

Debt, Financialization and Inequality in Macroeconomics

Position paper of

S. Cincotti, M. Raberto, A. Tegli

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The Challenge

In the last thirty years, most of the advanced economies and of the developing countries have undertaken a profound transformation of their financial sector; major changes can be identified in the deregulation of financial markets, the liberalization of capital transfers, and in the privatization of the banking system. An important consequence of this process has been the so-called financialization of the economy, namely, the increasing relevance that the financial sector has assumed with respect to the real one.

The process of deregulation and privatization has not been limited only to the financial side but has also interested all the other sectors of the economy. It is in the case of the financial sector, however, where most important and far-reaching changes have been occurred. This because of the importance of finance in modern services-oriented economies and the digital communication revolution, which has much benefitted an activity characterized by immaterial assets and centralized exchange.

This profound economic, political and cultural transformation can be probably traced back to 1971, when the post-World War II Bretton Woods system of fixed international exchange rates and dollar peg to gold was repealed by the Nixon Administration in the US. The process then acquired momentum in the early 80s, with the financial market deregulation promoted in US by the Reagan administration and in UK by the Thatcher government, and accelerated in Europe in the late 80s and early 90s with the fall and the break up of the Communist bloc and the birth of the European single market. On a smaller scale, Iceland can be regarded as a case study of the deregulation, privatization, and financialization process, which began there under the Oddson premiership in 1991, and that was characterized first by the privatization of the state-owned manufacturing system, mostly fish processing plants, accompanied by tax reduction and other business oriented reforms, and later by the privatization of the banking system in the early 2000s, which, within a deregulated environment, was allowed to growth and expand internationally, reaching a dimension close to ten times the Icelandic GDP in terms of balance sheet. Outside the Western hemisphere, it is worth citing the program of economic reforms promoted in China since 1978 under the Deng Xiaoping

leadership, that led China towards a market-like economy, and a package of market-oriented reforms undertaken in India since 1991, which included deregulation, privatization, and tax reforms measures. Finally, since the late 80s, economic policy worldwide has been devoted to the implementation of liberalization, deregulation and privatization agendas. Under the theoretical justification of globalization, a set of policies advocated by the so-called Washington Consensus, promoting free trade, capital mobility, and financial market deregulation, were implemented with particular emphasis in developing countries in South America and Asia.

The financial market liberalization, the privatization of banking systems and of state-owned manufacturing and services companies, as well as of some forms of social security provisions, such as pensions, have determined the so-called financialization of the economy (Epstein, 2005, Palley, 2007). The increasing relevance of financial markets, actors and institutions in the operation and in the governance of the economy during the last thirty years can be observed in many ways. Financial trading activities have increased exponentially and have been characterized by the emergence of new actors like hedge funds and private equity firms. The privatization of public companies has augmented the supply of stock shares on one side, while the privatization of retirement financing has created new demand for financial assets on the other side. The shareholder value has become the key reference interest in corporate governance, while capital market financing has become more relevant than bank-based financing. Financing in capital market has been made easier by financial innovation and securitization, which created new financial instruments such as collateralized debt obligations and mortgage backed securities, where households' and companies' loans have been transformed into tradable assets. Financial innovation has allowed an increase of the debt to GDP ratio of the private sector on one side, in particular for households and the financial sector, and has fuelled bubbles in the financial and real estate market on the other side. Both have been self-reinforcing during the boom period, given that inflated financial and real estate assets have been used as collateral for debt, thus fuelling again household's consumption and debt. The contribution to GDP of the finance, insurance and real estate (FIRE) sector has increased from nearly 15% to more than 20% in the last thirty years in US (Palley, 2007).

Real economic activity has been mainly characterized by a downward trend of gross investment spending as a share of GDP and by a decreasing economic growth characterized by falling rates in the last three decades with respect to the previous decade. The decrease in investment spending has been even worse considering the productive sector only, given the surge in residential investment (Palley, 2007). Workers have been subject to wage stagnation, and disconnection of wages from

productivity growth; while rent earners have benefitted by an increasing profits' share of national income; income and wealth inequalities have increased (Mishel et al. 2007).

The rising of household debt-income ratios and corporate debt-equity ratios has made the economy increasingly financially fragile and potentially unstable. In fact, this debt growth dynamics is unsustainable in the long run and the economy may become vulnerable to debt-deflation and prolonged recessions (Minsky, 1986). Internationally, financial fragility has become already evident in the 1990s with the Mexico (1994), the Asian (1997/1998) and the Russian (1998) crisis, which demonstrated the degree to which a too-rapid market liberalization can lead to a currency crisis, in which a sudden reversal of capital flows is followed by financial instability and a consequent sharp decline in economic activity. Another example was the Internet bubble burst of the early 2000s, when financial markets experienced a significant decline in asset prices. Finally, what started in the summer 2007 as a burst of a speculative bubble in the US real estate market developed, in the course of just a few months, into the most severe financial crisis since the Great Depression of the 1930s. The default of many subprime mortgages in US soon spread to the rest of the world by means of the transmission channel of securitization, triggering world-wide bank runs and several bankruptcies of major institutions. The supply of credit to private business soon came to a halt and the financial crisis spread to the real economy causing unprecedented GDP drops worldwide and a surge of unemployment.

The great financial crisis was indeed preceded by a global credit bubble enabled by the globalization of banking and a period of unusually low interest rates and risk spreads; data show that since 2000 the combined public and private debt grew rapidly in most mature economies, see \ McKinsey 2010. Advanced economies are now in a deleveraging phase where both private and public sectors are trying to reduce their debt levels. In particular, households are repairing their balance sheets after years of credit-funded consumption expenditures and mortgage-financed real estate boom. Governments are adopting tight fiscal policies to reduce the debt burden, accumulated during the crisis because of banks' bailout and lower tax revenues. Historical data analysis shows that a major financial crisis is nearly always followed by long period of deleveraging and that historically deleveraging episodes exert a significant drag on GDP growth, see McKinsey 2010.

It can then be argued that the boom-bust credit cycle of the 2000s has played a significant role in the developments of the great financial crisis (see Keen 2009) and that is still playing a central role in shaping the future prospects of developed economies, which are now on the track of a slow but

uncertain recovery. The experience of the 1997 Asian financial crisis and of the Japan lost decade has attracted the interest of a number of scholars towards the problem of debt, balance sheets distress, and deleveraging (see Krugman 1999, Kiyotaki 2002, Werner 2005, Koo 2008}). In particular, Koo 2008 has argued that both Japan's lost decade and the Great Depression were essentially caused by balance-sheet distress, with large part of the economy unable to spend due to excessive debt. The experience of the great financial crisis has made an increasing number of economists aware about the importance of debt and leverage, and a number of studies has therefore appeared, yet far to be general purpose macroeconomic models, see e.g. Geanakoplos 2010, Adrian 2010. In fact, despite this, and despite the prominence of debt in discussion about current economic difficulties, perhaps surprisingly, it is quite common to abstract from debt in most mainstream economic modelling, as for the dynamic stochastic general equilibrium (DSGE) models (see DeGrauwe 2010) currently adopted by major central bank and policy makers.

A recent attempt to include debt in a DSGE framework has been done by Eggertsson 2010. Indeed, the focus on debt and generally on credit and its influence on economic activity is not new, and one of the first most notable example is actually the debt-deflation theory of the great depression by Fisher 1933. In the post WWII mainstream economics, however, the insights by Fisher were not taken into account and only the concept of insufficient aggregate demand was incorporated in the so-called neo-classical synthesis of the 50s and 60s (see Patinkin 1965). Later on, the rational expectation revolution (see Lucas 1972) and the real business cycle theory (see Kydland 1982) of the 70s and the 80s, by taking to the extreme the Walrasian paradigm of money neutrality, even neglected the relevance of monetary variables in the economy and therefore the importance of credit. Years before, the monetary theory by Friedman 1963 was in this respect a notable exception by linking monetary aggregates with business cycles, even if no consideration about credit was present.

On the other hand, among the so-called post-keynesian, credit and money were regarded as central in the functioning of the economy. The most prominent scholar in this respect was Hyman Minsky which proposed theories explaining endogenous speculative investment bubbles as prosperous phases of the economy when corporate cash flow rises beyond what is needed to pay off debt and speculative euphoria develops, but soon thereafter debts exceed what borrowers can pay off from their incoming revenues, which in turn produces a financial crisis (see Minsky 1986). As a result of such speculative borrowing bubbles, banks and lenders tighten credit availability, even to companies that can afford loans, and the economy subsequently contracts. Beside the Minsky's

pioneering work, it is worth citing the endogenous credit-money approach of the post-Keynesian tradition (see Fontana 2003, Arestis 2006, Kriesler 2007). Contrary to the neoclassical synthesis that considers money as an exogenous variable controlled by the central bank through its provision of required reserves, to which a deposit multiplier is applied to determine the quantity of privately-supplied bank deposits, the essence of endogenous money theory is that in modern economies money is an intrinsically worthless token of value whose stock is determined by the demand of bank credit by the production or commercial sectors and can therefore expand and contract regardless of government policy. Money is then essentially credit-money originated by loans which are created from nothing as long as the borrower is credit-worthy and some institutional constraints, such as the Basel II capital adequacy ratios, are not violated. As the demand for loans by the private sector increases, banks normally make more loans and create more banking deposits, without worrying about the quantity of reserves on hand, and the central bank usually accommodates the demand of reserves at the short term interest rate, which is the only variable that the monetary authorities can control. In our studies, we fully endorse and follow the endogenous credit-money approach.

Our Journey

Our journey to current research activities can honestly be described only as a “*fall in love*”. We have a background in “*hard science*”, with specific emphasis in complex systems and ICT. In this context, science and technology have been the reference environment of our early bird studies, but in 1999, we have participated and organized the 5th Workshop on Economics with Heterogenous Interacting Agents in Genoa. WEHIA 1999 changed our perspective and research agenda and since that event our research interests lead to innovative and multidisciplinary approach to problem solving in economics and finance. Stated the background, it was rather direct to focus on finance.

In this respect, two main research lines started: (i) advanced econometrics and (ii) agent-based computational economics. In the former area, our attention focused on statistical arbitrage, risk management, portfolio management etc.: all topics that profoundly benefited of our scientific background and that are an opportunity for immediate applicability of advanced statistics and non linear noisy dynamics. In the latter, we have developed agent-based models able to reproduce the stylized facts pointed out by empirical data. The objective was to that the limitation of perfect and fully efficient markets, unlimited liquidity, and full rationality and information of economic agents can be overcome by a more realistic approach and this this lead to the development of the Genoa Artificial Stock Market (GASM) that has been enriched during the last decade with propensities and expectation formation, behavioral economics, interaction networks etc.

This research area was very successful and allowed us to publish several papers, but more effective in the modeling of stock markets more unsatisfied on limitation intrinsic in isolated stock markets. Thus, in 2005 some madness started emerging in our working meeting: to develop an agent-based model (and simulator) of the whole European economy. Our madness consolidated and lead to a proposal for EU grant that surprisingly was successful: we became coordinator of the EU FP6 FET project EURACE. The EU grant for EURACE close in 2009, but the project continued with financial support based on national project in Italy , Iceland and Spain.

EURACE is a fully-specified agent-based model of a complete economy that includes the real, the credit, the financial and the public sectors. Its includes spatial structure and local interactions, realistic time scales and asynchronous interactions, decentralized imperfect markets, adaptive and empirically grounded behavioral rules and a balance sheet approach in modeling agents.

EURACE is a real facility and its features lead to another crucial turn-point in our journey: we should stop from discussing limits and inapplicability of DSGE models and focus on agent-based computational economics proposals to economics policy design and regulation. By means of EURACE we aim to demonstrate that agent-based computational economics is a fruitful, mature and usable approach to address complex real problems in economics and finance and our journey is continuing in this direction.

Our Work

Our previous work has reproduced and investigated the economic mechanisms behind the debt-driven boom-bust cycles by means of the agent-based model and simulator Eurace (see Cincotti et al. 2010; Cincotti et al. 2012a; Cincotti et al. 2012b; Raberto et al. 2012; Teglio et al. 2012).

Eurace is a model and simulator of an artificial economy which belongs to the class of agent-based computational models (see Tesfatsion and Judd (2006) for a review). The agent-based approach to economics addresses the modelling of economic systems as complex adaptive systems, i.e., systems made by many self-interested interacting units (economic agents here) that may change their behavior in order to adapt to the changing (economic) environment and to the change of other units' behavior. The main distinguishing features of an agent-based artificial economy with respect to the mainstream dynamic stochastic general equilibrium (DSGE) modelling can be summarized as follows: out-of-equilibrium dynamics versus market equilibrium, decentralized markets with pairwise bargaining and price dispersion versus centralized markets and the law of one price, adaptive expectations with myopic behavior versus rational expectations and infinite foresight, endogenous shocks and business cycles versus exogenous shocks.

The Eurace artificial economy has been constantly evolving since the start in 2006 of the Eurace project within a EU-funded research grant under the sixth framework programme. Eurace is a fully-specified agent-based model of a complete economy that includes different types of agents and integrates different types of markets. Agents include households which act as consumers, workers and financial investors, consumption goods producers as well as capital goods producers, banks, a government and a central bank. Agents interact in different types of markets, namely markets for consumption goods and capital goods, a labor market, a credit market and a financial market for stocks and government bonds. Except for the financial market, all markets are characterized by decentralized exchange with price setting behavior on the supply side. Agents' decision processes are characterized by bounded rationality and limited information gathering and computational capabilities; thus, agents' behavior follows adaptive rules derived from the management literature about firms and banks, and from experimental and behavioral economics of consumers and financial investors. In particular, consumption goods producers (CGPs) as well as banks are short-term profit maximizers that fix prices (the price of consumption goods and the lending rate) based on a fixed mark-up on their costs (wages and cost of capital for CGPs and the central bank policy rate for banks). CGPs make their production decisions according to standard results from inventory theory (Hillier and Lieberman, 1986). Households' saving-consumption decision is modelled according to the theory of buffer-stock saving behavior (Carroll, 2001; Deaton, 1992), which states that households consumption depends on a precautionary saving motive, determined by a target level of wealth to income ratio. Households can invest their savings in the asset market, by buying and selling equity shares or government bonds. Households' portfolio allocation is modeled according to a preference structure designed to take into account the psychological findings emerged in the framework of behavioral finance and in particular of prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman). It is worth noting, however, that only the equity shares of CGPs are exchanged among households in the stock market and only CGPs are allowed to issue new equity shares to be sold to households. Equity shares of KGP and banks are equally distributed among households and can not be traded; put in another way, profits of the KGP and of banks are equally shared and distributed to households. An important and distinctive feature of EURACE is the balance-sheet approach in the modeling of agents. This approach allows important stock-flow consistency checks both at the aggregate level and at the level of the single agent. The balance-sheet approach also clearly show the endogeneity of the money generated by the banking sector through the provision of credit.

EURACE has then been used to study the interplay between debt, leverage and deleveraging and business cycles with a particular focus on the role played by the banking system. Indeed, one of the

main reasons why the economic crisis became so severe was that the banking sectors of many countries had built up excessive on—and off-balance sheet leverage. The erosion of the level and quality of the capital base determined that the banking system was not able to absorb systemic trading and credit losses nor could it cope with the large off-balance sheet exposures. The crisis was then further amplified by a procyclical deleveraging process. The weaknesses in the banking sector were rapidly transmitted to the rest of the financial system and the real economy, resulting in a massive contraction of liquidity and credit availability. In this respect, in Raberto et al. (2012) and Tegliio et al. (2012), we have addressed the relevant macroeconomic implications of Basel II capital requirements of the banking sector. We have been able to both reproduce endogenous debt-driven business cycles debt-driven by showing that loose capital-adequacy ratios for banks can spur growth in the short-run, but the higher stock of private debt can lead to higher firm bankruptcies, credit rationing and more serious economic downturns in the long-run. The pressure on wages and labor costs during initial credit-fueled economic booms, in conjunction with the speed of growth of credit-money, causes a rise of inflation, which in turn can determine higher interest rates. Excessively indebted firms may be unable to fulfill their financial commitments with the cash proceedings of their revenues, and may be obliged to take new loans to pay interests on their debt, therefore entering in a Ponzi scheme. However, the deterioration of firms' creditworthiness causes a further rise of interest rates due to the widening of the risk spread on policy rates. This, in turn, affects the balance sheet of highly indebted firms, which may become soon insolvent. Debt write-offs reduce banks's equity and their lending capacity, thus causing a widespread credit rationing and a forced deleveraging of the corporate sector that may trigger a possible wave of bankruptcies of even good but illiquid firms. A credit-fueled economic boom may thus turn out in a depression. Finally, in Cincotti et al. 2012b, we have employed the Eurace model to test regulatory policies providing time varying capital requirements for banks, according to the recently-proposed new regulatory standard for bank capital adequacy, called Basel III, which focuses on the macroprudential dimension of banking regulation, i.e., the system-wide implications of banks' lending and risk. An important Basel III provision is to reduce procyclicality of present banking regulation and promote countercyclical capital buffers for banks, on the base of mechanisms that enforce banks to build up or release capital buffers, according to the overall conditions of the economy. In EURACE, we have considered both the unemployment rate and the aggregate credit growth rate as conditioning variables. Results have shows that the dynamic regulation of capital requirements is generally more successful than fixed tight capital requirements in stabilizing the economy and improving the macroeconomic performance (Cincotti et al. 2012b).

Our Plans

We plan to further develop and enrich the EURACE model and simulator in order to address the two new relevant issues: the interplay between financialization, inequality and business cycles and the design of proper fiscal policies in depressed economies.

The increased income inequality observed in the last two decades in both advanced and emerging economies has been widely documented, see e.g. Krueger et al (2010) for a survey. A notable contribution to greater inequality in the distribution of income has been the sharp increase in the weight of capital income (mainly interests and returns on financial assets) within household disposable income in the years since 1995 in several OECD countries (OECD, 2008b,a). Furthermore, a growing number of studies relate income inequality with the financialization of the economy and financial instability, stating that the 2007-2009 economic crisis is rooted in the uneven income distribution and inequality caused by the current finance-led model of growth (Fitoussi and Saraceno, 2010; Galbraith, 2012; Tridico, 2012; Stiglitz, 2012). In particular, the thesis is that income inequality has been made sustainable in the pre-crisis boom period by the financial sector through the provision of easy credit for consumption and residential investments; financial innovation and easy credit have then created asset bubbles and debt-induced economic booms, with the consequent rising of household debt-to-income ratios that, along with higher corporate debt-to-equity ratios and excessive bank leverage, have made the economy increasingly financially fragile and unstable.

We aim address the interplay between inequality in income distribution and macroeconomic performance and stability by means of the EURACE artificial economy. We think that a computational approach based on the assumption of heterogeneous and interacting agents is clearly particularly suited to study the effects of inequality of wealth and income distribution on the economy in a dynamic setting.

The issue of fiscal policy is very relevant in the present times, because, as a consequence of the deterioration of public finances following the economic crisis and the needed bailout of part of the banking system, most of European economies are now subject to fiscal consolidation policy measures, despite still poor economic conditions after the great recession of years 2008/2009. Indeed, the commonly accepted policy hypothesis is that austerity might have expansionary effects, because the expectations that today's sacrifices will translate into tax reductions and higher disposable income in the future might induce economic agents to increase consumption and

investment in the short term. Another common defense of current austerity programs is the risk that bond markets, whenever a government is not sufficiently committed to budget balance, may demand huge spreads for sovereign debt and possibly push a nation into default.

The emerging empirical evidence is actually contradicting the tale of expansionary austerity. Economies under austerity programs are experiencing a second severe contraction of economic activity, following the one already occurred in 2008/2009; in addition, bond yields of peripheral Eurozone countries, which, unlike UK, can not devalue their currency, are going up to unsustainable levels. Indeed, historical evidence tells us that expansionary effects of austerity measures are rarely observed (Guajardo et al, 2011); in particular, they occur only when austerity measures have been implemented in an international setting where trade partners were flourishing. Fiscal austerity was typically combined with a mix of internal and external devaluation that resulted in sinking real wages and prices with respect to the trade partners. Due to lower relative prices, the competitive position of these countries in international trade became better, the current account position increased, and due to increased exports and/or decreased imports both the economy and the government budget recovered. On the contrary, in the current situation, where government spending decreases and/or taxes rise, i.e. demand from the government and disposable private income decrease, none of the major centers of economic activity, i.e. Europe, the USA, and China, is willing to accept substantially lower exports and/or higher imports. As all current accounts must sum up to zero by definition, the attempt to improve, e.g. by external devaluation, all current accounts simultaneously just gives rise to a beggar-thy-neighbour policy in which no one will eventually be able to attain this goal. The same logic also holds of course also for the economies within the Eurozone, where indeed internal devaluation is the only policy at disposal.

Furthermore, following the asset bubble burst, most of European economies (as well as UK and US) are now in an economic scenario where the over-indebted private sector is trying to deleverage its balance sheets and financial institutions are unwilling to lend, because they need too to strengthen their balance sheets and face a shortage of willing and creditworthy borrowers. This deleveraging of the private sector reduces aggregate demand, due to both lower consumption and investments, and throws the economy into a very special type of recession which has been named as balance-sheet recession (Koo, 2009; Koo, 2011). In such a scenario, monetary policy, the traditional remedy to recessions, is ineffective because the private sector is unwilling to increase borrowing, even at very low interest rates; while unconventional monetary measures boosting base money, like quantitative easing, are scarcely effective to increase the broad money supply and then sustain the economy. The money supply may actually contract, because the private sector collectively draws down bank deposits to repay debts. In the absence of new economic players borrowing and spending money,

the economy enters a deflationary spiral where demand is continuously reduced by net debt repayments. In such a scenario, it is argued that the public sector should actually move in the opposite direction to offset private sector deleveraging, i.e., perform a deficit-financed fiscal stimulus aimed to maintain incomes of businesses and households and allow balance sheets repair without forcing the economy into depression. Government borrowing should not encounter much difficulty in a balance-sheet recession, unlike in a dysfunctional monetary union, due to the availability of savings in excess from the private sector, low interest rates and high risk aversion. Moreover, recent studies (see e.g. DeLong and Summers, 2012) have provided convincing theoretical and empirical evidence about the efficacy of temporary expansionary fiscal policy in severely depressed economies. First, the absence of supply constraints and low interest rates makes the fiscal multiplier substantially greater than in normal times. Second, preventing prolonged output shortfalls through a deficit-financed fiscal stimulus may ease rather than jeopardize the long-run government budget constraint because of hysteresis effects of present output drops on the economy's future potential, through the decrease of investments and the increase of structural unemployment. In a balance-sheet recession as well as in a severe depression scenario, like the one faced now by most Western economies, fiscal stimulus could actually turn out to be expansionary and self-financing while fiscal austerity may turn out to be depressive and self-defeating.

We therefore aim to investigate these issues and design appropriate fiscal policies in balance-sheet recession scenarios by means of an enriched EURACE simulator characterized by a multi-country setting, where many countries with different fiscal policies and level of competitiveness share a common currency, like in the European monetary union. The EURACE artificial economy looks very well suited to provide the appropriate computational laboratory where to investigate these issues, as EURACE is able to reproduce the typical balance-sheet recession following the debt-driven asset bubble and bust. Moreover, the issue of banks solvency and regulation, already addressed within EURACE, and the one of public finances are indeed intertwined. An asset bubble burst deteriorates both banks' balance sheets and public finances and may trigger a vicious circle in which doubts about the solvency of states translate into doubts about the solvency of banks, which gives rise to the need for states to bail out these banks, which increases the doubts about the solvency of states. The recent developments in Spain are a point in case.

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