

# The Macroeconomics of Shadow Banking

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## Abstract

In this paper, we propose a simple short-run post-Keynesian model in which the key aspects of shadow banking, namely securitization and the production of structured finance instruments, are explicitly formalized. At the best of our knowledge, this is the first attempt to broaden purely real-side post-Keynesian models and their traditional focus on shareholder-value orientation, the financialization of non-financial firms, and the profit-led vs wage-led dichotomy. We rather put emphasis on the role of financial institutions and rentier-friendly environment in determining the predominance of specific growth and distribution regimes. First, we illustrate the macroeconomic rationale of shadow banking practices. We show how, before the 2007-8 crisis, securitization and shadow banking allowed for an increase in profitability for the whole financial sector, while apparently keeping leverage under control. Second, we define a variety of shadow-banking-led regimes in terms of economic activity, productive capital accumulation, and income distribution. We show that both an ‘exhilarationist’ and a ‘stagnationist’ regime may prevail, nevertheless characterized by a probable increase in income inequality between rentiers and wage earners.

**Keywords:** securitization, shadow banking, leverage, rentiers-led regimes, income distribution

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## 1. Introduction

The outbreak of the sub-prime mortgage crisis has brought to the forefront the role of the so-called shadow banking system as major responsible for the 2007-2008 financial meltdown. Paul McCulley, former managing director at PIMCO investment fund, is generally considered as the father of the expression ‘shadow banks’. With this term, he referred to those financial intermediaries funding their banking activity with uninsured commercial papers and without the backstop of the FED (McCulley, 2007:2). However, such definition, together with its implicit distinction between traditional regulated banks on the one hand and new, unregulated (i.e. shadow) financial institutions on the other, is controversial. Caverzasi *et al.* (2018) illustrate how this parallelism may be misleading, as the two kinds of institution should not be conceived as substitutes or competitors within the same business class, nor there exists a clear-cut distinction between those financial institutions that are involved in shadow banking, and those that are not (FSB, 2017:43). Fein (2013) notes that shadow bank “exists as an integral part of the regulated banking system (Fein, 2013:2)”. Most of the practices usually considered as shadow banking (see more on this below) actually originate, are performed, or are at least indirectly related to traditional regulated financial operators. We believe that it is therefore better to refer to a system involving different financial institutions and financial activities (Adrian and Shin, 2010; Adrian and Ashcraft 2012; Gorton, 2010). A system with the securitizing process at its core (Noeth and Sengupta, 2011; and Gorton and Metrick, 2012), which is therefore the cornerstone of our model.

An intensive debate has sparked among economists as to the implications of the development of shadow banking for both banking theory and monetary economics. Following Adrian and Shin (2010), banking theorists have so far provided a prevalently microeconomic perspective on ‘the changing nature of financial intermediation’ as due to the development of shadow banking. They have described in details the functioning of shadow banking actors, their complex nest of relations, and the most relevant features of the corresponding financial instruments (Coval *et al.*, 2009; Gorton and Metrick, 2010,2012; Cetorelli *et al.*, 2012). However, they pay relatively scarce attention to the consequences of the development of shadow banking on macroeconomic variables such as economic growth, income distribution, as well as on the overall macroeconomic stability and systemic resilience to financial shocks. Indeed, a few works in this strand of literature adopt a macroeconomic perspective (see Mian and Sufi (2015), for instance). Nonetheless, albeit presenting some thematic overlaps with our analysis, they mainly

focus on the investigation of the specific causes of the last financial crisis rather than on the more fundamental rationale for shadow banking development. Also, the theoretical framework is different. Whilst Mian and Sufi (2015) develop their analysis inside the conventional boundaries of mainstream economics, our work takes inspiration from the post-Keynesian approach.

A second strand of literature – i.e. post-Keynesian monetary economics – takes numerous insights from the banking approach, but shows much more concern for the macroeconomic aspects. This is favoured by the existence of a macroeconomic theoretical framework for the study of financial crises - mainly developed around the work of Hyman P. Minsky - and a macro-modelling approach in which the financial and monetary sides of the economy are explicitly modelled. Several studies have gained momentum in the immediate aftermath of the 2007-8 financial crisis by interpreting shadow banking development, and the financial crisis itself, through the lens of the Minskyan financial instability hypothesis (Tymoigne, 2009; Nersisyan and Wray, 2010; Dymski, 2010). From a methodological point of view, several of these contributions rely upon argumentative analyses. They do not frame shadow banking in a formal model and do not try to assess analytically its economy-wide implications. At the best of our knowledge, only a few studies have tried to model the intrinsic fragility of contemporary financial systems (Eatwell *et al.*, 2008; Nikolaidi, 2015; Bhaduri *et al.*, 2015). Nikolaidi (2015), for instance, models securitization in a stock-flow-consistent model in order to assess the heightened macroeconomic vulnerability that may arise out of financial sector-induced increases in households' leverage. Eatwell *et al.* (2008) focus on the pro-cyclical and destabilizing dynamics of investment banks' leverage emerging out of securitization practices. Finally, Bhaduri *et al.* (2015) describe systemic fragility as due to securitization-fuelled boom-and-boost cycles in financial assets' prices. Most of these studies still focus on a single specific aspect of the shadow banking system only. Nikolaidi (2015) and Bhaduri *et al.* (2015), for instance, do not bring into the picture the leading role of repos in fuelling the expansion of shadow banking practices. Eatwell *et al.* (2008) offer an oversimplified representation of repos, restrictively identified as a monetary policy tool. They neglect an explicit treatment of repos as financial relations connecting the different actors involved in the process of securitization and in the creation of structured finance products. More in general, all these contributions try to show how some aspects of shadow banking can be sources of heightened financial and

economic instability. However, they do not match their macroeconomic analysis with a clear investigation of the rationale and the purposes of shadow banking itself.

The abovementioned post-Keynesian contributions on financial instability in financialized economies are part of the wider post-Keynesian literature on finance-dominated capitalism. This literature mainly consists of new-Kaleckian or Harrodian models aiming to study the real-side effects of the financialization of *non-financial* firms (henceforth NFF). Accordingly, it identifies and perhaps reduces financialization to the so-called shareholder value orientation, i.e. the increased concern by NFF management for *shareholders'* interests as opposed to *stakeholders'* interests (Stockhammer, 2004; Skott and Ryoo, 2008; Hein, 2010; Onaran *et al.*, 2011). On the one hand, this change in NFF corporate governance is portrayed as the responsible (among other factors) for the reduction in workers' bargaining power and in the corresponding wage share on national income. On the other hand, NFF financialization has also induced NFF to more extensively deploy retained earnings to distribute dividends to shareholders and to finance financial investments, rather than productive investments and innovation efforts (Mazzucato, 2013; Botta, 2016). Both phenomena are considered as conducive to economic stagnation and rising income inequality, in particular in the context of wage-led economies (see Onaran and Obst, 2016). Although extremely relevant, the post-Keynesian literature on finance-dominated capitalism does not take into account a salient aspect of financialization itself, i.e. the development of shadow banking. Indeed, by relying on pure 'real-side' models that by definition neglect any 'active' financial sector, they cannot capture the intrinsic evolution of the financial sector as such, as well as the ensuing effects on the real side of the economy. With the present paper, we try to fill this gap.

The goal of this paper is twofold. First, we take inspiration from the 'banking approach' by describing and connecting each other the crucial aspects of shadow banking, i.e. the securitization of existing assets, the production and issuance of complex structured financial products (CDOs) using securitized assets as 'raw materials', the deployment of repos as source of funds for the systemic purchase of securitised assets. However, differently from the 'banking approach', we abandon its micro focus in order to adopt a macro perspective. Indeed, we frame shadow bank institutions and practices in a wider macro model. We focus on the behaviour of entire financial compartments, and eventually on the financial system as a whole, rather than on single operators. We do this in order to formally investigate the intrinsic rationale of shadow banking. In particular,

we show how shadow banking activities have been designed and implemented in order to increase the profitability of financial institutions – commercial banks and investment banks alike - and, at the same time, apparently and artificially maintain their leverage under control through the exploitation of regulatory arbitrage practices. In this regard, our work complements the previous contributions by Eatwell *et al.* (2008), Nikolaidi (2015) and Bhaduri *et al.* (2015). We put the several pieces of shadow banking (securitization, CDOs and repos) together in order to provide a comprehensive picture of shadow banking itself and to unveil its logic.

Second, in the final part of this paper, we assess the impacts that shadow banking practices exert on the whole economy. Our purpose is to move the post-Keynesian literature on finance-dominated capitalism away from its (almost exclusive) focus on the financialization of NFFs. In a way, we extend the macroeconomic analysis recently provided by Bhaduri *et al.* (2015), and we show how shadow banking ballooning may affect a variety of macroeconomic variables such as economic activity, real sector investments, and income distribution. An interesting finding, and perhaps a novelty of our work, is the description of shadow banking as functional to the creation of a rentier-friendly economy. In fact, we show that rising income inequality in financialized economies may be due to the increasing imbalance between income (wages) generated in the real sector and income (rents) emerging from financial assets originated by active shadow banking financial engineering, rather than from the traditional distributional conflict between workers and capitalists. We want to stress that, our analysis focuses on short-run dynamics only, whilst the long-run sustainability of shadow bank-related economic changes are out of the scope of the present work.

The paper is organised as follows. In section 2, we describe how our economy works, and how the financial and the real sectors are intertwined according to the national accounting stock-flow-consistent approach (Godley and Lavoie, 2007; Caverzasi and Godin, 2014; Bezemer, 2016). Section 3 deals with the effects that securitization and the production of structured financial products have on the profitability and leverage of both commercial banks (henceforth CBs) and financial firms (henceforth FFs). Section 4 moves the attention to the real side of the economy. We present a simple short-run post-Keynesian model to show the effects of shadow banking practices on economic activity, productive investments, and income distribution. Section 5 concludes.

## 2. A simple closed economy model with shadow banking

There is no doubt that the remarkable expansion of the financial sector with respect to the real side of the economy represents a salient aspect of the more recent evolution of developed economies. This long-term process involved a deep change in the structure of the financial system, as well as in its relation with the real side of the economy (see Botta *et al.*, 2015: 200-1).

The core of the so-called shadow banking is the process of securitization: “securitized banking is the business of packaging and reselling loans, with repo agreements as the main source of funds” (Gorton and Metrick 2012:425). This financial activity involves different kinds of financial institutions. Various layers of intermediation and several financial assets’ transformations take place within the financial system (see Pozsar *et al.*, 2013). Through securitization, different types of credit (e.g. student loans, consumer loans, mortgages etc.) are transformed into a multitude of financial instruments. These types of credit are first sold to other financial institutions (e.g. issuers of asset-backed securities, investment banks, brokers and dealers) and then transformed into increasingly complex structured financial instruments (MBS, ABS, CDO, CDO<sup>2</sup>, etc.). The two key financial instruments in this process are structured finance - CDOs in our model - and repos. In the end, financial relationships are commodified (Lysandrou, 2005) and used to ‘produce’ complex financial instruments, which are sold to savers in different forms through the intermediation of diverse financial institutions (e.g. Money Market Mutual Funds, pension funds, insurance companies).

Figure 1 below captures some of the preeminent aspects of shadow banking, and the main elements of the rise of securitization activities. It shows the values of: (i) securitised real estate loans, held as assets by the financial sector; (ii) mortgages issued by CBs; (iii) repos, displayed as an asset of CBs. MBS and repos exhibit a skyrocketing rise from mid-1990s, and a sharp fall after the 2007-2008 crisis. The dynamic of mortgages appears relatively smoother. However, it is important to bear in mind that the nominal value of this type of stock is significantly higher than the other two. Two considerations are of particular interest. First, the steep rise of MBS anticipated and somehow drove the rise in repos and mortgages. MBS started growing in 1996, exactly when the Fed reinterpreted the Glass-Steagall Act “allowing bank holding companies to earn up to 25 percent of their revenues in investment banking (Sherman, 2009:2)”. Second, the fall in the stock of securitised mortgages started in the third quarter of 2006. Therefore, it not only anticipated the dynamics of the other two series, but it also started *one year before* what

is commonly acknowledged as the starting date of the crisis (August 2007). This last point is extremely relevant to understand how FFs' financial solidity dramatically worsened in the run up to the crisis (see more on this below).

[FIGURE 1]

This section provides a formal representation of the abovementioned key aspects of shadow banking, and of their interconnections with the financial and the real sides of the economy. We take inspiration from the case of US economy since that it is commonly considered as the most developed financialized economy with shadow banking prominently at the centre of the financial system. Nonetheless, our formal analysis can also be applied to other economies, some European countries at the very least. Two points is worth stressing in this regard. First, in the case of Europe, the distinction between non-shadow banking institutions and shadow banks is somehow harder to capture than in the USA given the “universal banking” model characterizing most European economies (see Jeffers and Plihon, 2016). This is even the more so after the extensive financial deregulation taking place since the beginning of the 1980s in several European countries, and allowing European commercial banks to become financial conglomerates performing most of the activities usually carried out by investment banks and brokers and dealers. On top of this, securitization has reached considerably lower levels in the euro area than in the USA, eurozone securitization amounting to roughly two-fifth of the USA one (see Bakk-Simon et al., 2012). Despite these differences, Bakk-Simon et al. (2012) notes that “securitisation picked up significantly in Europe and in the euro area over recent years spurred by positive developments in house prices and mortgage activity in several euro area countries (Bakk-Simon et al., 2012, p.12)”. Like in the USA, “the bulk of [European] securitised loans were (are) home mortgages, [which] supported credit growth, especially for mortgage loans (Bakk-Simon et al., 2012, p.13)”. On the one hand, these processes contributed to feed the build-up of housing bubbles in countries such as Ireland, Spain, the Netherlands and the UK. On the other hand, a relatively high “*derecognition rate*” (i.e. the legal procedure through which originating banks can effectively put securitized assets out of their own balance sheets) allowed loans originators to reduce capital requirements vis-à-vis the booming creation of those very same assets. Second, despite of a certain degree of heterogeneity among European countries, an increasing body of literature stresses the importance of rising house prices

and of wealth effects as relevant forces behind increasing consumption expenditures in some European countries (Slacalek, 2009; Stockhammer and Wildauer, 2016). This is the case of Anglo-Saxon economies such as Ireland and the UK, “financially-developed” small economies such as Denmark, Sweden and the Netherlands, as well as of other euro countries such as Finland and Spain. As it will become clearer later on, all these aspects constitute central pieces of our narrative about the rationale and the macro consequences of shadow banking. Accordingly, we can consider our analysis as rather “transversal” from a geographical point of view, certainly based and inspired by the US experience, yet applicable to other developed countries.

We describe shadow banking as based on three main processes connecting two main institutions (CBs and FFs): (1) the securitization of mortgages by CBs, which, through this practice, put some of their assets off their own balance sheet and onto the balance sheet of FFs (read investment banks); (2) the production and issuance by FFs of structured financial products (CDOs) ultimately sold to NFFs and rentiers; (3) the provision by CBs of credit to FFs through the repo market in order to allow the latter to purchase securitised assets from the former. It goes without saying that, in reality, shadow banking is much more complicated than this.<sup>1</sup> It certainly involves many more actors than just CBs and FFs. For instance, Special Purpose Vehicles (SPV) may act as intermediaries in the perhaps arm-length relation between CBs and FFs. Even further, the purchases of CDOs by rentiers may be effectively intermediated by hedge funds or MMMFs. Nonetheless, according to the schematization of shadow banking proposed by Gorton and Metrick (2010) and Adrian and Shin (2010), these additional aspects appear as rather superfluous to our attempt to capture the deepest logic of shadow banking itself. Our simplified, although relatively comprehensive, representation of shadow banking suffices to analyse its essential rationale (section 3), as well as its short-run macroeconomic implications on the real economy (section 4).

Table 1 shows the Balance Sheet of the economy. We assume a closed private economy. It comprises six sectors, namely workers, rentiers, NFFs, CBs, and FFs (i.e. investment banks, broker and dealers, and hedge funds), and the Central Bank. We take in to account nine different assets. CBs hold two sets of assets. On the one hand, ( $J_{CB}$ ) denotes sector’s own funds as initially provided by CBs’ shareholders when subscribing

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<sup>1</sup> FSB (2017:43), in its ‘narrow definition’, identifies five (broad) economic functions of Shadow Banking, our representation of shadow banking does not capture only one of them (lending dependent on short term financing) while the other four, perhaps in a highly stylized manner, are included.

equities. We assume CBs to hold their own funds (or *Tier 1* capital) as reserves in form of cash. On the other hand, there are assets used by the traditional banking system to provide different forms of credit to the other sectors of the economy: loans ( $L$ ) to NFF, repos ( $RP$ ) to FF, and mortgages ( $M$ ) to working households. CBs move out a portion ( $z$ ) of mortgages from their balance sheet, selling this fraction to FF. This operation is usually implemented through Special Purpose Vehicles, which, for sake of clarity, we decided not to include in our model. As mentioned above the rise of international financial holdings is a crucial element in the transformation of the US financial system, due to their capacity to implement all the steps of the securitization process described in this paper. We nonetheless decided to distinguish between CBs and other FFs, in order to underline the specificities of the traditional banks, may these be part of holdings or not. We leave the analysis on financial holdings to future investigations.

[TABLE 1]

CBs have two kinds of liabilities: workers' deposits ( $D$ ) and equities ( $E_{CB}$ ). The former is held by working households and does not pay interests, while rentiers hold the latter. Equities can here be conceived as the counterpart of CBs' own funds. For the sake of simplicity, they are assumed to remain constant. This also applies to FF, whose equities ( $E_{FF}$ ) are again held by the rentiers. FFs rely on two sources of funds: they issue collateralized debt obligation ( $CDO$ ) which are sold to rentiers ( $CDO_R$ ) and to NFF ( $CDO_{NFF}$ ), and they use repos ( $RP$ ) to collect funds from CBs.<sup>2</sup> Next to cash ( $J_{FF}$ ), FFs hold the fraction of mortgages ( $zM$ ) purchased from CBs and transformed into CDOs.

Reverting to the real side of the economy, we consider two classes of households. Workers hold their wealth in form of deposits ( $D$ ) and houses ( $p_{HH}$ ). Their stock of debt is represented by mortgages ( $M$ ). Rentiers do not accumulate debt and hold their wealth in form of financial assets: Collateralized Debt Obligations ( $CDO_R$ ) and Equities ( $E$ ). NFF are indebted toward CBs ( $L$ ) and own both real and financial assets, respectively  $K$  (the nominal value of real capital) and collateralized debt obligations ( $CDO_{NFF}$ ).

[TABLE 2]

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<sup>2</sup> Repo financing partially take place between brokers and dealers themselves. This fact cannot be captured by the simplified aggregate perspective put forward in this paper. Nevertheless, our model still succeeds in capturing the core of the financial architectures characterizing shadow banking, and the fact that the traditional banking sector plays a key role as a net source of financing for the financial firms such as brokers and dealers. This fact has emerged as clear in the run up to the crisis. Indeed, according to Copeland *et al.* (2012), "clearing banks are not only agents, but also the largest creditors in the tri-party repo market on each business day (Copeland *et al.*, 2012 p.6)"

Table 2 shows the so-called full integration matrix, thus including net financial flows among the different sectors (*transaction flow matrix* above the first dotted line) and the update of the stock (*revaluation matrix* between the second and third dotted line).

Workers receive income in the form of wages ( $W$ ) by NFF and have two outflows: they buy consumption goods from NFF and pay interests on their outstanding stock of mortgages ( $i_M * M$ ). The flow associated with interest payments on mortgages will split between CBs and FFs according to the share ( $z$ ) of mortgages owned by the latter. Rentiers will receive dividends ( $DIV$ ) from CBs ( $DIV_{CB}$ ) and FFs ( $DIV_{FF}$ ), as well as interest on CDOs (i.e.  $r * CDO_R$ ), on which they also pay a fee ( $CDO_R$ ).<sup>3</sup> More in detail, the interest rate ( $r$ ) stands for the fixed *coupon* interest rate originally defined in CDO contracts, rather than the effective interest rate that eventually emerges from market transactions, and connected (in a negative way) to CDOs prices.<sup>4</sup> NFF pay wages ( $W$ ) and sell consumption goods ( $C$ ), and investment goods ( $I$ ). Their financial earnings are the interests received on the share of CDO they hold ( $r * CDO_{NFF}$ ), while their financial outflow is made by the fee they pay to FFs ( $f * CDO_{NFF}$ ) and the interest on loans paid to CBs ( $i_L * L$ ).

We assume CBs to distribute to rentiers, in the form of dividends ( $DIV_{CB}$ ), all the earnings they make out of the interest received on their assets. This applies also to FFs, whose inflows are the interests received on the share of mortgages owned ( $zM$ ), and the fees on the *CDO* issued ( $f * CDO$ ).

We assume NFF not to distribute dividends. Rather than being a limitation of our work, we excluded this mechanism for two reasons. First, the inclusion of this additional distributive channel would have made the understanding of the consequences of shadow banking on income distribution harder to catch. Second, and more importantly, our modelling choice allows us to emphasize the novelty of our contribution with respect to the existing post-Keynesian literature on this topic. Indeed, this literature has mainly focused on the financialization of NFFs (Davis, 2017), specifically highlighting the

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<sup>3</sup> The decision of including two specular flows ( $f * CDO$  and  $r * CDO$ ) originating from the same asset is motivated by the attempt of making explicit the considerable amount of profits FFs can make out of fees charged on the financial assets they sell to the savers.

<sup>4</sup> Indeed, financial corporations originally engineered CDO contracts as apparently riskless financial products, guarantying stable prices and relatively high (coupon) interest rates to final investors. This is why, before the crisis, most of them got ‘triple A’ evaluations from rating agencies, and they were vastly used as collaterals in repo agreements. Accordingly, investments on CDOs were not primarily driven by speculations on possible capital gains and changes in their prices. We think the evolution of their prices (prior to their collapse when the crisis erupted, of course), and of the corresponding effective interest rate, to be minor elements driving final savers’ investments on CDOs.

mechanism of ‘shareholder value orientation’, and its impacts on functional income distribution between profits and wages (see Hein and van Treeck, 2008). In our analysis, we focus on a different channel through which the generated income is distributed, namely increasing interest payments on outstanding mortgages by working households eventually remunerated to rentiers through the mechanisms of shadow banking. In this respect, two more points are worth stressing. First, the distributive process we describe puts emphasis on the *active* role shadow banking plays as producer and issuer of structured financial products through which income is redistributed from working households to rentiers. Second, such mechanism is complementary to the more traditional distributional process between wages, NFFs’ profits and distributed dividends to rentiers. Indeed, the inclusion in our model of NFFs’ dividends to rentiers (see Hein, 2010) would simply render the *level* of income inequality more pronounced (i.e. rentier would benefit of an additional source of income). Even further, it will not change at all the short-run distributional consequences of finance-led booms in the housing market (see section 4). Actually, what we would observe is an even stronger tendency towards the creation of a rentier-friendly economy, in which rentiers’ income share likely increases regardless of the expansionary/contractionary regime associated to the overgrowth of shadow banking (see more on this below).

Despite the abovementioned departures with respect to previous post-Keynesian contributions, we still preserve the other relevant aspect of NFFs’ financialization, namely the fact that they can deploy retained earnings to accumulate financial assets ( $CDO_{NFF}$ ) rather than investing in the real economy. In this paper, we take into account multiple financial assets, each of them associated to a specific interest rate. Given our aim, we do not discuss how each specific interest rate is determined (e.g. by applying a mark-up rate on the ‘cost of liquidity’ as influenced by central bank monetary policy). Rather, we are interested in the structure of the whole set of interest rates. In this context, suffice to say that the levels of the interest rates generally depends on the relative perceived risk of the underlying assets, which in turn depends upon their maturity, their level of collateralization, and their degree of ‘shiftability’ (see Mehrling, 2011).<sup>5</sup> Accordingly, we can safely assume the following interest rate structure to prevail, at least in ‘normal times’:  $i_M \geq i_L > r > i_{RP}$ .

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<sup>5</sup> Following Mehrling (2011), government bonds are usually considered as risk-free assets because financial institutions can always move them on the balance sheet of the central bank in exchange for reserves in the context of refinancing operations. By the same token, the degree of safety of any financial asset is more generally assessed according to the degree by which it can be shifted at par on the balance sheet of other operators in exchange for liquidity.

The revaluation matrix is straightforward, as it shows the change in the level of the same stocks described within the explanation of the aggregate balance sheet. Nonetheless, some elements are worth noting. First, following Adrian and Shin (2010), FFs finance their holding of new mortgages either through repo from CB or by selling new *CDO* contracts to rentiers and to NFF.<sup>6</sup> They rely on these two different types of borrowings for two reasons. On the one hand, the issuance of apparently riskless long-term obligations (i.e. CDOs) requires overcollateralization (the value of purchased underlying securitised assets must be higher than the value of issued collateralized obligations). Accordingly, FFs can only partially finance assets purchases through CDOs issuances, the remaining part being financed by recollecting funds on the repo market. On the other hand, repo markets stretch short-term cheap funds, however prone to dry up quickly. Accordingly, FFs will try to largely rely upon long-term CDOs-linked borrowing. Even though relatively more expensive than repos, CDOs-linked borrowing represents a more stable source of finance than the latter. Second, NFF can use their profits, as well as the new inflow of loans, to finance the purchase of real or financial capital. Finally, we assume house purchases to give rise to purely intra-sectorial exchanges among households. For the sake of simplicity, we do not consider the construction of new houses (more on this below). Accordingly, the price of existing dwellings adjusts to balance the supply and demand for houses, the latter being fed by new mortgages. New mortgages conceded to workers' households will eventually show up in price changes of the existing dwellings.

In this paper, we focus on the 'financialization-led' *short-run* dynamics of the economy, rather than on its long-run macroeconomic stability. Our main interest is to analyse how shadow banking-related current flows, as emerging from accumulated financial positions and past financialization processes, influence current economic activity and income distribution. In this regard, financialization has first allowed a wider range of households to benefit from an increasing amount of (then securitised) mortgages. This, in turn, has stimulated economic activity by feeding the construction of new dwellings. Without neglecting the importance of this channel, here we do not explicitly consider it. As far as the impacts on the GDP are concerned, we rather focus on the positive effect financialization may have induced on aggregate consumption and economic activity mainly by leading to higher prices of existing dwellings, thus raising

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<sup>6</sup> Money Market Mutual Funds ( MMMF) as well are important creditors for financial institutions involved in securitization. However, for the purpose of this paper, their intermediation activity can be captured in the relation between rentiers and FFs.

households' wealth through time. Accordingly, we keep the amounts of houses ( $H$ ) constant. We apply the same logic to equities ( $E$ ), which in this model simply represent shareholders' initial contributions to the constitution of financial corporations.

### **3. Financial sector's leverage and profitability under securitization.**

The so-called 'banking approach' to the recent evolution of modern financial systems has stressed how shadow banking practices were meant to allow financial operators to circumvent financial regulation, and to legally expand their business in search for larger profits. The unit of analysis of such a strand of literature is the single financial operator, say a proto-type commercial bank and/or investment bank, not the corresponding macroeconomic compartment as a whole. Even further, the emphasis is on the "legal" features of shadow banking financial architectures, say the legal status of SPV, allowing specific operators to reduce the costs of financing, to embark on a wider-scale business activity, and to (apparently) maintain their own financial solidity. Last but not least, the description of shadow banking mechanisms is rarely formalised through an even simple analysis of the accounting relationships connecting each other the different components of the entire financial industry. To sum up, most of the existing literature on shadow banking has hardly developed any formal investigation of the macroeconomic rationale of securitization and the issuance of structured finance products.

In this section of the paper, we try fill this gap by proposing a formal macro-sectorial analysis of shadow banking. In particular, we try to formally describe how shadow banking practices, i.e. the securitization of existing assets (say mortgages), and the creation of structured finance products (say CDOs), were meant to affect the profitability and the financial solidity of both CBs and FF macro-industries. In order to keep our analysis as simple as possible, we focus our attention on two standard measures of profitability and financial solidity (read leverage): the return on equity (ROE), and the asset-to-equity ratio (the liability-to-equity ratio in the case of FFs – see more on this below). In particular, we show how, in the last decades, both the CB sector the FF industry may have modified such variables by exploiting the accounting properties associated to shadow banking instruments, as well as the ampler margins of manoeuvre opened up by shadow banking practices.

We perform a simple *static* analysis, in which we compare the current financial world *with* financialization with respect to an old financial reality *without* shadow banking. We think this methodology to be valuable for at least three reasons. First, it helps to avoid a

cumbersome mathematical formalization, whilst still being rigorous from a formal and accounting point of view. Second, it allows us to effectively describe, although in a static fashion, the changes taking place in modern financial sectors thanks to the introduction of shadow banking. Third, it maintains at the centre of the analysis, and in the simplest way possible, the two main dimensions, i.e. profitability and financial solidity, shadow banking practices were purposely conceived to influence. Interestingly, macro-sectorial leverage (read financial soundness) is now considered as a fundamental financial variable to take into account in performing increasingly needed *macro-prudential* regulation.

### 3.1 The commercial bank sector

Consistently with the description of shadow banking provided in Table 1 and Table 2, CBs first originate financial assets, i.e. mortgages, and then distribute them throughout the financial system, thanks to the securitization process. At the same time, they provide other financial operators with the required loans, i.e. repos, in order to buy securitised assets. In this sense, CBs act on both sides of the market for securitised assets (see Botta *et al.*, 2015:212). This process affects CBs' leverage, as stated in equation (1):

$$lev_{CB} = \frac{\gamma_1[(1-z)M + L] + \gamma_2RP + \gamma_3J}{E_{CB}} \quad (1)$$

According to standard procedures to compute financial actors' capital adequacy ratios and leverages, financial assets are weighted for their perceived degree of riskiness, which also depends on the assets' time to maturity. These procedures have been outlined in the (voluntary) agreements known as Basel (I, II, and III) accords. One of the pillars of these accords is in fact the comprehensive system to riskweight bank's assets (see Getter, 2014). In equation (1),  $\gamma_n$  (with  $n$  from 1 to 3) stands for the different weights associated to the four assets CBs may hold in their balance sheet. Mortgages to workers, as well as loans to firms, are classified as long-term (relatively) risky assets with respect to repos and cash. Repos usually are short-term collateralized monetary market loans with a perceived low risk, whilst cash is a risk-free asset. Consistently with the technical aspects of Basel accords on leverage and capital adequacy ratios (see Bis, 2017), we can-assume ( $\gamma_1 > \gamma_2 > \gamma_3$ ) and ( $\gamma_3 = 0$ ), so that:

$$lev_{CB} = \frac{\gamma_1[(1-z)M + L] + \gamma_2 RP}{E_{CB}} \quad (1.b)$$

Consistently with equation (1.b), the profitability of the overall CBs sector, as measured by *ROE*, is:

$$ROE_{CB} = \frac{i_M(1-z)M + i_L L + i_{RP} RP}{E_{CB}} \quad (2)$$

Through the repo system, CBs provide financial corporations with the required means of payments to buy a part of securitised mortgages. The remaining portion is financed by the issuance of structured finance products, namely *CDO*. If we assume that total *CDO* issuance represents a portion  $\vartheta$  of the value of total securitised mortgages, we get:

$$CDO = \vartheta z M \text{ with } 0 < \vartheta < 1 \quad (3)$$

$$RP = (1 - \vartheta) z M \quad (4)$$

Substituting equations (3) and (4) into (1.b) and (2) respectively, we get:

$$lev_{CB} = \frac{\gamma_1 L + [\gamma_1(1-z) + \gamma_2(1-\vartheta)z]M}{E_{CB}} \quad (5)$$

$$ROE_{CB} = \frac{i_L L + [i_M(1-z) + i_{RP}(1-\vartheta)z]M}{E_{CB}} \quad (6)$$

In order to get the effects of securitization on CBs' leverage and profitability, first compare equation (5) with the corresponding leverage ratio that would emerge, given the total amount of initial mortgages, in the hypothetical absence of securitization (i.e. when  $z = 0$ ). We get:

[TABLE 3]

It is straightforward to verify through simple algebraic passages that the condition for CBs to reduce their leverage and improving their financial solidity under securitization reads:

$$\left[ \frac{\gamma_2}{\gamma_1} (1 - \vartheta) - 1 \right] z < 0 \quad (7)$$

Condition (7) always holds true since that  $(\gamma_2 < \gamma_1)$ . This clearly tells us that, for a given value of credit  $(L + M)$  provided by CBs to the economic system as a whole, *the securitization process allows commercial banks to decrease their leverage.*

Given this, it is now possible to analyse the extent by which such a securitization-induced reduction in leverage gives additional space to CBs for the aggressive expansion of mortgage issuances. In order to see this, assume that CBs originate different amounts of mortgages,  $M^{SEC}$  and  $M$ , referring respectively to the scenario *with* and *without* securitization, such that their leverage remains constant. Focusing on the numerator of equation (5), the leverage ratio is:

$$\gamma_1 L + [\gamma_1(1 - z) + \gamma_2(1 - \vartheta)z] M^{SEC} = \gamma_1 L + \gamma_1 M \quad (8)$$

Hence:

$$M^{SEC} = \frac{\gamma_1}{[\gamma_1(1 - z) + \gamma_2(1 - \vartheta)z]} M \quad (9)$$

From condition (7), we know that  $\frac{\gamma_1}{[\gamma_1(1 - z) + \gamma_2(1 - \vartheta)z]} > 1$  so that  $M^{SEC} > M$ . *For a given level of leverage, the banking sector involved in securitization is able to issue more mortgages and expand aggressively its business.*

In order to see how this finding affects CBs' profitability, we can look at CBs' ROE *with* and *without* securitization (for a given level of leverage). With a given  $E_{CB}$ , we can focus on ROE numerator. The condition for CBs to increase profitability under securitization (and the ensuing provision of repo lending to FFs) reads:

$$i_L L + i_M M < i_L L + \frac{[i_M(1 - z) + i_{RP}(1 - \vartheta)z]\gamma_1}{[\gamma_1(1 - z) + \gamma_2(1 - \vartheta)z]} M \quad (10)$$

After some trivial mathematical passages, condition (10) boils down to:

$$i_M < i_{RP} \frac{\gamma_1}{\gamma_2} \quad (11)$$

Condition (11) defines the economic circumstances under which, given CBs leverage, shadow bank practices could allow CBs to increase their profitability. Four points are worth stressing as to the fulfilment of condition (11).

First, *ceteris paribus*, the higher the degree of riskiness  $\gamma_1$  of mortgages created by CBs, the more likely securitization and ‘originate-and-distribute’ practices will raise CBs profitability. Accordingly, CBs will be highly incentivized to embark in securitization, and securitization practices will quickly spread among financial operators. It goes without saying that this scenario may fairly well describe the economic environment emerging in the US at the beginning of the 2000s, with the boom in sub-prime lending.

Second, such a (profitable) spread of securitization would get even more momentum the lower is the perceived riskiness of repo lending (i.e. the lower is  $\gamma_2$ ), as determined by the extent with which repo collaterals could potentially be converted at par by liquidity providers in the event of borrower’s default (see Gabor, 2016). It is well known that before the last financial crisis an increasing part of repo contracts were collateralised by CDOs ranked as riskless “triple-A” assets. In a way, shadow banking gave rise to a self-fulfilling process. Securitization provided the financial system with the raw materials (securitized mortgages) for the production of complex structured financial products (CDOs). FFs, in turn, produced allegedly safe CDOs, which made securitization increasingly profitable (thanks to supposedly secure repo lending).

Third, consistently with points 1 and 2, banking regulation aimed at restraining the creation of risky assets (say sub-prime mortgages) by attaching higher a risk coefficient (i.e. a higher value of  $\gamma_1$ ) to risky assets (say sub-prime mortgages), may turn counter-productive under securitization. Indeed, it could end out encouraging CBs to undertake securitization even more aggressively, rather than disincentive it.

Fourth, securitization is even more likely to increase CBs profitability in a context of relatively high monetary market interest rates. Indeed, the higher the interest rate on repos, the higher the revenues (and hence profitability) accruing to CBs thanks to this specific type of lending. Thus the securitization process that repos aim at fostering and financing, will get even more frenetic. This was the ‘rentier-friendly’ scenario prevailing in most developed economies in the years immediately before the outbreak of the crisis.

To sum up, equations (1) to (11) analytically describe the regulatory arbitrage CBs carry out through securitization. Securitization allows them to circumvent capital adequacy regulation and to expand the volume of risky assets they can originate (see Jacobson, 2017). This, in turn, permits CBs to likely increase their profits without compromising their own financial solidity. What could be seriously injured is certainly the solidity of the financial system as a whole given the increasing amount of risky assets eventually distributed through it. Our findings are perfectly in line with Minsky's analysis, which explained how banks rely on balance sheet's transformations to overcome policy regulations. However, the securitization process we describe involves the asset side of banks' balance rather than their liabilities. The liability management described by Minsky (e.g. Minsky, 1975:122) is replaced by an *asset management*. If regulatory monetary institutions aim at bringing back the financial system to a safe position, they have to directly restrain the kind of securitization practices financial operators can adopt.<sup>7</sup>

### 3.2 *The financial firm sector*

In our model, the FFs sector is the counterpart of CBs in the securitization process. In order to compute FFs sector's financial leverage, it is relevant to move the attention on their liability side. As mentioned above, FFs have two different sources of funds. They can collect money either by selling CDOs, or by increasing their short-term indebtedness towards banks through repos. Albeit appearing on the liability side of the sectoral balance sheet, these two sources are completely different in terms of their impact on the financial stability of the sector. While repos are an extremely short-term form of debt, CDOs are the financial instruments whose production and sale represent the core business of this stylized sector, and is therefore a more stable and (much) longer-term source of finance. In this sense, we follow Perotti and Suarez (2009) and take explicitly into account the different degrees of maturity of FFs' liabilities to assess the overall sector financial solidity. Before the outbreak of the last financial crisis, repos were perceived as a rather stable source of funds, whose reliability nevertheless strongly depended on the "convertibility at par" of the collateral assets temporarily sold by borrowers (FFs) to cash providers (CBs). In the years immediately before the crisis, CDOs were considered as safe collaterals for repos. Such a convention abruptly broke

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<sup>7</sup> Following Lavoie (2012), a possible solution could consist in allowing *traditional* securitization practices only, according to which assets are not moved out of CBs' balance sheets, but remain in the balance sheet of the originators.

down in the midst of the crisis, and the run on repos actually demonstrated how quickly repo markets could dry up and repo lending become unavailable. Following Adrian and Shin (2010) and Adrian *et al.* (2013), Leman Brothers' high exposure to (repo-centred) short-term borrowing was the main reason of its bankruptcy and the ensuing systemic earthquake. Consistently with these arguments, we assume that a coefficient  $\lambda_1$  is attached to *short-term* repo financing, whilst  $\lambda_2$  is assigned to *long-term CDOs*-based financing, with  $\lambda_1 > \lambda_2$ . Accordingly, equation (13) defines FFs' leverage in terms of their liability structure:

$$lev_{FF} = \frac{\lambda_2 CDO + \lambda_1 RP}{E_{FF}} \quad (12)$$

Consistently with the balance sheet matrix of our simplified economy, by plugging equations (3) and (4) into (12), we get:

$$lev_{FF} = \frac{\lambda_2 \vartheta zM + \lambda_1 (1 - \vartheta) zM}{E_{FF}} = \frac{[\lambda_2 \vartheta + \lambda_1 (1 - \vartheta)] zM}{E_{FF}} \quad (13)$$

By totally differentiating equation (13) with respect to  $M$  and  $\vartheta$  and setting it equal to zero, one gets:

$$\frac{dM}{M} = \frac{[1 - (\lambda_2/\lambda_1)]}{[(1 - \vartheta) + \vartheta(\lambda_2/\lambda_1)]} d\vartheta > 0 \quad (14)$$

Equation (14) simply tells that FFs can buy an increasing amount of mortgages from CBs ( $\frac{dM}{M} > 0$ ) while safely maintaining their leverage ratio unchanged ( $dlev_{FF} = 0$ ), just by increasing the share of their purchases which are financed through long-term CDOs issuances ( $d\vartheta > 0$ ). FFs were indeed highly interested in getting triple-A evaluations for their structured finance products. Following Coval *et al.* (2009), this helped FFs to artificially stimulate the demand for *CDO* by final investors, make new *CDO* issuances easier, and eventually expand their balance sheet in an allegedly safe way.

The implications of the above leverage ratio 'manipulation' on FFs' profitability are straightforward, and formalized in equation (15):

$$ROE_{FF} = \frac{[i_M - \vartheta(r - f) - (1 - \vartheta)i_{RP}]ZM}{E_{FF}} \quad (15)$$

According to the maturity and degree of riskiness of the different assets and liability implicitly considered in equation (15), and thus of the ensuing structure of interest rates, i.e.  $i_M > i_{RP} > r$ , the profitability of FFs will increase through the expansion of the pool of securitized mortgages held in their balance sheet.<sup>8</sup> Other way around, equations (14) and (15) together provide a mathematical representation of the well-known statement by Citigroup CEO Chuck Prince: “As long as the music is playing, you've got to get up and dance” (Nakamoto, 2007). Insofar as FFs had the opportunity to easily issue structured finance liabilities and increase their profits without affecting their apparently solid financial exposition, they had to do so.

#### 4. The impact of shadow banking on the real economy.

Consistently with the overall portray of the economy as showed in Tables 1 and 2, we take into account a simple close economy without government. Consumption by workers' and rentiers, as well as desired investments by NFF are the unique demand injections we take into account.

According to matrices in Table 1 and Table 2, equations (16) and (17) define consumption expenditures by workers and rentiers ( $C_W$  and  $C_R$ ), respectively. Workers' (rentiers') consumption depends positively on disposable income  $YD_W$  ( $YD_R$ ) and wealth  $V_W$  ( $V_R$ ), according to the corresponding parameters  $c_1^W$  ( $c_1^R$ ) and  $c_2^W$  ( $c_2^R$ ). Workers' disposable income is given by the difference between the total wage bill ( $wN$ ) and interests paid on the outstanding amount of mortgages ( $i_MM$ ). Workers' wealth consists of deposits  $D$ , and houses  $p_H H$ .

$$C_W = c_1^W YD_W + c_2^W V_W \quad (16)$$

$$C_R = c_1^R YD_R + c_2^R V_R \quad (17)$$

Rentiers' income depends exclusively on interests on *CDO* and dividends distributed by CBs and FFs:

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<sup>8</sup> Note that FFs will always be profitable since that, at the numerator of equation (15),  $(i_M + \vartheta f)$  is always higher than  $[\vartheta r + (1 - \vartheta)i_{RP}]$  given that  $i_M > r$  and  $i_{RP}$ .

$$YD_R = (r - f)CDO_R + DIV_{CB} + DIV_{FF} \quad (18)$$

$$\text{With } DIV_{CB} = i_M(1 - z)M + i_L L + i_{RP}RP; \quad DIV_{FF} = i_M zM + (f - r)CDO - i_{RP}RP$$

Equation (19) below formalises desired productive investments by NFF:

$$g = \frac{I}{K} = \beta_0 + \beta_1 u - \beta_2 i_L + \beta_3 (\pi - r) + \beta_4 r \psi \quad (19)$$

with  $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4 > 0$  and  $\psi = \frac{CDO_{NFF}}{pK}$  as the ratio between NFFs' financial assets ( $CDO_{NFF}$ ) and their productive assets ( $pK$ ), i.e. a standard measure of financialization of NFFs.

Next to the autonomous component ( $\beta_0$ ), several factors influence productive investments. First, desired productive investments depend positively on capacity utilization ( $u$ ) and negatively on the interest rate on loans from CBs ( $i_L$ ). Second, in the age of financialization, NFF have increasingly used retained earnings and loans from banks in order to acquire financial assets rather than productive means of productions (Stockhammer, 2004; Krippner, 2005). A potential trade-off stands out between financial and productive investments. Equation (19) captures this point by assuming that productive investments depend positively on the *gap* between the profit rate ( $\pi$ ) and returns on financial investments ( $r$ ). The higher is  $r$  with respect to  $\pi$  (financial investments are relatively more lucrative) the higher are NFF' incentives to divert resources towards financial investments themselves, thus scaling down productive investments. Finally, recent empirical studies about the impact of financialization on investments also show that financial earnings may sometimes provide additional resources for undertaking productive investments (Orhangazi, 2008; Tori and Onaran, 2017). This is particularly true for relatively small, thus more financially constrained, companies. Accordingly, in equation (22), productive investments may also benefit from increasing financial earnings as a share of productive capital  $r\psi$ .

Equations (20), (21) and (22) describe the production technology and the supply side of the economy. We assume a constant coefficient production technique. Accordingly, employed labour force  $N$  is jointly given by the rate of capacity utilization ( $u$ ), the installed capital stock  $K$ , and labour productivity  $a$  (equation 20). NFF set the price of

their output by applying a mark-up ( $\mu$ ) on unit labour costs (equation 21). Equation (22) defines the profit share.

$$N = \frac{uK}{a} \quad (20)$$

$$p = (1 + \mu) \frac{w}{a} \quad (21)$$

$$\pi = \frac{pY - wN}{pK} = \frac{\mu}{1 + \mu} u = \tau u \quad (22)$$

In order to find the equilibrium level of capacity utilization ( $u^*$ ), the corresponding growth rate of the productive capital stock ( $g^*$ ), one simply needs to find the demand-driven equilibrium level of output on the goods market. After normalizing consumption expenditures by the value of the capital stock and after assuming that the interest rates on loans and mortgages are equal (i.e.  $i_M = i_L = i$ ), we get:

$$u^* = \frac{[c_1^R - c_1^W]im + c_1^R \varphi + c_2^W \Omega_w + c_2^R \Omega_R + \beta_0 - \beta_2 i + (\psi \beta_4 - \beta_3)r}{[1 - c_1^W(1 - \tau) - \beta_3 \tau - \beta_1]} \quad (23)$$

$$\text{with } \Omega_R = \frac{V_R}{pK}; \quad \Omega_w = \frac{V_w}{pK}; \quad m = \frac{M}{pK}; \quad l = \frac{L}{pK}; \quad \varphi = \frac{Y_{DR} - iM}{pK} = il + (f - r) \frac{CDO_{NFF}}{pK}$$

$$g^* = \beta_0 + (\beta_1 + \beta_3 \tau)u^* - \beta_2 i + (\beta_4 \psi - \beta_3)r \quad (24)$$

Even further, we also analyse the distributive consequences of shadow banking practices by computing the ratio ( $\sigma^*$ ) between labour income and rentiers' income as emerging out of the short-run equilibrium (see equation 25 below). Admittedly, this is an overly simple measure of income distribution. Yet, it may well reflect the outstanding evidence about rentiers' increasing capacity to 'appropriate' larger parts of domestic income also through complex financial relations. Indeed, there is no doubt that new financial dynamics, and the connected rise in rentier-type income (versus labour income) lie behind the rising inequality registered in developed countries in the last decades (Epstein and Power, 2003; Piketty, 2014).

$$\sigma^* = \frac{YD_R}{wN - iM} = \frac{\chi}{(1 - \tau)u^* - im} \quad (25)$$

with  $\chi = YD_R/pK = \varphi + im$

#### 4.1 Comparative statics 1: the case of a house mortgage boom

Once defined the short-run equilibria of our model, we can analyse how changes in financialization-related variables may affect the real economy, as well as modify the equilibrium itself. Let assume, for instance, that the development of shadow banking practices led financial institutions to aggressively increase the quantity of mortgages ( $M$ ) conceded to workers through time. In turn, this has raised workers' wealth (by raising dwellings' price), as well as their corresponding indebtedness. On the one hand, the (ex-post) increase in workers' wealth ( $\Omega_w$ ) may possibly feed more consumption through a kind of 'Bhaduri-type' capital gain channel (Bhaduri, 2011).<sup>9</sup> On the other hand, higher debt service payments on the shoulders of working households indirectly redistribute income from workers to rentiers (through more generous dividends distributed by CB). While consumption expenditures of the latter might increase, the former might have to reduce consumption due to a lower disposable income. The overall effect of such a long process of financialization on economic activity is unclear, as counter-balancing forces are at work. Indeed, by differentiating equation (26) with respect to  $m$ , we get:

$$du^* = \frac{[(c_1^R - c_1^W)i + c_2^W(\partial\Omega_w/\partial m)]}{[1 - c_1^W(1 - \tau) - \beta_3\tau - \beta_1]} dm \quad (26)$$

It is straightforward to see that the numerator of equation (26) can be either positive or negative. The term  $(c_1^R - c_1^W)i$  is surely negative and constitutes a financial-led extraction on economic activity since that  $c_1^R < c_1^W$ . This condition represents the negative effects on aggregate consumption of redistributing income away from workers towards rentier. Redistribution takes indirectly place through the mediation of FFs' by the creation of new (rentiers') financial assets and, correspondingly, new (workers')

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<sup>9</sup> We ground our first comparative statics exercise on the effect that, in a highly financialized economy, the past heightened stream of mortgage creations may have induced on *current* consumption by raising households' wealth and, at the same time, households' indebtedness. Differently from Bhaduri *et al.* (2015), in equation (23) we do not explicitly take into account a positive link between *current* consumption expenditures and *current* capital gains. We do this in order to maintain our model as simple as possible. The inclusion of this further element, although absolutely feasible within our framework, would have complicated the analysis, without adding much to its economic implications.

liabilities. However, the ‘consumption expanding’ wealth effect  $c_2^w(\partial\Omega_w/\partial m)$  is positive. Economic activity will thus contract (expand) in the event the first distributive factor would outstrip (fall below) the wealth factor. In the first case, paraphrasing Bhaduri and Marglin (1990:38), we deal with a ‘shadow banking-led stagnationist regime’. In the second case, an ‘exhilarationist’ scenario prevails.

It is important to stress that the case for a shadow banking-led exhilarationist regime hinges upon the assumption that the more generous extension of mortgages to working households may have allowed them to considerably increase the demand for houses, hence paving the way for rising house prices, the housing boom and, eventually, rising households’ wealth. Nonetheless, it is equally interesting to consider the alternative scenario in which the excessive creation of mortgages, by leading households to become over-indebted, may eventually induce some of them to (perhaps forcefully) sell their houses (in order to make up for their debt) and prompt a drop (rather than an increase) in housing prices and households’ wealth. More formally, given the total amount of houses ( $H$ ) in the economy, we may have:

$$\Omega_w(t) = p_H(t)H + D = f\left(H^d(M(\zeta, t)) - \theta\left(\int_0^t M(\zeta, s)ds\right)H\right)H + D$$

where  $H^d(M(\zeta, t))$  is the demand for houses at time  $t$  as determined by mortgages conceded in the same period (i.e.  $M(\zeta, t)$ );  $\int_0^t M(\zeta, s)ds$  is the outstanding total amount of mortgages, and  $\theta(\cdot)$  is the fraction of existing houses sold on the market by over-indebted households, with  $\left(\partial\theta/\partial\left(\int_0^t M(\zeta, s)ds\right)\right) \geq 0$ . Last but not least, ‘ $\zeta$ ’ stands for an institutional parameter describing the easiness with which CBs can extend mortgages to working households, with  $M_\zeta(t) = (\partial M(t)/\partial\zeta) > 0$ .

In such a framework, with institutional limits to the creation of mortgages relaxed by the ‘originate and distribute’ practices associated to securitization (i.e. a higher value of  $\zeta$ ), and in proximity of the eruption of the subprime crisis, we might have:

$$\frac{\partial\Omega_w(t)}{\partial\zeta} = \frac{\partial p_H(t)}{\partial\zeta}H = \left\{\frac{\partial H^d}{\partial M(\zeta, t)}M_\zeta(t) - \frac{\partial\theta}{\partial\left[\int_0^t M(\zeta, s)ds\right]}\left[\int_0^t M_\zeta(s)ds\right]H\right\}H < 0$$

According to the above expression, the overexpansion of mortgages that previously fed the housing bubble and economic expansion (i.e.  $du^*/dm > 0$ ), may ultimately cause the bubble to burst, and trigger off the crisis and the ensuing recession ( $du^*/d < 0$ ). An initial exhilarationist regime might eventually turn in a stagnationst one, with tough consequences in terms of income inequality (see more on this below).<sup>10</sup>

According to equation (24), the expansionary or contractionary effect of a house mortgage boom on economic activity is transmitted to productive capital accumulation through the standard accelerator component. More in details, we have:

$$dg^* = (\beta_1 + \beta_3\tau)(\partial u^*/\partial m)dm \quad (27)$$

As far as income distribution is concerned, a reduction or an increase in the ratio between rentiers' and workers' income will highly depend on within which of the two regimes (expansionary or contractionary) the shadow banking-led house mortgage boom takes place. Totally differentiating equation (25) with respect to 'm', one gets:

$$d\sigma^* = \frac{i[(1-\tau)u^* - im] - \chi[(1-\tau)\partial u^*/\partial m - i]}{[(1-\tau)u^* - im]^2}dm$$

After some re-arrangements, we can verify that a house mortgage boom could hypothetically squeeze income inequality, i.e. ( $d\sigma^*/dm < 0$ ) should condition (28) be fulfilled:

$$\varepsilon_{u,m} > \eta^* \frac{(1 + \sigma^*)}{\sigma^*} \quad (28)$$

where  $\varepsilon_{u,m}$  is the elasticity of economic activity to an increase in the number of mortgages created by CB, while  $\eta^*$  is workers' debt service-to-income ratio.

Referring to the above set of equations, it is straightforward to see that, should economic activity react negatively to an expanding mortgage market ( $\varepsilon_{u,m} < 0$ ),

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<sup>10</sup> Since the beginning of the 2000s, investment in the housing market has been significantly motivated by speculative purposes (i.e. by the attempt to realise capital gains by exploiting bullish trends in the price of houses). Speculation in the housing market, the formation of housing bubbles and their ultimate explosion are certainly consistent with our description of the evolution of housing prices as associated to the increasing provision of mortgages and the over-indebtedness of households. Nonetheless, for the sake of simplicity, we do not explicitly model this aspect, which is out of the scope of the present work.

condition (28) will never be satisfied. Financialization-led economic slowdown or recessions will go hand in hand with worsening income distributions. By the same token, a contraction in economic activity as due to households' over-indebtedness giving rise to the burst of the housing bubble, will bring about an even more unequal distribution of generated income between rentiers and working households. Perhaps more interestingly, a detailed reading of condition (28) reveals that a more equalitarian income distribution could be quite far from arising even in the contest of a financialization-led economic expansion. Indeed, economic activity might even react positively to expanding mortgage lending, but still not enough to meet condition (28). Also note that the higher the workers' debt service burden ( $\eta^*$ ), the greater the right-hand-side of condition (28), and the more likely it will be above 1. In this context, in order to improve income distribution during financialization-driven economic expansions, economic activity should over-react by far to mortgage increases. It goes without saying that it is hard to imagine that such a scenario will ever take place, so that a financialization-led expansions will likely be characterized by persistently worsening income distributions.

Our concern appears even more grounded should we assume rentiers receiving dividends from NFFs on top of interest rate receivable accruing to them through shadow banking-created assets. The inclusion in our model of NFFs dividends would imply modifying equation (25) into equation (25.b):

$$\sigma_{(25.b)}^* = \frac{YD_R + DIV_{NFF}}{wN - iM} = \frac{\chi + \alpha\tau u^*}{(1-\tau)u^* - im} \quad (25.b)$$

with ' $\alpha$ ' as the share of NFFs profits distributed to rentiers in the form of dividends. A first-sight comparison between equation (25) and equation (25.b) immediately shows that the inclusion in our model of NFFs dividends would bring about a 'negative' effect on income inequality (i.e. income more unequally distributed in favour of rentiers). As to the dynamic effects of shadow banking-led macroeconomics, a finance-led increase in capacity utilization will more likely come together with a worsening income distribution. Indeed, *ceteris paribus*, a rise in  $u^*$  will now cause an increase in NFFs dividends to rentiers on top of higher interest rates receivables (as due to a higher  $m$ ), the first form of improvement in rentiers' income not being considered in our 'baseline' scenario. The case of a shadow banking-led stagnationist regime will maintain its distributional properties, with a more unequal income distribution emerging alongside a declining

capacity utilization.<sup>11</sup> In the end, the development of shadow banking practices have contributed to create a rentier-friendly economic environment, in which rentiers are more likely better off regardless the specific economic regime shadow banking practices may give rise to.

#### 4.2 Comparative statics 2: Living in a world where rentiers are well alive

There is a mounting debate among economists and policy-makers about the effects of the current unusually low level of interest rates on economic activity. Critics (see Bindseil *et al.*, 2015) stress that low interest rates, as induced by unconventional monetary policies, jeopardize savers. Accordingly, they call for a quick return to normality so that savings could be remunerated properly, and investment stimulated from the supply side of the credit market. In order to assess if this orthodox claim finds any ground, it is interesting to see what happens in our model if we assume a generalized increase in the interest rates on financial activities, and thus higher remunerations for rentiers and NFF on their respective financial asset holdings. This exercise could somehow represent the economic scenario prevailing in the last years preceding the outbreak of the 2007-2008 crisis, when rentiers were ‘well alive and in a good shape’.

For the sake of simplicity, let assume that interest rates on financial assets all increase by the same amount, so that  $di = di_{RP} = dr$ . Equations (29) and (30) define the effect of such ‘rentier-friendly’ economic scenario on economic activity and productive capital investments respectively:

$$du^* = \frac{\overbrace{c_1^R \xi}^+ \overbrace{-c_1^W m}^- \overbrace{-[\beta_2 + (\beta_3 - \beta_4 \psi)]}^?}{[1 - c_1^W(1 - \tau) - \beta_3 \tau - \beta_1]} dr = v dr \quad (29)$$

$$dg^* = \left[ \overbrace{(\beta_1 + \beta_3 \tau)v + [(\beta_4 \psi - \beta_3) - \beta_2]}^? \right] dr \quad (30)$$

As before, there are no clear-cut conclusions and different regimes could prevail. Hypothetically, a ‘rentier-led’ regime akin to the ‘puzzling’ regime described by Hein

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<sup>11</sup> Through simple manipulations of equations (25.b), we get:  $\sigma_{(25.b)}^* = \frac{(1+\chi/\alpha u^*)}{[(1-\tau)/\alpha \tau - im/\alpha \tau u^*]}$ . From this expression, it is easy to see that any reduction in  $u^*$  will reduce the denominator of equation (25.b) and, at the same time, will raise its numerator. Income inequality will certainly increase in the context of a finance-led economic contraction. Interestingly, this result would not emerge in a standard post-Keynesian model without shadow banking, in which income distribution is determined, in the short run, by the “distributional parameters”  $\mu$  (hence  $\tau$ ) and  $\alpha$ .

(2010) could emerge, with both capacity utilization and productive capital accumulation responding positively to increased rentiers' income. However, the economic mechanisms leading to this outcome are different. Indeed, Hein (2010) puts at the centre of his analysis the financialization of NFF, and the redistribution of NFF profits to rentiers in the form of higher dividends as the prime mechanism possibly leading to rentier-led economic expansions. In this paper, redistribution takes place between workers and rentiers via the mediation of an 'active' financial sector, which constantly creates new (financial) investment opportunities for rentiers, along with new liabilities for workers.

More in details, equation (29) implies that the equilibrium level of capacity utilization would expand due to higher interest rates only if increasing rentiers' consumptions would more than compensate for the reduction in workers' one, as well as for the likely contraction in NFF' productive investments. In this sense, equation (30) also tells that productive capital accumulation might hypothetically react both ways in a world of relatively high interest rates. Yet, the more NFF consider financial assets as substitute for real investment, the more likely the sponsoring a 'rentier-friendly' environment will lead productive investments to stagnate.<sup>12</sup>

Last but not least, the distributive effects of such a generalised increase in interest rates can be analysed by taking equation (25) and totally differentiating it with respect to  $i$ ,  $r$  and  $u$ . We get:

$$d\sigma^* = \frac{\{(l+m)[(1-\tau)u^*-im]+m\chi\}}{[(1-\tau)u^*-im]^2} di - \frac{\psi}{[(1-\tau)u^*-im]} dr - \frac{(1-\tau)\chi}{[(1-\tau)u^*-im]^2} du^* \quad (31)$$

Under the simplifying assumption according to which  $di = dr$ , and after noting that  $du^* = vdr$  from equation (29), equation (31) can be aptly manipulated in order to obtain the following expression:

$$\frac{d\sigma^*}{dr} = \frac{(l+m-\psi)-[(1-\tau)v-m]\sigma^*}{[(1-\tau)u^*-im]}$$

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<sup>12</sup> A generalized increase in interest rates will usually curtail productive investments by NFF through two main channels. First, external financing from CBs will get more expansive. Secondly, and perhaps more relevantly in a time of financialization, the accumulation of financial assets rather than productive ones will become relatively more remunerative. The only possible way through which NFF financialization could go hand in hand with booming productive investments is by providing NFF with higher cash flows, and hence more 'internal' resources to finance additional productive investments, as accruing by holding highly remunerative structured finance products.

Condition (32) below defines under which circumstances income distribution might paradoxically improve (i.e.  $(d\sigma^*/dr) < 0$ ) when financial assets (structured and non-structured) guarantee remunerative returns:

$$(l + m - \psi) < [(1 - \tau)v - m]\sigma^* \quad (32)$$

In line with the findings of the previous point, a ‘rentier-friendly’ world will be hardly associated with an improving income distribution. Indeed, should increases in the relative remunerativeness of financial assets versus productive assets entail a contracting economic activity, i.e. ( $v < 0$ ), condition (32) will never hold true. During recessions, rentiers will forge further ahead with respect to wage earners. During expansions, income inequality might theoretically shrink. Nonetheless, ( $v > 0$ ) is not sufficient for condition (31) to fulfil. Actually, a ‘rentier-led expansion-with-decreasing inequality’ might only take place if the positive response by economic activity will be strong enough to overcome the left-hand side of condition (32). Interestingly, the right-hand side of equation (32) is a positive function of ‘ $m$ ’, whilst its left-hand side responds positively to the wage share  $(1 - \tau)$  and negatively to  $m$ . Accordingly, the higher is the degree of financialization of the economy (as grasped by the ratio between house mortgages and the productive capital stock) the harder the possibility that any rise in interest rates on financial assets could lead to a more equitable income distribution. Even further, the economic context characterizing most developed economies since the mid-1970s, i.e. the persistent reduction in the wage shares (as favoured by NFF financialization), makes even more unrealistic the fulfilment of condition (32). These findings seem to recall how a Keynesian-type ‘euthanasia of the rentiers’ might be highly desirable in order to feed a sustained, and more equitable, economic recovery.

## 5. Conclusions

This paper contributes to the post-Keynesian analysis of financialization by presenting an ‘augmented’ post-Keynesian model in which an ‘active’ shadow banking sector producing structured finance instruments is explicitly formalized.

We show from a macroeconomic point of view how, before the crisis, securitization and shadow banking allowed financial institutions to increase the issuance of mortgages, as well as the profitability of the whole financial sector, while apparently keeping their financial position stable. In this sense, the 1996 reinterpretation of the Glass-Steagall act

(eventually repealed in 1999) appears as a turning point (see the corresponding sudden and steep rise of MBS in Figure 1). Even further, interpreting the post-crisis fall in MBS issuances as a signal of the end of shadow banking can be extremely erroneous, probably a pure wishful thinking. Figure 2 shows the stock of four different loans owned and securitised in the US: revolving credit, motor vehicle loans, consumer credit, and student loans. It is easy to see how all the series present astonishing upward trends in the post-crisis period. Interestingly, and complementary to the economic implications of Figure 2, Segoviano et al. (2015) show how such a recovery in securitization seems to be a global phenomenon, which goes beyond the US economy. This is certainly the case of Europe, where the share of “placed” securitised assets with respect to “retained” ones (i.e. the share of securitised assets effectively sold on financial markets rather than held on the balance sheets of the originators of the underlying loans) is approaching pre-crisis levels.

[FIGURE 2]

Even worse, our model clearly shows that the securitization process makes legislations on capital requirement not only ineffective, but also potentially counterproductive. If banks have to comply with strict capital ratio requirements while having access to securitization, they will have a strong incentive to take part in the creation of structured finance products to lighten their balance sheets, hence harming the stability of the economy as a whole. It seems therefore necessary (and urgent) to apply some form of control and limitation to the link between the issuer of the credit and securitizing system. Securitization makes credit easier. Paraphrasing Keynes, ‘when the goal of credit issuance is not the financing of productive activities, but the creation of financial commodities, the job is likely to be highly noxious for the economy’. Traditional banks should be dragged out of the shades.

The final part of the paper analyses the effects of shadow banking practices on economic activity, the accumulation of means of production, and income distribution. In modern financialized economies, any analysis of demand and growth regimes likely turns out as useless if it fails to consider how shadow banking related activity can redistribute income from wage earners to rentiers. This paper shows that a highly financialized economy and/or a ‘rentier-friendly’ regime very likely could give rise to economic stagnation with rising inequality.

This paper only takes into account short-term mechanisms. It could be considered as a first step of a promising venue of research in which shadow banking practices are explicitly integrated into macro models. The natural following steps would be to take into account further features of shadow banking as tax and regulation avoidance, or credit supply distortions, as well as to broaden even further the existing contributions by Eatwell *et al.* (2008) and Nikolaidi (2015), in order to explore more in details how the *internal circular dynamics* of contemporaneous financial systems (i.e. the securitization of financial assets and the creation of complex structured financial products as propelled by the extension of repos lending) could affect the medium-to-long run evolution of the real economy in terms of economic growth, income distribution, and the stability of the economy as whole.

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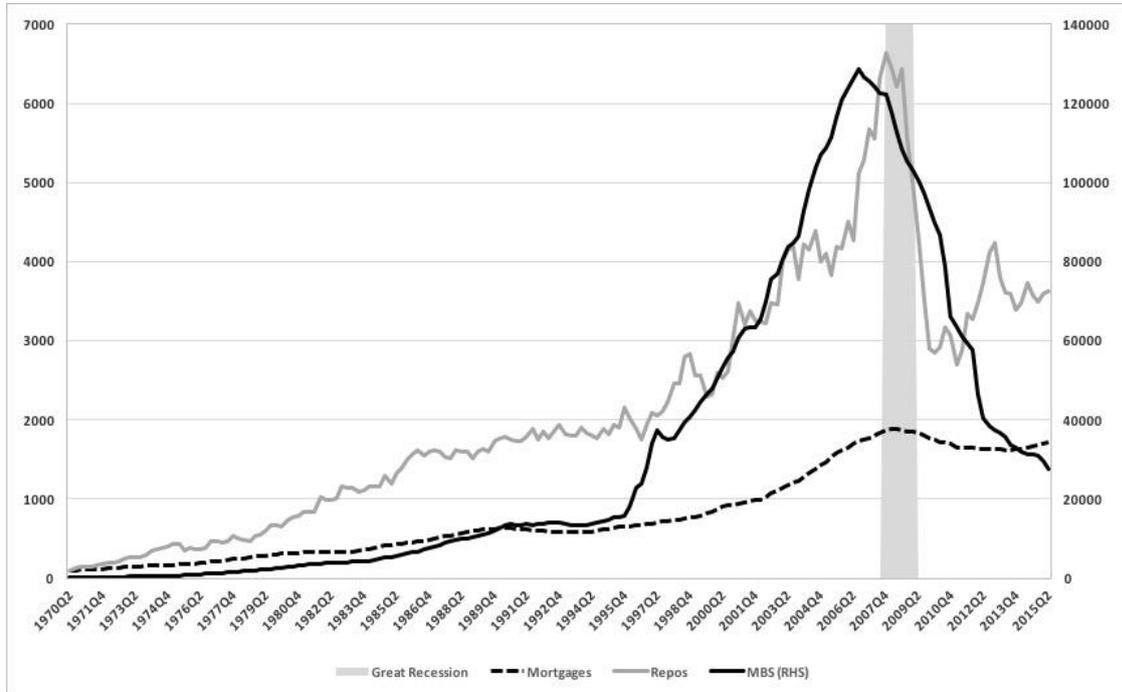
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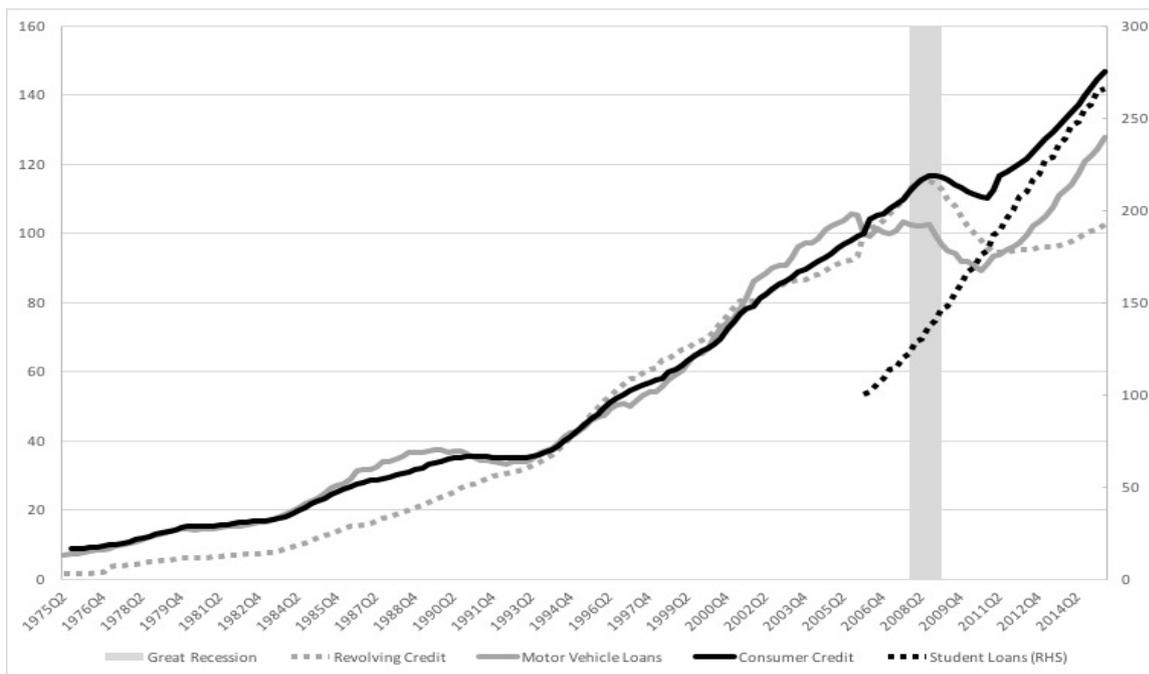
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## Figures and Tables

**Figure 1:** Private depository institutions' total mortgages asset; Private depository institutions' repurchase agreements asset; Total real estate loans owned and securitized by Finance Companies. 1970Q2 =100, for all the series. Source: Board of Governors of the Federal Reserve System (US), Flow of Funds Z1.



**Figure 2:** Selected assets owned and securitized by different kinds of financial entities (depository institutions, finance companies, credit unions, the federal government, nonfinancial business, nonprofit and educational institutions, and pools of securitized assets), 2006Q1 =100. Source: Board of Governors of the Federal Reserve System (US), Flow of Funds G19.



**Table 1.** Balance sheet matrix

	<b>Workers</b>	<b>Rentiers</b>	<b>NF-Firms</b>	<b>Commercial Banks</b>	<b>Financial Firms</b>	<b>Central Bank</b>	<b><math>\Sigma</math></b>
<b>Capital</b>			$+K$				$+K$
<b>Deposits</b>	$+D$			$-D$			$0$
<b>Houses</b>	$+p_{HH}$						$+p_{HH}$
<b>Cash</b>				$+J_{CB}$	$+J_{FF}$	$-J$	$0$
<b>Mortgages</b>	$-M$			$+(1-z)M$	$+zM$		$0$
<b>Loans</b>			$-L$	$+L$			$0$
<b>CDO</b>		$+CDO_R$	$+CDO_{NFF}$		$-CDO$		$0$
<b>Repos</b>				$+RP$	$-RP$		$0$
<b>Equities</b>		$+E$		$-E_{CB}$	$-E_{FF}$		$0$
<b>Net worth</b>	$NV_W$	$NV_R$	$NV_{NFF}$	$NV_{CB}$	$NV_{FF}$	$NV$	$+K + p_{HH}$

**Table 2.** Full integration matrix

	Workers		Rentiers		Non-financial firms		Commercial Banks		Financial Firms		Central Bank	$\Sigma$
	current	capital	current	capital	current	capital	current	capital	current	capital		
<b>Wages</b>	$+W$				$-W$							$0$
<b>Consumption</b>	$-C$				$+C$							$0$
<b>Real Investment</b>					$+I$	$-I$						$0$
<b>Financial payments:</b>												
<b>Dividends</b>			$+DIV$				$-DIV_{CB}$		$-DIV_{FF}$			$0$
<b>Mortgages</b>	$-i_M * M$						$+i_M * (1-z) * M$		$+i_M * z * M$			$0$
<b>CDOs</b>			$+r * CDO_R$		$+r * CDO_{NFF}$				$-r * CDO$			$0$
<b>CDOs</b>			$-f * CDO_R$		$-f * CDO_{NFF}$				$+f * CDO$			$0$
<b>Loans</b>					$-i_L * L$		$+i_L * L$					$0$
<b>Repos</b>							$+i_{RP} * RP$		$-i_{RP} * RP$			$0$
<b><math>\Sigma</math></b>	$-S_W$	$+S_W$	$-S_R$	$+S_R$	$-P_{NFF}$	$+P_{NFF}$	$0$	$0$	$0$	$0$	$-$	$0$
<b>Change in:</b>												
<b>Deposits</b>		$-\Delta D$						$+\Delta D$				$0$
<b>Houses</b>		$-\Delta p * H$										$-\Delta p * H$
<b>Mortgages</b>		$+\Delta M$						$-(1-z) * \Delta M$		$-z * \Delta M$		$0$
<b>Loans</b>						$+\Delta L$		$-\Delta L$				$0$
<b>CDOs</b>				$-\Delta CDO_R$		$-\Delta CDO_{NFF}$				$+\Delta CDO$		$0$
<b>Repos</b>								$-\Delta RP$		$+\Delta RP$		$0$
<b>Total</b>	$0$	$0$	$0$	$0$	$0$	$0$	$0$	$0$	$0$	$0$	$-$	$-\Delta p * H$
<b><math>\Delta</math>Net Worth</b>	$\Delta NW_W = Sav_W + \Delta p M$		$0$		$0$		$0$		$0$		$-$	$-\Delta p * H$
	$0$		$0$		$0$		$0$		$0$			

**Table 3.** Commercial banks leverage with and without securitization

	<i>With securitization</i>	<i>Without securitization</i>
$lev_{CB}$	$\frac{\gamma_1 L + [\gamma_1(1 - z) + \gamma_2(1 - \vartheta)z]M}{E_{CB}}$	$\frac{\gamma_1(L + M)}{E_{CB}}$