LISBON SCHOOL OF ECONOMICS & MANAGEMENT

UNIVERSIDADE DE LISBOA

Department of Economics

José Alves & Rita Pereira

The Portuguese Households' Indebtedness

WORKING PAPERS

U

LISBOA

UNIVERSIDADE
DE LISBOA

The Portuguese Households' Indebtedness[*]

José Alves[†]   Rita Pereira[‡]

March 1, 2017

Abstract

Since the 2008's financial crisis authorities have been particularly aware about the necessity of being provided with *early warning indicators* regarding financial stability. In fact, the Basel Committee on Banking Supervision suggests the analysis of the difference between the private sector credit-to-GDP ratio and its own long-term trend. For the past two decades Portugal, has witnessed a dramatic indebtedness increase among household. Our objective is to examine the reasons for this increase by analysing the ratio of domestic credit to the private sector to GDP between 1961 and 2011. The main conclusions are the non-suitability of the Basel Committee on Banking Supervision approach for Portugal and the break of the link between deposits and credit from 1992 onwards.

Keywords: Households Indebtedness, Early Warning Indicators, Credit.

JEL: C24; E44; E51; H31.

Introduction

The Portuguese households' indebtedness has not been receiving the deserved attention. Since the 1990 decade the levels of indebtedness have been increasing dramatically and the main reason is the households' housing demand that fuelled a rapid credit growth.

Indebted households are more vulnerable to unanticipated economic shocks which increases the probability of default and, consequently, threats the country's financial stability. Therefore, having indicators that may help authorities to signal periods of excessive credit, which usually result in financial instability, became a major concern, particularly since the 2008's financial crisis. In fact, the Basel Committee on Banking Supervision (BCBS) suggests the use of the Hodrick-Prescott (HP) filter to determine the Private Sector credit-to-GDP gap i.e., the difference between the credit-to-GDP ratio and its own long-term trend, and recommends it as a common starting point for authorities to determine whether there is an excessive credit growth or not. These so-called *early warning indicators* should be seriously considered although judgement is always recommended when authorities make their decisions. However, the BCBS approach has been criticized because it has not been considered appropriate to countries that had a rapid credit build-up.

Based on Kelly et al. (2011) study, we will explore the Portuguese case for the years between 1961 and 2011. The main findings are the non-suitability of BCBS approach to Portugal and the break of the deposits-credit link from 1992 onwards. The paper is organized as follows: Section Two reviews the literature regarding our topic; section Three we explore the importance of the *early warning indicators* and the criticism to the BCBS approach are explained; section Four presents the methodology and data employed; section Five provide the estimated results and, lastly, section Six summarizes our conclusions.

Literature Review

Regarding the studies of Portuguese indebtedness, Farinha and Noorali (2004) use the data from the 2000's Households' Wealth and Indebtedness Survey to analyse aggregate indicators regarding Portuguese households' wealth and indebtedness. The authors show how credit to house purchase is the main reason for households' indebtedness and although households' wealth has increased for the then past two decades, households' indebtedness grew even more. The authors do not consider that the more vulnerable households (indebted young families) represent any risk to financial stability even though they acknowledge that these highly indebted households would be extremely affected if facing unemployment, income reduction or an interest rate increase.

Castro (2006) elaborates a model where consumers may have liquidity constraints in order to study the Portuguese households' sensitivity of consumption to disposable income. It is shown a reduction in liquidity constraints in the 1990 decade due to the interest rates decrease and the increase of financial liberalization. It increases at the end of the same decade and the beginning of the 2000's because households' indebtedness increase as a percentage of the disposable income.

Farinha (2007) uses the data from 2006/2007's Households' Wealth and Indebtedness Survey to analyse the Portuguese households' indebtedness. Again, the author concludes that the most vulnerable households are young and low income families but since their share in the debt market is relatively low comparing to the total, there are small or no risks to financial stability. On the other hand, Costa and Farinha (2012) make a microeconomic analysis of the results from the 2010's Households' Financial and Consumption Survey. It concludes that the upward trend of the households' indebtedness throughout the last two decades has been interrupted as consequence of the Economic Adjustment Programme that Portugal is under since 2011. From the survey's results the authors also conclude

that the percentage of households who are unable to meet their financial obligations is low but likely to increase due to the country's difficult macroeconomic environment (such as unemployment and decrease of disposable income). In addiction, the authors argue that the most vulnerable households are the low income and young households who are indebted. Even though young families' participation in the debt market is high, the amounts borrowed are not significant when comparing to the total, plus their debts are supported in real estate. Therefore, the authors consider that in case of default, the impact on the financial stability would be mitigated.

Costa (2012) also uses 2010's Households' Financial and Consumption Survey to determine the probability of default considering the households' economic and socio-demographic features. As Costa and Farinha (2012), Costa (2012) concluded that low income households are the ones with higher probability of default. It shows that households' who have defaulted did so due to unexpected shocks in their financial situation, such as unemployment, and it would have not happened if it were for these unanticipated shocks. Therefore, the author explains that this situation shows how households were rational when taking credit decisions i.e., if no shocks had occurred the indebted families would have continued to be able to meet their financial commitments.

The ratio as an indicator

Financial stability has been at the heart of the authorities' concerns since 2008 when the financial crisis struck the financial system and the most developed economies. It highlighted the need for stable financial markets and a sound banking sector and also the need for a high-quality buffer to aid banks in more unstable times. As Shin (2013) states, "finding a set of early warning indicators that can signal the vulnerability to financial turmoil has emerged as a policy goal of paramount importance in the aftermath of the global financial

crisis."

To help national authorities on how to intervene when financial distress is a concern, the BCBS has drawn procedures to guide national authorities that use the countercyclical capital buffer regime. It requires the analysis of private sector credit-to-GDP gap as it is considered a good indicator for the financial stability or *early warning indicator*. The buffer aims at protecting the banking sector from the credit cycle, i.e. from periods when credit has an excessive growth and are usually associated with riskier behaviours that may compromise financial stability. There is also the concern to keep the banking sector solvent, stable and protected against possible future losses since its weaknesses rapidly and vastly spill over to the real economy. To determine whether the sector is strong or not, indicators must be used and the question lies on which one authorities should rely on. Therefore, the aggregate private sector credit-to-GDP gap was determined as a common starting point. It is the difference between the credit-to-GDP ratio and its own long-term trend and it requires using the HP-filter. Other indicators are suggested by BCBS to complement this reference tool, such as real GDP growth, credit condition surveys, funding spreads and CDS spreads, among others. It is also important to be aware of the importance of the GDP behaviour since it is the denominator of the ratio used as a common reference.

However, this BCBS approach is not criticism bullet-proof. Gersl and Seidler (2011) argue that the HP-filter approach is not the most suitable for the Central and Eastern European countries since the rapid credit growth these countries had could simple mean a convergence process to the advanced economies. The authors present an estimation of those countries' equilibrium private credit levels as an alternative indicator for excessive credit growth. Shin (2013) examines the power of three classes of *early warning indicators* in signalling vulnerabilities to crises. The author concludes that market prices-based indicators are unlikely to succeed and the most promising ones regard banking sector liability aggregates because it can be used in real time. Regarding the credit-to-GDP ratio gap

there are doubts about its ability to be used in real time. Kelly et al. (2011) also raises doubts regarding the success of the indicator for countries who had a rapid credit build-up and focus the analysis in the Irish case. The authors suggest a Markov Switching framework to analyse the periods when the credit-to-GDP ratio was stable in order to analyse the long-term trend in those periods. On the other hand, Giese et al. (2014) were able to show that the BCBS approach works for the UK and has provided sound signals of financial crises.

The contrast of these results may indicate that the BCBS proposal is not the best one for countries who had a rapid build-up in credit – such as Portugal, Ireland and Central and Eastern European countries - but it is suitable for more advanced economies, such as the UK. In fact, BCBS points out that this indicator should only be considered as a common reference and a starting point for national authorities to make decisions. The committee also advises authorities for the need of reasoning and judgment when analysing it in order not to be used as a mathematically indicator in decision making.

Despite the criticism, some authors have confirmed the importance of the credit-to-GDP ratio as an *early warning indicator*. Jordà et al. (2010) show that credit growth is a good indicator for financial instability and the relation between credit growth and current accounts has becoming tighter. Drehmann et al. (2011) show that the gap of the credit-to-GDP ratio is a good indicator for the build-up phase - the phase when credit growth is considerable – and it does not send too many false signals regarding the imminence of a crisis. Other indicators, such as credit growth and equity price growth, are also considered good indicators even though not as good as the former. Regarding the release phase, the authors show that market-base indicators are the ones that signal the beginning of a crisis better even though their performance is by far worse than the performance of the indicators in the build-up phase. Drehmann et al. (2010) show that the difference between credit-to-GDP ratio and its long-term trend seems to be the best indicator for the build-up phase

but authorities cannot rely on this indicator entirely without considering some reasoning and judgment regarding each situation. Drehmann (2013) concludes that the gaps of bank and total credit-to-GDP ratios are good *early warning indicators* and may help in the countercyclical capital buffer regime.

Modern economies rely heavily on credit and it is crucial for a country to be aware of these *early warning indicators*. An indicator that can measure, to some extent, financial instability is a great reference but it should be considered as what it actually is a reference. National authorities should not use this indicator or any other indicator as a mathematical rule and should always complement their decisions with judgment and discretion.

Data and Methodology

Our article is based, as mentioned before, on Kelly et al. (2011), who analyse the steady-state relationship between credit and GDP for Ireland. For our analysis, we made use of Domestic Credit to Private Sector (DCPS) and Gross Domestic Product (GDP) data from World Bank's World Development Indicators (WDI) database and covers the period from 1961 to 2011.

First, we run a two-state Markov Switching model to perform a structural break analysis of the DCPS-to-GDP ratio, as presented in (1),

$$\left(\frac{DCPS}{GDP}\right)_t = \begin{cases} \alpha_1 & s(t) = 1 \\ \alpha_2 & s(t) = 2 \end{cases} \tag{1}$$

where *s(t)* is the state the economy is in at time *t*. The two states may be interpreted as one being a stable state and another being an unstable state.

After making the structural break analysis we perform a Granger causality test to give a hint regarding the ability of each variable to predict the other. This test will cover

the entire period (1961-2011) and the sub-periods that resulted from the structural break analysis.

Then it follows long-run regressions to understand the relationship between DCPS and GDP not only throughout the entire period but also in the sub-periods detected. For robustness purposes, we used the OLS by running equations (2) and (3), and the Dynamic OLS (DLOS) used in equations (4) e (5):

$$GDP_t = \beta_0 + \beta_1 DCPS_t + \varepsilon_t, \tag{2}$$

$$DCPS_t = \beta_0 + \beta_1 GDP_t + \varepsilon_t, \tag{3}$$

$$GDP_t = \beta_0 + \beta_1 DCPS_t + \sum_{j=-k}^{k} \theta_{1,j} \Delta DCPS_{1,j} + \varepsilon_t, \tag{4}$$

$$DCPS_t = \beta_0 + \beta_1 DCPS_t + \sum_{j=-k}^{k} \theta_{1,j} \Delta GDP_{1,j} + \varepsilon_t, \tag{5}$$

where β_0 is the constant term, β_1 measures the effect of the independent variable on the dependent variable, ε_t is the error term and $\theta_{1,j}$ measures the effect of the independent variable in first differences on the dependent variable. For equations (4) and (5) we assume that follows an AR(2) process and the number of leads and lags, k, is equal to 2. The DOLS purpose, proposed by Stock and Watson (1993), is to determine the long-run relationship between the variables. This method not only adds lags and leads of the difference regressors to address autocorrelation problems but also allows for potential endogeneity between the variables. In addition, this methodology is also used in models regarding credit and households as Rubaszek and Serwa (2014) and Hansen and Sulla (2013) studies.

Empirical Analysis

Markov Switching Results

In figure 1, it is shown the results of the filtered regime probabilities obtained for the Markov switching regression. State 1 is considered the unstable state since it occurs in the years when the DCPS-to-GDP ratio has quick oscillations and an erratic behaviour. Stable 2 is considered the stable state and it mainly occurs during 1961-1975 and 1992-2011 sub-periods when the ratio has a stable behaviour in the sense that grows continuously throughout.

The first switch observed is around 1975 and it may correspond to the April 25th Revolution that released Portugal from a more than 40-year dictatorial regime. The country was in a political, social and economical turmoil and from 1974 to 1975 the ratio actually increased fifteen percentage points to return in 1976 to the same level as in 1974. According to Lopes (1982), the annual average of the 6-month credit interest rate was 7.5% in 1974 and 9,3% in 1975. This extreme increase in only one year and the already troubling economic environment may have motivated the first switch.

In addiction, the 1970's were a rough decade. In 1978, Portugal agreed on the first IMF programme to cope with the economical turmoil it was in and it actually corresponds to the second switch. Yet, and according to Lopes (1982), the annual average of the 6-month credit interest rate was 10% in 1976, 13,3% in 1977 and by 1978 it was already 18,8%. In this programme there were quantitative limits to credit and one important goal was for national monetary authorities to keep the monetary base evolution under strict surveillance.

Figure 1. State Probabilities of the DCPS-to-GDP Ratio for Portugal (1961-2011).
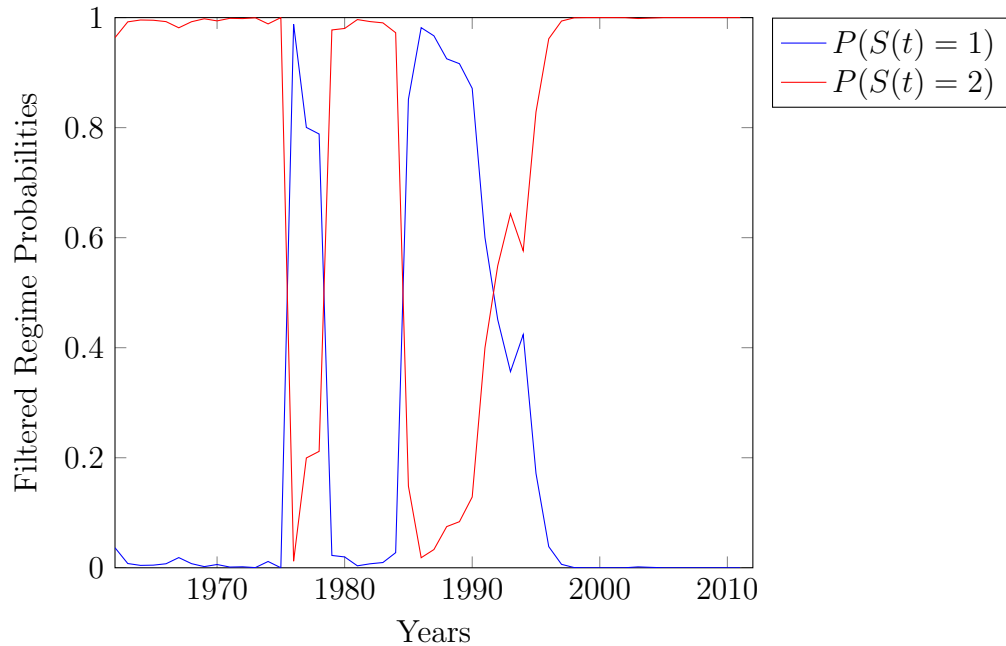
The third switch is around 1985 and it probably corresponds to the end of the second IMF programme that began in 1983, which also established quantitative limits to credit. The goal was to improve the balance-of-payments and to slow down inflation. According to Pinto (1983), in 1983 the annual average of the 6-month credit interest rate reached 28,1%, which is clearly unbearable and was one of the problems that justified the second IMF intervention.

Furthermore, Portugal joined the European Economic Community in 1986 and when in 1992 the first steps towards a monetary union were taken, the interest rates started to decline. In fact, the fourth and last switch is around 1992, which may correspond to the signing of the Maastricht Treaty that ultimately led to this decline in interest rates and consequently the increase of indebtedness[1].

---

[1]Through the World Development Indicators database it is possible to observe the sharp increase of the DCPS-to-GDP ratio, between 1992 to 2011.

Long Run Estimates

From the Markov Switching results two important structural breaks stand out around 1975 and 1992. For these two periods, 1961-1975 and 1992-2011, the long-run relationship between the variables was analysed carefully.

First, we compute the Granger causality tests . For the entire period studied and also for the 1992-2011 sub-period GDP seems to be helpful in predicting DCPS and vice-versa. However, in the 1961-1975 sub-period GDP is said to be Granger-caused by DCPS but the opposite does not occur. The results are shown in the table 1.

Table 1: Granger causality tests F-statistics by sub-periods (1961-2011)

	1961-2011	1961-1975	1992-2011
GDP does not Granger Cause DCPS	9.178	8.764	5.193
DCPS does not Granger Cause GDP	9.871	1.504	7.144

Note: Tests conducted with 2 lags.

When considering the entire period, both OLS and DOLS estimates (equations 2 to 5) show that GDP explains DCPS and vice-versa. The results are presented in table 2 . However, when analyzing the two sub-periods closely the results are different. In the first sub-period (1961-1975) both variables are non-stationary and cointegrated, which means they have to be analysed in a Vector Error Correction (VEC) model, as expressed in the following equations 6 and 7:

$$\Delta GDP_t = \beta_{GDP,0} + \beta_{GDP,GDP,1}\Delta GDP_{t-1} + \beta_{GDP,DCPS,1}\Delta DCPS_{t-1} +$$
$$+\lambda_{GDP}(GDP_{t-1} - \alpha_0 - \alpha_1 DCPS_{t-1}) + \nu_t^{GDP} \tag{6}$$

$$\Delta DCPS_t = \beta_{DCPS,0} + \beta_{DCPS,GDP,1}\Delta GDP_{t-1} + \beta_{DCPS,DCPS,1}\Delta DCPS_{t-1}+$$

$$+\lambda_{DCPS}(GDP_{t-1} - \alpha_0 - \alpha_1 DCPS_{t-1}) + \nu_t^{DCPS} \tag{7}$$

where ΔGDP and $\Delta DCPS$ in first differences, respectively, λ_{GDP} and λ_{DCPS} are the error-correction coefficients, ν_t^{GDP} and ν_t^{DCPS} are the error terms, and the expressions in parenthesis are the cointegrating vector between the variables. The results of equations (6) and (7) are presented in table 3.

Table 2: Estimation results for DCPS and GDP between 1961-2011 and 1992-2011 periods.

	GDP			DCPS	
	1961-2011			1961-2011	
	OLS	DOLS		OLS	DOLS
DCPS	0.053***	0.079***	GDP	11.240***	12.002***
	(0.006)	(0.007)		(1.329)	(2.769)
R^2	0.5983	0.928		0.598	0.800
Obs.	46	45		50	46
	1992-2011			1992-2011	
	OLS	DOLS		OLS	DOLS
DCPS	0.002***	-0.000**	GDP	281.298***	19.095**
	(0.000)	(0.000)		(13.876)	(8.137)
R^2	0.653	0.725		0.958	0.709
Obs.	20	18		20	18

*, ** and *** represent statistical significance at levels of 10%, 5% and 1%, respectively. Standard errors are in parenthesis.

Table 3: Estination results for VEC model.

	ΔGDP		ΔDCPS
GDP_{-1}	-0.791	GDP_{-1}	-32.164
	(0.680)		(56.395)
$DCPS_{-1}$	0.012**	$DCPS_{-1}$	-2.075***
	(0.004)		(0.346)
λ_{GDP}	0.000	λ_{DCPS}	-72.566***
	(0.000)		(15.044)
R^2	0.917		0.969
Obs.	13		13

*, ** and *** represent statistical significance at levels of 10%, 5% and 1%, respectively. Standard errors are in parenthesis.

The results from equation (6) show the existence of short-run causality coming from DCPS to GDP but the ones from equation (7) do not show the existence of short-run causality coming from GDP to DCPS. It may be explained by the fact that throughout this period DCPS growth had an erratic behaviour that did not match the GDP growth. It is clear how DCPS grew significantly particularly in 1969, 1973 and 1975 while GDP did not. In fact, for instance, in 1975 DCPS grew 36% while GDP only grew 1%. In addiction, from the result for error-correction coefficients of equation (7), we obtain a significant negative result for λ_{DCPS} meaning that there is a long-run causality from GDP to DCPS, i.e. GDP causes DCPS in the long-run. In short, GDP causes DCPS in the long-run but not in the short-run.

The sub-period between 1992 and 2011 also reveals interesting results. Even tough the OLS method shows that GDP and DCPS explain each other, the DOLS approach does not show that GDP explains DCPS. And since DOLS is considered a more robust and improved method, this final result will be taken seriously into account because it may be capturing some effects that OLS is not.

It must be noticed that the Granger Causality Test results seem to contradict the OLS and DOLS results. In the first sub-period, GDP does not granger-cause DCPS and the VEC model actually does not show short-run causality coming from GDP to DCPS. However, in the second sub-period where GDP and DCPS seem to be helpful in predicting each other, DOLS shows that GDP does not explain DCPS. As mentioned previously, the Granger Causality Test aim was only to give a hint about the ability of each variable to predict each other. Despite of this possible contradiction, it is important to consider the limitations of econometric analysis since it is impossible to capture all the effects of all variables. A completely correct and flawless analysis is simply impossible.

Results analysis

From the results presented in the previous section, two main conclusions arise.

First, similar to the Irish case (see Kelly et al. (2011)), for Portugal the BCBS approach does not appear to be the most suitable. Portugal clearly has two outstandingly different periods (1961-1975 and 1992-2011) that must be taken into account separately. Even though the results considering the entire period seem well-behaved it disguises the astonishing evolution this ratio has been having. As explained in section 3, the BCBS approach apparently only works for economies which did not had a rapid credit build-up and our results seem to corroborate this idea. The DCPS-to-GDP ratio is an indicator of financial instability but the approach to analyse it should be taken into account carefully in order to produce the best results. As a small and open economy that had a huge credit build-up, Portugal should definitely pay attention to it in order to track the evolution of households' indebtedness and its own financial stability.

Second, the DOLS results for the second sub-period showing that GDP does not explain DCPS may suggest a break of the link between deposits and credit. Traditionally, banks grant credit to investors and households according to the deposits made by savers and there

has always been this link that had kept the banking system sound and stable. However, the data for GDP and DCPS variables from WDI evidence some sub-periods where the DCPS growth rate was significantly higher than the GDP growth rate. Assuming that savings are related to a country's economic performance and taking into account that Portugal's GDP did not grew significantly in the past two decades, apparently credit growth was not accompanied by a growth in savings, especially from 1990's decade (Banco de Portugal (2004)).

From approximately the 1990 decade that traditional banking conduct was not the case for the Portuguese banking sector. Due to the lack of domestic resources and a strong credit growth fuelled by households' housing demand, banks had to resort to alternative forms to finance credit, such as the international financial markets. Banks realized that there was no longer the obligation to only grant credit with respect to deposits since they had access to an almost limitless pool of funds at a low interest rate that allowed them to do business differently.

Conclusions

This paper analyses the reasons of the Portuguese households' indebtedness. Since the 2008's financial crisis it has been a growing concern for authorities to be provided with the so-called *early warning indicators* in order to be able to take prudent actions when facing financial distress. The BCBS suggests using the HP-Filter to determine the Private Sector credit-to-GDP gap i.e., the difference between the credit-to-GDP ratio and its own long-term trend, and recommends it as a common starting point for authorities to determine whether there is an excessive credit growth or not.

This approach is not bullet-proof and some authors have shown that it is not the most appropriate for countries that have experienced a rapid credit build-up. Kelly et al (2011)

reached the same conclusion for the case of Ireland, a small and open economy. Due to the similarities with Portugal, this paper uses Kelly et al (2011) empirical analysis to determine if the BCBS approach is the most appropriate or not.

With World Development Indicators data of the DCPS-to-GDP ratio from 1961 to 2011, a two-state Markov Switching model was constructed to explore the structural breaks the ratio may have and the periods where long-run estimates could be made. There were two major structural breaks that showed two important sub-periods: 1961 to 1975 and 1992 to 2011. The long-run relationship between DCPS and GDP was analyzed in these sub-periods as well in the entire period using OLS and DOLS methods.

There are two main conclusions. The first one is that BCBS approach is not the most suitable for the case of Portugal because it disguises the existence of two outstandingly different periods, particularly the second one.

The second main conclusion is that GDP does not explain DCPS from 1992 to 2011, which probably indicates that the link between deposits and credit has been broken in this sub-period. Banks started to get financing in international financial markets in order to satisfy the particularly strong households' housing demand which, in fact, was partly encouraged by banks with attractive mortgages even for households with a more modest income. Even though the banking sector had an irresponsible conduct, it was not stopped or prevented by Banco de Portugal who assumed a passive attitude towards the development of the situation, although perfectly aware of it.

The evolution of Portugal's DCPS-to-GDP ratio was a considerably loud *early warning indicator* that was not seriously taken into account by authorities. It encouraged the Portuguese bank's daring behaviour during the 1990's and beginning of the 2000's and fuelled a tremendous credit build-up that ultimately damaged the country's financial stability.

References

Banco de Portugal (2004). Financial Stability Report. Technical report, Banco de Portugal.

Castro, G. L. (2006). Consumption, disposable income and liquidity constraints. Economic bulletin, Banco de Portugal.

Costa, S. (2012). Households' default probability: an analysis based on the results of the HFCS. Financial stability report, Banco de Portugal.

Costa, S. and Farinha, L. (2012). Households' indebtedness: a microeconomic analysis based on the results of the households' financial and consumption survey. Financial stability report, Banco de Portugal.

Drehmann, M. (2013). Total credit as an early warning indicator for systemic banking crises. Bis quarterly review, Bank for International Settlements.

Drehmann, M., Borio, C., Gambacorta, L., Jiménez, G., and Trucharte, C. (2010). Countercyclical capital buffers: exploring options. BIS Working Papers 317, Bank for International Settlements.

Drehmann, M., Borio, C., and Tsatsaronis, K. (2011). Anchoring countercyclical capital buffers: the role of credit aggregates . BIS Working Papers 355, Bank for International Settlements.

Farinha, L. (2007). Indebtedness of Portuguese households: recent evidence based on the household wealth survey 2006-2007. Economic bulletin and financial stability report articles, Banco de Portugal.

Farinha, L. and Noorali, S. (2004). Indebtedness and wealth of portuguese households. Economic bulletin and financial stability report articles, Banco de Portugal.

Gersl, A. and Seidler, J. (2011). Excessive Credit Growth as an Indicator of Financial (In)Stability and its Use in Macroprudential Policy. CNB Financial Stability Report 2010/2011, Czech National Bank, Research Department.

Giese, J., Andersen, H., Bush, O., Castro, C., Farag, M., and Kapadia, S. (2014). The credit-to-gdp gap and complementary indicators for macroprudential policy: Evidence from the uk. *International Journal of Finance & Economics*, 19(1):25–47.

Hansen, N.-J. H. and Sulla, O. (2013). Credit Growth in Latin America; Financial Development or Credit Boom? IMF Working Papers 13/106, International Monetary Fund.

Jordà, O., Schularick, M., and Taylor, A. M. (2010). Financial Crises, Credit Booms, and External Imbalances: 140 Years of Lessons. Working Paper 16567, National Bureau of Economic Research.

Kelly, R., McQuinn, K., and Stuart, R. (2011). Exploring the Steady-State Relationship between Credit and GDP for a Small Open Economy - The Case of Ireland. Research Technical Papers 1/RT/11, Central Bank of Ireland.

Lopes, J. S. (1982). IMF conditionality in the stand-by arrangement with Portugal of 1978. *Estudos de Economia*, III(2):141–166.

Pinto, A. (1983). A economia portuguesa e os acordos de estabilização económica com o Fundo Monetário Internacional. *Economia*, VII(3):555–596.

Rubaszek, M. and Serwa, D. (2014). Determinants of credit to households: An approach using the life-cycle model. *Economic Systems*, 38(4):572 – 587.

Shin, H. S. (2013). Procyclicality and the Search for Early Warning Indicators. IMF Working Paper WP/13/258, International Monetary Fund.

Stock, J. H. and Watson, M. W. (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica*, 61(4):783–820.