TEMPORAL AGREGATION INSIDE THE CAUSATION BETWEEN REAL AND FINANCIAL SPHERES : SOME LESSONS FOR MONETARY POLICY

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Abstract - The lack of theoretical consensus on the predominant causality direction between real and financial spheres as well as on the macroeconomic importance of transmission channels drive to an empirical approach to put foward temporal agregation issue inside the feedback between the two areas. The aim of this paper is to offer a method to identify the difference between short and long runs causal structure linking the two spheres, reasonning on transmission channels. It becomes possible for a given country, not only to better surround mechanisms intervening inside the feedback, but also, owing to the sources of the temporal agregation issue, to detect transmission channels to focus for a durability or not of macroeconomic effects of monetary policy.

Keywords: causality, transmission channels, temporal agregation, monetary policy.

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1 INTRODUCTION

The interdependence between real and monetary-financial (financial) spheres remains a recurrent research domain in economy. Graff and Karmann (2001) list the different manners to apprehend causality between the two areas.

For the first one, the observed positive interrelationship remains spurious owing to own growth logic for each of the spheres. For the second (keynesian) frame, financial dynamics result in real fluctuations. The third more schumpeterian approach justifies the reverse by leaning notably on the need of previous financing for all real marketable activity, on the importance of financial institutions in the orientation of resources toward the productive investment. The fourth frame, demonstrates that financial dynamics can hinder those of the real, thanks to the Minsky's argument of financial sphere instability. The last frame constitutes a synthesis of the three previous ones in order to establish the feedback between the two areas.

However if now there is no doubt concerning the feedback, theoretically and empirically a debate dealing with the predominating causality direction between the real and the financial subsists. The knowledge of this direction can take on importance in term of macroeconomic regulation. The source of any economic politicy depends on a real or financial shock. However, whatever the sphere source of the shock is, this last does not imply that politic effects have to be assessed predominantly from the only causation whose origin is the sphere source of the shock. For instance, any monetary politicy is able to have more effects on the real sphere than on the financial. Therefore, inside linkages between the two spheres, the temporal aggregation issue appears. Indeed, nothing indicates *a priori* that the causal structure between the real and the financial always remains identical at short and long runs. If the causal structure between both areas differs according to the temporal horizon, a same target for any economic policy and particularly for monetary policy can require different instruments, depending on whether results are discounted at short or long run. That is the reason why, the goal of this paper is to point out an empiric method appropriate in evidence of temporal aggregation issue in the feedback between real and financial spheres, from a comparison between the causal structures at short and long runs. Some lessons for monetary policy can be deduced.

The following section presents real and financial series of interest choosing from the litterature on transmission channels between the real and the financial related to monetary policy. The third section focuses on the econometric procedure which consists in identifying the globally (on short and long-run) and specifically (on long run) predominating causality direction. Thus it is possible to identify the differences in the causal structure between short and long runs, which are the basis of the temporal agregation issue. Then an application to the US economy is discussed.

2 REAL AND FINANCIAL INDICATORS OF INTEREST

The feedback between real and financial areas supposes the existence of transmission channels. Theoretically, four transmission channels are generally advanced.

Firstly, at the level of the interest rates channel, long and short term real rates and the yields curve are focused. On the one hand, Taylor (1995) explains in others that any monetary restriction results in a rise of real current interest rate. According to the rational expectation theory, the long rate is nothing else than an average forecasting of the short interest rate. Coupling this hypothesis on rational expectations with the keynesian prices rigidity, it comes out that the short rate rise reacts on the long rate which determines the real investment. A decrease in real investment and durable goods consumption followed by a fall in the income are resulted. On the other hand, Taylor shows the importance of the interest rates terms structure in the transmission between real and financial spheres.

These are the reasons that prevail to consider short (SR) and long (LR) interest rates, as well as the spread of terms (SPTERM), like transmission variables between the real and the financial.

Secondly, the neglect of the hypothesis of substituability between bonds and credits permits to apprehend the transmission between the two spheres *via* the credit channel. Inside of it, three transmission mechanisms must be distinguished.

The lending channel stipulates that the dependence of investors on the banking financing, with asymetric information, can transmit fluctuations between financing resources and the income, through variations in the distributed loans volume or in the credit cost. Distributed credits to the private sector (CREPRIV) and the lending rate (DEBR) like the minimal remunerating rate for the banking service, are relevant transmission variables.

The balance-sheet channel permits to put in evidence a complementary role between the interest rates and credit transmissions. Transmission variables that can account for this channel are then: CREPRIV, DEBR and SPTERM.

The financial accelerator permits to understand the way variations in financial resources supply modify the borrowers net value. For borrowers, it can provoke adjustments in term of investment volume. For lenders, as Bernanke, Gertler and Gilchrist (1999) formalise it, the adjustment consists in a variation of the external financing premium which is a decreasing function of borrowers net value. To include conditions of funds supply in the analysis, a banking margins spread (SPBK) is privileged. It measures the gap between DEBR and the monetary market rate taken like a proxy of the banking refinancing cost.

Concerning the asset prices channel, on the one hand, the opportunity to invest is an increasing function of the Tobin's Q. Indeed, the shares volume given out by firms to cover the productive investment cost varies according to this last cost and to market firms valuation. On the other hand, according to variations in monetary supply, agents can regain their funds modifying their shares subscriptions to the profit of bondholder investments in others, what disrupts the firms market valorisation. However, fluctuations in market valuations affect Tobin's Q and by following have an impact on the productive investment and on the income. To account for the asset prices transmission, the shares price index (SHARE) constructed by the International Financial Statistics is chosen.

The exchange rate channel exists at least owing to the significant positive relation between net exports and the real exchange rate index. Following a modification in the external value of the national currency and considering the prices and wages rigidity, a net exports variation generate fluctuations in real GDP in the same direction, *ceteris paribus*. That is why the exchange rate channel is understood from a real exchange rate index (RER), ratio between the consumer price index of the main commercial partner and the national price index, and also from the domestic inflation rate (P).

For the other indicators of interest, as any equation of the real block in quantitative models is generally established around the traditional keynesian relation, the chosen real indicators are: the GDP, (C) the households consumption, the private investment approached by the gross fixed capital GFC, public expenditures (G) and net exports (NEXP). For the financial indicators, the aggregate M2, the demand deposits (DD) and commercial banks reserves close to the Central Bank (RESERVE) are used. The Tobin's Q is approached by a spread between SHARE and LR (calculated like an index, proxy of the cost of capital replacement).

All the data are taken from the International Financial Statistics.

3 THE ECONOMETRIC PROCEDURE

The first stage consists in a study of stationarity. Several unit root tests are used. It is about a global conclusion from the advanced Dickey and Fuller — ADF —, the Phillips and Perron — PP —, as well as the Ng and Perron (2001) — NP — and the KPSS tests.

The second stage deals with causation tests. The aim is to identify temporal agregation issue inside the feedback between real and financial spheres. For this, it is necessary on one side, to know if the predominant causality direction is the same at short and long runs, and on the other side, to determine which transmission channels are the basis of any difference in the causal structure between short and long runs.

The idea is firstly to provide a measure of the causality from the real to the financial and *vice versa*, globally at short and long runs, to determine the predominating causality direction. In time series, two tests are then possible: the Toda, Yamamoto, Dolado and Lütkepohl (TYDL) and the non-parametric causation test constructed from a Fully-Modified Vector Autoregressive Regression (FM-VAR) estimation[1]. These tests have the advantage to treat any possible cointegration between series without passing by cointegration tests. Besides, the tests statistics always converge toward a standard distribution and the question of degeneration of the covariance matrix in the Wald statistics is avoided. Nevertheless, for TYDL the risk of bias from the preliminary cointegration test or even from the unit root tests is eliminated by an overparameterised VAR. For the nonparametric test based

[1] The FM-VAR estimation is done according to the Phillips'method (1995).

on the FM-VAR, the least square estimator is corrected without having to achieve this overparameterisation.

It confers an important advantage to the nonparametric causality test (NPCT). Besides, on the one hand, possibilities of application of TYDL depend closely on the structure of the optimal VAR (number of variables and autoregressive lags) as well as of limits linked to the overparameterisation necessary to absorb potential cointegration. On the other hand, NPCT is solely applicable if there are variables integrated of order less than 2. Working on macroeconomic data, the risk of impossibility to apply NPCT is low. Finally, it is more optimal to work on groups of variables to study causation than to resort to a combination of bivariate tests. Indeed, the TYDL test has a low power as soon as for a same number of autoregressive lags, the number of variables included in the VAR, on which a Wald statistics is calculated, increase. Such a loss of power is not possible for NPCT.

Then a global causality indicator (GCI) is computed like this. The predominance of the causality direction from the financial to the real on the reverse is studied by distinguishing:

— The intensity of causation between financial and real aggregates (I1);

— The intensity of causation between financial prices and real aggregates (I2);

— The intensity of causation between financial aggregates and price variables on the real sphere (I3);

— The intensity of causation between prices of financial and real areas (I4).

To limit the number of variables in the FM-VAR system, groups of indicators are used such as the number of variables in the system is at most equal to 4. For each of the four aforementioned causation types, let k_1 is the number of causal relations from the financial to the real and k_2 the number for the reverse causality direction. The following indicators are computed:

Intensity of the causation from the financial to the real:

$$f_k = \sum_{i=1}^{k_1} \left(\left| \widehat{\beta}_i \right| (1 - \widehat{p}_i) \right)$$

Intensity of the causation from the real to the financial:

$$r_k = \sum_{j=1}^{k_2} \left(\left| \widehat{\gamma}_j \right| (1 - \widehat{p}_j) \right)$$

As there are four types of causality:

$$LRCI = \sum_{k=1}^{4} (f_k - r_k)$$

$\widehat{\beta}_i$ and $\widehat{\gamma}_j$ are the long-run average elasticities of the caused group in relation to the causal group. $\widehat{p}$ is the pvalue attached to the null hypothesis of non-causation between the financial indicators group and the real one or conversely.

If $GCI > 0$, then the importance of the causality from the financial sphere to the real area is higher than the reverse causality quantification. If $CGI = 0$, a perfect feedback between the real and the financial, in which the intensity of opposite causal directions have precisely the same level, exists. If $CGI < 0$, then the causality from the real sphere to the financial is predominant.

The NPCT permits to identify the predominant causality direction between real and financial spheres, globally at short and long runs. To focus specifically on the long run, it is necessary to follow the same method with a block tests for long-run Granger non-causality from the Yamamoto and Kurozumi's test (2003).

This test is a generalisation to groups of variables of the Bruneau and Jondeau (1999) procedure. The main advantage of Yamamoto et Kurozumi's method is to definitively resolve the degeneration issue of covariance matrix that exist working on groups of variables.

Let us summarize the YK test for long-run non-causation[2]. The authors take into account the standard cointegrated VAR(p):

$$\Delta Y_t = A_0 + \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t.$$

where Y is a n-vector containing all the variables of interest such as the null hypothesis is $\underset{(n_2,n)}{R_R^*} Y \nrightarrow \underset{(n_1,n)}{R_L} Y$ with $R_R^* = [0 \quad I_{n_2}]$ and $R_L = [I_{n_1} \quad 0]$. Calling Ω the covariance matrix of the estimated coefficients and C a long-run impact matrix, the first computed Wald statistics is:

[2]For more details on the mathematic writing, see Yamamoto and Kurozumi (2003).

$$W_{YK} = T\left(R\hat{b}\right)^{'}\left(R\Omega R^{'}\right)^{-1}\left(R\hat{b}\right)$$

where $\hat{b} = vec\left(\hat{\bar{B}}\right)$, with $\bar{B} = C\left[I_n, -\Gamma_1, ..., -\Gamma_{p-1}\right]$.

W_{YK} is not always computable owing to the possible singularity of $R\Omega R^{'}$ coming from the degeneration of Ω.

In this case of degeneration, two procedures are proposed. On one side, the standard generalized inverse function is used to calculate the previous Wald statistics. On the other side, an alternative procedure based on a chi-squared asymptotic convergence is resorted. As a result, two other Wald statistics are obtained when there is a degeneration of Ω[3]. One personal particularity of the forthcoming approach in relation to the YK procedure is a calculation of a synthesized Wald statistics when there is a degeneration issue. It is an average between both YK previous Wald statistics. Another particularity is that the Wald statistics which will be computed are corrected by the number of estimated coefficients in each equation of the cointegrated VAR. All the calculation can be done with GAUSS and SAS IML.

As this modified YK procedure permits to identify the existing causal relations between groups of real and financial indicators, it is then necessary to calculate a long-run causality indicator between the real and the financial ($LRCI$) like GCI.

The third stage is to identify the role played by transmission channels in the result from $LRCI$ and GCI. More precisely, it is possible to hierarchize the importance of each of the transmission channels in the result on the predominant causality direction, and to compare if the classification is the same from a global analysis at short and long runs and from a specific study at long run. For both temporal studies, it is sufficient to suppress in the calculation of $LRCI$ or GCI the transmission variables, according to the channel of interest, and to observe the evolution of $LRCI$ or GCI. A set of respectively long run and global transmission indicators ($LRTI$ and GTI) is obtained. If the $LRTI$ or GTI is less than $LRCI$ or GCI, with $LRCI$ or GCI positive, then the studied transmission channel has a bias in favour of a causation from the financial to the real sphere and conversely. The interpretation is reversed when $LRCI$ or GCI is negative.

[3]The Kurozumi's rank test is used to determinate the rank of Ω equal to s, what permits to know if a degeneration issue is faced.

The last stage is to compare the results obtained from ($LRCI$ and $LRTI$) with (GCI and GTI) to identify the source of any temporal agregation issue inside the feedback between real and financial areas. Is it the same predominant causality direction at short and long runs ? Does every transmission channel have a bias in favour of the same predominant causality direction ? Is the classification of the role played by transmission channels is identical at short and long runs ?

4 AN APPLICATION TO US DATA

The analysis of the American economy turns on constant quarterly data (basis: 1995) from the second quarter of the year 1958 to the year 2001.

The synthesis of the unit root tests accounts for variables integrated of order 1[4].

[4]See in annexe for the detail of unit root tests.

SYNTHESIS OF UNIT ROOT TESTS RESULTS					
INDICATORS	*ADF*	*PP*	*KPSS*	*NP*	*CONCLUSIONS*
SHARE	1	1	1	1**	1
C	1	1	1	1	1
CREPRIV	1**	2	1	1**	1
DD	1	1	1**	0	1
NEXP	1	1	1	1	1
GFC	1	1	1	1	1
G	1	2	1	1	1
RER	1	1	1	1	1
M2	1**	1	1	1*	1
GDP	1	2	1	-	1
Q	1	1	1	-	1
RESERVE	1	1	1	-	1
SPBK	1	1	1**	1	1
SPTERM	1**	0	0	1**	1
DEBR	1	1	1**	-	1
SR	1	1	0	2	1
LR	1	1	1*	-	1
P	1	1	1**	0	1
*without stars : (1 %), ** : (5 %), * (10 %), - : not interpretable*					

$Tab.1$

Therefore, it is possible to use the NPCT and the modified YK procedure.

NONPARAMETRIC CAUSALITY TESTS BASED ON FM-VAR ESTIMATION						
Alternative hypothesis (H1)	*PVALUE (%)*	*CONCLUSION*	WEIGHT	*PVALUE (%)*	*CONCLUSION*	WEIGHT
M2, RESERVE → GFC, G	82,04	NC		100,00	NC	
M2, RESERVE → C, GDP	1,73	C	0,35	100,00	NC	
M2, RESERVE → EXPN	68,58	NC		0,00	C	0,01
DEBR, SR → GFC, G	20,32	NC		100,00	NC	
DEBR, SR → C, GDP	0,00	C	1,75	100,00	NC	
DEBR, SR → EXPN	0,00	C	0,43	97,17	NC	
SPTERM, SPBK → GFC, G	0,00	C	0,03	99,94	NC	
SPTERM, SPBK → C, GDP	0,00	C	0,91	99,97	NC	
SPTERM, SPBK → EXPN	98,49	NC		92,81	NC	
SHARE, RER → GFC, G	100,00	NC		0,00	C	0,65
SHARE, RER → C, GDP	0,00	C	0,09	0,00	C	0,15
SHARE, RER → EXPN	99,97	NC		0,76	C	0,06
Q → GFC, G	87,55	NC		94,53	NC	
Q → C, GDP	0,00	C	0,05	100,00	NC	
Q → EXPN	0,00	C	0,22	44,90	NC	
M2, RESERVE → LR, P	93,80	NC		0,00	C	0,43
CREPRIV, DD → LR, P	100,00	NC		0,00	C	1,66
DEBR, SR → LR, P	0,00	C	0,07	0,00	C	3,65
SPTERM, SPBK → LR, P	0,00	C	0,06	0,00	C	3,10
SHARE, RER → LR, P	0,00	C	0,00	0,00	C	1,30
Q → LR, P	0,00	C	0,00	0,00	C	0,06
	Causality tests			**Reverse causality tests**		
NC : non-causality, C : causality						
Tab. 2						

MODIFIED YK CAUSALITY TESTS										
Alternative Hypothesis	*s*	*p (%)*	*p' (%)*	*CONCLUSION*	*WEIGHTS*	*s*	*p (%)*	*p' (%)*	*CONCLUSION*	*WEIGHTS*
M2, RESERVE → GFC, G	6 ≤ 16		39,20	NC		6 ≤ 16		50,03	NC	
M2, RESERVE → C, GDP	14 ≤ 16		0,66	C	0,00	14 ≤ 16		44,90	NC	
M2, RESERVE → NEXP	0 ≤ 6			Neutral		2 ≤ 6		7,96	C	1,17
DEBR, SR → GFC, G	6 ≤ 16		2,73	C	0,34	6 ≤ 16		0,35	C	0,96
DEBR, SR → C, GDP	6 ≤ 16		47,46	NC		6 ≤ 16		49,76	NC	
DEBR, SR → NEXP	0 ≤ 6			Neutral		6 = 6	0,00		C	0,00
SPTERM, SPBK → GFC, G	6 ≤ 16		0,49	C	0,41	6 ≤ 16		0,45	C	0,67
SPTERM, SPBK → C, GDP	6 ≤ 16		0,07	C	0,53	6 ≤ 16		0,76	C	2,02
SPTERM, SPBK → NEXP		20,82		NC		-	6,76		C	0,40
SHARE, RER → GFC, G	6 ≤ 16		0,03	C	3,51	6 ≤ 16		0,32	C	1,46
SHARE, RER → C, GDP	6 ≤ 16		12,99	NC		6 ≤ 16		0,51	C	1,71
SHARE, RER → NEXP		2,44		C	0,74	-	18,87		NC	
Q → GFC, G	6 = 6	0,00		C	0,00	0 ≤ 6			Neutral	
Q → C, GDP	6 = 6	0,00		C	0,00	0 ≤ 6			Neutral	
Q → NEXP		87,04		NC		-	5,30		C	0,15
M2, RESERVE → LR, P	6 ≤ 16		50,07	NC		6 ≤ 16		50,05	NC	
CREPRIV, DD → LR, P	6 ≤ 16		50,01	NC		6 ≤ 16		50,13	NC	
DEBR, SR → LR, P	6 ≤ 16		0,42	C	0,00	14 ≤ 16		4,80	C	0,00
SPTERM, SPBK → LR, P	6 ≤ 16		50,81	NC		6 ≤ 16		52,50	NC	
SHARE, RER → LR, P	6 ≤ 16		50,01	NC		6 ≤ 16		36,96	NC	
Q → LR, P	2 ≤ 6		50,75	NC		0 ≤ 6			Neutral	
	Causation tests					**Inverse causation tests**				

s represents the rank of the covariance matrix of estimates which is less than or equal to the value of full-rank. When there is no indicated value it means that the number of cointegrated relations is equal to 0 or to the number of variables in the VAR system.

p and p' are the pvalues associated with the null-hypothesis of non-causation, respectively in case of non-degeneration and of degeneration.

Neutral: neutrality of the first group in relation to the second group, NC: non-causality, C: causality.

Tab.3

The feedback between real and financial areas is recovered since both univocal causality directions are identified.

From the identified causal relations, the following results are obtained:

$\sum_{k=1}^{4} f_k$	$\sum_{k=1}^{4} r_k$	$I1$	$I2$	$I3$	$I4$	GCI	$LRCI$
395,39	1106,95	33,39	262,05	-209,00	-792,00	-711,56	-
587,22	800,38	-107,69	-105,47	0	0		-213,16

$Tab.4$

All transmission channels are identified because for each, there are causations making intervene at least one of the transmission variables related to the transmission channel. As a result, for the United States, in the feedback between real and financial spheres, globally at short and long runs, as well as specifically at long run, causality from the real to the financial is more important.

What are the transmission channels which participate in this predominance of the causation from the real sphere to the financial ?

Looking at the evolution of GCI and $LRCI$ after successive suppressions of transmission variables, one can hierarchize the role played by the different transmission channels in the predominance of the causality from the real to the financial.

NPCT			MODIFIED YK		
SUPPRESSED VARIABLES	**GTI**	**GCI**	**SUPPRESSED VARIABLES**	**LRTI**	**LRCI**
Interest rates channel		-711,56	*Interest rates channel*		-213,16
SPTERM, SR, LR	*-620,55*		SPTERM, SR, LR	1 909,46	
SPTERM	-500,56		SPTERM	90,15	
SR et LR	-1 180,55		SR et LR	1 606,15	
Credit channel			*Credit channel*		
CREPRIV, DEBR, SPTERM, SPBK	*-90,29*		CREPRIV, DEBR, SPTERM, SPBK	70,47	
Lending channel			*Lending channel*		
CREPRIV, DEBR	-300,29		CREPRIV, DEBR	-65,64	
Balance-sheet channel			*Balance-sheet channel*		
CREPRIV, DEBR, SPTERM	-89,29		CREPRIV, DEBR, SPTERM	237,67	
Financial accelerator			*Financial accelerator*		
CREPRIV, DEBR, SPBK	-33,29		CREPRIV, DEBR, SPBK	148,46	
Assets prices channel			*Assets prices channel*		
SHARE	*-673,14*		SHARE	-248,39	
Exchange rate channel			*Exchange rate channel*		
RER, P	*325,39*		RER, P	-357,53	

Tab.5

The predominance of the causality from the real to the financial globally at short and long runs comes in increasing order from: the asset prices channel, the interest rates channel, the credit channel (with notably the balance-sheet channel and the financial accelerator) and the exchange rate channel. At long run, it is only the interest rate and the credit channels which are in favour of the same causal predominance. bHowever, oth the asset prices and the exchange rate channels have a less important role in the transmission, so the long-run causality from the real is more important.

At the macroeconomic level, the complementary role between interest rates and credit channels put in evidence by Bernanke and Gertler (1995) is identified. This complementary role proceeds by the balance-sheet channel which explains itself in part, as for the interest rates channel, by the spread of terms. By this way, firstly, the doubts related to the macroeconomic existence of the credit channel are dissipated. Such doubts could be justified for the lending channel, as Edwards and Mishkin (1995) show it, by the less important role played by banks in the credit market since the 1970's. This argument can be explained by the financial deregulation and by innovations of products that make emerge a less constrained universal bank, in term of funds supply necessary to the productive investment, as well as in term of reserves and banking deposits. In addition, notably for the United States, prudential rules acting on banking balances tend to limit the potential macroeconomic impact of the credit channel. Actually, the credit channel plays especially for outsiders of the direct finance, what means that the micro-economic proofs of the existence of this channel have a macroeconomic translation, even in the United States where external direct financing competes actively with the indirect finance.

Nevertheless, the complementary character between the credit and interest rates channels developed by Bernanke and Gertler (1995) is validated empirically, because both channels have a bias in favour of the same causal predominance between real and financial spheres.

Comparing the global results (at short and long runs) and specifically at long run, there is no doubt about the existence of a temporal agregation issue due to the asset prices and to the exchange rate channels. In fact, globally or especially at long run, the same predominant causality direction within a feedback between real and financial spheres is identified. However, focusing on transmission channels there is evidence of difference between short and long runs. As at long run, the asset prices and the exchange rate channels have a bias in favour of a causation from the financial to real on the contrary of the result globally at short and long runs, at short run these channels have a bias in favour of a causality from the real to the financial. Therefore, in the case of the US economy it is only with the asset prices and the exchange rate channels that a temporal agregation issue can be faced at the level of monetary policy. To lead the monetary policy, if instruments acting through one of these two channel are used, there are few possibilities to maintain the same macroeconomic results at short and long runs. Conversely, focusing on the interest rate or on the credit channel, which are complementary, seems to offer more guarantee for the temporal durability of monetary policy effects. The US economy does not seem to face a dramatic temporal agregation issue, because the two spheres which play the more determinant role in the predominant causality inside the feedback between real and financial areas, are not concerned by any temporal agregation issue.

5 CONCLUSION

Our analysis permits to put forward a method to identify sources of temporal agregation issue inside the feedback between real and financial spheres. Focusing on the predominant causality direction, on the classification of the role played by each transmission channel, and thanks to indicators measuring the intensity of causation and transmission, it is possible to point out differences inside the causal structure between short and long runs. The application to the US economy gives evidence of a feedback that must be apprehended preferentially thanks to a keynesian integrated approach. Comparing results at short and long runs, there is no doubt about a more waranted durability of macroeconomic effects of the monetary policy, acting through interest rate and credit channels unlike asset prices or exchange rate channel. This method permits not only to have an empirical knowledge of the causal structure between both areas, but also it can be a basis to choose instruments of monetary policy, from the role played by transmission channels at short and long runs in the causal structure between real and financial spheres, and from the discounted durability of macroeconomic effects of any monetary policy.

6 ANNEXE

ADF TEST											
SHARE	*SERIE*	*I(1)*	*I(2)*	**C**	*SERIE*	*I(1)*	*I(2)*	**CREPRIV**	*SERIE*	*I(1)*	*I(2)*
3	1,66			*3*	2,38			*3*	2,22		
2	0,60			*2*	1,28			*2*	2,20		
1	0,98	-4,74		*1*	3,58	-2,81		*1*	2,39	-2,00	-6,64
DD	*SERIE*	*I(1)*	*I(2)*	**NEXP**	*SERIE*	*I(1)*	*I(2)*	**GFC**	*SERIE*	*I(1)*	*I(2)*
3	-2,46			*3*	-2,84			*3*	1,75		
2	-0,96			*2*	-1,20			*2*	0,89		
1	-1,10	-3,48		*1*	-1,41	-6,53		*1*	2,56	-7,16	
G	*SERIE*	*I(1)*	*I(2)*	**RER**	*SERIE*	*I(1)*	*I(2)*	**M2**	*SERIE*	*I(1)*	*I(2)*
3	1,14			*3*	0,76			*3*	2,01		
2	2,37			*2*	1,58			*2*	1,73		
1	4,68	-5,37		*1*	0,35	-4,34		*1*	3,90	-2,30	-9,03
GDP	*SERIE*	*I(1)*	*I(2)*	**Q**	*SERIE*	*I(1)*	*I(2)*	**RESERVE**	*SERIE*	*I(1)*	*I(2)*
3	1,82			*3*	1,24			*3*	-1,90		
2	1,69			*2*	1,02			*2*	-0,66		
1	3,86	-3,91		*1*	1,15	-6,79		*1*	-2,22	-6,87	
SPBK	*SERIE*	*I(1)*	*I(2)*	**SPTERM**	*SERIE*	*I(1)*	*I(2)*	**DEBR**	*SERIE*	*I(1)*	*I(2)*
3	1,34			*3*	0,31			*3*	0,88		
2	2,36			*2*	2,52	-0,11		*2*	2,52		
1	-1,66	-6,65		*1*	-3,42	-6,69		*1*	-1,01	0,00	
SR	*SERIE*	*I(1)*	*I(2)*	**LR**	*SERIE*	*I(1)*	*I(2)*	**P**	*SERIE*	*I(1)*	*I(2)*
3	0,37			*3*	0,55			*3*	-0,52		
2	3,27	-0,68		*2*	2,93			*2*	3,05		
1		-11,82		*1*	-1,27	-12,23		*1*	-1,66	-6,58	

PP TEST											
SHARE	*SERIE*	*I(1)*	*I(2)*	**C**	*SERIE*	*I(1)*	*I(2)*	**CREPRIV**	*SERIE*	*I(1)*	*I(2)*
3	1,46			*3*	2,11			*3*	1,92		
2	0,01			*2*	2,90			*2*	4,71	5,68	-0,27
1	1,68	-8,63		*1*	8,33	-6,10		*1*			-39,58
DD	*SERIE*	*I(1)*	*I(2)*	**NEXP**	*SERIE*	*I(1)*	*I(2)*	**GFC**	*SERIE*	*I(1)*	*I(2)*
3	-1,64			*3*	1,96			*3*	2,82		
2	2,69			*2*	-1,27			*2*	1,23		
1	-0,64	-24,87		*1*	-1,18	-11,35		*1*	2,30	-15,33	
G	*SERIE*	*I(1)*	*I(2)*	**RER**	*SERIE*	**I(1)**	*I(2)*	**M2**	*SERIE*	*I(1)*	*I(2)*
3	2,82			*3*	-0,92			*3*	1,85		
2	4,38	4,32	-0,08	*2*	1,18			*2*	1,88		
1			-26,81	*1*	0,46	-8,47		*1*	4,83	-13,04	
GDP	*SERIE*	*I(1)*	*I(2)*	**Q**	*SERIE*	*I(1)*	*I(2)*	**RESERVE**	*SERIE*	*I(1)*	*I(2)*
3	2,78			*3*	1,97			*3*	-4,08		
2	3,89	4,84	-0,34	*2*	0,04			*2*	1,74		
1			-23,19	*1*	0,96	-10,41		*1*	-1,26	-24,15	
SPBK	*SERIE*	*I(1)*	*I(2)*	**SPTERM**	*SERIE*	*I(1)*	*I(2)*	**DEBR**	*SERIE*	*I(1)*	*I(2)*
3	1,72			*3*	0,30			*3*	-0,11		
2	1,88			*2*	1,50			*2*	2,81		
1	-1,91	-10,12		*1*	-3,07			*1*	-0,52	-11,82	
SR	*SERIE*	*I(1)*	*I(2)*	**LR**	*SERIE*	*I(1)*	*I(2)*	**P**	*SERIE*	*I(1)*	*I(2)*
3	-0,62			*3*	-0,57			*3*	-0,35		
2	3,85	0,16		*2*	2,97			*2*	1,16		
1		-11,45		*1*	-0,69	-11,65		*1*	-1,18	-7,66	

NP TEST											
SHARE	*SERIE*	*I(1)*	*I(2)*	**C**	*SERIE*	*I(1)*	*I(2)*	**CREPRIV**	*SERIE*	*I(1)*	*I(2)*
MZa	1,10	-16,97	-3 476,05	*MZa*	1,40	-19,96		*MZa*	0,68	-13,89	0,36
MZt	0,51	-2,77	-416,90	*MZt*	2,37	-3,06		*MZt*	0,57	-2,61	0,35
MSB	0,47	0,16	0,00	*MSB*	1,70	0,15		*MSB*	0,84	0,19	0,97
MPT	21,04	1,96	0,00	*MPT*	203,23	1,57		*MPT*	48,30	1,87	57,70
DD	*SERIE*	*I(1)*	*I(2)*	**NEXP**	*SERIE*	*I(1)*	*I(2)*	**GFC**	*SERIE*	*I(1)*	*I(2)*
MZa	-25,28			*MZa*	-5,22	-16,36		*MZa*	1,44	-115,36	
MZt	-3,33			*MZt*	-1,38	2,85		*MZt*	1,72	-7,59	
MSB	0,13			*MSB*	0,26	0,17		*MSB*	1,20	0,07	
MPT	1,70			*MPT*	5,30	1,55		*MPT*	105,69	0,22	
G	*SERIE*	*I(1)*	*I(2)*	**RER**	*SERIE*	*I(1)*	*I(2)*	**M2**	*SERIE*	*I(1)*	*I(2)*
MZa	1,16	-7,02	-1,41	*MZa*	-2,45	-19,07		*MZa*	0,98	-7,80	0,31
MZt	2,88	-1,87	-0,74	*MZt*	-1,07	-3,03		*MZt*	0,90	-1,97	0,27
MSB	2,49	0,27	0,52	*MSB*	0,44	0,16		*MSB*	0,92	0,25	0,88
MPT	410,82	3,50	15,10	*MPT*	9,77	1,51		*MPT*	59,45	3,14	47,86
GDP	*SERIE*	*I(1)*	*I(2)*	**Q**	*SERIE*	*I(1)*	*I(2)*	**RESERVE**	*SERIE*	*I(1)*	*I(2)*
MZa	1,27	-5,42	-4,35	*MZa*	0,40	-4,44	-1,64	*MZa*	1,30	-3,52	-7,39
MZt	2,52	-1,47	-1,45	*MZt*	0,14	-1,49	-0,77	*MZt*	0,87	-1,31	-1,92
MSB	1,98	0,27	0,33	*MSB*	0,35	0,33	0,47	*MSB*	0,67	0,37	0,26
MPT	268,26	5,03	5,68	*MPT*	13,78	5,53	12,65	*MPT*	37,07	6,96	12,34
SPBK	*SERIE*	*I(1)*	*I(2)*	**SPTERM**	*SERIE*	*I(1)*	*I(2)*	**DEBR**	*SERIE*	*I(1)*	*I(2)*
MZa	-3,35	-20,96		*MZa*	-8,29	-9,00	0,14	*MZa*	-1,85	-3,87	-7,68
MZt	-1,28	-3,21		*MZt*	-2,00	-2,04	0,08	*MZt*	-0,91	-1,26	-1,96
MSB	0,38	0,15		*MSB*	-0,24	0,23	0,61	*MSB*	0,49	0,33	0,25
MPT	7,31	1,28		*MPT*	3,10	3,01	25,92	*MPT*	12,62	6,44	3,20
SR	*SERIE*	*I(1)*	*I(2)*	**LR**	*SERIE*	*I(1)*	*I(2)*	**P**	*SERIE*	*I(1)*	*I(2)*
MZa	-1,14	-3,47	-23 900,30	*MZa*	-2,11	-2,67	-4,63	*MZa*	-22,92		
MZt	-0,70	-1,15	-109,32	*MZt*	-1,01	-1,10	-1,47	*MZt*	-3,37		
MSB	0,61	0,33	0,00	*MSB*	0,48	0,41	0,32	*MSB*	0,15		
MPT	19,37	7,03	0,00	*MPT*	11,43	8,98	5,41	*MPT*	1,08		

KPSS TEST								
	SERIE	*I(1)*		*SERIE*	*I(1)*		*SERIE*	*I(1)*
SHARE	1,59	0,33	**C**	3,48	0,27	**CREPRIV**	3,31	0,57
DD	0,42	0,23	**NEXP**	1,9	0,57	**GFC**	3,12	0,06
G	3,29	0,73	**ITDR**	2,35	0,23	**M2**	3,36	0,21
GDP	3,43	0,46	**Q**	1,2	0,30	**RESERVE**	3,03	0,09
SPBK	0,70	0,14	**SPTERM**	0,23		**DEBR**	0,58	0,06
SR	0,31		**LR**	0,41	0,06	**P**	0,67	0,06

CRITICAL VALUES FOR ADF AND PP			
	1%	*5%*	*10%*
Modèle 3	3,51	2,79	2,38
Modèle 2	3,21	2,54	2,17
Modèle 1	-2,58	-1,94	-1,62
CRITICAL VALUES FOR KPSS			
	0,74	0,46	0,35
CRITICAL VALUES FOR NP			
MZa	-13,80	-8,10	-5,70
MZt	-2,58	-1,98	-1,62
MSB	0,17	0,23	0,28
MPT	1,78	3,17	4,45

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