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Effects of Information Asymmetry and Political Governance on Total Factor Productivity in the WAEMU

Adama Ouédraogo*, Inoussa Traoré, Ousmane Traoré, Idrissa M. Ouédraogo

Ministry of Agriculture, Water, Animal and Fisheries Resources, Ouagadougou, Burkina Faso
Email: *adamis.ouedraogo1@gmail.com

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Abstract

Improving total productivity (TFP) is a major challenge within the West African Economic and Monetary Union (WAEMU). Despite research on the determinants of TFP in sub-Saharan Africa and other regions, certain factors that explain TFP, such as information asymmetry and governance, warrant attention in the WAEMU context. This paper analyzes the effects of information asymmetry and political governance on TFP within WAEMU. Using the Fully Modified Ordinary Least Squares estimator proposed by Pedroni (1996, 2000) on aggregate data from WAEMU countries covering the period 2003-2023, we show that information asymmetry has a direct negative effect and an indirect negative long-term effect on TFP. We also show that political governance factors, such as government stability, control of corruption, democratic accountability, socioeconomic conditions, investment profile, internal conflicts, external conflicts, and military in politics, have significant direct long-term effects on TFP in this region. We therefore suggest improving information management and the quality of political governance in the WAEMU.

Keywords

Information Asymmetry, Political Governance, TFP, WAEMU

1. Introduction

The importance of total factor productivity (TFP) as a driver of economic performance is recognized in most studies on economic growth (Solow, 1956; Kydland & Prescott, 1982; Romer, 1990; Aghion & Howitt, 1992). According to the standard neoclassical approach to economic theory, technical progress is considered exogenous and therefore has little influence on growth (Solow, 1956; Samuelson, 1958).

Solow's growth model (1956) thus dismisses the question of the sources of long-term growth to focus on the mechanism of capital accumulation and the economy's convergence towards a steady state. However, the work of Romer (1986) & Lucas (1988) challenges this approach. They consider technical progress to be endogenous to the production process. Since then, a wealth of literature has developed on endogenous growth. Entire books have been devoted to it (Grossman & Helpman, 1991; Barro & Sala-i-Martin, 1995; Aghion & Howitt, 1998). These theories have sought to reintegrate an explicit analysis of the long-term determinants of productivity growth, thereby broadening the range of factors used to explain growth. Thus, endogenous growth models explicitly incorporate knowledge accumulation, innovation, and imperfect competition into the explanation of growth.

Based on these endogenous growth theories, a wealth of literature has developed on the factors explaining TFP. Studies documented the effects of the TFP factors, such as innovation, incentives or subsidies for research and development, the abundance of skilled labor, and changes in market size (Romer, 1990; Aghion & Howitt, 1992; Hall & Jones, 1999; Comin & Gertler, 2006; Akanbi, 2011).

Some of the literature highlights the importance of technological progress in explaining TFP (Jajri, 2007; Abdulkadhim & Pickles, 1990; Bhatia, 1990; Kartz, 1969). Additionally, physical capital and human capital affect TFP (Baier, Gerald, & Tamura, 2002; Young, 1995). Other factors, such as human resource development, human resource management, and institutional restructuring, can also influence productivity (Jajri, 2007). Many other determinants of TFP, including trade openness, external debt, macroeconomic stability, financial development, infrastructure, and research and development, have been explored in the literature (Fosu, 2012; Akanbi, 2011; Bronzini & Piselli, 2009; Akinlo, 2006; Miller & Upadhyay, 2000; Olson, Sarna, & Swamy, 2000; Edwards, 1998). The literature also documents the link between institutions and certain TFP determinants, such as financial development and research (Jones & Romer, 2010; Acemoglu, 2008; Chinn & Ito, 2007; Nelson & Nelson, 2002; Lynn, Reddy, & Aram, 1996). Studies have analyzed the relationship between institutions and economic performance (McMillan & Rodrik, 2011; Glaeser et al., 2004; Acemoglu, Johnson, & Robinson, 2001; Knack & Keefer, 1995; North, 1989, 1990). The connection between TFP and economic growth is also examined in the literature (Baier, Gerald, & Tamura, 2002; Chen, 1997; Fare et al., 1994; Solow, 1957). Research indicates that the quality of certain institutions plays a significant role in influencing TFP (Fadiran & Akanbi, 2017; Del Mar Salinas-Jiménez & Salinas-Jiménez, 2011; Jajri, 2007; Olson, Sarna, & Swamy, 2000).

However, the relationship among political governance, information asymmetry, and TFP has attracted little attention in the literature for WAEMU countries. Yet these countries have low factor productivity (Soumaila, 2014). Considering issues related to information and political governance can therefore help shed light on the evolution of TFP in this region. It is therefore important to ex-

plore the effects of these two factors on TFP in the specific context of the WAEMU. Our research constitutes an empirical contribution in this regard. Beyond the factors mentioned in the literature, it addresses information asymmetry and political governance as potential determinants of TFP in the WAEMU. Consequently, it seeks to answer the following question: What are the effects of information asymmetry and political governance on TFP in the WAEMU? It therefore analyzes the effects of these two factors on TFP in the WAEMU. It assumes that information asymmetry and political risk have negative effects on TFP in the WAEMU.

The rest of this research contains four main sections. In the first section, we present a review of the literature on the subject. In the second section, we describe the study methodology. In the third section, we present and discuss the results obtained. The last section is a conclusion of this research, followed by economic policy proposals.

2. Literature Review

2.1. Information Asymmetry, Credit Risk, and TFP

Contrary to the theorists of the new classical economy, the new Keynesian economy, with contributions from Stiglitz & Weiss (1981) and Akerlof (1970), considers that there are imperfections in the markets associated with the information available to economic agents. This reality raises the problem of information asymmetry, which generates market failures.

In the neoclassical approach, the labor market is subject to the law of supply and demand for labor, with wages being the adjustment variable. However, in the functioning of this market, employers are victims of information asymmetry, particularly moral hazard regarding the productivity of their employees (Shapiro & Stiglitz, 1984). Employees reduce their efforts and, consequently, their productivity if employers do not constantly monitor them (Shapiro & Stiglitz, 1984). However, such monitoring generates costs for employers, and it is difficult to dismiss the least productive workers. These problems of hidden behavior can affect worker productivity and, consequently, TFP. In the credit market, too, information asymmetry exists and is a source of financial instability. Financial markets are imperfect, characterized by information asymmetry between lenders and borrowers (Stiglitz & Weiss, 1981). In these markets, the moral qualities of the actors can affect financial development. Information asymmetry in the credit market generates risks of non-repayment of credit, thus limiting bank financing (Svetlana et al., 2011) and, consequently, TFP.

Although the problem of information asymmetry arises in various markets, measuring it remains problematic. To date, there is no comprehensive, global measure of information asymmetry in the economy. However, we can approximate information asymmetry in the credit market using payment defaults. Thus, some studies on the subject have used the credit default rate for this purpose (Svetlana et al., 2011; Demetriades & Fielding, 2009). In this research, we have focused our attention on this market.

There is research on the relationship between information asymmetry and TFP (Loaba & Zahonogo, 2018; Greenwood & Jovanovic, 1990; Boyd & Prescott, 1986; Williamson, 1986; Diamond, 1984; Fu, 1996). According to this literature, information asymmetry is likely to affect TFP through several mechanisms. It can harm investment and, consequently, affect economic growth (Fu, 1996). It can also harm financial intermediation and economic growth (Boyd & Prescott, 1986; Williamson, 1986; Diamond, 1984). Indeed, information asymmetry between lenders and borrowers affects financial intermediation. However, this intermediation can promote economic growth by reducing management costs and channeling funds to the most efficient users (Diamond, 1984; Williamson, 1986). Similarly, information issues influence productivity (Greenwood & Jovanovic, 1990). More recently, Loaba & Zahonogo (2018) found a direct negative effect and an indirect negative effect of bank credit risk on economic growth in the WAEMU. Based on all this research, information asymmetry is likely to have direct or indirect negative long-term effects on TFP in the WAEMU.

2.2. Governance, Political Risk, and TFP

According to North's theory (1990), institutions are formal and informal constraints and rules that make it possible to monitor and limit the actions of individuals. Our approach to governance fits into this framework and therefore includes several dimensions. In this research, we focus on political governance. We assess this dimension through the political risk factors described in section 3.2. Indeed, the quality of political governance in a country can affect the accumulation of physical and human capital and, consequently, TFP. For example, better control of corruption is likely to promote financial development and improve investment. Corruption can negatively affect the allocation of public funds and thus economic growth (Mauro, 1998; Tanzi & Davoodi, 1997). Corruption directly affects sources of productivity improvement, technological progress, and investment (Svensson, 2005; Krusell & Rios-Rull, 1996). Furthermore, political stability is essential for financial development, improved investment, and consequently improved TFP. Indeed, in the presence of political instability, it becomes less attractive for entrepreneurs to invest in long-term projects (Salem & Trabelsi, 2010; Gries, Kraft, & Meierrieks, 2009; Roe & Siegel, 2009). Furthermore, high-quality regulation enables the conclusion and enforcement of fair contracts between banks on the one hand, and depositors and insurance institutions on the other (Jacquet & Pollin, 2007). This can therefore contribute to improving TFP.

Studies have analyzed the importance of institutions for TFP in certain contexts. In some of these studies, the quality of institutions impacts physical capital and human capital and, consequently, TFP (Ketterer & Rodriguez-Pose, 2012; Eicher, Garcia-Penalosa, & Teksoz, 2006; Mankiw, Romer, & Weil, 1992). In addition to capital accumulation, institutions can affect TFP and business output through other channels (Rodrik, Subramanian, & Trebbi, 2004; Easterly & Levine, 2003; Grigorian & Martinez, 2002; Acemoglu, Johnson, & Robinson, 2001; Kaufmann,

Kraay, & Zoido-Lobaton, 1999). Better institutions create a favorable business environment and a structured legal framework, enabling actors to channel investments toward more productive activities (Acemoglu & Robinson, 2008; Chanda & Dalgaard, 2008; McGuinness, 2007). Economic institutions such as property rights over TFP influence TFP in SSA (Fadiran & Akanbi, 2017). More specifically, some research has examined the link between TFP and governance variables. In this regard, studies have highlighted the negative effect of corruption on TFP (Del Mar Salinas-Jiménez & Salinas-Jiménez, 2011; Olson, Sarna, & Swamy, 2000; Mauro, 1998; Tanzi & Davoodi, 1997). Similarly, political instability hurts TFP (Aisen & Veiga, 2011).

Overall, this review of the literature highlights the abundance of work on the determinants of TFP. However, studies have paid less attention to the effects of information asymmetry and political governance factors on TFP, particularly in the WAEMU context.

3. Study Methodology

3.1. Model Specification, Model Variables, and Data Sources

The identification of factors explaining TFP has been the subject of modeling in studies. However, due to differences in the contexts of these studies, not all these models can explain TFP in the WAEMU. Our model is based on the following specification of the TFP determinants model by Fadiran & Akanbi (2017):

$$tfp_{it} = f\left[gdp_{it}, pl_{it}, govt_{it}, trade_{it}, pop_{it}, ms_{it}, infras_{it}, hc_{it}, rd_{it}, inst_{it}\right]$$

where:

tfp_{it} is total factor productivity; gdp_{it} is gross domestic product; pl_{it} is the general price level; $govt_{it}$ is total public expenditure; $trade_{it}$ is trade openness; pop_{it} is the total population; ms_{it} is the M2 money supply; $infras_{it}$ is the physical infrastructure index, hc_{it} is the human capital index, rd_{it} is the level of research and development; $inst_{it}$ is the level of institutions; i and t refer to the individual (country) and temporal (year) dimensions, respectively.

This specification of the TFP model concerns sub-Saharan Africa and is therefore closest to the general context of developing countries, including those of the WAEMU. We adjust this model to the context of our research by considering variables assessing banking development, information asymmetry, and political governance. We therefore specify the basic TFP model in the WAEMU as follows:

$$\begin{aligned} tfp_{it} = {} & \Delta_t^0 + \beta_i^0 + \theta.GroRat_{it} + \alpha.GovExp_{it} + \rho.Trade_{it} \\ & + \sigma.PopGro_{it} + \gamma.BroMon_{it} + \mu.PhyCap_{it} + \varphi.HumCap_{it} \\ & + \lambda.BanDev_{it} + \beta.AsyInf_{it} + \Phi.PolGov_{it}\_u_{jt} \end{aligned} \quad (1)$$

where:

$GroRat_{it}$, is a measure of economic activity; $GovExp_{it}$, public spending; $PopGro_{it}$, population growth; $BroMon_{it}$, money supply; $PhyCap_{it}$, physical

capital index; $HumCap_{it}$, human capital index; $BanDev_{it}$, banking development; $AsyInf_{it}$, information asymmetry; and $PolGov_{it}$, political governance.

According to the previous literature review, information asymmetry can also affect TFP through the channel of banking development (Loaba & Zahonogo, 2018; Boyd & Prescott, 1986; Williamson, 1986; Diamond, 1984). We can therefore specify the following TFP model:

$$\begin{aligned} tfp_{it} = {} & \Delta_t^0 + \beta_i^0 + \theta.GroRat_{it} + \alpha.GovExp_{it} + \rho.Trade_{it} \\ & + \sigma.PopGro_{it} + \gamma.BroMon_{it} + \mu.PhyCap_{it} + \varphi.HumCap_{it} \\ & + \lambda.BanDev_{it} + \beta.AsyInfBanDev_{it} + \Phi.PolGov_{it} + u_{jt} \end{aligned} \quad (2)$$

3.2. Description of Model Variables and Data Sources (Table 1)

Given the diversity of the databases used and the need for the longest possible series to analyze long-term effects, we excluded Benin, Guinea, and Mali from the sample due to the unavailability of long series or missing data on certain variables of interest. For example, in the ICRG database, political governance data are not available for Benin. Similarly, for certain periods, data on the tfp_{it} are not available for Guinea and Mali. As a result, our sample includes five WAEMU countries, namely Burkina Faso, Côte d'Ivoire, Niger, Senegal, and Togo, and covers the period 2003-2023.

Table 1. Description of model variables.

Variables	Labels	Definitions	Source	Expected signs
		Dependent variable		
tfp	Total factor productivity	Refers to total factor productivity (TFP). It is calculated for the countries in our sample and available in the Penn World Table (the series name is "rtfpna" and measures TFP at constant national prices (2021 = 1).	Penn World Table	
		Variables of interest in the model		
AsyInf	Information asymmetry	This is a measure of information asymmetry (moral hazard, adverse selection) in the credit market. Studies approach it through the bank credit default rate (Svetlana et al., 2011; Demetriades & Fielding, 2009). This rate is the ratio of all banks' non-performing loans to these banks' total credit over the same period.	Reports of the UMOA Banking Commission (2003-2023)	(−)
PolGov	political governance	It is a measure of the quality of political governance, assessed by political risk factors such as: GovSta, CorCon, DemAcc, SocCon, InvPro, IntCon, ExtCon, MilPol, and nmg.	International Country Risk Guide (ICRG), 2024	(+)
GovSta	Government stability	This is an estimate of the government's ability to conduct its stated programs and remain in power. It considers government cohesion, legislative strength, and popular support.	International Country Risk Guide (ICRG), 2024	(+)

Continued

CorCon	Corruption	This is an estimate of corruption within the political system: demands for special payments and bribes related to import and export licenses, exchange controls, tax assessments, police protection, or loans; actual or potential corruption.	International Country Risk Guide (ICRG), 2024	(+)
DemAcc	Democratic accountability	This is a measure of the government's responsiveness to its population.	International Country Risk Guide (ICRG), 2024	(+)
SocCon	Socio- economic conditions	This is an estimate of the socio-economic pressures in society that could limit government action or fuel social unrest. It considers consumer confidence, poverty, and unemployment.	International Country Risk Guide (ICRG), 2024	(+)
InvPro	Investment Profile	This is an estimate of the level of contract viability, payment delays, and repatriation of funds in a country.	International Country Risk Guide (ICRG), 2024	(+)
IntCon	Internal conflicts	This is an estimate of the level of civil unrest, civil war, and terrorism in a country.	International Country Risk Guide (ICRG), 2024	(+)
ExtCon	External conflicts	This is an estimate of the level of cross-border conflict, foreign pressure, and war.	International Country Risk Guide (ICRG), 2024	(+)
MilPol	Military in politics	This is an estimate of the level of decline in democratic accountability, distortion of government policy, change in government policy or replacement of government, and creation of armed opposition.	International Country Risk Guide (ICRG), 2024	(+)
nmg	Average level of governance	A calculated average of the various political governance factors concerned.	authors	(+)
		Other explanatory variables in the model		
BanDev	Banking development	This is a measure of banking development assessed by domestic credit to the private sector relative to GDP.	WDI (2024)	(+)
HumCap	Human Development	Human capital index.	Penn World Table	(+)
PhyCap	Physical capital	Physical capital stock is calculated and available in the Penn World Table (the series name is "rnna" and measures Capital stock at constant 2021 national prices (in mil. 2021US$). We calculate "PhyCap" by relating this capital stock to real GDP.	Penn World Table	(+)
Trade	Trade openness	Trade openness index.	WDI (2024)	(+)
PopGro	Population growth rate	Refers to population change.	WDI (2024)	(+)
GroRat		GroRat is a measure of GDP growth, calculated for the countries in our sample and available in the World Development Indicators (the series name is "GDP growth (annual %)"	WDI (2024)	(+)

Source: Authors, February 2026.

3.3. Estimation of the Specified PTF Model

Estimating the econometric model requires studying the stationarity of the differ-

ent variables. Since the seminal work of Levin & Lin (1992), unit root tests have evolved significantly in the late 1990s, notably with the work of Im, Pesaran, & Shin (1997), and Maddala & Wu (1999). In our study, we use the LLC unit root tests of Levin, Lin, & Chu (2002) and the IPS tests of Im, Pesaran, & Shin (2003) and Hadri (2000) because of their robustness and frequent use in the literature. The panel unit root test of Levin, Lin, & Chu (2002) assumes a homogeneous autoregressive unit root, while Im, Pesaran, & Shin (2003) assume a heterogeneous unit root. The latter unit root test takes heterogeneity into account.

We present the results of the various unit root tests in level and first difference form in **Table A1** and **Table A2**. These results of the panel unit root tests are consistent and show that the variables are integrated of order one.

We therefore proceed with panel cointegration tests. Among the tests developed in the panel context, we consider the tests for the absence of cointegration on panel data proposed by Pedroni (1995, 1997, 1999) and Kao (1999). Pedroni's tests take heterogeneity into account. Kao (1999), meanwhile, proposed tests of the null hypothesis of no cointegration: the Dickey-Fuller test and the augmented Dickey-Fuller test. Unlike Pedroni's tests, Kao considers the special case where cointegration vectors are assumed to be homogeneous across individuals. Ideally, to test for the existence of cointegration vectors between the variables under consideration, the traditional approach of Pedroni (1999, 2004) seems to be a better option. However, this approach is limited when the sample size is small. Using Monte Carlo simulations, Gutierrez (2003) showed that the smaller the sample size, the more Kao's tests dominate those of Pedroni. Therefore, the structure of our panel (N = 5, T = 21) gives an advantage to Kao's ADF test. As a result, Kao's (1999) cointegration test approach is more appropriate in the specific case of this research. The various Kao (1999) tests performed concluded that there is cointegration between the PTF and the various explanatory variables in the different models and sub-models (see **Table A3** and **Table A4**).

In this research, our model uses macroeconomic variables. Some variables in the system may therefore be jointly determined. Endogeneity issues may therefore arise. As a result, many explanatory variables may be correlated with the error term. Consequently, estimating our model using the ordinary least squares (OLS) method may produce inconsistent results due to endogeneity stemming from a possible simultaneity bias. In addition, reverse causality may arise from the explanatory variables. Given these considerations, an appropriate estimation of the PTF model requires the use of an estimator that considers the concerns expressed. We therefore used the Fully Modified Ordinary Least Squares (FMOLS) estimator proposed by Pedroni (1996, 2000). The main strength of this approach is its ability to control the endogeneity of the explanatory variables. In addition, it allows for heterogeneity between cross-sectional units. Better still, for small panels where the individual dimension (N) is smaller than the time horizon (T), such as ours (N =

5 and T = 21), FMOLS estimators are highly effective (Pedroni, 1996, 2000).

3.4. Robustness Testing

As part of this study, we performed several robustness checks. These checks help address potential biases arising from the small sample size. When the panel data sample size is small, it can affect the inference of unit root and panel cointegration tests, such as LLC, IPS, and Kao, as well as long-term estimators such as FMOLS. We therefore performed alternative unit root tests (Levin-Lin-Chu, Im-Pesaran-Shin, and Hadri tests) to verify the robustness of the stationarity results. We have summarized the results in Table A1 and Table A2. We also performed cointegration tests (Kao and Pedroni) to verify that the long-term relationship is robust. Pedroni's cointegration tests confirmed the results of Kao's tests. In addition, we used alternative long-term estimators (FMOLS and Pooled Mean Group (PMG) estimator) to verify that the coefficients remain stable. The results of our estimates using the PMG estimator produced similar results to those of the FMOLS estimator, thus ensuring the stability and reliability of the results of this study.

4. Presentation of Results and Discussion

4.1. Effects of Information Asymmetry and Political Governance on TFP

We estimated PTF model 1 by substituting the various governance indicators, GovSta, CorCon, DemAcc, SocCon, InvPro, IntCon, ExtCon, MilPol, and nmg, respectively. In this case, we estimated nine sub-models: Sub-model 1 is an estimation of PTF model 1 with GovSta as the political governance variable, sub-model 2 with CorCon, sub-model 3 with DemAcc, sub-model 4 with SocCon, sub-model 5 with InvPro, sub-model 6 with IntCon, sub-model 7 with ExtCon, sub-model 8 with MilPol, and sub-model 9 with nmg. We summarize the results in Table 2.

The estimated long-term coefficients of the variable "AsyInf," which captures the direct effect of information asymmetry on TFP, appear to be significant and negative in all sub-models. Information asymmetry, therefore, has a direct negative effect on TFP. This result is in line with our expectations. Indeed, as theory indicates, information asymmetry generates malfunctions in the credit market, marked by credit defaults. However, banks' rationality requires them to distance themselves from these credit risks. In the WAEMU, these dysfunctions therefore prevent the full utilization of productive capacities in this market and consequently lead to productivity losses. This result is consistent with the conclusions of other studies. Indeed, credit risk harms economic growth in the WAEMU (Loaba & Zahonogo, 2018). Similarly, credit defaults are hampering banking development in West Africa (Demetriades & Fielding, 2009). Furthermore, credit defaults limit bank financing in SSA (Svetlana et al., 2011).

The coefficients of the "PolGov" variable, which captures the specific effects of

political governance factors on TFP, appear to be significant and positive in nine sub-models. It is non-significant in the sub-model with internal conflict (IntCon). Governance, therefore, affects TFP in WAEMU. Indeed, in the WAEMU, an improvement in the quality of each of these components of political governance stimulates TFP. This result is also in line with our expectations. Studies found comparable results. Indeed, productivity growth is higher in better-governed countries (Olson, Sarna, & Swamy, 2000). Similarly, in the context of Italy, better local institutions can help firms to combine inputs more effectively, approach optimal size, and ultimately be more productive (Agostino et al., 2016).

Table 2. Summary of results from PTF Model 1 estimates.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GroRat	0.001181**	0.002027***	0.000236	0.001616***	0.000690**	0.001478***	−0.002452***	0.000833*	−0.001146***
	(0.0147)	(0.0000)	(0.5201)	(0.0000)	(0.0132)	(0.0033)	(0.0000)	(0.0508)	(0.0002)
GovExp	−0.002627***	−0.001908***	−0.000420*	−0.002011***	−0.002312***	−0.001885***	−0.000688***	−0.001896***	−0.002412***
	(0.0000)	(0.0000)	(0.0521)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Trade	−0.001096***	−0.002294***	−0.001018***	−0.002321***	−0.001592***	−0.002344***	−0.001056***	−0.001515***	0.000340**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0201)
PopGro	−0.006937	−0.024272***	−0.027210***	−0.026476***	−0.035305***	−0.029234***	−0.032423***	−0.024462***	−0.024429***
	(0.2769)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
BroMon	−0.001646***	−0.001386***	−0.003722***	−0.000379	−0.000753***	−0.000405	−0.001883***	0.002451***	−0.001638***
	(0.0007)	(0.0031)	(0.0000)	(0.1506)	(0.0039)	(0.3906)	(0.0000)	(0.0000)	(0.0000)
PhyCap	−0.247678***	−0.235692***	−0.284369***	−0.248998***	−0.244299***	−0.249056***	−0.309957***	−0.264334***	−0.274094***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HumCap	0.146013***	0.008388	0.075934***	−0.070986***	−0.089532***	−0.061418	−0.030908*	−0.489304***	−0.061991***
	(0.0004)	(0.8161)	(0.0082)	(0.0007)	(0.0000)	(0.1008)	(0.0953)	(0.0000)	(0.0050)
BanDev	0.000476	−0.000596	−5.00E−05	0.000119	0.000857**	0.000256	0.001549***	0.001512***	0.002077***
	(0.4556)	(0.3448)	(0.9179)	(0.7377)	(0.0184)	(0.6973)	(0.0000)	(0.0094)	(0.0000)
AsyInf	−0.134004***	−0.256354***	−0.275400***	−0.252043***	−0.248839***	−0.226428***	−0.122669***	−0.118316***	−0.131824***
	(0.0003)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0004)	(0.0000)
PolGov	0.019167***	0.051211***	0.041519***	0.003013**	0.014540***	0.001478	0.087155***	0.036763***	0.091681***
	(0.0000)	(0.0000)	(0.0000)	(0.0343)	(0.0000)	(0.3816)	(0.0000)	(0.0000)	(0.0000)
Nbre obs	100	100	100	100	100	100	100	100	100
R-squared	0.906242	0.905075	0.917378	0.900421	0.902467	0.900303	0.952933	0.906197	0.917637
Adjusted R-squared	0.890800	0.889440	0.903769	0.884020	0.886402	0.883882	0.945180	0.890747	0.904072

The values in parentheses are *p*-values; *** significant at 1%, ** significant at 5%, * significant at 10%. **Source:** authors' estimates, February 2026.

About government stability, improved cohesion in government action, legislative strength, and popular support boost productivity in these countries. Political instability negatively affects growth by lowering productivity growth rates (Aisen & Veiga, 2011). Concerning corruption control, reducing corruption reduces resource allocation problems in the WAEMU and, consequently, improves TFP in this region. This result is consistent with economic literature. Indeed, corruption could lead to inefficient allocation of public funds and negatively affect economic growth (Mauro, 1998; Tanzi & Davoodi, 1997). Corruption has negative consequences on resource allocation, entrepreneurship, investment, and innovation (Baumol, 1990). Elevated levels of corruption and informal economies make it difficult for new companies to enter the market (Djankov et al., 2002). These barriers to market entry discourage investment decisions (Alesina et al., 2005). Consequently, reducing corruption would boost productivity in the WAEMU. About democratic accountability, improving the government's responsiveness to the concerns of the population stimulates TFP in the WAEMU. Concerning internal conflicts, a reduction in civil unrest, civil war, and terrorism contributes to improving TFP in the WAEMU. About socioeconomic conditions, an improvement in consumer confidence, employment levels, and living conditions would have a positive impact on productivity in these countries. Concerning the investment profile, an improvement in the viability of contracts, the repatriation of funds, and the reduction of payment delays in the countries concerned promote TFP. Keho (2012) found a negative coefficient for investment conditions on financial development in the WAEMU. According to him, this result does not reflect a negative effect of this variable on financial sector development; rather, it indicates that efforts to improve the business environment have not gained the confidence of investors and financial institutions and stimulated the supply and demand for financial services. About external conflicts, a reduction in cross-border conflicts, foreign pressure, and war promotes improvement in TFP in the WAEMU. Concerning the military in politics, the results show a paradox in the context of the WAEMU. Although a high level of this indicator reflects a high political risk, it contributes to promoting the application and/or enforcement of existing laws by the population and the restoration of state authority, which is essential for improving TFP.

We estimated PTF model 2 by cross-referencing banking development with information asymmetry. We present the results in **Table 3**.

The long-term coefficients of the variables capturing the cross-effect of information asymmetry and banking development on TFP appear to be significant and negative. However, the coefficients for banking development are positive. The negative coefficient of this interactive variable, therefore, stems from information asymmetry. For example, considering sub-model 9 (see **Table 3**), the estimated coefficient of "BankDev" is 0.002728. However, the estimated coefficient of "AsyInf * BanDev" is −0.012123. The marginal effect of "AsyInf" is therefore −4.443914. In WAEMU countries, information asymmetry therefore has an indi-

rect negative effect on TFP in the long term. Indeed, in the credit market, information asymmetry generates credit defaults, resulting in a decrease in bank financing, which affects TFP growth in the long term. Studies found comparable results. Credit defaults harm bank financing in sub-Saharan Africa (Svetlana et al., 2011; Demetriades & Fielding, 2009). These credit defaults cause banks and financial institutions to distance themselves from borrowers. This distancing is more significant when the proportion of opportunistic borrowers is high, leading to a decrease in bank financing.

Table 3. Summary of the results of the PTF model 2 estimates.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GroRat	0.000745	0.001682***	−2.87E−05	0.001309***	0.000395	0.000967*	−0.002808***	0.000380	−0.001493***
	(0.1238)	(0.0003)	(0.9369)	(0.0000)	(0.1146)	(0.0528)	(0.0000)	(0.3570)	(0.0000)
GovExp	−0.002687***	−0.001977***	−0.000550**	−0.002083***	−0.002400***	−0.001987***	−0.000766***	−0.001976***	−0.002478***
	(0.0000)	(0.0000)	(0.0103)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Trade	−0.001210***	−0.002339***	−0.001070***	−0.002435***	−0.001664***	−0.002378***	−0.001153***	−0.001652***	0.000239*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0915)
PopGro	−0.003612	−0.018502***	−0.020570***	−0.019588***	−0.027752***	−0.024530***	−0.028983***	−0.021123***	−0.020631***
	(0.5646)	(0.0015)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
BroMon	−0.001756***	−0.001353***	−0.003596***	−0.000279	−0.000694***	−0.000419	−0.001968***	0.002300***	−0.001700***
	(0.0003)	(0.0024)	(0.0000)	(0.2817)	(0.0031)	(0.3668)	(0.0000)	(0.0000)	(0.0000)
PhyCap	−0.251668***	−0.242297***	−0.289409***	−0.254747***	−0.250450***	−0.255902***	−0.312892***	−0.267896***	−0.277464***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HumCap	0.154930***	0.015230	0.082628***	−0.060815***	−0.077561***	−0.054916	−0.020765	−0.477090***	−0.053201**
	(0.0002)	(0.6574)	(0.0035)	(0.0030)	(0.0000)	(0.1388)	(0.2631)	(0.0000)	(0.0139)
BanDev	0.001242*	0.000354	0.000817*	0.000953***	0.001647***	0.001294*	0.002193***	0.002268***	0.002728***
	(0.0577)	(0.5622)	(0.0945)	(0.0095)	(0.0184)	(0.0535)	(0.0000)	(0.0001)	(0.0000)
AsyInf * BanDev	−0.012957***	−0.017099***	−0.017317***	−0.017606***	−0.017213***	−0.016678***	−0.011850***	−0.012844***	−0.012123***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
PolGov	0.019134***	0.049169***	0.040444***	0.000836	0.013738***	0.002721*	0.086866***	0.036441***	0.091164***
	(0.0000)	(0.0000)	(0.0000)	(0.5439)	(0.0000)	(0.0994)	(0.0000)	(0.0000)	(0.0000)
Nbre obs	100	100	100	100	100	100	100	100	100
R-squared	0.907501	0.905753	0.917634	0.901471	0.903280	0.901458	0.953942	0.907545	0.918633
Adjusted R-squared	0.892266	0.890230	0.904068	0.885243	0.887350	0.885228	0.946356	0.892317	0.905231

The values in parentheses are p-values; *** significant at 1%, ** significant at 5%, * significant at 10%. **Source:** authors' estimates, February 2026.

4.2. Effects of Other Variables in the Model on TFP

The results of the other variables of the model are presented in Table 2. The esti-

mated coefficients for physical capital appear significant and negative in the various estimates. The estimated coefficients for human capital appear significant and negative in five sub-models. According to the literature on TFP, physical capital and human capital are important aspects of productivity improvement (Akanbi, 2011; Bronzini & Piselli, 2009; Akinlo, 2006; Miller & Upadhyay, 2000; Olson, Sarna, & Swamy, 2000). The accumulation processes of these factors can explain the results for these two factors in WAEMU countries. Concerning physical capital, an efficient combination of inputs and/or widespread adoption of existing technology in economies would lead to such a result in the WAEMU. Indeed, the process of capital accumulation can affect productivity growth in an economy (Del Mar Salinas-Jiménez & Salinas-Jiménez, 2011). Technology returns may therefore differ depending on an economy's combination of inputs. The adoption of existing technology through capital accumulation can contribute to efficiency gains (Romer, 1986). Fadiran & Akanbi (2017) found a negative coefficient of physical capital on TFP in sub-Saharan Africa (SSA). According to them, countries in this region have experienced elevated levels of infrastructure deterioration, civil unrest, political instability, and violence, which can contribute to the inadequate quality of physical capital, thus not reflecting positively on TFP. About human capital, the low level of this factor could explain the unexpected result in the WAEMU, limiting its effect on the productivity of other factors of production and its contribution to technological progress and efficiency gains in this area. Indeed, human capital can have a level effect on the productivity of other productive inputs and influence the evolution of TFP (Del Mar Salinas-Jiménez & Salinas-Jiménez, 2011). Studies on TFP also obtain comparable results of a negative effect of human capital (Fadiran & Akanbi, 2017; Teixeira & Fortuna, 2010; Ciccone & Papaioannou, 2009; Shapiro, 2006; Miller & Upadhyay, 2000; Maudos, Pastor, & Serrano, 1999; Rauch, 1993). Indeed, in SSA, education levels and other measures of human development have not yet been fully utilized in the production sector (Fadiran & Akanbi, 2017). By extension, this explanation could also be valid in the WAEMU. Another explanation could be the inefficient use of human capital factors in the WAEMU. Indeed, to increase productivity, an economy needs to make effective use of human capital in the labor market and increase the number of skilled workers to exploit more sophisticated technology (Jajri, 2007).

The estimated coefficients of trade openness are significant and negative in all estimates. This result contradicts economic theory. The literature suggests that trade and openness positively influence productivity (Topalova & Khandelwal, 2011; Melitz & Ottaviano, 2008; Alcala & Ciccone, 2004; Melitz, 2003). In Malaysia, openness to foreign companies and the global economy, as well as economic restructuring that allows their presence, contribute to TFP growth (Jajri, 2007). However, the study by Fadiran & Akanbi (2017) finds a negative and significant effect of trade openness in SSA. The estimated coefficients for banking development are significant and positive. Improved financing of the economy stimulates TFP in the WAEMU. However, Fadiran & Akanbi (2017) found negative coeffi-

cients for banking development on TFP in SSA. According to these authors, most citizens in SSA do not benefit from the development of the banking system. Access to credit remains limited, particularly for small business owners who operate mainly in the informal sector, where most of the population is employed (Fadiran & Akanbi, 2017). The negative coefficient of population growth can be explained by the relative weakness of the quality of the WAEMU population. TFP growth is more likely to be linked to improvements in the productive capacity of the population than to its size. The economic growth rate coefficients are significant and positive. An improvement in the level of economic activity has positive effects on TFP in the long term. On the other hand, the money supply and public expenditure coefficients are significant and negative. The change in the level of these two factors is relatively small to stimulate TFP in the countries concerned.

5. Conclusion

Improving TFP is a major challenge in WAEMU countries. However, research on TFP in this region has not fully covered certain important determinants, such as information asymmetry and political governance. The objective of this paper was to analyze the effects of these TFP factors in the WAEMU. Using Pedroni's (2000) FMOLS estimator on data from five WAEMU countries, we obtained the following results:

Information asymmetry and political governance significantly explain TFP in the WAEMU. Information asymmetry has a direct negative effect and an indirect negative effect on long-term TFP. The indirect effect of information asymmetry on TFP is channeled through banking development.

Political risk is high overall and harms TFP in this region. More specifically, political governance factors have significant direct effects on TFP in this economic area.

Furthermore, we found that banking development, economic growth, public spending, and money supply have positive long-term effects on TFP in the WAEMU. However, trade openness, human capital, physical capital, and population growth have negative effects on TFP.

Considering these results, it is important to combine banking development policies with policies aimed at reducing information asymmetry and improving political governance to improve TFP in the WAEMU region.

About information asymmetry, it is important to act on the variables that influence credit risk. According to the findings of Loaba & Zahonogo (2018), the lending rate has a positive and significant effect on credit risk. Similarly, Boyd & Nicolo (2005) show that an increase in the interest rate on credit increases borrower opportunism and the risk of default. Therefore, all other things being equal, a policy of lowering interest rates can lead to an increase in the profitability of investment projects, which is financed by bank credit. This policy will lead to a decrease in credit defaults and, as a result, the development of banking intermediation and an improvement in TFP. Similarly, we can consider other measures

to reduce information asymmetry. These include the creation of optimal contracts between managers and investors; the issuance of regulations requiring managers to provide private individuals with complete information on the actions taken; and the use of financial intermediaries for the disclosure of internal information. In terms of improving political governance, it is important to conduct institutional reforms aimed, among other things, at reducing corruption, developing justice, reducing political instability, improving the socio-economic conditions of the population, and restoring the authority of the state in WAEMU countries. Among other things, it is important to formulate and implement robust measures and regulations to promote investment in physical and human capital and ensure its full utilization in the production sector, to crack down on corruption, and to make structural investments for the benefit of the population.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendices

Table A1. Results of unit root tests at the level.

Variables	IPS H0: non-stationary		LLC H0: non-stationary		Hadri H0: stationary	
	Constant	Constant + Trend	Constant	Constant + Trend	Constant	Constant + Trend
GroRat	0.0000	0.0000	0.0000	0.0000	0.0023	0.0073
GovExp	0.0740	0.1568	0.1211	0.1729	0.0014	0.0118
Trade	0.4235	0.6570	0.1642	0.4562	0.0000	0.0005
PopGro	0.9996	0.9848	0.9991	0.7715	0.0011	0.0009
BroMon	0.9935	0.8276	0.5757	0.7478	0.0000	0.0000
PhyCap	1.0000	0.9652	1.0000	0.8340	0.0000	0.0000
HumCap	1.0000	1.0000	1.0000	0.0000	0.0000	0.0140
BanDev	0.9038	0.9504	0.1186	0.7174	0.0000	0.0001
AsyInf	0.0123	0.1769	0.0299	0.0758	0.0806	0.0003
GovSta	0.3509	0.5122	0.1801	0.4178	0.0000	0.0792
CorCon	0.1440	0.5757	0.0702	0.6642	0.0002	0.0003
DemAcc	0.9053	0.7819	0.7016	0.4043	0.0000	0.0000
SocCon	0.9040	0.8493	0.9609	0.7120	0.0002	0.0093
InvPro	0.9865	0.9898	0.9788	0.9848	0.0000	0.0383
IntCon	0.2748	0.5445	0.1104	0.2274	0.0000	0.0005
ExtCon	0.0508	0.0327	0.0167	0.0165	0.0000	0.0011
MilPol	0.8768	0.5925	0.2530	0.4783	0.0000	0.0001
nmg	0.7330	0.5878	0.3588	0.4435	0.0000	0.0011
AsyInf * BanDev	0.0016	0.0371	0.0010	0.0019	0.0196	0.0000

The figures correspond to probabilities p. For $p > 0.1$, the null hypothesis of non-stationarity cannot be rejected according to the LLC and IPS tests. However, for $p < 0.1$, the null hypothesis of stationarity is rejected according to the Hadri test.

Table A2. Results of unit root tests in first differences.

Variables	IPS H0: non-stationary		LLC H0: non-stationary		Hadri H0: stationary	
	Constant	Constant + Trend	Constant	Constant + Trend	Constant	Constante + Trend
GroRat	0.0000	0.0000	0.0000	0.0000	0.6341	0.1059
GovExp	0.0000	0.0004	0.0000	0.0000	0.0705	0.0171
Trade	0.0038	0.0934	0.0006	0.0166	0.4449	0.0081
PopGro	0.0776	0.5957	0.0338	0.1745	0.2169	0.0018
BroMon	0.0000	0.0000	0.0000	0.0000	0.1769	0.0009
PhyCap	0.0000	0.0000	0.0000	0.0000	0.0052	0.0373
HumCap	0.9929	0.9620	0.9779	0.6777	0.4001	0.0002
BanDev	0.0000	0.0000	0.0000	0.0000	0.1967	0.0036
AsyInf	0.0000	0.0000	0.0000	0.0000	0.4534	0.0690

Continued

GovSta	0.0000	0.0000	0.0000	0.0000	0.7749	0.0451
CorCon	0.0001	0.0079	0.0000	0.0001	0.1794	0.2312
DemAcc	0.0000	0.0003	0.0000	0.0000	0.1834	0.0000
SocCon	0.0000	0.0001	0.0000	0.0000	0.1400	0.0297
InvPro	0.0000	0.0024	0.0000	0.0000	0.7418	0.0093
IntCon	0.0000	0.0000	0.0000	0.0000	0.4062	0.0024
ExtCon	0.0000	0.0000	0.0000	0.0000	0.2817	0.0007
MilPol	0.0000	0.0000	0.0000	0.0000	0.2306	0.0005
nmg	0.0000	0.0000	0.0000	0.0000	0.4309	0.0273
AsyInf * BanDev	0.0011	0.0161	0.0014	0.0060	0.1183	0.0000

The figures correspond to probabilities *p*. For $p > 0.1$, the null hypothesis of non-stationarity cannot be rejected according to the LLC and IPS tests. However, for $p < 0.1$, the null hypothesis of stationarity is rejected according to the Hadri test.

Table A3. Results of Kao's (1999) cointegration tests on PTF model 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic
ADF	−2.5598***	−2.4605***	−2.6040***	−2.4302***	−2.3504***	−2.3978***	−2.7687***	−2.4200***	−2.7952***
	(0.0052)	(0.0069)	(0.0046)	(0.0075)	(0.0094)	(0.0082)	(0.0028	(0.0078)	(0.0026)

The values in parentheses are *p*-values. (*), (**), and (***) indicate rejection of the null hypothesis of no cointegration at the 10%, 5%, and 1% significance levels, respectively.

Table A4. Results of Kao's (1999) cointegration tests on PTF model 2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic	t-Statistic
ADF	−2.6200***	−2.5020***	−2.5498***	−2.4420***	−2.3952***	−2.4889***	−2.7790***	−2.5187***	−2.8132***
	(0.0044)	(0.0062)	(0.0054)	(0.0073)	(0.0083)	(0.0064)	(0.0027)	(0.0059)	(0.0025)

The values in parentheses are *p*-values. (*), (**), and (***) indicate rejection of the null hypothesis of non- cointegration at the 10%, 5%, and 1% significance levels, respectively.