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The subprime crisis: from financial markets collapse to a global economic crisis

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Abstract

The aim of this paper is to study the contagion effects of the subprime financial crisis on the real economy of developed countries. The contagion of this crisis will be measured by increased linkages between markets after a shock has taken place (the stock market shocks, the interbank spread). The VAR model is utilized to examine the relationship between the U.S. markets and European markets on two sub-periods: a calm period and a crisis period. Our results show that the subprime financial crisis has seriously affected the economic growth of developed countries. The recessionary impact of the financial turmoil in the industrial cycle is confirmed in the United States and Europe. We emphasize that the uncertainty about the proliferation of financial shocks is a recessive factor by its effects on consumption and investment.

Key word: subprime crisis, contagion, stock markets, the interbank markets, real sphere.

Biographical notes: Meriam CHIHI is now a researcher at both the Applied Economics Laboratory in the Faculty of Economics and Management of Sfax in Tunisia and the Group on Law Economics and Management, (GREDEG), UMR CNRS 6227, University of Nice Sophia Antipolis (UNS), Higher Institute of Economics and Management (ISEM), Department of Human Science (MSH). This article is a part of her PhD entitled "The international transmission of the subprime crisis between developed countries".

1. Introduction

This decade witnessed a serious financial and economic crisis affecting developed countries. These developed countries have been suffering from the effects of this crisis since the 2007 depression. It began with the US subprime financial crisis in the summer 2007 and continued with the failure of major financial institutions in the USA (Bear Sterns, Fannie Mae and Freddie Mac, Lehman Brothers, AIG, Washington Mutual, CitiGroup) and other countries (Northern Rock (United Kingdom), Fortis (Germany), Royal Bank of Scotland, Hypo Real Estate (Germany)), then the stock market crash of 2008 on these countries and the spread of the financial crisis in their real economies. In fact, this crisis evolved into global financial crisis spilled over between developed countries and finally turned the advanced economies into recession in 2008. This in risk assessment has led to over-indebtedness of households and risky subprime such as increased financial and real estate prices. Indeed, the derivatives are now on the market for subprime loans, which explains their failures on the front line serving as a trigger of crisis. This financial crisis has spread to the real economy. First, the financial crisis has led to a crisis of confidence affecting all economic agents in which banks refuse to lend to each other. Then, lenders facing an increased risk of default have tightened credit conditions. The crisis of confidence and the contraction in credit conditions have negatively affected investment either for households or businesses. Finally, the drop in demand has led to a situation of global trade contraction leading to the spread of the crisis to the entire global economy.

In this study we will discuss the effects of contagion across markets namely stock markets, interbank markets and real activity in developed countries. We propose to specify the theoretical mechanisms through which financial shocks caused by the crisis are transmitted to the real economy. In fact, the rapidity and extent of transmission of the subprime financial crisis urged lots of experts to seek an explanation: Saleem (2009), Dooley and Hutchison (2009) and Longstaff (2010). Some of these experts have referred to studies about previous crises.

Important papers on prior to 2007 contagion include Allen and Gale (2000), Kyle and Xiong (2001), Forbes and Rigobon (2001), Kodres and Pritsker (2002), Kiyotaki and Moore (2002), Kaminsky, Reinhart, and Vegh (2003), Allen and Gale (2004), Chiang et al. (2007), Ahlgren and Antell (2010) Brunnermeier and Pedersen (2009), and many others. The notion of contagion is more related to periods of crisis when the phenomena of transmission of shocks are clearly felt. In this study, we have adopted the definition proposed by Forbes and Rigobon (2002): according to them, financial contagion is ‘a significant increase in cross-market linkages after a shock to one country (or group of countries)’.

With reference to this definition, we will try to provide an assessment of links between the U.S. markets and European markets in calm periods and crisis periods. Our focus is strictly limited to purely statistical methods to assess the cost of the crisis on the basis of differences in levels or growth rates of variables of activity (industrial production index, IPI), price variable (the index of consumer prices) and two variables that consider specifically the transmission channels of financial crises (the interbank spread and stock prices). We apply the VAR models to estimate the relationship between the markets studied in two sub-periods and estimate a parsimonious model in which the links and causalities are clearly identified.

Our results show that financial shocks have significant effects on the activity in the United States and Europe. During this crisis, it appears that the financial turmoil is repetitive, they contribute to the business cycle very largely and they seem to grow during the crisis. The shocks caused by stock markets and interbank markets are the main driving forces behind the evolution of the global economy. Their effects tend to be more dramatic in times of crisis.

The rest of this paper is organized as follows: Section 2 present a theatrical literature review of the various channels through which financial disturbances affect the real activity. Section 3 presents the test of contagion and the discussion of the empirical results. Section 4 is a conclusion.

2. Theoretical analysis of the transmission channels of financial shocks to real activity

The recent financial crisis has led to the fall in house prices, the immobility of the interbank market and the collapse of stock markets. This has affected the decisions of non-financial agents regarding consumption and investment. These effects were reflected on the production.

Christophe Blot et al (2009) suggest that financial shocks are transmitted by changes in interest rates caused by changes in the cost of capital. They have highlighted the role of asset prices as an essential element for monetary policy in line with financial crises. Hence the transmission channels are summarized as follows:

The first transmission channel is the interest rate: This channel allows the transmission of the shocks of interest rates. These shocks are caused by changes in liquidity in the interbank market and changes in monetary policies. Christophe Blot et al (2009) state in this context as in any Keynesian model in the presence of nominal rigidities in prices and wages, a decrease in interest rates reduces the cost of capital and leads to the increase in business investment and consequently in demand and production. The recent crisis has caused a severe liquidity crisis in the interbank market that has shown a sharp increase of three-month interbank rates. We are talking about a financial shock (shock on short-term rates).

The second channel is the wealth effect: Household incomes are the main sources of wealth enabling households to generate ongoing income. Their consumption is based on their wealth. A decrease in the price of shares or property is a negative shock that hinders the richness of these agents. This shock reduces their permanent income and thus their consumption. All these findings show that wealth effects may provide account for the behavior of household consumption. Empirically, this second channel is very pertinent in the case of the United States and that of the United Kingdom which have opted for the financialization of their consumption. In addition, American and British households get the possibility to increase their debt if market conditions are favorable and housing becomes more valuable, but if the real estate deteriorates this source of funding disappears and consumer spending declines. However, this phenomenon is not present in France where households have a small share of their wealth in financial assets. Consequently, household consumption is not very sensitive to movements in stock prices there.

The establishment of an alternative guarantee system (deposit of one third in the event of default by the borrower) inhibits the effect of "real estate wealth". The increase in consumption is attributed to increased wage income especially in France rather than the United States or the United Kingdom. The downturn in the housing market in the U.S. since 2006 and the downfall of stock market should have a greater impact on the real economy in the United States, Britain rather than in France.

The third channel is the significance of financial effects: There is today a transmission of financial turmoil from the financial sphere to the real economy. Bernanke and Blinder (1988) and Bernanke and Gertler (1995 and 1996) suggest that financial imperfections are the consequences of information asymmetries. These information asymmetries support the amplification of monetary shocks, real and financial as well as their propagation. There

are several mechanisms that lead to these phenomena of financial amplification. As part of the financial accelerator model, borrowers face an external finance premium depending on their financial situations. All monetary shocks, real or financial have a negative impact on the incomes of agents leading to an increase in the external finance premium. In this case, investment or consumption plans of these agents are thereby affected, thus amplifying the initial shock. This financial shock worsens the financial position of non-financial agents through a tightening of financial conditions, lower asset prices and a slowdown in real estate and future growth prospects. Consequently, banks will opt for a restructuring of their assets by supporting big business and by depriving small ones. Thus, the financial accelerator is a vector of propagation of shocks to the real economy manifested by a decrease in investment and consumption.

The fourth channel is shocks and uncertainty: The recent crisis is marked by the diffusion and increased uncertainty. Investors and households are forced to make their investment decisions and consumption in riskier climate. In this climate of uncertainty, households increase their savings as a reason for caution. Investors face constraint due to the irreversibility of capital investment. As the decision is irreversible, the firm gives up the opportunity to invest in order to do so in a more convenient time. The uncertainty, reigning macro-economically, pushes investors to delay investment decisions, consequently reducing demand and production

3. Testing for contagion

The mechanisms described in the previous section shows how financial shocks are transmitted to the real economy. It appears that the shock can have several sources (stock market, real estate, interest rates) and the transmission mechanisms are multiple. The notion of contagion is related to periods of crisis when the phenomena of shock transmission are clear. To study this phenomenon, it is important to divide the total period (July 2003 - September 2010) into two periods: pre-crisis period (July 2003 - October 2006) and the crisis period (November 2006 - September 2010). Thus, the model should allow us to account for all price changes that play a role in the transmission and amplification of financial crises. The VAR model seems particularly suitable because it allows us to identify and assess the macroeconomic effects of financial shocks.

3.1. The VAR's variables

We develop the VAR models for the four markets in each country surveyed (the U.S, France and United Kingdom). In tests of contagion between the various markets of the countries studied, we focus on some key variables:

To approximate the uncertainty of the global economy, which affects the spending decisions of economic agents, a variable of stock returns¹ has been introduced for all countries. The stock price is a proxy of financial wealth of the agents and is added to capture the financial effects. We use the return series of the major indices (S&P500 for America, the CAC 40 for France and the FTSE 100 for the United Kingdom). The series of monthly returns are calculated by taking the natural logarithm of price ratios multiplied by 100.

The variable interbank spread is a proxy of liquidity problem (quantitative) faced by banks in times of crisis. This is an indicator of bank stress, it measures the difference between the 3-month interbank rates and treasury bills rates. It is an indicator of the difficulties of refinancing banks in times of crisis.

For the macroeconomic variables we have chosen the most important macroeconomic indicators such as variations in the consumer prices index the CPI and the index of industrial production IPI

Table.1. Descriptive statistics

	Precrisis period : (2003 :07-2006 :10)				Crisis period (2006 :11-2010 :11)			
USA	ΔIPI	$RSP500$	$\Delta Spread$	ΔCPI	ΔIPI	$RSP500$	$\Delta Spread$	ΔCPI
Mean	0.173	0.866	0.008	0.231	-0.090	-0.401	-0.003	0.181
Std. dev.	2.016	2.149	0.073	0.423	5.787	5.787	0.534	1.62
Skewness	0.002	-0.103	-0.777	-0.329	-0.270	-0.808	0.550	-1.710
Kurtosis	-0.201	-0.440	1.699	0.271	0.690	0.845	5.161	5.364
JB	0.067	0.394	8.849	0.848	1.507	6.524	54.55	79.28
ADF	-9.35 (S)	-3.547 (S)	-6.712 (S)	-5.10 (S)	-4.207 (S)	-4.592 (S)	-5.98 (S)	-3.295 (S)
France	ΔIPI	$RCAC40$	$\Delta Spread$	ΔCPI	ΔIPI	$RCAC40$	$\Delta Spread$	ΔCPI
Mean	0.156	1.376	0.004	0.21	0.146	-0.775	0.005	-0.204
Std. dev.	0.276	2.863	0.0176	15.095	0.342	5.98	0.311	13.36
Skewness	-0.337	-0.647	0.490	0.683	-0.293	-0.398	2.909	0.443
Kurtosis	0.140	0.343	0.543	0.624	-0.548	-0.074	17.914	0.768
JB	0.790	2.989	2.098	3.768	1.263	1.252	694.767	2.699

¹ The fall in stock prices makes it more difficult business financing and deteriorating balance sheets and balance sheets of financial institutions whose assets are valued at their market value, which penalizes the various projects investment.

ADF	-4.74(S)	-4.46(S)	-4.11(S)	-10.53(S)	-3.768(S)	-5.11(S)	-5.57(S)	-11.48(S)
UK	ΔIPI	$RFTSE100$	$\Delta Spread$	ΔCPI	ΔIPI	$RFTSE100$	$\Delta Spread$	ΔCPI
Mean	0.152	1.047	0.004	0.167	-0.230	-0.211	0.005	0.248
Std. dev.	7.199	2.137	0.0176	0.260	6.338	5.171	0.311	0.433
Skewness	0.055	-0.844	0.490	-1.161	0.350	-0.570	2.909	-0.867
Kurtosis	-0.376	0.371	0.543	1.518	-0.323	-0.083	17.914	0.243
JB	0.256	4.989	2.098	12.830	1.166	2.560	694.767	6.008
ADF	-8.017(S)	-4.867(S)	-4.117(S)	-4.759(S)	-8.222(S)	-5.001(S)	-5.570(S)	-4.439(S)

Notes: The significance is at the 5% levels. (S) Indicates that the process is stationary. The value between (.) is the P value.

Table.1. presents descriptive statistics for each return series for the two sub-periods. Stationary is examined by applying the Dickey-Fuller (ADF). The results of this test allow us to reject the null hypothesis of existence of a unit root against the alternative hypothesis for all variables. All series are stationary and thus integrated of order zero (I (0)), it is recommended to apply in this case a VAR model.

All series of returns are leptokurtic and have a very strong asymmetry mainly to the left. The test statistic of Jarque-Bera allows us to reject the null hypothesis of normality in all cases. We can see also that the yields are high during the period before the crisis. High yields are associated with a high level of risk (represented often by the standard deviations). This proves that the crisis appears to be an atypical period for all countries with a deterioration of returns that are in most cases strongly negative. We find that this decline in yields is associated with a high risk for the countries studied.

3.2. The VAR results

We propose to test whether there is an increase of links between different markets of each of the three countries during the crisis. This approach is motivated by the standard definition in the literature on contagion proposed by Forbes and Rigobon (2002). The application of the VAR model allows us to directly examine whether links between markets in times of crisis, differ from those in periods of calm.

The VAR model can be written as:

$$\Delta Y_t = \alpha + \sum_{i=1}^k \beta_i \Delta y_{t-i} + \delta_k \Delta X_{t-k} + \varepsilon_t$$

Separately for each of the four different dependent variables ΔY_t described in the previous section, we use the changes in the IPI, the CPI and the interbank spreads, as well as the returns on the S&P500 index, the FTSE100 and the CAC40.

Note that for every country, we estimate the VAR seven different times, each time using a different dependent variable. In addition, we estimate the VAR separately for each of the two subperiod: the precrisis period and the crisis period. The lag structure is suggested by the Akaike Information Criterion (AIC).

Table 2 summarizes the results of estimating the VAR model for the two sub-periods. These results allow us to determine whether there is a significant difference in the relations between the markets studied in times of crisis. Table 2 also reports the p-values for the F-test that the δ_k coefficients are jointly zero. This F-test can also be viewed as a test of the hypothesis that ΔX_{t-k} Granger-cause subsequent changes or returns in the other markets examined.

Table.2. VAR estimation results

This table reports the estimation results of the VAR specification shown below, where each VAR is estimated separately for the indicated period. Also reported is the p-value for the F-test of the hypothesis that $\delta_1 = \delta_2 = \dots = \delta_k = 0$.

Countries	Models	Precrisis period			Crisis period		
		δ_k	DW	P	δ_k	DW	P
USA	$RSP500_t = \alpha + \sum_{i=1}^k \beta_k RSP500_{t-k} + \delta_k \Delta Spread_{t-k}$	7.30 (0.16)	2.29	0.18	-3.34 (0.03)	1.83	0.19
	$\Delta Spread_t = \alpha + \sum_{i=1}^k \beta_k \Delta Spread_{t-k} + \delta_k RSP500_{t-k}$	0.0008 (0.88)	2.55	0.23	-0.00 3(0.83)	1.90	0.25
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k RSP500_{t-k}$	-0.009 (0.93)	2.49	0.56	0.071 (0.09)	2.05	0.30
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k \Delta Spread_{t-k}$	-5.56 (0.11)	2.42	0.41	-0.307 (0.49)	1.90	0.89
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k \Delta CPI_{t-k}$	-0.358 (0.55)	2.47	0.72	0.53 (0.21)	1.95	0.16
	$\Delta CPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta CPI_{t-k} + \delta_k \Delta Spread_{t-k}$	0.485 (0.61)	1.53	0.27	-0.445 (0.00)	2.37	0.68
	$\Delta CPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta CPI_{t-k} + \delta_k RSP500_{t-k}$	-0.017 (0.58)	1.57	0.16	0.039 (0.00)	1.90	0.63
France	$RCAC40_t = \alpha + \sum_{i=1}^k \beta_k RCAC40_{t-k} + \delta_k \Delta Spread_{t-k}$	-22.35 (0.44)	2.05	0.75	-5.141 (0.06)	1.60	0.37
	$\Delta Spread_t = \alpha + \sum_{i=1}^k \beta_k \Delta Spread_{t-k} + \delta_k RCAC40_{t-k}$	-0.001 (0.31)	1.89	0.63	-0.009 (0.29)	2.11	0.28
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k RCAC40_{t-k}$	0.015 (0.32)	1.97	0.28	0.012 (0.17)	2.00	0.52
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k \Delta Spread_{t-k}$	-3.47 (0.23)	1.84	0.41	-0.177 (0.29)	2.06	0.24
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k \Delta CPI_{t-k}$	0.0002 (0.94)	1.90	0.87	0.005 (0.19)	1.65	0.23
	$\Delta CPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta CPI_{t-k} + \delta_k RCAC40_{t-k}$	0.678 (0.39)	2.77	0.75	0.549 (0.08)	2.90	0.58
	$\Delta CPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta CPI_{t-k} + \delta_k \Delta Spread_{t-k}$	-118.7 (0.40)	2.71	0.28	1.56 (0.79)	2.09	0.18
UK	$RFTSE100_t = \alpha + \sum_{i=1}^k \beta_k RFTSE100_{t-k} + \delta_k \Delta Spread_{t-k}$	-5.537 (0.79)	2.00	0.44	-0.62 (0.80)	1.89	0.23
	$\Delta Spread_t = \alpha + \sum_{i=1}^k \beta_k \Delta Spread_{t-k} + \delta_k RFTSE100_{t-k}$	-0.0001 (0.91)	1.83	0.45	-0.016 (0.07)	1.87	0.15
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k RFTSE100_{t-k}$	-0.024 (0.21)	1.96	0.85	0.0118 (0.36)	1.98	0.23
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k \Delta Spread_{t-k}$	-2.806 (0.33)	1.90	0.03	-0.094 (0.65)	1.96	0.46
	$\Delta MPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta MPI_{t-k} + \delta_k \Delta CPI_{t-k}$	-0.023 (0.00)	2.23	0.71	-6.17 (0.00)	2.49	0.90
	$\Delta CPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta CPI_{t-k} + \delta_k RFTSE100_{t-k}$	-0.835 (0.10)	2.23	0.55	0.157 (0.37)	2.78	0.26
	$\Delta CPI_t = \alpha + \sum_{i=1}^k \beta_k \Delta CPI_{t-k} + \delta_k \Delta Spread_{t-k}$	-159.01 (0.02)	2.53	0.27	0.651 (0.82)	2.74	0.14

Notes: The value between (.) is the P value.

3.2.1. The crisis in the USA

For the United States, our results show that the two variables used to capture the impact of financial shocks namely stock returns and interbank spread, reflected significantly in the United States. Indeed, the interbank spread has a capacity to predict stock returns up to four months. The negative sign of coefficient δ_k in times of crisis indicates that a negative shock to the interbank market due to a problem of liquidity increases uncertainty and leads to lower stock returns. This result thus shows the important role of banks in the transmission and amplification of shocks. So there is a contagion between the U.S. capital markets. The contagion is coming from the interbank market and affecting the U.S. stock market.

The same applies to variables of activity; our results show that industrial production in the United States responds with the expected sign various financial shocks. The coefficient δ_k is positive and significant, indicating that a negative shock on the stock market leads to a lower level of investment.

Our results also show that the difficulties in the interbank market and stock market have caused a deterioration in consumption to the extent that δ_k is significant negative sign for the largest market while it is significantly positive for the stock market. For the latter the collapse of the U.S. stock market in the United States led to the deterioration of household wealth, which explains the decrease in consumption. This deterioration in consumption in the United States is mainly due to the phenomenon of financialization consumption characterizing U.S. households. Our results show that the impact of financial shocks on the real sphere, during the subprime crisis, is negative.

3.2.2. *The crisis in France*

Our results show an interaction between stock returns and interbank spread. The negative sign of the coefficient δ_k during the crisis indicates a negative shock to the interbank market due to a problem of liquidity or confidence between banks, leads to lower stock returns. Indeed, it appears significantly to the extent that it possesses an ability to predict the evolution of stock returns to a month. We can see that the banking crisis feeds the collapse of the benchmark index of the Paris Bourse. So there is a contagion from the interbank market and affecting the French stock market.

Similarly for the activity variables, our results show that the difficulties in the interbank market which are transmitted to the French stock market, led to a decrease in consumption. Indeed, the coefficient δ_k is significant positive sign for the stock market. We could say that the collapse of liquidity in the interbank market has blocked the activity in this market, causing the collapse of the French stock market. These effects have a negative impact on consumption, which is degraded. These results found in times of crisis and non-existent in pre-crisis period, show the rise of the link between these markets and therefore highlight a contagion phenomenon

3.2.3. *The crisis in UK*

Our results show that stock returns have an ability to predict the evolution of the interbank spread up to month. The negative sign of the coefficient δ_k during the crisis indicates a negative shock to the stock market. This shock is materialized by lower returns leading to an increase in interbank spreads. The latter is explained by a liquidity problem and the loss of confidence among banks on the British interbank market especially after the nationalization of Northern Rock Bank. So there is a contagion between financial markets in Britain. This contagion comes from the stock market and affects the interbank market.

For activity variables, our results show that industrial production responds with the expected sign in the fall in consumption due to the recent financial crisis where the coefficient δ_k is significantly negative. Indeed, the United Kingdom is on the same line as the United States, they have both opted for the model of financialization consumption. Thus, degradation of the latter cannot occur without effecting on investment and growth. These relationships identified during the crisis confirm the spread of the subprime crisis in the UK markets via the channel of the financial effect.

3.3 Discussion of results

To measure the increase links between the different markets of the United States, France and United Kingdom reflecting the impact of financial shocks on the real sphere, we estimated VAR models for each country. These models consist of macroeconomic variables (activity variable and cost variable) and include variables that could reveal financial shocks, are an interbank spread (to catch the draining of liquidity), stock returns (to measure the effect of uncertainty on investment decisions and consumer agents).

Our results show that the decline in stock prices and the falling yields have led to a drop in industrial production. The effect of interbank spread is significant for the three countries under examination. This result is explained by the effects of the recent crisis which caused a severe liquidity crisis in the interbank market. This liquidity crisis has manifested itself by a sharp increase in three-month interbank rates; we are talking about a financial shock (interest rate shocks) whose significant effect is confirmed by this study. The transmission channels that have been present here are: the rate channel and the interests of the financial effect. For the United States, the turmoil in stock markets considered here as negative shocks have arisen by the spread of uncertainty and hence the increase in volatility, these shocks have reduced industrial production and had therefore adversely affected the

activity. Investors and households are forced to take their investment decisions and consumer in this very risky climate. In this climate of uncertainty, households increased their precautionary savings. Investors have delayed or postponed their investment decisions, consequently reducing the demand and production. We are talking about a contagion through the channel of shock and uncertainty and that of the wealth effect.

Our analysis also reveals the specific role of the banking sector which is verified for all the sample of countries studied. Indeed, the contraction of credit conditions from banks lead to the transmission of shocks to the real economy. The tightening of credit conditions stated, in the third quarter 2007, shows the economic downturn. Based on this framework, the impact of financial shocks on the real economy during this crisis is negative. The contribution of financial shocks to the current crisis is comparatively much lower in France than in the United Kingdom and the United States. Indeed, consumption of households is based on their income (such wage income of its financial assets (stocks, bonds, etc.) and non-financial (real estate)) which represent their main sources of income enabling them to have their permanent income.

A decrease in stock prices or real estate is a negative shock to wealth that impedes these agents. This shock reduces their permanent income and hence their consumption. Here appears the importance of the channel the wealth effect, which played an important role in the contagion of this recent crisis. This channel is highly relevant for the United States and the United Kingdom rather than France. Indeed the American and British households have opted for the financialization of their consumption. They have the opportunity to increase their indebtedness if the conditions are favorable and their homes have value, but in case of flipping real estate, this funding source disappears and expenditures of these households fall. This phenomenon is not present in France where households have a small share of their wealth in financial investments. The increase in consumption is attributed to increased wage incomes especially in France. Finally, the downturn in the real estate market and stock market since 2007 had a greater impact on the real economy in the United States and United Kingdom than in France.

4. Conclusion

The recent financial crisis provided us an ideal opportunity to adequately study the phenomenon of contagion. The subprime crisis, the collapse of interbank liquidity and the stock market crash are factors that have played a fundamental role in the recent financial crisis and economic recession. Motivated by the definition of contagion frequently adopted in the literature and proposed by Forbes and Rigobon (2002), we adopted a VAR model to test the relationship between these markets. We tested a model at the macro level to examine the links in the U.S. markets on the one hand, and the links among British and French markets on the other hand. The main contribution of this model is shown through the study of the simultaneous increase in inter-markets links with the presence of growth economics factors.

Our results provide strong evidence of increased cross-market linkages. In times of crisis, the financial indicators are able to predict changes in leading indicators of economic growth in the studied countries. The fall in stock prices and the deterioration of liquidity have led the advanced economies (USA, UK and France) a major recession, whose effects are particularly profound. The propagation of disturbances occurred between interbank markets, stock markets and real economy through different channels (*the interest rate, wealth effect, financial effects, shocks and uncertainty*) during the period of the crisis, which were absent during the period before the crisis. It is clear from our results that all countries have suffered the negative effects of financial shocks due to the subprime financial crisis.

Reference

1. Ahlgren, N., & Antell, J. (2010). Stock market linkages and financial contagion: A cobreaking analysis. *The Quarterly Review of Economics and Finance*, 50, 147-166.
2. Altunbas Y., L. Gambacorta & D. Marquès (2007) : « Securitisation and the bank lending channel », *ECB Working Paper* n°838.
3. Ashcraft A. (2006) : « New evidence on the lending channel », *Journal of Money, Credit and Banking*, vol.38 n°3, pp. 751-775.
4. Allen, F., & Gale, D. (2000). Financial contagion. *Journal of Political Economy*, 108, 1-33.
5. Allen, F., & Gale, D. (2004). Financial Intermediaries and Markets, *Econometrica*, 72, 1023-1061.
6. Benmelech, E., & Dlugosz, J. (2009). The credit rating crisis. NBER Macroeconomics Annual, vol. 24, University of Chicago.
7. Beltratti, A and Morana, C., (2010) “International house prices and macroeconomic fluctuations”, *Journal of Banking and Finance*, 34, 533-545.
8. Brunnermeier, M.- K., & Pedersen, L.- H. (2009). Market liquidity and funding liquidity. *Review of Financial Studies*, 22, 2201-2238.

9. Barrell R., E.P. Davis & O. Pomerantz (2006) : « Costs of financial instability, household sector balance sheets and consumption », *Journal of Financial Stability* vol.2 n°2, pp. 194-216.
10. Bean C., J. Larsen & K. Nikolov (2003) : « Financial frictions and the monetary transmission mechanism : theory,evidence and policy implications », in *Monetary transmission in the Euro area* edited by I. Angeloni, B. Mojon & A. Kashyap, Cambridge University Press.
11. Bernanke B. & A Blinder (1988) : « Credit, money, and aggregate demand », *American Economic Review* 98 (may), pp. 435-439.
12. Bernanke B. & M. Gertler (1995) : « Inside the black box : the credit channel of monetary policy transmission », *Journal of Economic Perspectives* vol.9 n°4, pp. 27-48.
13. Bernanke B., M. Gertler & S. Gilchrist (1996) : « The Financial accelerator and the flight to quality », *The Review of Economics and Statistics* vol. LXXVIII n°1, pp. 1-15.
14. Bloom N. (2007) : « The impact of uncertainty shocks », *NBER Working Paper* n°13385.
15. Chihi, Bouaziz, M. (2012) « Analysis of the Contagion During the Subprime Financial Crisis: Application of the GARCH BEKK Model », *The Empirical Economics Letters*.
16. Carlin, B., Lobo, M., & Vishwanathan, S. (2007). Episodic liquidity crises: cooperative and predatory trading. *Journal of Finance*, 62, 2235-2274.
17. Christophe blot et al., (2009), “De la crise financière à la crise économique: Une analyse comparative France-Etats-Unis, Revue de l’OFCE.
18. Chihi Bouaziz, M et al (2012), "Contagion effect of the subprime financial crisis: Evidence of DCC multivariate GARCH models", *European Journal of Economics, Finance and Administrative Sciences* Issue 44.
19. Demirgüç-Kunt, E. Detragiache & P. Gupta (2000) : « Inside the crisis : an empirical analysis of banking systems in distress », *IMF Working Paper* n°156. 24
20. Denis C., D. Grenouilleau, K. Mc Morrow & W. Röger (2006) : « Calculating potential growth rates and output gaps », *Economic paper* n°247, European Economy, March.
21. Dooley, M., & Hutchison, M. (2009). Transmission of the U.S. subprime crisis to emerging markets: Evidence on the decoupling-recoupling hypothesis. *Journal of International Money and Finance*, 28, 1331-1349.
22. ECB (2008) : « The role of banks in the monetary policy transmission mechanism », August, pp. 85-98.
23. Forbes, K., & Rigobon, R. (2001a). Contagion in Latin America: Definition, Measure, and Policy Implication. Mit-Sloan school of management and NBER.
24. Forbes, K. J., & Rigobon, R. (2002). No contagion, only interdependence: Measuring stock market comovements. *Journal of Finance*, 57, 2223–2261.
25. Goodhart C. & B. Hofmann (2007) : « House prices and bank credit », in *House prices and the macroeconomy : implications for banking stability* edited by C. Goodhart & B. Hofmann, Oxford University Press.
26. Guo, F., Chen, C-R, and Huang Y-S. (2011) “Markets contagion during financial crisis: A regime-switching approach” *International Review of Economics & Finance* (20), 20-95.
27. Kaminsky, G., Reinhart, C., & Vegh, C. (2003). The unholy trinity of financial contagion. *Journal of Economic Perspectives*, 17, 51-74.
28. Kodres, L., & Pritsker, M. (2002). A rational expectations model of financial contagion. *Journal of Finance*, 57, 769-800.
29. Kyle, A., & Xiong, W. (2001). Contagion as a wealth effect. *Journal of Finance*, 56, 1401-1440.
30. Kiyotaki, N., & Moore J.H., (2002). Balance sheet contagion. *American Economic Review*, 92 (2), 46-50.
31. Longstaff, A. (2010). The subprime credit crisis and contagion in financial markets. *Journal of Financial Economics* 97, 436-450.
32. Mishkin F. S. (2009) : « Is Monetary policy effective during financial crises», *NBER Working Paper Series*, N°14678, January.
33. Mishkin F. S.(2007) : « Housing and the monetary transmission mechanism », *Federal Reserve Bank of Kansas City Economic Symposium*. 25
34. Pesaran H. & Y. Shin (1998) : « Generalized impulse response analysis in linear multivariate models», *Economics Letters* 58, pp. 17-29.
35. Pyndick R. (1988) : « Irreversible investment, capacitu choice and the value of the firm », *American Economic Review*, vol.78 n°5, pp. 969-985.
36. Reinhart C. & K. Rogoff (2008), « Is the 2007 US SubPrime Financial Crisis so Different? An International Historical Perspective », *American Economic Review* vol.98 n°2, pp. 339-344.