Income distribution and the size of the financial sector: a Sraffian analysis
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1. This paper moves from previous analyses of Sraffa’s writings on money and banking to identify the features of a Sraffian approach to these problems and to analyse how changes in the size of the financial sector can affect income distribution.

The recent expansion of the financial sector has been accompanied by deregulation, an acceleration of financial innovation and changes in income distribution. The size of these phenomena has attracted the attention of the literature. A large part has analysed the relationship between financial development and inequality, arguing that the former tends to reduce the latter (for a review of this literature see Demirgüç-Kunt and Levine, 2009). It moves from the claim that perfect credit markets reduce inequality by bringing about the efficient exploitation of personal qualities, material endowments and the growth potentials of the economy. Credit market imperfections hold back the achievement of these results, but are counteracted by deregulation and financial innovation, which tend to eliminate rent positions.

Other literature has focussed on the influence of the “financialisation” of the economy on effective demand, growth and distribution (for a review see Hein, 2009).¹ It has recently related the current financial crisis to these phenomena, underlining the merits of those approaches to monetary problems that reject the “efficient market hypothesis” to argue that financial innovation improves the stability and the growth potentials of the economy as long as it is properly regulated and controlled.

Several lines of development can be outlined in this literature. An important one focuses on the changes in the relations among workers, managers and shareholders occurred after the monetarist counter-attack to the labour movement of 1979-82. Boyer (2000) describes the new institutional forms brought about by these changes.

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¹ Epstein (2005) provides a definition of “financialisation” and an analysis of its different aspects.

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and formalises a model in which growth is finance-led, instead of wage- or profit-led, as in Bhaduri and Marglin (1990). The choice of the managers to increase dividend payouts, as demanded by shareholders, plays a central role in this analysis. It increases capital gains and the earnings of financial rentiers, generating a negative influence on investment, but a positive one on the ability to borrow of the household sector. Owing to this positive effect, consumption can increase and counter-act the negative influence on investment enhancing effective demand, growth and profits.

Other works have further elaborated this line of research moving within a Kaleckian (Stockhammer, 2004; Hein and van Treeck, 2008), a Steindlian (Dutt, 2005; 2006) and a stock-flow-consistent framework (Lavoie and Godley, 2001-2; Taylor, 2004; Lavoie, 2008; Hein, 2008). They have added to the “finance-led” a “profits without investment regime” and a “contractive regime” (see Hein, 2009).

Other lines of research, dealing with the current financial crisis, can be found in a Special Issue of the Cambridge Journal of Economics. Blankerburg and Palma (2009: 536) introduce it by underlining that, despite the wide range of problems and analyses considered, all contributions agree that it is necessary to ‘restrict finance, once again, to its original function, namely to serve, rather than dominate, productive capital accumulation and economic development’. For Palma (2009: 832) the study of the financialisation of the economy and of the crisis makes theoretical sense if it goes beyond the financial aspects and considers the political settlements and distributional changes in which these phenomena occurred. For him, the main cause of the crisis is the development of a new “technology of power”, call it neo-liberalism or neo-conservatism, which, after 1980, has been able to achieve political consensus on a distribution of income unequal and high rent-based in representative democracies.

By following a Sraffian approach the work here proposed, like that of Palma (2009), examines the financial system by going beyond its technical aspects. It considers the links between the expansion of this sector and income distribution. Barba and Pivetti (2009) take a similar line to argue that the rise in household debt observed in recent years is the result of changes in income distribution leading to growing inequality. In what follows we argue instead that the expansion of the financial sector can affect the
level of production and generate changes in the income shares of workers and capitalists, even if the rates of wage and profits remain constant. It has contributed to the recent increase in inequality by reducing the income share of the workers.

The study proposed in what follows can be seen as complementary to those attributing a central role to capital gains and to the new “technologies of power”. Moreover it can give support to some other points of contention:

- financial innovation and those forms of regulation, which permit an intensive expansion of the financial industry, can increase inequality;
- a society committed to the stability of income distribution should introduce forms of regulations that make it possible to control the growth of the financial industry in order to avoid changes in the income shares;
- the financial industry is interested in influencing the legislation on regulation and in using lobbying activities to this end;
- the recent crisis is the consequence of the financial industry’s attempts to increase its turnover and earnings regardless of the rise in the systemic risk, rather than a fortuitous event caused by the burst of a speculative bubble.

The paper is so organised. Section 2 recalls the main features of Sraffa’s approach to money and banking. Section 3 presents some data on the evolution of income distribution and of the financial sector. Section 4 considers an economy in which the financial industry provides loans to firms and workers and analyses how an increase in financial lending affects the level of production and the income shares of workers and capitalists even if the wage and the profit rates remain constant. Section 5 describes how the evolution of regulation and financial innovation in recent years may have favoured the expansion and the earnings of the financial sector, disregarding the rise of systemic risk. Section 6 concludes.

2. The literature on Sraffa’s writings on money and banking offers a detailed account of his views. It shows the existence of continuity between his earlier papers on monetary questions and his later work on value and distribution and underlines the

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relevance that his approach attributes to the formation of monetary legislation and policy measures and to their influence on income distribution.

Since his earlier writings Sraffa considered income distribution as a “conventional” phenomenon, even if it was only in his later work that he analytically verified whether the level of all distributive variables can be considered independent of the material conditions of production. In his 1920 honor thesis he suggested that monetary events, like inflation and deflation, have a permanent influence on social conflicts and contribute to the determination of the normal or equilibrium level of distributive variables. In the 1922 articles on the Italian banking crisis and in the 1923-1927 writings on the economic policy of the Fascist Government he focused on the formation of monetary interventions and on the benefits they offered to different entities and social groups, showing a detailed knowledge of the working of the banking system and of the exchange markets. After his arrival in Cambridge in 1927, active participation in the discussions on Keynes’ work led him to shift attention from policy to theory. Following Keynes, he became aware of the problems related to the elaboration of a “conventionalist” theory of the interest rate and in the writings related to Production of Commodities he hinted at the possibility of determining the rate of profits in the analysis of prices and distribution by assuming the interest rate as an independent variable. He suggested to move along these lines by first becoming aware of how far we can go in assuming that income distribution is independent of the material conditions of production and then by evaluating to what extent the monetary authorities can control the interest rates, given their relations with the banking system and the stock exchange (Sraffa Papers, D3/12/68, 2; D3/12/78, 6 and 13; D3/12/111).

For Sraffa, lobbying activities affect monetary legislation and policy measures, which are part of the conflicts among economic and social groups. In his 1922 Economic Journal article on the mechanisms through which the Banca Italiana di Sconto, one of the major Italian banks, was led to close its door at the end of 1921, Sraffa (1922: 191-12) pointed out in which cases the Italian Government acted to protect powerful

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3 In a preparatory draft of the Introduction to Production of Commodities he wrote: ‘One of the objects of this enquiry is to serve as a preliminary to an investigation of the theory of distribution. … The way in which we are proceeding is to see how far we can go in assuming that the distribution is indeterminate with respect to the internal conditions of the system; and at what point, if any, do we find it necessary to acknowledge that the technical conditions of production determine the distribution’ (Sraffa Papers, D3/12/42, 78; dated 23/3/1957).
pressure groups at the expenses of society as a whole. He argued for a general tendency towards the formation of large and diversified financial groups able to influence the exertion of power, to control relevant sections of the economy, of the media and of the political world and to disguise the aims of their initiatives from the majority of the population to such an extent as to represent a danger for democracy.

The general tendency seems to be towards the … formation of large "groups" of companies of the most varied kinds concentrated around one or more banks, mutually related by the exchange of shares and by the appointments of Directors common to them. Within these "groups" the various interests are all equally subject to the interests of a few individuals who control the whole group … Very little is known … about these groups … What the public knows and feels … is the enormous financial and political power which they have and the frequent use they make of it to influence both the foreign and home policy of the government in favour of their own interests. Each group keeps several press organs which support its policy, and some of the accusations made against certain Ministries of being actuated by the interests not of a class, but of private concerns, and of favouring one financial group against another, have no doubt a basis of truth (Sraffa, 1922: 196).

The analysis of these problems was related to that of the operation of the banking systems. To identify the system that best suited the needs of the country, Sraffa did not refer to an “optimal” or “efficient” configuration of the markets, but examined the historical evolution of the Italian economy and institutions. Comparing the banking systems prevailing at the time, he argued that a mixed system is more suitable than a specialized one for the development of the economy, since it is more oriented towards the channeling of funds to industry (Sraffa, 1922: 194-95). For him a mixed banking system is as risky as a specialized one in terms of liquidity and solvability. Yet, it can cause problems because it generates large groups or "concentrations" and embroiled relations between banks and industries, which can favor the interests of the owners at the expense of those of society (Sraffa, 1922, 195-97). The ability of these groups to affect the exertion of power is the major drawback of this system.

The questions of liquidity, solvability and exertion of power were further analyzed in subsequent writings, where Sraffa touched on issues that are still relevant in monetary debates. In the lectures on Continental Banking he argued that the liquidity of an asset depends more on the difficulty of selling it at the current price than on its maturity. The existence of a large market and the availability of a powerful buyer, as the central
bank can be, to buy these securities at a given price, improve the liquidity of the assets and the solvability of the institutions using them (Sraffa Papers, D2/5/14, 2-4).

Sraffa also hinted at the relevance of the relations of power between the central bank and the banking system. He noticed that, to avoid problems of solvability, in the countries where mixed systems operate the central bank develops closer co-operative relations with credit institutions than those existing in England (Sraffa Papers, D2/5/14, 5). On other occasions he underlined that the conflicts of interest among firms, technical and political authorities can endanger the stability of the economy. In the correspondence with A. Tasca on the 1926 revaluation of the Italian lira, published in 1927 in Stato Operaio, Sraffa distinguished his position from those of the Marxist literature arguing that the independent interests of administrative and political bodies can have a relevant role in the formation of policy (see Panico, 2001: 290-91).

In the conference on the “Revaluation of the Lira” given to the Emmanuel Economics Society on 3 November 1927 (Sraffa Papers, D2/3), Sraffa blamed the Government, more than the exchange authorities, for the revaluation of the lira and the subsequent recession. For him, the exchange authorities had been successfully trying, during a first phase, to use innovative measures (e.g. administrative credit controls) to contrast the devaluation without causing a recession. They lost control of the exchange after Mussolini’s speech in Pesaro (August 1926), which forced them to pursue a policy of gradual revaluation that ended up in a sharp and rapid one (Sraffa Papers, D2/3/8-9).

The lectures on “Continental Banking” also dealt with the issue of the autonomy of the German central bank before and after the iperinflation of the 1920s. Sraffa described as necessary the provisions of the 1924 Charter, which made the German central bank as independent as possible from the Government on the appointment and dismissal of its President and on the issue of money (Sraffa Papers D2/5/38-46).

Finally, in these lectures Sraffa jotted some anticipations of the theories of financial innovation of Minsky (1957), Kaldor (1958; 1970) and Rousseas (1989). He claimed that the relevant role of the English banks in the creation of means of payment is a

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4 The lectures point out that the legislation on the monetary issue limited the access of the German Government to base money, but not the flexibility of the central bank’s funding of the banking system.
result of the Peel Act of 1844, which imposed on the central bank rigid rules in the issue of money. The scarcity of the means of payment issued by the central bank induced commercial banks to be innovative in the use of cheques. In Continental Europe, instead, the lack of rigid rules in the issue of central bank money brought about systems that make a limited use of cheques (Sraffa Papers, D2/5/1, 8 and 9).

In post Keynesian theories too financial innovation accelerates when the scarcity of the means of payment prevents the turnover of financial firms from growing at a satisfactory pace. This acceleration can affect the leading position of the monetary authorities and the effectiveness of regulation. In these theories financial innovation is a positive phenomenon as long as regulation preserves the power of the authorities over the management of financial firms. Reducing the power of the authorities puts at risk the stability of the economy. The theories that are based on the market efficiency hypothesis claim instead that financial innovation is always a positive phenomenon generated by the reactions of financial firms to changes in preferences and conditions of production (induced by regulation, technical progress and improved knowledge on risk distribution). These reactions lead to the elimination of the “frictions” preventing the system from working efficiently and achieving higher levels of welfare.

Sraffa’s approach to money and banking was thus characterised by four elements:

- the analyses of monetary events and income distribution are closely related;
- monetary legislation and policy measures are part of the distributive conflicts among economic and social groups;
- lobbying activities and the relations of power among firms, technical authorities and governments are relevant in the formation of legislation and policy measures;
- the level of distributive variables is influenced by the historical evolution of society and by the choices of the authorities and of the financial sector.

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5 For Kaldor, preoccupations with their leading position have induced the authorities to privilege the adoption of accommodating policies in the course of the history. The authorities ‘are in the position of a constitutional monarch: with very wide reserve powers on paper, the maintenance and continuance of which are greatly dependent on the degree of restraint and moderation shown in their exercise’ (Kaldor, 1970: 196). They are aware that the maintainance of their position is ‘not a matter of legal powers, but of the avoidance of policies which would have led to the erosion of that role’. (Kaldor, 1970: 196).

3. Some recent literature presents data underlining that during the Bretton Woods era, when the expansion of the financial sector was effectively controlled, inequality decreased, while the opposite tendency occurred in the subsequent years, during the “financialisation” of the economy. These data suggest the existence of links between monetary events and income distribution.

Palma (2009) points out that in USA the share of national income earned by the richest 1% of the population decreased from 1929 to 1978. In the subsequent 25 years inequality went back to the situation of the early XX century. Notice from Figure 1 that this result holds when we both include and exclude capital gains, which suggests that changes in capital gains have only partially contributed to what has occurred.

Fig. 1 – USA: income share of the top 1% of population, 1913-2006 (dotted line excludes capital gains)

Palma (2009) also points out that from 1978 to 2006 the average income of the bottom 90% of the population remained constant in real terms (see Fig. 2). The rate of growth of the average income of the bottom 90% of the population was 3.7% from 1933 to 1978 and 0.1% from 1978 to 2006, while that of the average income of the top 1% of the population was 1.7% from 1933 to 1978 and 4.5% from 1978 to 2006.\(^7\)

Barba and Pivetti (2009: 122-23) too highlight that a shift in distribution away from low and middle classes occurred after 1980. They notice that from 1965 to 2006 real

\(^7\) Palma (2009: 841) makes even more evident the tendency to increased inequality by clarifying that from 1978-2006 the average income of the richest 0,5% of the population grew at an annual rate of 5,1%, that of the richest 0,1% at an annual rate of 6,5% and that of the richest 0,01% at 8,1%.
compensation and output per hour of labour increased around 50% and 220% and argue that the rising household debt observed in the last 25 years can be ‘viewed as a response to falling or stagnant real wages and salaries’ (Barba and Pivetti, 2009: 122).

Fig. 2 – USA average income of the top 1% and the bottom 90% of the population, 1933-2006.

For the OECD and the European Commission the wage share diminished in most countries after 1980. In USA, after oscillating around 70% from 1960 to 1981, it went down reaching 65% in 2008. In the 15 countries composing the European Union before 2004, it moved from 70% of 1960 to 74% in 1981 and to 65% in 2008. For Epstein and Jayadev (2005) during the financialisation of the economy the profit share increased at the expense of the wage share. For van Treeck (2008: 375), the profit share raised in USA from an average of 29.83% during 1960-74 to and average of 34.05% over 1985-2004. The financial sector has been the major beneficiary of the rise in the profit share. From 1986 to 2006 its quota of corporate profits moved in USA from 10% to 30% (Blankenburg and Palma, 2009: 531; see also Crotty, 2007).

The data on the profit rate are more ambiguous. Hein (2009: 16-17) recalls the work of Dumenil and Levy (2001, 2005) on the profit rate in France and USA since the early 1980s and those of Epstein and Power (2003) and Epstein and Jayadev (2005),
dealing with 29 and 15 OECD countries during the period 1960-2000, to point out that the profit rate tends to undergo movements similar to those of the interest rate.\(^8\)

The rise in inequality after the 1970s has been accompanied by a high growth of the financial industry\(^9\) at international and domestic level and by an acceleration of financial innovation. For the WTO, the international transactions on goods and services increased 11 times from 1977 to 2007. During the same years financial transactions in foreign exchange markets grew at a much higher rate than international trade. They increased 175 times\(^10\) if we only include traditional products and 281 times if we add derivative contracts on exchanges and interest rates. These data underestimate the growth of the turnover of financial firms because those on exchanges and interest rates do not exhaust the derivative contracts. Large transactions are carried out on derivatives on credits, equities and commodities, with the latter showing the highest rate of growth in the last years.

Domestic debt also increased beyond the needs of productive activity after 1980. In USA it was relatively stable from 1950 to 1980, moving from 140% to 160% of GDP, and jumped to over 350% from 1980 to 2007 (Palma, 2009: 834). The USA average annual growth rates of GDP and domestic debts, reported in the table, indicate that after 1982 the latter increased much more than productive activity (Palma, 2009: 835).

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>GDP</td>
<td>3.4</td>
<td>3.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Domestic debt</td>
<td>4.0</td>
<td>5.7</td>
<td>6.8</td>
</tr>
<tr>
<td>Financial sector’s debt</td>
<td>10.4</td>
<td>10.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Non financial sector’s debt</td>
<td>3.6</td>
<td>4.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Households’ debt</td>
<td>5.6</td>
<td>5.3</td>
<td>7.6</td>
</tr>
</tbody>
</table>

\(^8\) For van Treeck (2008: 375-76), instead, the profit rate and the profit share have both increased in recent years. Yet, the data he presents for USA do not confirm his claim (van Treeck, 2008: 376, Fig. 2). They show that after 1980 the profit rate has been on average lower than in the previous 20 years: it was rising in the 1980s (especially in the first half), but decreasing after the second half of the 1990s.

\(^9\) Palma (2009: 833-35) describes what he defines the “dance of the trillions” by pointing out that from 1980 to 2007, unlike what had happened before, the annual rate of growth of the stock of traditional financial assets was higher than the annual rate of growth of output. As to derivative contracts, he points out that from 1998 to 2007 the annual rate of growth of the gross market value of the contracts on interest and exchanges was 8 times higher than that of world output. Recently, the highest average annual rate of growth is that of the gross market value of derivative contracts on commodities (51%).

\(^10\) Data of the initial years are taken from Haq, Kaul and Grunberg (1996). Those of the subsequent years are provided by the Triennial Reports of the Bank of International Settlements (BIS).
Low income groups took advantage of the offers of innovative financial firms. For Barba and Pivetti (2009: 115-18), consumer credit in USA, after remaining roughly constant from 1965 to 1982, began to expand at increasing rates reaching an average annual rate of growth of 8% during the period 1992-2006. Moreover the percentage of families in the first three quintiles holding home mortgages rose respectively from 9.9% to 13.8%, from 20.1% to 27% and from 34% to 44.4% from 1983 to 2004.

Summing up, the data on income distribution and the financial sector show that after 1980, unlike what had happened before, inequality and the turnover of financial firms increased. The profit share rose at the expense of the wage share. The financial sector benefited from this change more than the non-financial one. The rates of interest and profit underwent similar movements. The wage rate was stagnant and benefited little from the rise in labor productivity. Consumption was supported by loans to low and middle income groups. Lending activities and other financial transactions to foreign and domestic sectors grew at higher rates than international trade and GDP. The “explosion” of financial activities occurred through traditional and innovative instruments and offered opportunities to borrow to all income groups.

4. To explore the existence of links between the size of financial industry and income distribution let’s consider a simplified closed economy. The aim is to verify whether and how the expansion of the financial industry can affect the income shares, even if the rates of wage and profit remain constant. In order to maintain the analysis manageable, we focus on some forms of lending, disregarding others, which can have played a relevant role in generating the results outlined in the previous Section.

The economy produces $n+1$ commodities, $n$ of which are basic and are used as consumption and circulating capital goods. The other commodity is non-basic, does not wear out as time goes by and is demanded as a form of investment that provides the owner with wellbeing, security and social status, but no money return.$^{11}$

Industrial capitalists own the firms producing these commodities, which use as inputs the basic ones, labour and loans from financial firms to fill the cash-flow gaps. Other

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$^{11}$ To avoid the complexity of joint production, we assume that wealth is not invested in fixed capital, but in this non-basic commodity, which we can identify with gold or jewels.
capitalists (bankers) own financial firms, which produce loans by using as inputs the basic commodities and labor and lend to workers and to the other firms. Loans to workers have an infinite maturity and pay the interest rate \( i_w \). Loans to firms are made in the form of overdraft allowances on which the interest rate \( i \) is paid for the entire period of production. Financial firms also receive deposits from capitalists and from the other firms. They pay the interest rate \( i_d \), whose level is fixed by the monetary authorities, and are used to buy inputs, to pay interests, to receive the payments of the commodities sold, and to transfer profits to capitalists at the end of the period. To simplify the analysis we assume that \( i = i_w \) and that \( i_d = 0 \).

The household sector is composed of workers, industrial capitalists and bankers. Workers earn wages and consume basic commodities. They can use their savings to buy the non-basic commodity. Moreover they receive loans from financial firms to buy basic and non-basic commodities according to the proportions \( c_q \) and \( (1 - c_q) \), with \( 0 \leq c_q \leq 1 \), and pay interests on loans. Capitalists earn profits and consume according to the propensity \( c_p \), with \( 0 \leq c_p \leq 1 \). To simplify the analysis we assume that workers do not save and do not own firms, while capitalists do not consume. As a consequence, personal and functional distributions coincide.

The previous assumptions allow us to write the following balance sheets:

<table>
<thead>
<tr>
<th></th>
<th>Workers</th>
<th>Capitalists</th>
<th>Industrial firms</th>
<th>Banks</th>
<th>Government</th>
<th>Sums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Money</td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>-H</td>
<td>0</td>
</tr>
<tr>
<td>Central bank swaps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loans</td>
<td>(-(1+g_q)Q_w)</td>
<td>(-(Q_n+Q_{n+1}))</td>
<td>(Q)</td>
<td>(0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td>((1+g_d)D_p)</td>
<td>((D_n+D_{n+1}))</td>
<td>(-D)</td>
<td>(0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comm. n+1</td>
<td>((1-c_q)(1+g_q)Q_w= p_k K_w)</td>
<td>(p_k K_p)</td>
<td>(p_k (Q_n+Q_{n+1}))</td>
<td>(p_k K)</td>
<td>(p_k K)</td>
<td></td>
</tr>
<tr>
<td>Sums</td>
<td>(-c_q(1+g_q)Q_w)</td>
<td>(p_k K_p+(1+g_d)D_p)</td>
<td>(-Q_n+Q_{n+1})</td>
<td>(0)</td>
<td>(-H+B)</td>
<td>(p_k K)</td>
</tr>
</tbody>
</table>

where:

- \( H \) is the amount of bank reserves in high-powered money issued by the central bank and paying an interest rate equal to zero,
- \( B \) is the amount of swaps that the central bank lends to financial firms at their request at an interest rate equal to the deposit rate,
Q is the total amount of bank loans,
Q_w is the amount of bank loans to the workers,
Q_n is the amount of bank loans to firms producing basic commodities,
Q_{n+1} is the amount of bank loans to firms producing the non-basic commodity,
g_q is the rate of variation of the loans to the workers,
D is the total amount of deposits,
D_p is the amount of capitalists’ deposits,
D_n is the amount of deposits of firms producing basic commodities,
D_{n+1} is the amount of deposits of firms producing the non-basic commodity,
g_d is the rate of variation of capitalists’ deposits,
p_k is the price of the non basic commodity,
K is the accumulated stock of the non-basic commodity in the whole economy,
K_w is the accumulated stock of the non-basic commodity owned by workers,
K_p is the accumulated stock of the non-basic commodity owned by capitalists.

To evaluate how income distribution and the level of activity vary with the new loans to workers, let’s introduce the price equations of a linear model, which assumes fixed coefficients and constant returns to scale in the production of commodities and loans:

\[(1 + r)A\mathbf{p} + \mathbf{l}w + q\mathbf{i} = \mathbf{p}\]
\[(1 + r)a_k^T\mathbf{p} + l_kw + q_k\mathbf{i} = p_k\]
\[(1 + r)a_b^T\mathbf{p} + l_bw = i\]
\[r = \alpha,\]
\[w = \lambda c^T\mathbf{p}\]

where:
A is the material input matrix of the n basic commodities,
a_k is the material input vector of the non-basic commodity,
a_b is the material input vector used in the production of loans,
p is the price vector of the n basic commodities,
r is the rate of profits,
w is the money wage rate taken as the numeraire,
l is the labor input vector of the n basic commodities,
l_k is the labor input of the non-basic commodity,
is the amount of labor used to produce 1 unit of loans,

$q$ is the loan input vector per unit of gross output of basic commodities,

$q_k$ is the amount of loans required to produce 1 unit of the non-basic commodity,

$\alpha_r$ is the non-negative coefficient linking the rate of profit to the rate of interest fixed by the central bank,

$c$ is the vector representing the wage bundle, i.e. the basket of commodities consumed by workers,

$\lambda$ is the real wage rate measured in terms of the wage bundle $c$.

The $n+4$ equations (1)-(5) contain $n+4$ unknowns ($p, p_k, i, r$ and $\lambda$). Equations (1)-(3) can be transformed as follows (see Kurz and Salvadori, 1995: 482-83):

$$\left(1 + r\right)A_B p + w l_B = p \tag{6}$$

$$\left(1 + r\right)a_{kb}^T p + w l_{kb} = p_k \tag{7}$$

where $A_B = A + qa_B^T$, $l_B = l + l_b q$, $a_{kb} = a_k + q_k a_b$ and $l_{kb} = l_k + q_k l_b$.

Equations (6) have the standard form of a Sraffian single production model with a unique non-negative solution for $p$.

In this multi-sector model, unlike what happens in a one-sector analysis, the income shares and the rates of wage and profit can undergo different movements. To deal with the profit and wage shares let’s move from the equilibrium condition between earnings and expenditure (or saving and investment decisions) and recall that the sum of workers’ expenditure $E_w$ (composed of consumption, investment in the non-basic commodity and interest payments), plus capitalists’ expenditure $E_p$ (composed of investment in the non-basic commodity) is equal to the sum of $W$, total wages (gross of interest payments), plus $P$, total profits. Workers’ borrowing requirements are then equal to the opposite of capitalists’ ones:

$$E_w - W = - (E_p - P)$$

Since we assume that workers spend more than they receive as wages, capitalists must spend less than they receive as profits, i.e. they must invest some profits in the form
of deposits. Consequently, their propensity to spend, \( z = E_p/P \), must be \( 0 \leq z < 1 \) and the new loans to workers are equal to capitalists’ unspent profits:

\[
g_q Q_w = (1 - z) P
\]

This condition can be re-written as follows:

\[
P = p^r x^r = \frac{g_q Q_w}{1 - z} \tag{8}
\]

\[
x_n = A^r x + a_k X_k + a_b Q \tag{9}
\]

where \( x_n \) is the vector representing the amounts of basic commodities used as inputs in the economy, \( x \) is the vector of the gross output of the basic commodities, \( X_k \) is the quantity produced of the non-basic commodity, and \( g_q \) is assumed as an independent variable indicating the ability of the banks to allow access to credit to the workers.

Equation (8) shows that total profits are a non-negative amount and an increasing function of \( g_q \). Moreover, an increase in the latter has a multiplying effect on the former. This multiplying mechanism operates through changes in the quantities produced. When the banks allow more loans to workers, the amount of material and labor inputs required to produce them increases. Thus the demand for the basic commodities, used as inputs of production and as consumption of the new workers employed, rises both directly and indirectly. Moreover, the new loans to workers allow them to buy a larger amount of basic and non-basic commodities.

The links between profits, quantities produced and loans to workers testify to the relevance attributed by the analysis here proposed to this kind of lending activity. It represents a new source of finance for the household sector and the only way in the model in which effective demand can be autonomously increased.\(^{12}\)

\(^{12}\) The banks can initially cover the rise in loans to the workers by borrowing swaps from the central bank. The equilibrium between new loans to the workers and capitalists’ deposits is then restored when the higher profits generated by the multiplying process are deposited with the banks. Notice too that we can introduce in the model another autonomous element increasing effective demand by assuming that capitalists have a positive level of consumption, determined by the function \( C_p = C_{op} + c'_p P \), where \( C_p \) is their consumption, \( C_{op} \) is the autonomous component, \( c'_p \) is their marginal propensity to consume. In this case equation (8) becomes \( P = \left[ g_q Q_w + (1 - z) C_{op} \right]/(1 - z) s'_p \), where \( s'_p \) is the marginal propensity to save, \( P > 0 \) when \( g_q = 0 \) and varies directly with \( C_{op} \) according to the multiple \( 1/s'_p \).
What’s more, equation (8) points out the existence of a link between income shares and the size of the financial industry. If we define these shares as \( \pi = P/(W + P) \) and \( \omega = W/(W + P) \), we can use this link to evaluate how they change when the loans to workers vary. These effects can be examined through the derivatives \( d\pi/dg_\pi \) and \( d\omega/dg_\omega \), which show that the profit share increases (and the wage share diminishes) if the percentage variation of the rate of growth of the loans to workers is higher than the rate of growth of total wages. Moreover, the bankers’ income share increases more than that of the other capitalists if the rate of growth of total loans is higher than the percentage variation of the rate of growth of the loans to workers.

These results have important implications. Since the expansion of financial lending can influence the income shares, a society that is committed to the stability of the distributive shares should be interested in the introduction of forms of regulations that make the loans of the financial industry grow in line with total wages. The need to control the expansion of the financial industry can thus be justified not only in terms of the traditional Keynesian argument that it can bring about a situation in which “speculation predominates over enterprise”, but also for its negative effects on the stability of the income shares and on social conflicts. The financial industry, on the contrary, is interested in the introduction of forms of regulations that allow its lending activities to expand at higher rates than total wages.

Further analysis is required to appreciate under which conditions the quantities produced are non-negative and an increasing function of the new loans to the workers.

13 The effect of changes in \( g_q \) on \( \pi \) (and \( \omega \)) can be calculated through the derivative \( d\pi/dg_\pi = (\pi\omega/g_q)\left[\varepsilon(P,g_\pi) - \varepsilon(W,g_q)\right] \), where \( \varepsilon(P,g_\pi) \) and \( \varepsilon(W,g_q) \) are the elasticities of total profits and wages with respect to \( g_q \). Since \( g_qQ_w = (1-z)P \) we have that \( \varepsilon(P,g_\pi) = 1 \) and that \( d\pi/dg_\pi \geq 0 \) if \( \varepsilon(W,g_q) \leq 1 \), i.e. if \( dW/W \leq dQ/Q \) for \( g_qQ_w/Q \).

14 Define \( \beta = P_\pi/P \) as the ratio between bankers’ and total profits. The derivative of \( \beta \) with respect to \( g_\pi \) is \( d\beta/dg_\pi = (P_\pi/g_\pi P)\left[\varepsilon(P_\pi,g_\pi) - \varepsilon(P,g_\pi)\right] \). Since \( \varepsilon(P,g_\pi) = 1 \), we have that \( d\beta/dg_\pi > 0 \) if \( \varepsilon(P_\pi,g_\pi) > 1 \), i.e. if \( dP_\pi/P > dQ/Q \). Moreover, since \( dP_\pi/P = (a_\pi \rho) dQ/(a_\pi \rho Q) = dQ/Q \), we have that \( \varepsilon(P_\pi,g_\pi) > 1 \) if \( dQ/Q > dQ/Q \).
To examine this point, let’s derive from the assumptions on the behavior of workers and capitalists the following equations:

\[ x = x_n + \frac{Lw + Q_w [g_q c_q - i(1 + g_q)]}{p^T c} \]  
(10)

\[ X_k = \frac{1}{p_k} [p^T x_n rz + (1 - c_q) g_q Q_w] \]  
(11)

\[ Q = q^T x + q_k X_k + (1 + g_q) Q_w \]  
(12)

\[ L = l^T x + l_k X_k + l_w Q \]  
(13)

\[ Q_w = Q_w^* \]  
(14)

In these equations \( X_k \) and the vector \( x \) have a unique non-negative solution and are an increasing function of \( g_q \) if the demands for each basic commodity generated by the loans to the workers are non-negative (see the Appendix). These demands are the sum of three elements. Firstly, there is the demand for basic commodities, used as inputs and as consumption, coming from the non-basic sector, whose level of production depends in turn on the value of new loans to workers. Secondly, there is the demand for basic commodities, as inputs and as consumption, generated in the banking sector by the production of loans to workers. Thirdly, there is the difference between the value of the demand for basic commodities generated by the decisions of the workers to consume part of their new loans according to the percentage \( c_q \), and the interest payments made by the workers. If we assume that workers use part of their new loans to compensate the reduction in consumption due to interest payments, this third element too is nonnegative. In this case, however, the value of the new loans to workers must allow the latter to compensate, i.e. the value of the new loans to the workers must not be lower than the value of the workers’ interest payments, \( g_q Q_w \geq i (1 + g_q) Q_w \), so that \( 0 \leq c_q \leq 1 \).

Summing up, the expansion of the banking industry affects the income shares, even if the rates of profit and wage remain constant, and has positive (multiplying) effects on the level of production. The stability of the distributive shares requires that financial
activities grow in line with total wages. The introduction of forms of regulation favouring a high growth of the financial sector can destabilise income distribution and intensify social conflicts.

5. The analysis presented in the previous section suggests that, while a society committed to the stability of the income shares is interested in introducing forms of regulation that limit the expansion of the financial industry, the latter has an interest in favoring forms of regulation allowing its managers to expand the turnover. During the Bretton Woods era, when the financial sector was restrained in size and effectively controlled, banks’ crises did not occur. As White (2009: 39) recalls, they failed ‘to show up on the radar’. Since the 1970s banks’ crises have been increasing in number while the evolution of legislation on financial regulation has taken a different direction: it has reduced the power of the monetary authorities to restrain the financial operations that put at risk the stability of the economy and have strengthened the ability of financial firms to evade controls and constraints.

Mishkin (2001) lists nine different instruments of regulation. Four of them can be used to reduce the degree of competition among financial firms. They are:

1. controls of entry,
2. limits on economies of scale,
3. limits on economies of scope and diversification,
4. limits on pricing (e.g. interest ceilings).

They can also be used to affect the size and the structure of the sector and to control the quality of management and the exposure to risk of the individual firms.

Other three forms of regulation can be used to enhance the ability of depositors and other operators to evaluate the behaviour of the managers. They are:

5. capital requirements,
6. disclosure requirements,
7. bank examination.

They tend to strengthen market discipline by reducing the degree of asymmetric information between those who supply and those who demand financial services.
Another form of regulation aims at reducing the probability of bank runs by protecting depositors from the loss of their assets. It is listed as
8. liabilities insurance.

The last form of regulation aims at reducing the probability of systemic distress by assessing beforehand the management’s exposure to risk. It is listed as
9. supervision.

It may be discretionary or rules-based and may be enforced by the imposition of penalties. To make the enforcement effective, legislation may allow the authorities to dismiss and replace the managers of financial firms and may endow them with different degrees of power on these matters.

During the New Deal and Bretton Woods eras governments and societies showed limited faith in market discipline and legislation endowed the authorities with substantial powers over financial firms. Regulation introduced liabilities insurance, attributed a major role to discretionary supervision and made an important use of the first four forms of regulation listed above. It aimed at reinforcing the position of the authorities by strengthening their discretionary powers and by avoiding that the financial sector grew more than other sectors. To achieve this result, but also to reduce competition among financial firms and guarantee banks’ profits, legislation imposed limits on entries, scale, scope and pricing.

As to the forms of regulation listed above as (5), (6) and (7), they had limited relevance in those years. Capital ratios were used, but they did not replace the evaluation of the competent supervisor, who had the final word in the identification of the managers’ behaviour towards risk exposure.

The strategy followed by this regulatory regime was consistent with that generally pursued by State intervention at the time. It tended to integrate different interests and secure a consensual participation of as many sectors as possible in the benefits generated by the growth of the economy. Limitations on entries, scale, scope and pricing in a rapidly expanding environment secured the profits and the consensual participation of the financial sector in the national programmes. The regulatory regime thus carried out a complex strategy, which underlined the relevance of the
power relations between the authorities and financial firms and the fact that the stability and the growth potentials of the economy can be damaged if the size of the financial sector supersedes that of the other sectors. An increasing weight of the financial sector in the economy and in the society may lead to policies that favour its interests at the expenses of those of the other sectors. It may bring about a situation in which speculation dominates over enterprise and exacerbate distributive conflicts.

The limits on competition prevailing until the 1970s constrained the ability of financial firms to adjust to the new situation generated by the oil shocks. Inflation raised the nominal interest rates, changed the cost of financial services, affected the preferences of the operators and forced financial firms to innovate to improve their efficiency. The slowdown of the economy following the oil shocks and the decision of the authorities to set tight controls on the money supply further accelerated financial innovation. The regulatory regime had to be modified because it had become impossible to guarantee the profitability of financial firms by limiting competition.

The regulatory regime could be reformed in different ways. Interest ceilings and other limits on competition were lifted in USA and Europe. In USA the process of financial innovation was autonomously accomplished by the private sector. It was attended by a reduction of the resources attributed to the regulatory authorities and by a general climate that enhanced the ability of firms to elude controls. In continental Europe, the process of liberalisation and financial innovation was instead guided by the authorities and did not deprive them of the ability to control the management of financial firms and the stability of the system. In USA, during the 1970s and 1980s, the first four forms of regulation underwent major changes. Unlike what had happened before, rejections of bank’s charters became infrequent and the Department of Justice eased opposition to horizontal mergers under the Reagan administration. States’ laws and agreements and Fed’s decisions weakened the barriers to branching and geographical

\[\text{As White (2009: 36) writes: ‘Pressure became more intense under the Reagan administration that sought to reduce the size and scope of the federal government in the early 1980s, just as bank failures were beginning to rise. The OCC saw a decline in its expenditures and its workforce shrank. From 3,282 employees, of whom 2,282 were examiners in 1979, the OCC shrank to 2,702 employees and 1,835 examiners by 1982. Staff at the OCC turnover reached 15 per cent in 1984. The decline in supervision was particularly acute in Texas where the median exam interval in 1986 was 700 days for banks that subsequently failed or needed assistance’}.\]
competition (see White, 2009: 31-2). Finally, Regulation Q on interest ceilings was gradually eliminated.

The forms of regulation listed as (5), (6) and (7) also underwent important changes. The Financial Institutions Regulatory and Interest Rate Control Act of 1978 obliged banks to disclose more information and introduced a new Uniform Interagency Bank Rating System, named CAMEL, to harmonise the criteria used by the different agencies. In 1981 capital ratios, previously used by supervisors as first indicators of the risk exposure of a firm, became compulsory. Bank examinations changed in quantity and quality for the reduction in the amount of resources made available to regulators (see White, 2009: 31-6). Surprise examinations lost relevance and the authorities had to limit the scope of their reviews and to enhance a regular dialog with banks’ managers and board members.

Supervision underwent a contradictory process that, on a whole, weakened the powers of the authorities. On the one hand, the Financial Institutions Regulatory and Interest Rate Control Act of 1978 strengthened the enforcement powers, allowing the authorities to remove bank officials for personal dishonesty, but not for incompetence. On the other hand, the reduction in the resources attributed to them limited the ability of the authorities to effectively control a sector growing in size and complexity.

In the 1990s the US legislation on regulation further accomplished the process of liberalisation by formalising the abolition of the limits on competition and the emergence of universal banking. The 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act definitely eliminated all barriers to nation-wide branching and the 1999 Gramm-Leach-Bliley Financial Services Moderization Act permitted universal banking within the structure of a financial holding company.

What’s more, the US legislation explicitly introduced a rules-based approach to supervision in order to replace the approach previously adopted that was based on the discretionary evaluations of the authorities. The 1991 Federal Deposit Insurance Corporation Improvement Act introduced the “prompt corrective actions” with the intention to hold back the possibility that the authorities’ forbearance could lead to wide financial distress. Banks were classified according to five categories of risk
exposure, defined by financial ratios calculated by dividing the value of risk-weighted assets to that of capital. The thresholds of risk exposure were automatically calculated and when banks crossed them, mandatory actions, which increased monitoring and restrictions, inevitably applied. The Act removed the authorities’ discretion and formalised the change from a discretionary to a rules-based approach to supervision.

To evaluate their risk exposure the Federal Deposit Insurance Corporation Improvement Act obliged financial firms to provide for regulators an amount of information larger than before. These new obligations and the obstacle set to forbearance gave the impression that firms were more strictly constrained. Yet, the removal of discretionary powers from the authorities enhanced the ability of financial firms to evade controls:

By ruling out discretion, banks were able to develop new complex financial instruments that are not subject to statutory standards and allow them to assume more risk with existing capital. The most notorious of these were of course, the mortgage-backed securities that were held off-balance sheet in Structured Investment Vehicles (SIVs) that skirted the rules-based control system that was sufficiently rigid that it was difficult to quickly adjust to innovations. Banks were able to increase their risk and hence their return, while regulators appeared to be faithfully executing their mandates (White, 2009: 36).

The limited availability of resources made it difficult for the authorities to monitor the quality of the new instruments and forced them to rely on the advice of the Ratings Agencies. Yet the intervention of these entities raised a conflict of interests, due to their position of advisors of controllers and customers of the controlled firms, and drove the system further away from a satisfactory solution of the problems of regulation.

Dealing with the origin of the recent financial crisis, White (2009: 36) claims that ‘the genesis of the most recent collapse has part of its root’ in the shift to the rules-based regime. It generated a financial industry that grew in scale, scope and complexity and further weakened the ability of the authorities, already limited by the availability of resources, to control financial firms and the rise of systemic risk:

The fast changing character of the financial system increased the challenge to federal bank supervisors, who had a relatively rigid rules-based statutory supervisory regime, who faced an increasingly complex and evolving banking system, adept at increasing risk (White, 2009: 37).
The introduction in the 1990s of rules-based forms of regulation has been presented as a consequence of the problems caused by the discretionary forbearance of the authorities during the banks’ crisis of the 1980s. There are elements however suggesting that other factors, including the lobbying activities of the financial industry, can have played a role in the formation of this piece legislation. For some literature, the 1991 Federal Deposit Insurance Corporation Improvement Act was introduced at a time when politicians criticised supervisors for being too though, not too relaxed. Mishkin (2001), for instance, dealing with the relation between regulators and politicians, refers to a paper by Berger, Kyle and Scalise (2001) that, in order to argue that bank supervisors are not completely independent of political pressures, provides evidence that from 1989 to 1992 supervisors were tough and were blamed by politicians for creating the credit crunch of those years.

Moreover, the theoretical debate on monetary policy and the actions taken in this field since the late 1980s moved in a direction opposite to that of the Federal Deposit Insurance Corporation Improvement Act. The failure of the monetarist experiment and the development of the “institutional design” literature16 promoted the view that in monetary policy competent and independent judgement works better than any conceivable rule:

Competent and dedicated policy-makers are better able than quantitative ceilings and rules to exercise good judgement and deliver the adequate mix of restraint and flexibility. To do so, however, they must be shielded from temptation and pressures that are part of political life (Wyplosz, 2002: 14).

The central banks’ reforms implemented since the late 1980s moved from the view that monetary rules do not work and endowed these institutions with discretionary powers, checked by transparency and a high degree of technical independence. The Federal Deposit Insurance Corporation Improvement Act contradicts this tendency: it replaces a rules-based for a discretionary approach to regulation. This contradiction raises doubts on the claim that this piece of legislation was a consequence of the problems caused by the relaxed standard applied by the authorities in the 1980s and suggests that its introduction may have been favoured instead by the pressures of the

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16 This literature was inspired by Rogoff (1985) trying to find a satisfactory solution to the dynamic inconsistency problem raised by Kydland and Prescott (1977). For an account of this literature, see Panico and Rizza (2004).
financial sector to reduce the power of the authorities to increase its turnover and revenues regardless of what happens to systemic risk.

The role of lobbying activities in the formation of monetary legislation is testified by the information provided by the US Senate. According to these data, organised by the Centre for Responsive Policy (see www.opensecrets.org), the financial sector spent nearly 477 million dollars for “campaign contributions”, i.e. 1.1 million dollars for House representative, during the election cycle 2007-2008 and 455 million dollars for “lobbying activities”, i.e. 0.85 million dollars for each member of the Congress, in 2009 and 1.04 million dollars for each House representative. Moreover, the financial sector has the highest quota of expenditure in “campaign contributions” (on average 19.4% during the period 1990-2010) and in “lobbying activities” (on average 14.7% during the period 1998-2009) of all other sectors of the economy.

Lobbying activities are paid limited attention by the literature and, when they are considered, they are mainly seen as a means to resist changes that favour efficiency\(^\text{17}\), rather than as a means to affect the power relations with the authorities in order to increase the revenues of the sector regardless of what happens to systemic risk. The data presented above suggest instead that they may play an important role in the formation of monetary legislation, as implied by Sraffa’s approach.

To conclude, the evolution of legislation on financial regulation after the 1970s appears to have been enhanced by the desire of the financial sector to reduce controls and constraints in order to expand its turnover. As implied by the analysis of Section 4 above, the achievement of this objective has contributed to raising the income share of this sector and to generating the changes in income distribution observed in the recent decades. This process has however produced a rise in the systemic risk and the recent crisis. It is probable, according to this interpretation, that the attempts to restore a stable situation, like that observed before 1970, will be hindered by the attempts of the financial sector to preserve the high rates of growth of its turnover recently observed.

\(^{17}\) Mishkin’s (2001: 29), for instance, refers to Kroszner and Strahan (2001), which argues that private interests play a role in determining votes on banking regulation, to point out that small banks, the traditional beneficiaries of branching restrictions, tried to block interstate branching reform.
6. In this paper we have argued that the use a Sraffian approach to monetary problems may provide useful insights into the factors affecting the evolution of the economy and of society. It points out that monetary legislation and policy measures are part of the distributive conflicts among economic and social groups and that lobbying activities and the relations of power among firms, technical authorities and governments are relevant in their formation. The paper also points out that in an economy where the banking industry gives loans to the workers, the income shares of capitalists and workers change when the banking industry expands its activity even if the rates of wage and of profits remain constant. It shows that when the percentage variation of the rate of growth of the loans to workers is higher than the rate of growth of total wages, the profit share rises at the expenses of the wage share, and when the rate of growth of total loans is higher than the percentage variation of the rate of growth of the loans to workers, the share of income of the bankers rises more than that of the other capitalists. Finally the paper also point out the existence of a multiplier linking total profits to the new loans to the workers and identifies under which condition the decision of the banking industry to allow a larger access to credit to the workers has an expanding effect on the level of production.

The analyses presented in this paper complement those proposed by other economists that have underlined the role of capital gains and of the development of new technologies of power to interpret the financialisation of the economy and its links with income distribution. Taken together, these analyses can provide a better understanding of how the impressive changes occurred after the 1970s have come about and how they are related to the distribution of power and of income in society. Their content can clarify aspects of the complex phenomena of the financialisation of the economy, which the literature adopting the “efficient market hypothesis” fails to do, and can provide useful insights into the policies that can contribute to return to a stable working of the economy and to a high level of social justice.

References


Appendix

To analyse the equilibrium solutions and the effects of changes in the value of the new loans to the workers on the quantities produced, let’s start by noticing that from the previous equations (8) and (11) we have that:

$$X_i = \frac{g_q Q_v \left[ 1 - (1-z)c_q \right]}{(1-z)p_i} \geq 0 \quad \text{for} \quad g_q \geq 0 \quad \text{and} \quad \frac{dX_i}{dg_q} > 0 \quad \text{(A1)}$$

From equations (9), (10)-(14) and (A1) we obtain

$$\left( \mathbf{I} - \mathbf{A}^r_y - \frac{w_l}{\mathbf{p}' \mathbf{c}} \right) \mathbf{x} = Q_v \left\{ \frac{g_q \left[ 1 - (1-z)c_q \right]}{(1-z)p_i} \left( a_{i0} + \frac{w_l}{\mathbf{p}' \mathbf{c}} \right) + (1+g_q) \left( a_{i} + \frac{w_l}{\mathbf{p}' \mathbf{c}} \right) + \frac{g_q c_q - i \left( 1 + g_q \right)}{\mathbf{p}' \mathbf{c}} \right\}$$

and defining

$$\mathbf{H} = \left( \mathbf{I} - \mathbf{A}^r_y - \frac{w_l}{\mathbf{p}' \mathbf{c}} \right)^{-1}$$

we have that $$\mathbf{x} = \mathbf{H} \mathbf{m} Q_v$$.

The conditions of viability guarantee that the matrix $$\mathbf{H}$$ is nonnegative. Thus, to have a non-negative solution for $$\mathbf{x}$$, the vector $$\mathbf{m}$$ must be nonnegative too.

The vector $$\mathbf{m}$$ is the sum of three elements. The first, $$\frac{g_q \left[ 1 - (1-z)c_q \right]}{(1-z)p_i} \left( a_{i0} + \frac{w_l}{\mathbf{p}' \mathbf{c}} \right)$$, and the second, $$(1+g_q) \left( a_{i} + \frac{w_l}{\mathbf{p}' \mathbf{c}} \right)$$, are nonnegative. The third element, $$\frac{g_q c_q - i \left( 1 + g_q \right)}{\mathbf{p}' \mathbf{c}}$$, can be positive, negative or null. It is nonnegative if workers compensate the reduction of consumption due to their interest payments by consuming part of their loans, i.e. if $$c_q g_q \geq i (1+g_q)$$. In this case, the value of $$g_q$$ must be compatible with $$0 \leq c_q \leq 1$$, which occurs if $$g_q \geq i (1 + g_q)$$ or $$g_q \geq i / (1 - i)$$. Under these conditions the vectors $$\mathbf{m}$$ and $$\mathbf{x}$$ are nonnegative.

Let’s now identify, in general terms, the values of $$g_q = g_{qi}$$ that make each element $$m_i$$ of the vector $$\mathbf{m}$$ nonnegative. From (A2) we have that
The element \( g_{qi} \left( \frac{(\mathbf{p}^\top \mathbf{c} a_{bi}) + w l_{b} c_i}{p_k (1 - z)} + c_q c_i \right) + \left(1 + g_{qi}\right) \left( a_{hi} + \frac{w l_i}{\mathbf{p}^\top \mathbf{c}} c_i - \frac{i}{\mathbf{p}^\top \mathbf{c}} c_i \right) \geq 0 \quad (A.3) \)

The element \( \left( a_{hi} + \frac{w l_i}{\mathbf{p}^\top \mathbf{c}} c_i - \frac{i}{\mathbf{p}^\top \mathbf{c}} c_i \right) \) is the difference between the demand for the basic commodity \( x_i \), both as an input and as consumption, generated by the production of loans to the workers in the banking industry, and the reduction in the same commodity induced by the workers’ interest payments.

If \( \left( a_{hi} + \frac{w l_i}{\mathbf{p}^\top \mathbf{c}} c_i - \frac{i}{\mathbf{p}^\top \mathbf{c}} c_i \right) \geq 0 \), condition (A.3) holds for all values of \( g_{qi} \geq 0 \).

If \( \left( a_{hi} + \frac{w l_i}{\mathbf{p}^\top \mathbf{c}} c_i - \frac{i}{\mathbf{p}^\top \mathbf{c}} c_i \right) < 0 \), condition (A.3) holds for:

\[
\delta + \left( a_{hi} + \frac{w l_i}{\mathbf{p}^\top \mathbf{c}} c_i - \frac{i}{\mathbf{p}^\top \mathbf{c}} c_i \right) > 0 \quad \text{and} \quad g_{qi} \geq -\frac{\left( \mathbf{p}^\top \mathbf{c} a_{bi} + w l_i c_i \right) - i c_i}{\delta + \left( \mathbf{p}^\top \mathbf{c} a_{qi} + w l_i c_i \right) - i c_i} > 0
\]

where \( \delta = c_q c_i + \frac{\left( \mathbf{p}^\top \mathbf{c} a_{bi} + w l_i c_i \right) [1 - (1 - z) c_q]}{(1 - z) p_k} \geq 0 \).

It follows that \( m \geq 0 \) if \( g_q \geq \max \left[ g_{qi} \right] \).

The derivative of the vector \( x \) with respect to \( g_q \) is:

\[
\frac{dx}{dg_q} = Q_{h_i} \left[ \frac{1 - (1 - z) c_q}{(1 - z) p_k} \left( a_{bi} + \frac{w l_i}{\mathbf{p}^\top \mathbf{c}} c_i \right) + a_{hi} + \frac{c_q - (i - w l_i)}{\mathbf{p}^\top \mathbf{c}} c_i \right]
\]

where \( h_i \) is the row \( i \) of the matrix \( H \).

Notice that when condition (A.3) holds, that is when \( m \geq 0 \), \( \frac{dx}{dg_q} \geq 0 \).