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Immediate Effects And Delays Of Financial Inclusion Via Mobile Money On Financial Development In Uemoa : Dynamic Panel Approach

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ABSTRACT : The objective of this study is to assess the effects of mobile money on financial development in the context of the WAEMU countries. To achieve this objective, panel data for the eight WAEMU member countries were compiled over the period from 2012 to 2021. These data come from the World Bank and BCEAO databases. A synthetic index of financial development was constructed from indicators related to credit from the monetary sector to the private sector ; to money in the broad sense ; and domestic credit to the private sector by banks. An estimate using the linear regression method in a dynamic panel carried out on stata 15 showed that financial development is influenced by its past values. Similarly, the variables relating to the geographical penetration rate of financial services and the geographical penetration rate of mobile money have a delayed effect on financial development in the WAEMU region. On the other hand, the rate of use of mobile money has no immediate or delayed influence on the financial development of the WAEMU. These results show that mobile money is a powerful tool for financial inclusion, but that its use does not yet improve the financial deepening of WAEMU countries.

KEYWORDS : WAEMU, Financial development, mobile money, dynamic panel.
JEL classification : G21, O16, C23

I. INTRODUCTION

According to the IMF (2017), financial inclusion can be understood through two components. These are banking inclusion and digital inclusion. The first refers to all individuals who hold at least one account with a financial institution while the second focuses on individuals who are included thanks to technological innovations, the most widespread of which is mobile moneet [1]. In this research, the focus is on financial inclusion via digitalisation, in particular mobile money. Mobile money is a technique that consists of offering financial services such as transactions, bill payments and deposits to people who do not have a bank account [2]. For more than a decade, the world of financial inclusion has been strengthened by the digitalisation of means of payment [3]. In other words, the rapid development of digital financial services has helped to improve the rate of financial inclusion [4]. According to the Group System for Mobile Communication (2017), the mobile phone penetration rate in Africa has reached 75%. Faced with this widespread use of telephony in Africa, an ecosystem has been set up by financial players to promote the financial inclusion of a population that until now has been marginalised by the formalities of a traditional financial system.

To this end, African financial literature has drawn heavily on advances in financial digitalisation and financial inclusion. It should also be noted that most of the work has been concentrated in sub-Saharan Africa. This can be explained by the remarkable performance in terms of financial inclusion and digitisation in this part of Africa. Overall, data from the global Findex (2022) show that the rate of account ownership has more than doubled, rising from 23% in 2011 to 55% in 2021, while the global average growth rate was 50% (the rate, which was 51% in 2011, has risen to 76% in 2021). Sub-Saharan Africa leads the way in the digitalisation of financial services (IMF, 2020). It should be noted that mobile money transactions account for 25% of GDP in sub-Saharan Africa, compared with just 5% in the rest of the world (IMF, 2020). These different indicators show the positive dynamics of financial digitalisation in this part of Africa.Indeed, financial inclusion cannot be limited solely to holding an account, but also to using it. Holistically, use can be understood as saving and borrowing. With regard to these two aspects, respectively 39% and 7% have managed to save money and borrow via mobile money (Global Fndex, 2022).Although financial digitalisation has contributed to the development of the financial system in SSA, it must be acknowledged that this development remains limited, as several countries are still characterised by insufficient financial instruments and financial inclusion [5].

When it first appeared, digital finance was supposed to improve the financial system by enabling it to reach mass markets combining performance with effectiveness and efficiency [6]. Considering the current state of the financial landscape in SSA countries and the evolution of digital practices, it may seem appropriate to analyse the impact of digital financial inclusion practices on financial development in SSA. A developed financial sector is an essential component of a nation's economy [5]. As such, the concept of financial development has demonstrated a kirielle of research. However, the vast majority of this research has highlighted the causality between financial development and economic growth without reaching a consensus (Sene & Thiao, 2020). Generally speaking, financial development can be understood in terms of the ability of financial institutions to fulfil their financial intermediation role. Consequently, financial development makes it possible to evaluate the efficiency with which intermediaries mobilise and allocate savings available in the economy to investment projects (Cezar, 2012). Thus, the objective of this research is to analyse the effect of current digital financial practices on financial development in SSA.

However, for reasons relating to the heterogeneity of countries in terms of monetary policy, the research focuses particularly on the member countries of the West African Monetary Union (WAEMU). Although the WAEMU banking system has maintained a positive growth dynamic in recent years, enormous efforts still need to be made, as the banking penetration rates in WAEMU member countries remain the lowest in the world (European Investment Bank, 2016). All other things being equal, the challenge is to find out whether, in the long term, digital practices have the capacity to improve the financial development of WAEMU countries. In order to achieve this objective, this research is organised around a literature review, a research methodology, and the presentation and analysis of the results.

II. LITERATURE REVIEW

Determinants of financial inclusion : In theoretical terms, financial inclusion is understood as the set of mechanisms put in place to guarantee access to financial services for a population according to its expressed needs. According to Guérineau & Jacolin, (2014), financial inclusion is not just access to financial services but also intensive use of them. Regarding the people who are supposed to have access to these services [10] specifies that these are businesses and households. These people (businesses and households) are generally considered to be disadvantaged and to have low incomes [11]. According to Beck et al., (2015) there are two key dimensions to access to financial services. These are the geographical dimension and the socio-economic dimension. The first relates to the proximity between the financial service provider and the beneficiary. The second is the absence of prohibitive charges and documentation requirements. Generally speaking, four indicators are recognised for assessing financial inclusion in a country. These are : access, use, quality (affordability of the service) and well-being. However, given the qualitative aspect of the last indicator, most research takes the first three indicators into account.From all of the above, it can be said that financial inclusion is the set of policies that enable all potential applicants to improve their living conditions through access to financial services and more intensive use of financial services at reduced cost. In order to assess the scope of financial inclusion policies, [12] proposes a financial inclusion index with a multidimensional approach. The aim of such an index is to compare the level of financial inclusion between regions or economies at a given point in time[13]. The indicators in this index take three dimensions into account: accessibility, availability and use of financial services (Timite & Skalli, 2023).

Mobile money and mobile banking practices : The rise of mobile finance began with an alarming situation in African countries. It was noted that many Africans do not have a bank account. Moreover, very few do not have a mobile phone [15]. Given this situation, financial inclusion through mobile telephony has been seen as an alternative that could alleviate the situation of financial exclusion. From 2007 onwards, developing countries began to see unprecedented growth in mobile finance. The development of mobile finance was made possible by the success of M-pesa (M stands for mobile and Pesa for money in Swahili), launched by the Safaricom operator in Kenya in partnership with Vodafone. Having undergone a number of changes in response to a process of improvement, mobile finance is now based on two models (mobile banking and mobile money). Mobile money is a technique for offering financial services such as transactions, bill payments and deposits to people who do not have a bank account [2]. Unlike mobile money, mobile banking is a financial inclusion process aimed at people who already have an account (either with a bank or an MFI) but do not benefit from digital financial services [2]. Mobile banking links the customer's account to financial services. As a result, access to financial services is conditional on holding an account with the financial institution in the mobile banking model. Mobile banking is the most widespread mobile finance method in developed countries, while mobile money is the most widely used method in developing countries (Fox & Van Droogenbroeck, 2017).

Table1 : Mobile money Vs Mobile Banking

Modèles / Options	Bank-led model (mobile banking)	Nonbank-led-mobile money)
Regulator	Financial/banking regulator	Telecoms & financial/banking regulator
Holder of transaction accounts	Banks	Telecom
Holder of settlement accounts	Banks	Banks
Caisses/distributors	Banks	Telecom
Access to services	Limited to account holders	Limited to telecom subscribers
Customers	Banks	Telecom

Source : Fox & Van Droogenbroeck, (2017a)

Mobile money and financial inclusion in the WAEMU region : In the UEMOA region, mobile money is defined as a range of financial services accessible via a mobile telephone platform that bypasses traditional bank branches (Timite & Skalli, 2023). Today, because it is so easy to access, mobile money is almost a special choice in the financial culture of the population of WAEMU countries. The work of Timite & Skalli (2023) shows that mobile money makes a valid contribution to improving financial inclusion in the WAEMU region. According to these authors, financial inclusion with the use of mobile money is better than the level of financial inclusion without mobile money. Similarly, [3], following his work on the financial index in the era of mobile money, came to the same result. It shows that mobile money has a significant effect on financial inclusion in certain African countries. Furthermore, the use of mobile money does not provide access to all financial services. According to the Commission Bancaire's annual report (2020), the services most commonly used via mobile money are e-wallet deposits, cash withdrawals, person-to-person transfers and phone top-ups. Mobile money does not provide access to bank credit. These activities reflect exactly the attributes conferred on Electronic Money Establishments (EMEs). These activities are limited to issuing electronic money, making it available to the public and managing electronic money. In the WAEMU region, 46 institutions are authorised to issue electronic money. These include 17 EMEs, 27 banks in partnership with telecoms and fintechs, 1 SFD and 1 national treasury. Within the space, top-up and person-to-person transfer transactions remain the most prevalent for the 2023 financial year. These two operations account for 75.3% and 86.2% respectively of total electronic money transactions.

Approaches to measuring financial development : 'No empirically acceptable definition of financial development exists; however, the broad theoretical literature suggests that financial intermediaries and markets are created and develop to optimise information and transaction costs, thus promoting information acquisition, risk diversification, liquidity transformation and facilitation of financial transactions' [17]. Various indicators are used to measure financial development. These indicators are grouped into different dimensions. The World Bank uses dimensions relating to the depth, access, efficiency and stability of financial systems. Each dimension contains a set of measurement indicators. The depth dimension comprises all the indicators that make it possible to measure the extent and diversity of financial services available within an economy. The access dimension encompasses all the indicators that make it possible to assess the availability of financial services for different segments of the population. The efficiency dimension covers the indicators used to assess the performance of financial institutions. The stability dimension measures the ability of the financial system to be resilient in the face of shocks. A great deal of research (Cezar, 2012, Sene, & Thio, 2020, Schumpeter 1912 ; Aka, 2010; Akinboade, 1998; Barry, 2012; C. Eggoh 1 & Villieu 2, 2013; Eggoh, 2010; Habibullah, 1999; Jeanneney & Kpodar, 2006; Yahyaoui & Rahmani, 2009) have been conducted on the link between economic growth and financial development. However, to date, no research has examined the impact of the mobile money financial inclusion model on financial development in the WAEMU region.

III. RESEARCH METHODOLOGY

Data collection : This research adopts a quantitative methodological approach. The data required to achieve the research objectives are panel data collected from the Central Bank of West African States (BCEAO) and the World Bank over the period 2012 to 2022. The data collected relates to all eight WAEMU countries and is analysed using stata software. This software was used to run a panel regression according to the behaviour of the variables.

Data analysis method : The general regression model is written as follows: $Y_{it} = \propto_{it} + \beta X_{it} + \emptyset W_{it} + \in_{it}$
With, Y_{it} the financial development indicators; X_{it} the mobile money variables and W_{it} the control variables. Based on the work of Daouda, et al, (2021), the most relevant indicators of financial development are : domestic credit to the private sector by banks (CISPB), broad money (MSL), monetary sector credit to the private sector (CSMSP). All these variables are expressed as a percentage of GDP and come from the World Bank database. According to Aka (2010), these financial development indicators are highly correlated. This is confirmed by the correlation matrix. In fact, the correlation matrix between these three variables shows that there is a strong link between them. Among other things, the CSMSP and CISPB variables were found to evolve in a similar way (a correlation coefficient of 0.9998). Similarly, there was a positive coefficient of around 0.5678 between CSMSP and MSF. Finally, MSL and CISPB have a coefficient of 0.5580. This result confirms the link between these three financial development indicators.

Table 2 : Correlation matrix

Elements	CSMSP	MSL	CISPB
CSMSP	1.0000	-	-
MSL	0.5678	1.0000	-
CISPB	0.9998	0.5580	1.0000

Source : Authors, October 2024 based on World Bank data

Consequently, as part of this research, a synthetic indicator for the financial development variable will be constructed from these indicators. To achieve this, a Principal Component Analysis (PCA) is performed in order to construct a synthetic index. The table of principal components shows that the first and second components, Comp1 and Comp2, are sufficient to explain all of the variance in the data (100%). The third component provides virtually no additional information. Consequently, a synthetic index is constructed using the first two components.

Table 3 : Main components

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.43993	1.87994	0.8133	0.8133
Comp2	.559992	.559911	0.1867	1.0000
Comp3	.0000806737	.	0.0000	1.0000

Source : Authors, October 2024 based on World Bank data

The variables relating to mobile money are : the geographical penetration rate of electronic money services (TPGME), the demographic penetration rate of electronic money services (TPDME) and the electronic money usage rate (TME). In order to avoid estimation bias, other control variables such as: the bancarisation rate in the strict sense (based on the adult population aged 15 and over) (TBS), the demographic penetration rate of financial services (TPD_SF), the geographical penetration rate of financial services (TPG_SF). All these variables help to explain financial inclusion in the WAEMU area.

Table 4 : Measurement of exogenous variables

Variables	Formulas		
TBS	Number of natural persons holding deposit or credit accounts with postal savings banks	/ on	Working population
TPD_SF	Total number of Financial Services	/ on	Adult population *10,000
TPG_SF	Total number of Financial Services	/ on	Total surface area *10,000 KM2
TPGME	Number of Electronic Money Service Points	/ on	Adult population *10,000
TPDME	Number of Electronic Money Service Points	/ on	Total surface area *10,000 KM2
TME	Number of Individuals holding Electronic Accounts with EME and ME Institutions	/ on	Adult population

Source : BCEAO financial inclusion indicators

The search model is then written as :

$$DF_{it} = \propto_{it} + \beta_1 TPDME_{it} + \beta_2 TPGME_{it} + \beta_3 TUME_{it} + \beta_4 TBS_{it} + \beta_5 TPD\_SF_{it} + \beta_6 TPG\_SF_{it} + \in_{it}$$

With DF_{it} the synthetic index of the three financial development variables.
With a panel model, the basic estimate becomes :

$$DF_{it} = \propto_{it} + \partial_1 DF_{it-1} + \beta_1 TPDME_{it} + \beta_2 TPGME_{it} + \beta_3 TUME_{it} + \beta_4 TBS_{it} + \beta_5 TPD\_SF_{it} + \beta_6 TPG\_SF_{it} + \in_{it}$$

With ∂_1 the coefficient of the lagged term that captures DF dynamics.
The advantage of panel models lies in their ability to capture dynamic effects in the variables studied (Ndour, 2023). The use of a dynamic GMM panel model is justified when the standard regression estimation assumptions are violated. In particular, there is a problem of endogeneity, heteroscedasticity or autocorrelation in the errors. However, dynamic panel estimates are considered better for economic and financial research. There are three main estimators of a GMM model : the Arellano-Bond (1991) first difference GMM estimator, the Arellano-Bover or Blundell-Bond (1998) system GMM estimator and the linear estimator of panel data. However, in our context, given the structure of the data on which our analyses are based, the third estimator was used. This has the advantage of providing more reliable estimates while combining the other two estimators.

IV. PRESENTATION OF THE RESULTS

The stationarity test shows that only the DF variable is stationary at level. All the other variables are stationary at first difference. The Breush and Pagan test (appendix) indicates a p-value of (0.0000), which is equivalent to rejecting the null hypothesis that there is no significant variability between groups. Consequently, estimation using a panel model is appropriate for processing the data. In this respect, the Hausman test (appendix) shows a Chi2 of 0.02 with a p-value of 1. This result implies that there is no systematic difference between the coefficients of the fixed-effect and random-effect models. Therefore, the use of the random effects model should be considered.

In addition, in order to obtain robust estimates, it was deemed appropriate to switch to an estimation with the GMM model, because of the autocorrelation problems contained in the residuals of the random-effect model. The estimate of the lagged value of the residuals is significant (appendix). This implies that the errors are correlated over time. Consequently, simply estimating with a random effect model could lead to conclusions based on a biased estimate. In order to obtain more reliable results, the GMM model of Arellano-Bond (1991) was used. Arellano-Bond's GMM model is particularly useful when the variables are non-stationary, but also stationary in differences. It allows more efficient estimation using additional information from the level data. It is designed to handle problems caused by correlation between unobserved effects and lagged dependent variables. However, the latter was not also used in our analyses. In fact, the Arellano-Bond autocorrelation test shows that there is a first difference autocorrelation on the residuals, but it also has a high ratio of number of instruments to number of observations compared with the dynamic panel data estimation model (linear DPD).
The DPD linear estimator fits a linear model of dynamic panel data in which unobserved panel level effects are correlated with lags of the dependent variable. This command can fit GMM Arellano-Bond and GMM Arellano-Bover/Blundell-Bond models. It is similar to the proposed fits except that it can also model idiosyncratic errors with a low-order moving average correlation or predetermined variables with a more complex structure than the other two estimators allow. The results of the Sargan test (appendix) show a p-value of 0.4461. This does not allow the null hypothesis to be rejected. Therefore, the identification restrictions are considered valid which means that the instruments used in the model are not correlated with the error. Therefore, the estimate is probably reliable.

The estimate indicates that variables such as the delayed value of financial development (DF/L1), the geographical penetration rate of financial services (d_TPG_SF) and the geographical penetration rate of electronic money services (d_TPG_ME) are those that are significant at the risk threshold of 5%. Indeed, it is found that the delayed value of financial development has a coefficient of 0.7642765. This implies that an increase of one unit of DF in the previous period results in an increase of 0.7642765 in the current period. This reflects the presence of a dynamic development of financial development in the WAEMU area. The geographical penetration rate variable for financial services shows a positive coefficient of 0.0048769. This means that it also has a positive effect on financial development. On the other hand, the results show that the geographical penetration rate of electronic money with a coefficient of -0.0043688 has a negative influence on financial development.

Table 5 : Panel Data Linear Estimator

VARIABLES	DF (1)
L.DF	0.764***
	(0.0828)
d_TBS	0.0133
	(0.0159)
d_TPD_SF	-0.00128
	(0.00115)
d_TPG_SF	0.00488***
	(0.00113)
d_TME	-0.000251
	(0.00397)
d_TPDME	-0.00119
	(0.00183)
d_TPGME	-0.00437***
	(0.00110)
Constant	0.174***
	(0.0438)
Observations	80
Number of observation	8

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source : Auteurs octobre 2024

Indeed, these results from the estimation must be interpreted with caution because they are the immediate effects of exogenous variables on financial development. Thus, it will also be useful to take into account the delayed values of a period of exogenous variables in order to carry out a better analysis of the results obtained. When we move to an estimate with the delayed values of endogenous variables, we find that the same variables are significant but with different coefficients. The delayed value coefficient of financial development is 0.7532715 (similar to the first estimate). This confirms the hypothesis that past values of financial development influence present values. However, in terms of the geographical penetration rate of financial services, the coefficient (0-0066421) is negative. This justifies a retroactive dynamic effect. That is, the geographical penetration rate of financial services has a positive effect on financial development. But such an effect is not necessarily stable because, in the long term, the effect can be negative.

This finding suggests that as financial services become more widespread, the marginal effect of their expansion may diminish. If a majority of the population is already banked, further expansion could lead to market saturation, leading to increased competition and lower profit margins for financial institutions, This could limit innovation and investment in better quality financial products. Nevertheless, it can be concluded that the geographical penetration rate is a major factor to take into account if one wants to improve immediately, the level of financial development in the WAEMU area but theit must be accompanied by innovations capable of making its positive effect last over time. The results of the second estimate also show that there is a retroactive dynamic in the rate of use of electronic money services on financial development. In the immediate effect model, this variable has a negative influence on financial development, which is not the case in the delayed value estimation. Thus, it can be said that the expansion of electronic money tends to improve financial development in the long term. Because its delayed value has a positive effect on the current values of financial development.

Table 6 : Linear estimator of panel data the delayed introduction of values for exogenous variables

VARIABLES	DF
L.DF	0.753***
	(0.0988)
L.d_TBS	0.0123
	(0.0304)
L.d_TPD_SF	0.00134
	(0.00202)

L.d_TPG_SF	-0.00664***
	(0.00235)
L.d_TME	-0.00222
	(0.00778)
L.d_TPDME	-0.000581
	(0.00349)
L.d_TPGME	0.00668***
	(0.00227)
Constant	0.241***
	(0.0626)
Observations	80
Number of observation	8

Source : Auteurs octobre 2024

V. DISCUSSION OF RESULTS

The results from the data analysis show that financial development is influenced by its own past values. This suggests that it is imperative to implement consistently strategies that can better ensure the depth, access and efficiency of financial services in the WAEMU area. Indeed, financial technology is one of the strategies that can continuously improve financial development. According to [26],the lack of financial infrastructure has been at the origin of financial exclusion in developing countries (DPE). Today, the financial infrastructure on which PED and more particularly the countries of SSA are based to be able to fight against financial exclusion is mobile money [27]. Several researchers have highlighted the positive effects of mobile money on financial inclusion in SSA. However, none of them has been specifically interested in the effects of mobile money on financial development. Theoretically, [27] postulate that mobile money when widely used contributes to improving financial development in SSA countries. Our analyses are based on the WAEMU countries, and this approach seems to be confirmed but with a nuanced interpretation.

Indeed, the rate of use of mobile money does not improve financial development but its expansion can contribute to it. The expansion of mobile money has a negative effect on financial development in the immediate future. But this influence becomes positive after a certain time. The geographical penetration of mobile money is an indicator that allows to measure the accessibility dimension of financial services. Thus, we can say that the access enabled by mobile money exerts a delayed influence on financial development. On the other hand, the use of mobile money in developing countries does not influence financial deepening as stated by the theoretical work of Nan, et al., (2021).As a result, our results suggest that WAEMU countries must consider adopting other financial digitization technologies (high-frequency trading, crowdfunding, cryptocurrency, etc.) or implement policies to massify the supply of credit through mobile money if they want to support their financial development in line with the digital trend. The results of our study cannot be compared with those of [28], [29], [30] for two reasons. First, the latter conducted their analyses at a micro level (on a country). Then, these authors focused their research on a single variable (credit to the private sector) of financial development.

VI. CONCLUSION

The objective of this research is to evaluate the effect of mobile money on financial development in WAEMU countries. To achieve this objective, a dynamic panel analysis was carried out. Data are from the World Bank and BCEAO databases for the period 2011 to 2021. A dynamic panel data estimation was performed under the stata software. The results show that there is a dynamic effect on financial development in the WAEMU area. Variables such as the geographical penetration rate of financial services and electronic money have a significant but retroactive effect on financial development. This leads to say that in the WAEMU area, financial development depends on access to financial services (services from traditional financial intermediation institutions and electronic money operators). However, the rate of use of mobile money does not have any immediate or delayed influence on financial development. Even if mobile money is widely adopted, its use is not optimized to accompany financial development. While empirical studies support that financial development has a positive impact on economic growth, it is essential that WAEMU countries seek to improve their respective financial development index. Therefore, WAEMU countries should seek to explore other types of financial innovation that will be more effective in terms of deepening financial development. However, the relevance of this study may vary when other financial development variables are added to the model. For this reason, more comprehensive research may be undertaken in the future. Also, it should be noted that results may vary from region to region.

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ANNEX

Table7 : Test of Breusch and Pagan

Breusch and Pagan Lagrangian multiplier test for random effects

DF[observation,t] = Xb + u[observation] + e[observation,t]

Estimated results:

	Var	sd = sqrt(Var)
DF	2.436739	1.561006
e	.4649718	.6818884
u	4.592402	2.142989

Test: Var(u) = 0

chibar2(01) = 278.55

Prob > chibar2 = 0.0000

Table 8 : Test Hausman

	---- Coefficients ----			
	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
d_TBS	.0478532	.04837	-.0005168	.009478
d_TPD_SF	.0013028	.0012774	.0000254	.0008423
d_TPG_SF	.0014945	.0014827	.0000118	.0004641
d_TME	.0187175	.0188389	-.0001214	.0022319
d_TPDME	-.0014473	-.0014422	-5.12e-06	.0013659
d_TPGME	-.0002625	-.0002611	-1.47e-06	.0004192

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 0.02

Prob>chi2 = 1.0000

Table 9 : Autocorrelation of the delayed value residuals

VARIABLES	(1) res
L.res	0.517***
	(0.112)
Constant	0.0774**
	(0.0304)
Observations	80
R-squared	0.215

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10 : Arellano-Bond autocorrelation test

Arellano-Bond test for zero autocorrelation in first-differenced errors

Order	z	Prob > z
1	-1.9017	0.0572
2	-1.1849	0.2360

H0: no autocorrelation

Test de sargan après Linare DPD

Table 11 : Identification Restrictions

Sargan test of overidentifying restrictions

H0: overidentifying restrictions are valid

chi2(35) = 35.46895
Prob > chi2 = 0.4461