi.org/10.1016/S0014-2921(97)00034-2)
- Frankel, J. A., & Rose, A. K. (1998). The endogeneity of the optimum currency area criteria. *The Economic Journal*, 108(449), 1009–1025. <https://doi.org/10.1111/1468-0297.00327>
- Gammadigbe, V., & Dioum, S. B. (2022). Monetary integration in West Africa: Are business cycles converging? *African Development Review*, 34(1), 68–80. <https://doi.org/10.1111/1467-8268.12617>
- García-Herrero, A., & Ruiz, J. M. (2008). Do trade and financial linkages foster business cycle synchronization in a small economy? *Moneda y Credito*, 226, 187–226.
- Garriga, A. C. (2016). Central bank independence in the world: A new data set. *International Interactions*, 42(5), 849–868. <https://doi.org/10.1080/03050629.2016.1188813>
- Garriga, A. C., & Rodriguez, C. M. (2023). Central bank independence and inflation volatility in developing countries. *Economic Analysis and Policy*, 78, 1320–1341. <https://doi.org/10.1016/j.eap.2023.05.008>
- Ghanayem, A., Downing, G., & Sawalha, M. (2023). The impact of political instability on inflation volatility: The case of the Middle East and North Africa region. *Cogent Economics & Finance*, 11(1), 2213016. <https://doi.org/10.1080/23322039.2023.2213016>
- Heathcote, J., & Perri, F. (2002). Financial autarky and international business cycles. *Journal of Monetary Economics*, 49(3), 601–627. [https://doi.org/10.1016/S0304-3932\(02\)00103-4](https://doi.org/10.1016/S0304-3932(02)00103-4)
- Huang, S., Fidrmuc, J., & Fidrmuc, J. (2015). Whither China? Reform and economic integration among Chinese regions. *China Economic Review*, 33(C), 94–110. <https://doi.org/10.1016/j.chieco.2014.12.007>
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53–74. [https://doi.org/10.1016/S0304-4076\(03\)00092-7](https://doi.org/10.1016/S0304-4076(03)00092-7)
- IMF. (2022). Crisis upon crisis (p. 80). <https://www.imf.org/external/pubs/ft/ar/2022/downloads/imf-annual-report-2022-english.pdf>
- Inklaar, R., Jong-A-Pin, R., & De Haan, J. (2008). Trade and business cycle synchronization in OECD countries—A re-examination. *European Economic Review*, 52(4), 646–666. <https://doi.org/10.1016/j.euroecorev.2007.05.003>
- Inoue, T., Toyoshima, Y., & Hamori, S. (2012). Inflation targeting in Korea, Indonesia, Thailand, and the Philippines: The impact on business cycle synchronization between each country and the world. IDE Discussion Paper No. 328. https://www.academia.edu/download/79405456/ARRIDE_Discussion_No.328_inoue.pdf
- Ishiyama, Y. (1975). The theory of optimum currency areas: A survey. *IMF Staff Papers*, 22(2), 344–383.
- Kalemli-Ozcan, S., Sørensen, B. E., & Yosha, O. (2001). Economic integration, industrial specialization, and the asymmetry of macroeconomic fluctuations. *Journal of International Economics*, 55(1), 107–137. [https://doi.org/10.1016/S0022-1996\(01\)00097-6](https://doi.org/10.1016/S0022-1996(01)00097-6)
- Kalemli-Ozcan, S., Sørensen, B. E., & Yosha, O. (2003). Risk sharing and industrial specialization: Regional and international evidence. *American Economic Review*, 93(3), 903–918. <https://doi.org/10.1257/000282803322157151>
- Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 90(1), 1–44. [https://doi.org/10.1016/S0304-4076\(98\)00023-2](https://doi.org/10.1016/S0304-4076(98)00023-2)
- Kebalo, L., & Zouri, S. (2022). Monetary agreements reform and issue of the key fiscal convergence criterion in the West African Economic and Monetary Union (WAEMU). *Journal of Economic Integration*, 37(1), 30–53. <https://doi.org/10.11130/jei.2022.37.1.30>
- Kenen, P. B. (1969). The theory of optimum currency areas: An eclectic view. *Monetary Problems of the International Economy*, 45(3), 41–60. <https://doi.org/10.1515/9780691196602-012>
- Khan, G. Y., Khalil, I., Mehboob, S., Rauf, A., & Ahmed Abbasi, B. (2020). Questioning business cycle synchronization among south asia in pre and post SAARC establishment: An empirical investigation. *European Online Journal of Natural and Social Sciences*, 9(3), 628. <https://european-science.com/eojnss/article/download/6086/2800>
- Kose, M. A., Prasad, E. S., & Terrones, M. E. (2003). How does globalization affect the synchronization of business cycles? *American Economic Review*, 93(2), 57–62. <https://doi.org/10.1257/000282803321946804>
- Kydland, F. E., & Prescott, E. C. (1977). Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy*, 85(3), 473–491. <https://doi.org/10.1086/260580>
- Mahawiya, S., Haim, A., & Eric Fosu, O.-A. (2020). In search of inflation limits for financial sector development in ECOWAS and SADC regions: A panel smooth transition analysis. *Cogent Economics & Finance*, 8(1), 1722306. <https://doi.org/10.1080/23322039.2020.1722306>

- Mattera, R., & Franses, P. H. (2023). Are African business cycles synchronized? Evidence from spatio-temporal modelling. *Economic Modelling*, 128, 106485. <https://doi.org/10.1016/j.econmod.2023.106485>
- McKinnon, R. I. (1963). Optimum currency areas. *The American Economic Review*, 53(4), 717–725.
- Mestre, R., & Odry, R. (2021). *Monetary Policy and Business Cycle Synchronization in Europe*. *EconomiX-UMR7235*. Université Paris Nanterre.
- Mundell, R. A. (1961). A theory of optimum currency areas. *The American Economic Review*, 51(4), 657–665.
- Nguyen, V. T. H., Hoang, T. T. T., & Nguyen, S. M. (2020). The effect of trade integration on business cycle synchronization in East Asia. *The Journal of Asian Finance, Economics and Business*, 7(8), 225–231. <https://doi.org/10.13106/jafeb.2020.vol7.no8.225>
- Nzimande, N. P., & Ngalawa, H. (2017). The endogeneity of business cycle synchronisation in SADC: A GMM approach. *Cogent Economics & Finance*, 5(1), 1358914. <https://doi.org/10.1080/23322039.2017.1358914>
- Obstfeld, M. (1994). Evaluating risky consumption paths: The role of intertemporal substitutability. *European Economic Review*, 38(7), 1471–1486. [https://doi.org/10.1016/0014-2921\(94\)90020-5](https://doi.org/10.1016/0014-2921(94)90020-5)
- Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61(S1), 653–670. <https://doi.org/10.1111/1468-0084.61.s1.14>
- Pedroni, P. (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20(03), 597–625. <https://doi.org/10.1017/S0266466604203073>
- Pentecôte, J.-S., Poutineau, J.-C., & Rondeau, F. (2015). Trade integration and business cycle synchronization in the EMU: The negative effect of new trade flows. *Open Economies Review*, 26(1), 61–79. <https://doi.org/10.1007/s11079-014-9318-8>
- Pesaran, M. (2006). Estimation and inference in large heterogeneous panels with cross section dependence. *Econometrica*, 74(4), 967–1012. <https://doi.org/10.1111/j.1468-0262.2006.00692.x>
- Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), 621–634. <https://doi.org/10.1080/01621459.1999.10474156>
- Pesaran, M. H., Ullah, A., & Yamagata, T. (2008). A bias-adjusted LM test of error cross-section independence. *The Econometrics Journal*, 11(1), 105–127. <https://doi.org/10.1111/j.1368-423X.2007.00227.x>
- Pesaran, M. H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of Econometrics*, 142(1), 50–93. <https://doi.org/10.1016/j.jeconom.2007.05.010>
- Rose, A. K. (2009). Understanding business cycle synchronization: Is inflation targeting paving the way to Asian Monetary Union?. In: R.J. Barro, & J.-W. Lee (Eds.), *Costs and benefits of economic integration in Asia* (vol. 2011, pp. 89–125). Oxford University.
- Schiavo, S. (2008). Financial integration, GDP correlation and the endogeneity of optimum currency areas. *Economica*, 75(297), 168–189. <https://doi.org/10.1111/j.1468-0335.2007.00598.x>
- Schmidt-Hebbel, K., & Carrasco, M. (2016). The past and future of inflation targeting: implications for emerging-market and developing economies. In *Monetary policy in India* (pp. 583–622). New Delhi: Springer. https://doi.org/10.1007/978-81-322-2840-0_18
- Tapsoba, J.-A. (2009). Intégration monétaire africaine et changements structurels: Commerce, partage des risques et coordination budgétaire [African Monetary Integration and Structural Changes: Trade, Risk Sharing, and Budgetary Coordination]. Doctoral dissertation, Université d'Auvergne-Clermont-Ferrand I.
- Viner, J. (1950). *The customs union issue*. Carnegie Endowment for International Peace.
- Westerlund, J. (2005). New simple tests for panel cointegration. *Econometric Reviews*, 24(3), 297–316. <https://doi.org/10.1080/07474930500243019>
- Zouri, S. (2020). *La Communauté économique des États de l'Afrique de l'Ouest est-elle une zone monétaire optimale? [Is the Economic Community of West African States an Optimal Currency Area?]*. Doctoral dissertation. Paris 1.