INCOME INEQUALITY AND GROWTH:

PROBLEMS WITH THE ORTHODOX APPROACH

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Abstract. This paper discusses the main issues about increasing inequality, whether it matters and its impact on economic activity and growth. It starts by briefly considering the empirical evidence of the share of income going to the top one percent since 1945 in the advanced countries. It then considers whether this represents an increase in the productivity of the top one percent or merely an extraction of economic rent. The empirical evidence suggests the latter is generally the case and, as a consequence, there is not likely to be a trade-off between greater income equality and efficiency (the latter being reflected in a lower economic growth rate). This is reinforced by considering the mainstream explanation of the distribution of income and by a consideration of the argument as to whether labor is paid its marginal product, which is found to be problematic. Hence, some reservations about the use of the aggregate production function are raised. The paper turns next to the question of whether or not a greater degree of inequality causes a slower economic growth, both for the advanced and the developing countries. It next considers if the increasing gap between the top one percent and the rest of the income distribution has been either responsible for, or exacerbated, the Great Recession. It concludes that the degree of inequality is an important factor in determining economic activity and one that has been ignored for too long in macroeconomics.

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1. Introduction

"Capital is Back" is the title of an influential paper by Piketty and Zucman (2014) that considers the broad sweep of capital inequality over the last three centuries and, notably, its rise over the last three decades. But perhaps, equally importantly, "income inequality is also back". By now it is almost superfluous to discuss the remarkable impact that Piketty's *Capital in the Twenty-First Century* (2014a) has had not only in academic circles, but far more widely. It has received plaudits ranging from economists such as Robert Solow (2014) and Paul Krugman (2014) to such influential economic and financial commentators as Martin Wolf (2014) and John Cassidy (2014). It has generated a large number of comments and debates from all spectrums of economics including both neoclassical and heterodox economists (including notably papers in the 2013, 2014 and 2015 issues of the *Journal of Economic Perspectives* and the 2014 volume of the heterodox *Real World Economics Review*). The most recent has been the special session devoted to the book at the 2015 meeting of the American Economic Association with discussions by Mankiw, Auberbach, Hasslett, and Piketty. There is no doubt about the exceptional quality of the scholarship of *Capital in the Twenty-First Century*, the careful marshalling of the historical statistics[1] and readability of the book. However, rather surprisingly, Stiglitz's (2012) *The Price of Inequality,* although equally readable, but more polemical, did not have anywhere near the same impact.

The influence of the book may well have more to do with the effectiveness of its rhetoric, in McCloskey's (1985/1998, 1994) sense of the term. This is in part due to the style of the book, which as numerous commentators have noted, is written in a markedly different way from that of an academic journal article. The other reason is the way the changes in inequality are measured in the book. Changes in, for example, the Gini coefficient do not have the same impact as the statement that the US the share of income (excluding capital gains) of the top one percent was 17.6 percent in 1936, falling to a low of 8 percent in 1964 before climbing to 19 percent in 2012. (The trend does not seem to have been reversed by the Great Recession.) The headline figure that the top ten percent have nearly 50 percent of the income in 2012 also points dramatically to the possibly serious problems of inequality. There is a similar pattern in the UK, where the figures were 17 percent in 1937, falling to a low of 6 percent in the mid-1970s and then rising to 13 percent in 2007. The contrast of this pattern compared with Kuznets' original inverted U-shape path (admittedly based on much less data) stands out markedly. In continental Europe and Japan, the pattern has been very different and has followed more of an L-shaped path. In other words, there has been a sharp fall in the share of the top one percent after the

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[1]There was a well-publicised criticism of some of Piketty's statistics in the *Financial Times*. It seems that these were of a second order of magnitude or simply wrong and did not undermine the broad thrust of the arguments of Piketty (Wade, 2014, p. 5).

Second World War, but with only some small increase subsequently. This important difference in the experience of these two groups of countries is one that is in need of an explanation.

Yet, what is remarkable is how little impact the issue of the increasing, or indeed, the level of income inequality has had in a political context (Wade, 2012). Indeed, in spite of the detailed work that has been done by a number of economists on this issue, income inequality has been largely neglected in mainstream economics. Thomas Kuhn (1970) has emphasized the role of the textbook in delineating the paradigm, or disciplinary matrix, and in determining what "puzzles" are important. The latter is determined by, especially, the exercises at the end of textbooks, so that the methodology of the discipline is acquired by ostentation and not by explicit methodological rules. Thus, the fact that there is no discussion of income inequality in the standard macroeconomics (or microeconomics) textbooks suggests that, at least until recently, it has been seen to be of little economic importance.[2]

While there is a literature on optimal taxation, consideration of income inequality raises questions of equity and the distribution of income that are desirable from society's point of view. These were a major concern of the Classical economists, originating most notably with the writings of Bentham and the consequentialists. But the marginal revolution and the use of ordinal, rather than cardinal, utility in effect denied the possibility of interpersonal comparisons of utility. This was also reflected in the supposed normative/positive dichotomy in economics, with mainstream economists primarily concerned with the latter. Thus, the questions of the appropriate degree of income and wealth inequality was left to the political philosophers such as Rawls, Sen, Doworkin, Nozick, Arneson, and Cohen (Roemer, 2009; Milanovic, 2013). It ceased to be of central concern to mainstream economics.

Certainly within orthodox economics, the underlying assumption of validity of the marginal productivity theory of distribution, introduced in the introductory economics textbooks and adopted widely in neoclassical theoretical models, reduces the need to consider the equity considerations of the distribution of income. As John Bates Clark (1899, p.v) memorably wrote many years ago, "[i]t is the purpose of this work to show that the distribution of income to society is controlled by a natural law, and that this law, if it worked without friction, would give to every agent of production the amount of wealth which that agent creates". While this statement does not imply that this is what every agent *ought* to get, it is often implicitly assumed that this is the case. Moreover, the implication is that any attempt to alter the free market distribution of earnings will lead to a trade-off between efficiency (including long-term growth) - because of its effect in distorting incentives - and the efficient allocation of resources; the

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[2] As Milanovic (2013) dramatically put it: "Before the global crisis, income inequality was relegated to the underworld of economics. The motives of those who studied it were impugned. According to Martin Feldstein, the former head of Reagan's Council of Economic Advisors, such people have been motivated by envy. Robert Lucas, a Nobel prize winner, thought that 'nothing [is] as poisonous ' to sound economics as 'to focus on questions of distribution' ".

"great contradiction" as Okun (1975) termed it. A seminal discussion of this approach to income is Ferguson's (1969) classic theoretical work, *The Neoclassical Theory of Production and Distribution.* An essential part of this methodology is the existence of a well-behaved aggregate production function, but which, we shall argue below, is problematical from both a theoretical and empirical point of view. The sharp increase in the share of the top one percent, for some, renders this mainstream explanation of the distribution of income suspect and consequently raises important issues about the determination of profits and wages. Indeed, Piketty (2014a, p. 330) goes so far as to entitle a section of his book "the illusion of marginal productivity".

There are three other reasons why income distribution, notwithstanding its earlier neglect, has become a more important issue in recent years (see, for example, Oxfam, 2013).

The first is the finding using cross-country data that many indices of social pathology are directly related to the degree of income inequality. Wilkinson and Pickett's (2009/2011) controversial book, *The Spirit Level*, presents a good deal of evidence on this issue, but we will not consider it further in this overview.

The next concern stems from the finding by a number of recent studies by such international organizations as the Asian Development Bank (ADB), the OECD, the IMF and the World Bank that greater income inequality is associated with lower economic growth (Berg *et al*.,2011; OECD, 2011; ADB, 2012; Cingano, 2014; and Ostry *et al*., 2014). As we will discuss later, an important finding is that the data do not support the hypothesis that redistributive policies in the face of the increasing inequality causes any decline in growth. Hence, the supposedly reduced incentives of the higher income earners do not cause lower economic growth rates. Even a much weaker finding that if there were no statistically significant relationship between inequality and growth, this would be sufficient to demolish the argument that redistribution away from the rich to the poor affects incentives and causes lower growth rates. There is little empirical support for the Okun (1975) equity-efficiency trade-off or his analogy of the "leaky bucket". (This is that redistribution from the rich to the poor will involve some costs as it is transferred by the government in the leaky bucket.)

The third and final issue is the relationship between the degree of income inequality and the short-run level of economic activity, leading to a revival of the stagnationist thesis of the 1950s. In particular, the rise in income inequality in the US over the last thirty years led to an increase in household borrowing by the large majority whose income had stagnated in real terms over this period. The positive effect of this borrowing was that it contributed to maintaining the growth of aggregate demand, given the high savings of the top ten, and one, percent. But this inexorable rise in household debt, according to this thesis, brought with it the seeds of its own destruction. The unsustainability of the debt has been seen by some as exacerbating the Great Recession, if not precipitating it (Cynamon and Fazzari, 2013; van Treeck, 2013).

In this overview, we shall first look at the empirical evidence concerning the rapid increase in income inequality, primarily with regard to the developed countries. We shall consider the neoclassical argument that as factors are paid their marginal products, there is no need to be concerned about either income inequality or the distribution of income between capital and labor. We shall raise some fundamental, but long-neglected questions, about the aggregate production function and the marginal productivity theory.

We will then discuss the evidence documenting the negative effect of inequality on the economic activity, turn our attention to the short-term relationship between the two, and conclude with a consideration of what are the drivers of income inequality.

2. The salaries of the top one percent: justified income or economic rents?

The rise in the earnings of the top one percent over the last thirty years or so in the US have been extensively analyzed and debated so that we need only to be brief. A good summary is provided by Bivens and Mishel (2013), who report that labor compensation of the top one percent over the period 1979 to 2007 accounted for 60 percent of the growth of market-based incomes (38 percent of post- tax incomes). These are not small shares of the total growth rate.
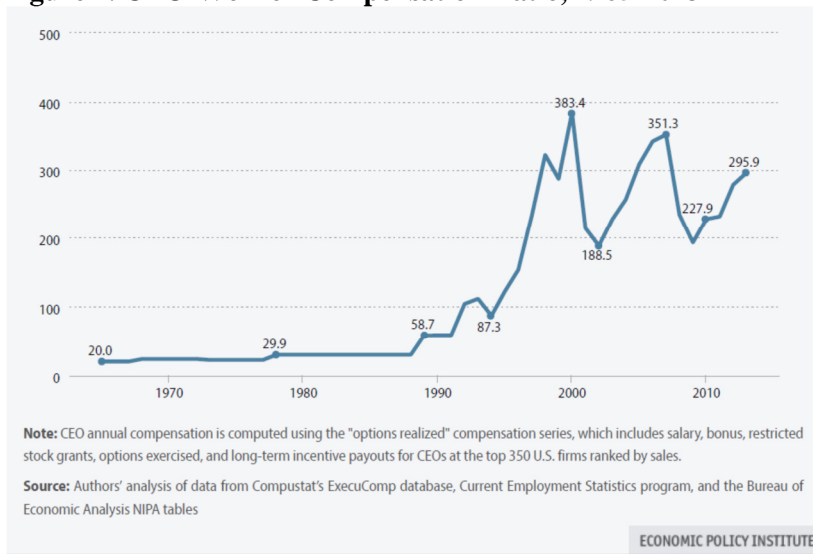
The orthodox explanation of increasing income inequality has generally been in terms of labor market forces; the increasing wage premium for college graduates, the effect of technical change on the increased demand for skills, and the effect of globalization (OECD, 2011; Autor, 2014). But we shall argue that the evidence seems to point to the fact that the increase in the share of the top one percent was the result of rent extraction and the result of pay setting institutions.

Figure 1 shows the rapid growth of the remuneration of the chief executive officers (CEOs) relative to workers over the period from 1965-2015, during which time CEO annual compensation increased from $819,000 to $15,375,000 (in 2013 prices). Figure 2 shows the correlation between the CEO's remuneration and the stock exchange, although the actual increase from 1978 to 2013 of remuneration was actually double that of the stock exchange. This reflects the move towards a much greater part of the remuneration of CEOs being tied up with stock options.

As Bivens and Mishel (2013) point out, the evidence that the increase in the top one percent's share is mainly due to rent gains is largely indirect. The fact that the rapid increase in the market pay of the top one percent coincided in the US and the UK with cuts in the top rates in taxation are ascribed to the fact that it now has become worthwhile for the CEOs and other high salary earners to bargain more aggressively for increased remuneration, rather than for other non-taxable benefits. This was seen as the result of bargaining over rents or a surplus rather than the
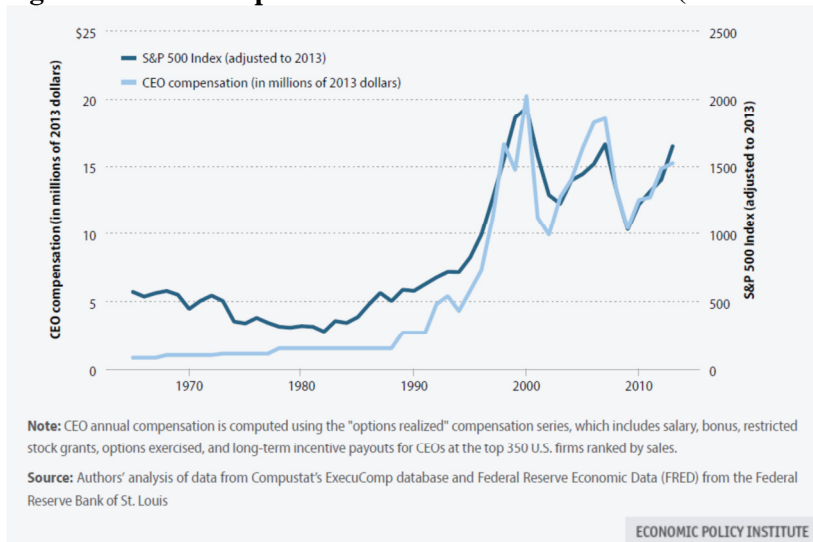
operation of perfectively competitive markets with factors being paid their marginal products (Alvaredo *et al.*, 2013; Bivens and Mishel, 2013).

Figure 1. CEO-Worker Compensation Ratio, 1965-2013

Note: CEO annual compensation is computed using the "options realized" compensation series, which includes salary, bonus, restricted stock grants, options exercised, and long-term incentive payouts for CEOs at the top 350 U.S. firms ranked by sales.

Source: Authors' analysis of data from Compustat's ExecuComp database, Current Employment Statistics program, and the Bureau of Economic Analysis NIPA tables

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Source: Mishel and Davis (2014)

Figure 2. CEO Compensation and the S&P 500 index (in 2013 dollars) 1965-2013

Note: CEO annual compensation is computed using the "options realized" compensation series, which includes salary, bonus, restricted stock grants, options exercised, and long-term incentive payouts for CEOs at the top 350 U.S. firms ranked by sales.

Source: Authors' analysis of data from Compustat's ExecuComp database and Federal Reserve Economic Data (FRED) from the Federal Reserve Bank of St. Louis

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Source: Mishel and Davis (2014)

There is now great deal of evidence as to how top executives' pay is set in practice. The idea that optimal contracts have been introduced for CEOs, and other highly paid executives, to solve the principal-agent problem seems very far from reality. As Bebchuk and Fried (2005 and 2009) have shown, citing a great deal of empirical literature, the CEOs' salaries are determined by remuneration committees and directors, all of whom have a vested interest in justifying large increases in the CEOs' salaries. They dismiss the optimal contracts literature, referring to it as

the "official story". Directors often receive large benefits, which are at the CEOs' discretion. Moreover, there are often interlocking pay committees so the CEOs' remunerations are mutually determined. There are spillover effects into the public sector where large pay increases of the top executives are justified by reference to comparable private-sector pay, often judged merely by the size of the organization rather than any reference to its profitability. (See Marris, 1964.) Performance pay in the private sector is often linked to the overall increase in the value of the company's shares, not how the company performs *relative* to the stock market overall. Moreover, many of the arrangements for CEOs' pay are far from transparent, which is what one would expect if the principal-agent problem was to be minimized.

The remarkably small number of financial linkages that connect most of the world's firms has been shown by Vitali *et al.* (2011). They used complex network analysis to trace the shareholdings between 43,060 transnational corporations and found that 147 of these companies had control of 40 percent of the value of transnational corporations and 737 had control of 80 percent. It can be seen that this interrelationship not only poses severe economic stability problems, but also how a very small network of top managers could come to set their own salaries based on a circularity notion of comparability. Bivens and Mishel (2013, pp. 63-71) and Alvaredo *et al*. (2013, pp. 9-11) present a more detailed discussion of this evidence. The question even arises as to whether or not the rapid growth of the finance sector to 8 percent of GDP (with 40 percent of corporate profits) in 2007 in the US actually represented a gain in the efficiency of the economy.

In other words, according to this evidence, the rapid increase in CEOs' remuneration has been driven more by rent extraction than the result of a well-functioning competitive market for senior executives. Moreover, while changes in income distribution need not be a zero sum gain, there is a strong presumption that the rise in the share of the top one percent has been at the expense of the remaining 99 percent in the US. If these high salaries are derived from rent seeking, then it should be relatively costless in terms of economic growth to redistribute income through higher taxation and greater public expenditure of social benefits, health and particularly education. The relationship between work effort and pay in the neoclassical schema (work is a disutility) is over simplistic. Many CEOs and top earners gain a great deal of utility through the power and prestige of their positions and it is doubtful whether they would work any less harder if their earnings were taxed more.

Perhaps equally convincing evidence that these salaries are largely rents is the fact that the rapid increase in shares of the top one percent in the US has been mirrored, although to a lesser extent, in Australia, Canada and the United Kingdom. But, the experiences of continental Europe and Japan are very different, with the share of the top one percent exhibiting an L-shaped curve. "To us, the fact that high-income countries with similar technological and productivity developments have gone through different patterns of income inequality at the very

top supports the view that institutional and policy differences play a key role in these transformations. Purely technological stories based solely upon the supply and demand of skills can hardly explain such diverging patterns" (Alvaredo *et al.*, 2013, p.5).

But why did the share of the top one (or indeed ten) percent in income and wealth fall after the Second World War only to rebound some thirty years later, especially in the US and the UK?

Given that wages and income inequality are heavily influenced by social norms, the answer must lie in the effect of institutions (Acemoglu *et al.*, 2005; Piketty, 2014a). There is a substantial literature on this and we cannot do justice to it here. But the Great Depression and the Second World War brought substantial institutional and policy changes in the advanced countries. Other factors include the destruction of capital during the war, the break of special interest groups in the defeated countries (Olson, 1982), the setting up of the welfare state in the UK and the generally pro-labor legislation together with the acceptance of high marginal taxation rates. In the US, Levy *et al.* (2007) term this accord the *Treaty of Detroit*. But equally, there was a breakdown of this consensus under the Thatcher and Regan administrations, when at least in the UK, there was a radical shift in the view of what "society" is, and indeed whether it actually exists independently of the individuals of a country. There was a sense that high salaries merely reflected the value that an individual produced. See, for example, Acemoglu *et al.* (2015) for a discussion of the importance of institutions in the determination of pay in South Africa and Sweden.

However, as we noted above, the orthodox approach to the determination of wages is the marginal productivity theory of factor pricing, where there is no room for the *fundamental* effect of social norms or institutional arrangements. As we shall show, this is problematical for the mainstream approach to inequality and the modeling of income distribution.

3. Piketty's "the illusion of marginal productivity"

Piketty (2014a, pp. 330-333) is rightly extremely skeptical of the concept of marginal productivity as an explanation for the determination of wages and salaries of the top one percent. The hedge fund manager, for example, Paulson earned $3.7 billion dollars in 2007 (Rajan, 2010, p. 80). Was this his marginal product? How do we test this proposition? Should the marginal products of a handful of CEOs of the banks that precipitated the Great Recession be regarded as substantially negative over this period?

It is worth citing Piketty (2014a, pp. 330-331) at some length on this point.

> To my mind, the most convincing explanation for the explosion of the very top US incomes is the following. As noted, the vast majority of top earners are senior managers of large firms. It is rather naïve to seek an objective basis for their high salaries in individual "productivity". When a job is replicable, as in the case of an assembly-line worker or fast food server, we can give an

approximate estimate of the "marginal product" that would be realized by adding one additional worker or waiter (albeit with a considerable margin of error in our estimate). But when an individual's job functions are unique, or nearly so, then the margin of error is much greater. Indeed, once we introduce the hypothesis of imperfect competition into standard economic models (eminently justifiable in this context), the very "individual marginal productivity" becomes hard to define. *In fact, it becomes something close to a pure ideological construct on the basis of which justification for higher status can be elaborated.* (Emphasis added)

What is interesting here is that although Piketty dismisses the concept of marginal productivity for senior managers, he still seems to consider that theoretically it can be measured for those doing "replicable jobs", albeit imprecisely. This seems a somewhat contradictory position. As the top one percent took the vast majority of the increase in income over the last thirty years and this had nothing to do with their marginal productivity (which, as Piketty notes, cannot be independently measured), how could the remainder of the labor force be paid their marginal products?

Nevertheless, it is a short step from Piketty's statement to assuming that for these employees with replicable jobs, competitive markets will ensure that they are paid the contribution they make to the economy. Even if there is no direct evidence that firms and other organizations actually do set salaries and wages in this way, recourse to Friedman's (1953) "Methodology of Positive Economics" permits the standard approach to argue that such direct evidence is not necessary for wages to be equal to marginal products under competitive conditions. (See also Machlup, 1967.) All that is required is that the predictions of the model (such that aggregate factor shares equal the estimates of the aggregate output elasticities) are not refuted.

However, while the evidence discussed above provides support for Piketty's arguments regarding CEOs' pay, we shall argue that even for replicable jobs, the marginal productivity theory, *qua* a theory, is logically problematical. This is because the principle requires output and inputs to be measured in *physical* terms and hence the relationship is a behavioral one, *i.e.* it is a testable hypothesis.

This is how students are introduced to the theory in introductory economics textbooks. In Mankiw (2010), the production function is that of a bakery and the output is the *number* of loaves. Typically, use is then made of Euler's theorem for a linear homogeneous function using the price in dollars of each unit of output to demonstrate how the value of output, under the usual neoclassical assumptions, is equal to the value of the total compensation of the inputs. Ferguson (1969, p. 250), in a debate with Joan Robinson, wrote that he "assumed a production function relating *physical* output to the *physical* inputs of heterogeneous labor, heterogeneous machines and heterogeneous raw materials" (emphasis added). Indeed, this is also true of Cobb and Douglas (1928) who, in the opening sentence of their classic article, wrote of the "volume of physical production". But then a legerdemain occurs in the introductory, and even the more

advanced, textbooks. The discussion then progresses to the whole economy and aggregate factor shares, where the output is a constant-price value measure and the "price" is a price deflator. But the (erroneous) implication is that the results of the physical one-sector production function still follow through unaffected.

In all sectors of the economy, the measurement of output is in constant-price value (monetary) terms and this is definitionally related to the value of the inputs. This is to say, $Y \equiv W + \Pi \equiv wL + rK$, where Y is value added, W is labor's compensation, Π is total profits, w is the wage rate, L is the number of workers, r is the rate of profit and K is the constant price value of the capital stock. This has serious implications for the testing of the hypothesis that factors are paid their marginal products.

To show what, in retrospect, may be seen to be a straightforward point, let us, following Piketty, take the example of a small restaurant managed by the owner. The manager has no idea of the elasticity of demand for his meals, and so undertakes a mark-up pricing policy. (The work of Hall and Hitch (1939), many years ago, established this was the most common way of price setting in industry. See also Coutts, Godley and Nordhaus (1978) and Coutts and Norman (2013).) Prices are determined by a mark-up on the unit costs of labor (the waiters and chefs) and the ingredients of the meals together with the other capital costs (rates, *etc.*). Consequently, total revenue is given by:

$$p_M M \equiv R \equiv (1 + \pi)(wL + I) \tag{1}$$

where p_M is the price of the meal (M), R is total revenue, and I is the value of the ingredients. The operating profit is equal to $\Pi \equiv \pi(wL + I)$. The mark-up is determined by the state of competition from other restaurants, the overall level of affluence in the local area and it is also influenced by a target for the level of profits. Nominal wages are assumed to be determined by the state of the local labor market. The contribution of value added of the restaurant to output as reported in the NIPA will be given by:

$$R - I \equiv V \equiv wL + \Pi \equiv wL + \pi(wL + I) \tag{2}$$

Suppose the restaurant is flourishing and the manager considers it desirable to hire a new waiter to speed up the service, but for sake of argument, the same number of meals is served. Under this pricing policy, the increase in value added in adding an extra employee is *definitionally* equal to $\partial V / \partial L = (1 + \pi)w$.

So if we interpret $\partial V / \partial L$ as the marginal product of labor, we can see that it is less than the wage rate. This is because the hiring of the extra waiter, through the pricing policy, automatically increases profits at the same time. Consequently, Π is not held constant as L changes and as the neoclassical marginal productivity theory assumes. Of course, if the manager

merely passes on the increased labor cost in the form of an increased price of the meal then, by definition, $\partial V/\partial L \equiv w$. But this is not the result of optimization using a well-behaved production function subject to a cost constraint. In fact, changes in the local labor market conditions (such as an increase in the minimum wage) that affect the wage rate of the waiter will also cause his/her putative marginal productivity to change. But the causation is from the wage rate to the putatively marginal productivity.[3]

It should be noted that this applies to a firm that is selling a marketed product to the private sector. But what about the large (public) sector of the economy where there is no independent measure of aggregate output?

Much depends upon the way it is calculated. In the early national accounts, the output was just taken to be equal to the total labor compensation. In many cases, there are measures of physical outputs (such as the number of operations in hospitals, or trials in the judicial system, which can be used), but the problem still arises as to how to price or value them. Attempts in the UK have been made to revise the output measures of government services after the Atkinson Review (2005), but insurmountable problems remain for the testing of marginal productivity.

It should be noted that the accounting identity, $Y \equiv wL + rK$, holds irrespective of the degree of state of competition, whether or not there are well-defined production functions and whether or not firms optimize. If this accounting identity is partially differentiated with respect to labor, we obtain $\partial Y/\partial L = w$ and $(\partial Y/\partial L)(L/Y) = wL/Y = a$ where a is labor's share. The expression $(\partial Y/\partial L)(L/Y) = \alpha$ is the neoclassical definition of labor's output elasticity and, under neoclassical production theory, is equal to the wage share if there are perfective competitive markets, a well-behaved aggregate production function and factors are paid their marginal products. But from the definition of the national accounts, α must be *definitionally* equal to the wage share. This led Phelps Brown (1957, p.557) to comment wryly that labor's output elasticity of the production function and the wage share "will be only two sides of the same coin". We shall return to the implications of this below.

On a more pragmatic note, Thurow (1975, pp. 211-230) in his "A Do-it-Yourself Guide to Marginal Productivity" raises some further problems that occur even if output can be valued independently of the inputs. The questions Thurow raises include:

- "What is the time period over which marginal products are paid?"
- "Are groups or individuals paid their marginal products?"

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[3] Note that if prices are determined by a mark-up on unit labor costs, labor's share is given by $1/(1+\pi)$. The mark up will be determined by the state of competition in both the product and the labor market.

- "What is the theory that determines whether marginal-productivity groups are large or small, heterogeneous or homogeneous?"
- "What is the level of aggregation at which capital and labor are paid their marginal products?"
- "To what degree does the economy fit the competitive model and to what degree does it fit the monopoly model? The actual economy is a mixture, but what are the relevant proportions?"

Other questions include the problems posed by disequilibrium, uncertainty, the presence of increasing returns to scale, whether governments can in principle ever pay their employees according to their marginal productivity and to what extent do psychic-income benefits influence monetary remuneration. Clearly, even ignoring the problems of the measurement of the monetary value of output independently of the value of wages, there are many other insuperable difficulties noted by Thurow in the way of providing an adequate test of the marginal productivity theory. These concerns are shared by Stiglitz (2012) and, many years ago, by Kaldor (1966).

4. A digression: the "illusion of the aggregate production function"

It is somewhat paradoxical that Piketty, in spite of his reservations about the marginal productivity theory in explaining the wage rate, nevertheless at times explains the changes in the shares going to capital and labor in terms of an aggregate CES production function.

This determination of the functional distribution of income between the two factors of production also involves the usual neoclassical assumptions underlying the marginal productivity theory of distribution. These are the existence of a well-behaved one sector aggregate production function, perfect competitive markets with all firms and service providers internally efficient (*i.e.* no *X*-efficiency), constant returns to scale and that factors are paid their marginal products. Piketty notes that over the last thirty years or so, capital's share of income has risen while the ratio of capital to income has also increased. In terms of conventional neoclassical production theory, this change is entirely due to the change in technology, namely the elasticity of substitution has increased.

Piketty (2014a, p. 232) starts with the simple explanation of the return to capital being its marginal product, but concedes that it also depends upon the relative bargaining power of the parties concerned. It may be higher or lower than the marginal product, especially "since this quantity is not always measurable". Yet, at times, the main thrust of his argument rests on factor shares being determined by technology and the form of the aggregate production function. After discussing the effect of bargaining power on factor shares, this is soon ignored and Piketty is

discussing the role of technology and the production function as an explanation for the changes in the functional distribution of income between capital and labor. "The relevant question is whether the elasticity between labor and capital is greater or less than one. If the elasticity [of substitution] lies between zero and one, then an increase in the capital/income ratio … leads to a decrease in the marginal product of capital large enough that the capital share decreases". If the elasticity is greater than one, then an increase in the capital-labor ratio leads to a drop in capital's share. This has led to a discussion of Piketty's theory, in particular his three laws of capitalism, in terms of the neoclassical production function and marginal productivity theory of distribution.

One of the difficulties with, and indeed criticisms of, Piketty's approach and conventional economic analysis of shares is that Piketty has a very wide definition of capital or wealth. He uses the terms interchangeably, including land, dwellings, commercial inventory, other buildings, infrastructure and financial assets (bank accounts, mutual funds, bonds, stocks, financial investments of all kinds, insurance policies, pension funds). The conventional production function analysis takes output (or income) as value added and capital's share as the ratio of total profits to income. It can be seen that Piketty's definition is much wider than that of the NIPA. For production theory, the former is the correct measure, whereas Piketty's "wealth" is more useful as a measure of the command over resources and, indirectly, political and economic power.

One criticism is a large element of wealth is housing, which is both a consumption and an investment good. Bonnet *et al.* (2014) argue that the return to housing should be the rental value of housing and not the rise in house prices, which Piketty uses, as these include capital gains. They recalculate the value of housing based on rent indices and find that these produce a lower estimate of housing wealth. This is sufficient to turn Piketty's large increase in the capital-income ratio into one that is roughly constant. Consequently, this has led to a minor reassessment of Piketty's argument within the neoclassical production function theory.

This evidence suggests that the aggregate elasticity of substitution should be less than unity, which, it is argued, is confirmed by many empirical studies estimating neoclassical production function (Rowthorn, 2014). Rognlie (2014) makes a similar point except he emphasizes that Piketty uses net income and wealth, whereas most studies use gross income in estimating the elasticity. Gross elasticities are higher than net elasticities and most estimates of these are less than unity, so using net elasticity of substitution should give even lower estimates. He also assumes that if one removes the capital appreciation from the capital stocks, then there is no increase in the capital-income ratio as in Rowthorn's argument the increase in capital's share is due to an elasticity that is less than unity.

Nevertheless, it has also been argued that estimates of the aggregate production functions can be used as an indirect test of the marginal productivity theory. Given all the usual neoclassical

assumptions, then, if factors are paid their marginal products, the estimated output elasticities should be identical to the factor shares. This is essentially the only theory of the determination of wages and the rate of profit discussed in both introductory and advanced textbooks. Mankiw and Taylor (2008, p.69), for example, assert that "[*t*]*otal output is divided between the payment to capital and the payments to labor depending on their marginal productivities*" (emphasis in the original). "We can now verify that if factors earn their marginal products, then the parameter α tells us how much income goes to labor and how much goes to capital" …. "The Cobb-Douglas production function is not the last word in explaining the economy's production of goods and services or the distribution of income between capital and labor. It is, however, a good place to start" (p.71). There is not a word here about social norms, bargaining power and the role of institutions.

It is sometimes forgotten that in the 1930s, and in subsequent years, Douglas and his colleagues undertook a large number of cross-industry estimations of the Cobb-Douglas production function. These found that the output elasticities were virtually identical to the factor shares. Table 1 reports some of these estimates for the 1960s for Australia. It is also notable not only how close the estimated output elasticities are to the factor shares (the average value of labor's output elasticity is 0.58 and its share is 0.54) but that the R^2s are near unity.

Table 1.
Production Function Estimates for Australian Manufacturing, 1956, 1957, 1964-68

Fiscal Year	N	β	SE	α	SE	a	$\alpha + \beta$
1956	159	0.365	0.03	0.615	0.02	0.602	0.980
1957	159	0.381	0.03	0.610	0.02	0.581	0.991
1964	163	0.396	0.03	0.595	0.03	0.527	0.991
1965	161	0.414	0.03	0.576	0.03	0.530	0.990
1966	161	0.434	0.03	0.562	0.03	0.528	0.996
1967	160	0.425	0.03	0.575	0.03	0.517	1.000
1968	160	0.456	0.03	0.536	0.03	0.514	0.992

Note: a is the share of labor in total output, α is labor's output elasticity.
Source: Douglas (1976), Tables 4 and 5, pp. 912 and 913.

Douglas (1976, pp. 913-914, emphasis added), summarizes the implication of these as follows:

> The results of this study lend further corroboration to the accuracy of the production function as a description of manufacturing production and as a determinant of the distribution of the product -which is a separate but allied subject. ... A considerable body of independent work tends to corroborate the original Cobb-Douglas formula, but, more important, *the approximate coincidence of the estimated coefficients with the actual shares received also strengthens the competitive theory of distribution* and disproves the Marxian. Many of the original objections have been answered. Some remain.

Taken at face value, these results only imply that the average worker is paid his/her marginal product, but it is only a short step to infer that this provides support for the proposition that all employees, including the CEOs, earn their marginal products.

As we have noted, Piketty seems to have a somewhat ambiguous position with regard to the aggregate production function. Basically, it seems as if he accepts the central tenet of the existence of an aggregate production function, but he is ambivalent about the principle of factors being paid their marginal productivity. He seems to accept the concept of the marginal productivity, but factor returns may be distorted by other institutional and sociological factors. Indeed, he sees the salaries of the top one percent being determined by such factors, but still holds to the principle of marginal productivity and the "race between technology and education offers a plausible explanation of the long-run evolution of the wage distribution, at least up to a certain level of pay and a certain degree of precision" (p. 41).

4.1 The Cambridge capital theory controversies

There is, however, a fundamental question about whether or not the aggregate production function can theoretically exist. It is worth briefly discussing this problem which, although it was fully debated nearly fifty years ago and the problems largely confirmed, has been subject to what can be best termed collective amnesia by the economics profession. (See also Galbraith, 2014.)

In the 1950s and 1960s, what came to be known as Cambridge capital theory controversies occurred, which, as its name suggests, centered around whether the theoretical concept of "capital" as a factor of production had any meaning outside the highly restrictive one-commodity world. The upshot was that the answer was "no". This important debate between Cambridge, UK, and Cambridge, Massachusetts, has long been relegated to the history of economic thought, forgotten or treated as an esoteric debate in theory.[4] In 1962, Samuelson published a paper where he purported to show that a one-commodity aggregate production function could be generalized to include more than one sector. In other words, his construct of the "surrogate production function" could be seen as what he terms a "parable" for a more complex technology than the single-sector "corn" model. The capital theory controversies, and they were entirely a matter of theory, proved that this construct was untenable.[5]

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[4] Piketty seems to regard it as a debate over whether it is the capital-output ratio adjusts to allow balanced growth or there is some other mechanism, such as Kaldor's (1956) model of the change in the savings propensities. "It was not until the 1970s that Solow's so-called growth model effectively carried the day" (Piketty, 2014a, p.231). However, the Cambridge capital theory controversies had nothing to do with this.
[5] It is thus difficult to comprehend Piketty when he writes "In my view, the virulence – and at times sterility- of the Cambridge capital controversy was due in part to the fact that the participants on both sides lacked the historical data needed to clarify the terms of the debate. It is striking to see how little use either side made of national capital estimates done prior to World War I, they probably believed them to

Once one moved from a one-sector model, some important standard predictions of neoclassical production theory would not hold. Importantly, an increase in the capital-labor ratio was not unambiguously associated with an increase in the rate of profit and a fall in the wage rate, the phenomenon of "capital reversing". "Reswitching" could occur where a given technique of production could be the most profitable at two different interest rates. (See Cohen and Harcourt (2003) and Pasinetti and Scazzieri (2008) for useful summaries.) While even theoretical debates are rarely conclusive in economics, the force of the Cambridge, UK, critique was handsomely conceded by Samuelson (1966). Moreover, in the 1970s, a discussion of the capital theory controversies was even included in several undergraduate textbooks on economic growth. But the debate now has been completely ignored or forgotten. The controversy was somewhat acrimonious as Cambridge, UK, saw it more than a mere technical argument, but one that had fundamental methodological implications as to the way the capitalist system should be analyzed (Harcourt, 1976). Eventually, the problems of capital reversing and reswitching, while a logical possibility, were dismissed as a (Ruth Cohen) curiosum and regarded by some as merely equivalent to a "Giffen good".

4.2 The aggregation problem

But for those impatient with what Solow (1988, p. 309) saw as "a playing-out of ideological games in the language of analytical economics"[6], there still remains the problems posed by the more general aggregation problem, of which the Cambridge capital theory controversies can be seen as a subset. Fisher (2005, p. 490), who has done more work than most on the aggregation problem from a quintessentially neoclassical viewpoint, is firmly of the opinion that successful aggregation simply cannot be done.

> Even under constant returns, the conditions for aggregation are so very stringent as to make the existence of aggregate production functions in real economies a non-event. This is true not only for the existence of an aggregate capital stock but also for the existence of such constructs as aggregate labor or even aggregate output.
>
> One cannot escape the force of these results by arguing that aggregate production functions are only approximations. While, over some restricted range of the data, approximations may appear to fit, good approximations to the true underlying technical relations require close approximation to the stringent aggregation conditions, and this is not a sensible thing to suppose.

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be compatible with the realities of the 1950s and 1960s (p.232)". The debate had nothing to do with historical empirical estimates of the capital stock.

[6] It is difficult to see how it could be anything other than ideology as it involved competing paradigms (Kuhn, 1970).

The damaging implications of this for the aggregate production function are now almost never mentioned in the literature. (For a more detailed discussion of the aggregate production function, see Fisher (1992) and Felipe and Fisher (2008)).

If these results are accepted at face value, it means that, for example, most of the discussion is about growth within the neoclassical framework, including the Solow growth model is flawed.

So why are aggregate production functions still so widely used?

One, usually unstated, reason is that aggregate production functions "work", in that statistical estimations of them give plausible estimates of the parameters. As Solow once remarked to Fisher, if capital's share turned out to be 0.75 instead of 0.25, "we would not now be talking about aggregate production functions". But notwithstanding this, there are several conundrums. Fisher (1971) undertook a simulation exercise where the aggregation problems meant that the well-defined micro-production Cobb-Douglas production functions could not be aggregated to give an aggregate production function. Yet, the estimations of the aggregate wage equation derived from the simulated data suggested that a well-behaved aggregate Cobb-Douglas production function with output elasticities equal to factor shares did exist. However, Fisher concluded that the causation ran from the stability of the factor shares to the Cobb-Douglas production function and not *vice versa*. In a later paper, Fisher *et al.* (1977) repeated the same exercise for the CES production function. They found that the simulations gave some well-defined estimates of the "aggregate elasticity of substitution", which, as Fisher *et al.* (1977) point out, does not exist. Moreover, the estimates of the some of the "aggregate elasticities of substitution" actually lay outside the range of those of the individual shares. While Fisher did not find an organizing principle behind this result, as he did with the Cobb-Douglas production function, it is clear that it is the change in the factor shares that determines the elasticity of substitution and not *vice versa*. Felipe and McCombie (2006) also undertook a simulation analysis where the underlying micro production functions were Cobb-Douglas but the output elasticity of capital was 0.75 (instead of the usual 0.25) and of labor was 0.25 (instead of 0.75). Prices were determined by a mark-up of 1.333 and used to aggregate the micro-production functions. When the aggregate production function was estimated the "output elasticities" of capital and labor were now 0.25 and 0.75, each equal to the relevant factor share.

The fundamental problem is that the production function is an engineering relationship and should be expressed in *physica*l terms. As such, it is a behavioral relationship. But in practice it has to be estimated using constant-price value data for both output (confusingly, sometimes called the volume of output) and the capital stock. If the identity $Y = wL + rK$ is differentiated and then integrated at any point of time, then the result is a Cobb-Douglas given by:

$$Y \equiv Bw^a r^{1-a} L^a K^{(1-a)} \equiv AL^a K^{(1-a)} \tag{3}$$

where B is the constant of integration and a and $(1 - a)$ are the factor shares.[7] Equation (3) is *not* an approximation to the identity, but holds *exactly*. However, when cross-sectional observations are used in statistical estimation, a, $(1 - a)$, w and r may differ. However, it can be seen that if these differences are not great, as empirically they are not, then one will get a near prefect statistical fit. No wonder Douglas and his colleagues found the estimates of the supposed output elasticities almost identical to the factor shares and obtained R^2s of over 0.95 – this is simply because they were in fact estimating the factor shares.

What about estimates of aggregate production functions using time-series data?

The identity will also give a good fit to time-series data provided the weighted log of the wage rate and profit rate can be accurately proxied by a time trend. This will often have to be a non-linear function as the wage rate and the profit rate have a strong cyclical component. The use of a linear time-trend can give such poor statistical results that it often gives the impression that a behavioral equation is being estimated. It should be noted that this critique does not just apply to the Cobb-Douglas production function. If the identity has changing factor shares due to, say, the relative change in the bargaining power of firms and workers due to globalization, a better transformation of the accounting identity may be given by a CES relationship (Felipe and McCombie, 2001; Simon, 1979a). In fact, one could simply use a Box-Cox transformation to estimate the best statistical fit, one of which is a relationship identical to the CES.

This argument was first articulated by Phelps-Brown (1957) and his argument formalized by Simon and Levy (1963). Simon (1979b)[8] thought the criticism sufficient to mention in his Nobel Prize acceptance speech and the criticism was applied to Solow's (1957) by Shaikh (1974, 1980). Samuelson (1979) also noted it with respect to Paul Douglas's estimations. The criticism was extended and applied to other studies by Felipe and McCombie and their series of papers brought together in Felipe and McCombie (2013). The argument is deceptively simple and has been subject to a number of criticisms, or rather misunderstandings (notably that it only applies to the Cobb-Douglas production function) and criticisms that beg the question by assuming *a priori* that an aggregate production function theoretically exists. These are considered in Felipe and McCombie (2013, chapter 12) and none of them are found compelling.

What are the implications?

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[7] Note that this is different from the identity derived from neoclassical production theory where the value of output is pQ where p is the price in, say, £s per unit output. It is theoretically possible to recover the physical volume of output from this and theoretically (although not in practice) estimate the production function in terms of physical units.

[8] As Simon (1979b, p.497) put it "Fitted Cobb-Douglas functions are homogeneous, generally of degree close to unity and with a labor exponent of about the right magnitude. These findings, however, cannot be taken as strong evidence for the classical theory, for the identical results can readily be produced by mistakenly fitting a Cobb-Douglas function to data that were in fact generated by a linear accounting identity (value of goods equals labor cost plus capital cost), (see E. H. Phelps-Brown). The same comment applies to the SMAC [CES] production function" .

The use of the aggregate production function to determine the output elasticities and hence indirectly test and often (erroneously) confirm the marginal productivity theory of distribution by comparing them to the factor shares is without foundation. The fact that capital's share has increased while the capital-output ratio has remained constant is not caused by an aggregate elasticity of substitution of less than unity. It is the change in factor shares and the accounting identity that gives, or causes, the misleading impression of an aggregate elasticity of substitution (which "does not exist" as Fisher, Solow and Kearl (1977) remind us) of less than one.

Piketty puts forward three laws to explain the development of inequality, partly with the neoclassical framework. The first fundamental law is a definition or accounting identity that $\beta = r(K/Y)$. In other words, capital's share equals the rate of profit (r) times the capital-output ratio (K/Y). The second is $K/Y = s/g$ where s is the net savings ratio and g is the rate of growth. The equation $\Delta K/\Delta Y = s/g$ $\Delta K/\Delta Y = s/g$ is an identity, so as g falls relative to s, the capital-to-income ratio increases, so the equation $K/Y = s/g$ must be viewed as a case where the capital-income ratio has stabilized. Combining these, we have an expression for capital's share in national income $\beta = rs/g$, or Piketty's second fundamental law. Piketty uses net rather than gross income and savings rates, and Krusell and Smith (2014) show that this is not innocuous. Moreover, they interpret the law within the framework of the Solow growth model and the neoclassical production function. (See also Homburg, 2014.)

Finally, and perhaps most importantly, there is the relationship between r and g. Whenever $r > g$ functional inequality will rise. "The inequality $r > g$ implies that wealth accumulated in the past grows more rapidly than output and wages" (p. 571). This is the "Central Contradiction of Capitalism". However, this relationship has been later clarified in the debate between Mankiw (2014) and Piketty (2014b, 2015) and has to be qualified by allowing for savings out of capital and capital taxation. Moreover, it has been interpreted in terms of the standard neoclassical growth model and the steady-state "golden rule" of accumulation. What is important, though, in Piketty's analysis is that there are a number of shocks that owners of wealth experience and these lead to wealth inequality and a Pareto distribution of wealth amongst the wealthiest decile. The larger the value of $r - g$, the greater the degree of wealth inequality, but it will converge to some finite level.

In a sense, Piketty muddied the waters by using the aggregate production function, albeit tentatively, to explain the increase in capital's share through technology alone and the aggregate production function. However, Piketty (2015, p.70) is well aware of the limitations of the aggregate production function and the role of the paradigm in determining what are the legitimate questions. "All economic concepts, irrespective of how 'scientific' they pretend to be, are intellectual constructions that are socially and historically determined, and which are often used to promote certain views, values or interests." […] "In particular, the notion of the

aggregate capital stock K and of an aggregate production function $Y = F(K, L)$ are highly abstract concepts. From time to time I refer to them. But I certainly do not believe that such gross oversimplified concepts can provide an adequate description of the production structure and the state of property and social relations for any society."

Our arguments question whether the aggregate production function can provide any description of the underlying technological structure of an economy.

5. Does income inequality harm economic growth?

One argument about the effect of income redistribution is that it is harmful for economic growth. High incomes provide incentives for innovation and entrepreneurship and are justified in terms of increasing the efficient use of resources and the dynamism of the economy (Lazear and Rosen, 1981; Mankiw, 2014). Some of the early literature maintains that a certain degree of inequality is helpful to the functioning of a market economy through capital accumulation, as it gives high-saving capitalists more income (Lewis, 1954; Kaldor, 1956, 1961).

However, if the extremely high share of income of those at the top of the ladder is nearly all derived from extracting economic rents, then the implications are very different. Questions of equity arise. Given the concerns expressed in the introduction about the harmful social and economic effects of increasing inequality (Wilkinson and Pickett, 2009), there is a case for reducing income inequality on these grounds alone. Moreover, as education is one of the key drivers of economic growth, if redistribution takes the form of increased government expenditure in this area, it may actually increase the growth rate. Consequently, an important empirical question is the relationship between income inequality and growth.

Considerable research has been done, in the light of the recent events, to unravel the various relationships and the direction of causation. Clearly, if market income inequality is inimical to growth, redistribution will lead to a "win-win" situation; the poor will be made better off and at the same time the growth of output will increase. While econometric evidence is never conclusive (Summers, 1991), the evidence now strongly suggests that greater inequality is harmful for growth. This suggests that there is a case for government intervention. What is the most appropriate form and degree of government intervention is less clear cut. Early studies that come to this conclusion include, *inter alios*, Alesina and Rodrik (1994) and Persson and Tabellini (1994). In general terms, it can be argued that their conclusions have been supported by more recent studies using better datasets and more appropriate estimation techniques (notably the System GMM estimator). Most important are the studies of Berg *et al.* (2008, 2011), Ostry *et al.* (2014) and Cingano (2014).

Alesina and Rodrik (1994) examine the relationship between countries' average growth rates and their initial income distribution at the beginning of a long time period. They find that the

lower the level of income inequality at the beginning of the period, the higher the subsequent growth. This suggests higher income inequality impedes growth. Persson and Tabellini (1994) develop a general equilibrium model (an overlapping generations model), whose fundamental empirical implication is that a more equal distribution of income increases growth. This model's prediction is first tested on a "historical" dataset of nine countries going back to the 19th Century over sub-periods of 20 years and then on a post-war sample of 56 countries over one time period (1960-1985). OLS regressions confirm the negative effect of greater inequality on growth. In particular, the positive correlation between greater income equality and slower growth holds true in democratic countries.

Barro (2000 and 2008) and Easterly (2007) also give support to the hypothesis that greater inequality negatively affects growth. Barro confirms that the Kuznets curve is a clear empirical phenomenon and that an inverse U-shape relationship between income inequality and GDP per head is stable for the period 1960-2000. Moreover, using a cross-country growth model, a negative impact of income inequality on economic growth is also confirmed. Easterly's (2007) paper focuses on *structural inequality*. Structural inequality is defined as that inequality that is determined by historical events such as colonization by conquest, slavery and the distribution of land by the state or colonial power. In other words, the elite group is created by these mechanisms and is not affected by the functioning of the market.[9] Then, the causal relationship between inequality and development is tested using measures of factor endowments as instruments, following the Engermann and Sokoloff' s (1997) hypothesis that "factor endowments are a central determinant of (structural) inequality, and (structural) inequality in turn is a determinant of bad institutions, low human capital investment, and underdevelopment" (Easterly, 2007, p.756). According to this thesis, the characteristics of the land endowments, such as the suitability for growing sugarcane, may require the use of slavery and are thus historically determined as lands with a high unequal distribution of landownership (for instance, Latin America). Alternatively, the land endowments may require the work of family farms and thus favor the development of a middle class. Using a cross-country sample, regressions analysis shows that whether the land is suitable for wheat or sugarcane (which demands slave labor) determines the extent of structural inequality and structural inequality affects the development path.

Turning next to the studies of the more recent period, Berg and Ostry (2011) commence with the observation that the growth paths of many developing countries are rarely smooth, exhibiting periods of fast growth over several years, followed by long periods of slower growth or stagnation. Berg and Ostry (2011) provides a useful summary of Berg *et al*. (2008) (subsequently published as Berg *et al*. 2012). The development problem is not to kick start a

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[9] Market inequality, instead, is the disparity due to market forces, which allocate income unevenly across people.

period of rapid growth, but to sustain it. The advanced countries and Asia generally have relatively soft landings after a period, or spell, of sustained growth (p.8), whereas African countries more often than not experience severe collapses or hard landings. Berg and Ostry consider whether the distribution of income has anything to do with these different growth regimes. In particular, they test whether the degree of income inequality affects the duration of a growth spell, that is "the interval starting with a growth upbreak and ending with a downbreak" (Berg and Ostry, 2011, p.3). They first determine the degree of correlation between the length of the growth spells over a large sample of developed and developing countries and the average distribution of income. The latter is measured by the Gini coefficient over the relevant period. They find that a higher level of income inequality is related to a shorter duration of fast growth, suggesting that a greater degree of income inequality has an adverse effect on the overall rate of growth. The hypothesized channels through which greater income inequality may hamper sustained growth are credit market imperfections that may present an obstacle for the poor to finance their education, the concentration of political power in the hands of the elite and a greater risk of political instability. Because of data limitations, Berg *et al.* (2011) first undertook a variable-by-variable analysis, considering the possible determinants of shorter growth spells separately. They find that political institutions with strong constraints limiting the actions of the executive branch, improvements in primary education and a reduced child mortality, a greater ratio of bank deposits to GDP, more trade liberalization, more financial integration (FDI, in particular), high shares of manufacturing exports, lower macroeconomic volatility (currency depreciation and inflation), less external shocks (trade reductions and increased US interest rates) and low income inequality are all correlated with longer growth spells. This largely confirms the results of much of the previous literature on the determinants of cross-country disparities on economic growth.

What is particularly important is that the income inequality variable has the largest effect of all these variables on the duration of the growth spell and is highly statistically significant. As many of these determinants might be correlated with each other, the joint effect of these factors is then examined and the income distribution still remains extremely important. Income inequality is not just acting as a proxy for the other factors.

Berg *et al*. (2012) further investigate the duration of the growth spells. After identifying structural breaks in the growth paths of 140 countries that define growth spells, they begin their empirical analysis by estimating a proportional hazard model. This estimates the probability that a growth spell will end the next year, conditional on its current length, together with a number of socio-political factors that exist at the beginning of the growth spell and ones that also change over the period of the spell. The results again confirm some well-established findings. To summarize: an improvement in measures of both political and economic institutional arrangements is associated with an increase of the duration of a growth spell; within a spell,

improvements in primary education raise the predicted duration of a spell; a positive relationship is found between financial development (bank deposits-to-GDP ratio) and the duration of the growth spell; trade liberalization makes a growth spell last longer and the same goes for the FDI (in)flows. Measures of export sophistication and an increase in the manufacturing exports as a share of total exports during the growth spell are positively correlated with the spell length. External shocks are estimated to reduce the spell duration; an increase of the Gini coefficient is associated with a lower duration of the growth spell, whereas a non-robust significant association is found between the duration of a growth spell and measures of ethnic, linguistic or religious heterogeneity; an increase in child mortality affects negatively the spell length; and, finally, inflation, depreciation of the currency and an increase of the public debt-to-GDP ratio are all negatively correlated with growth length.

Of particular interest is the finding that income inequality "survives as one of the robust and important factors associated with growth duration". "A 10-percentile increase in inequality – the sort of improvement that a number of countries have experienced during their spells – increases the expected length of a growth spell by 50 per cent" (Berg *et al.*, 2011, p.13).

What can be said about the role of redistribution?

A contrary argument is that those countries with a high level of market inequality could also be the ones that have the greatest redistribution. If the latter distorts incentives, risk taking and reduces capital accumulation *etc.*, then it is this, and not income inequality *per se,* that reduces growth. Importantly, Ostry *et al.* (2014) have been able to test this hypothesis and have rejected it. Using a recent cross-country dataset (Solt, 2009) that allows them to distinguish between *market inequality* (before taxes and transfers) and *net inequality* (after taxes and transfers), Ostry *et al.* (2014) compute the redistributive transfers (the difference between the Gini coefficient for market and net inequality) for a large sample of countries. They find that redistribution is correlated with market inequality to such an extent that there is no significant relationship across countries between market inequality and net inequality (*i.e.*, the inequality of income after redistribution).

These data allow them to study the role of income redistribution on the pace of growth and the duration of growth spells. First, using panel regression analysis, the average growth rate of GDP per head is regressed on the level of initial income, *net inequality* and redistribution, which is the baseline specification. Next, several controls, such as physical and human capital, population growth, the quality of political institutions, external shocks and measures of openness to trade, are added. The results reveal that a higher level of inequality lowers economic growth, whereas redistribution has no statistically significant effect. This holds true even with the inclusion of these additional determinants. Redistribution favors economic growth through its effect on reducing net inequality. They further study the length of growth spells and relate the probability that a growth spell will end the following year to several possible

determinants (either lagged one year relative to the potential end of the spell or at the beginning of the spell). As was found in Berg *et al*. (2011), but now controlling for redistribution, an increase in net inequality is associated with a higher risk that the spell will end the next year. When redistribution is high (the top 25th percentile of the observations), further redistribution harms economic growth (recalling the Okun (1975) hypothesis), but when this is modest (the rest of the distribution), further redistribution does not have any effect. Large redistributions may affect negatively the duration of a growth spell but, on the whole, redistribution reducing inequality seems to have a positive effect on growth.

Cingano (2014) also distinguishes between market and net inequality and considers whether the changes in the share of income held by poor and affluent households (the gap between low income and high income households) may affect economic growth. He also investigates the role of human capital as a channel through which inequality negatively affects growth reducing education opportunities for the poor. Using panel data for 31 OECD countries and controlling for country and time fixed effects (System GMM estimations), growth of GDP per head averaged over a time interval of 5 years is regressed on GDP per head at the beginning of the period (as a standard control for convergence), a vector of controls for human and physical capital, and inequality (Gini index), all measured at the beginning of the period. The estimates show that, in these OECD countries, net inequality (inequality of disposable income) negatively affects economic growth, whereas gross inequality (market inequality) has no effect. When both net and market inequality are included, only the former has a (negative) statistically significant impact, meaning that the redistribution made to reach a given level of net inequality has not hampered economic growth (as also found in Ostry *et al.*, 2014). Next, the effects on growth of inequality in different parts of the income distribution are studied. The Gini index is thus replaced by measures of inequality at the bottom and top of the income distribution. The degree of inequality at the bottom of the income distribution impacts negatively on growth. The degree of income inequality at the top of the distribution, however, has no significant effect on economic growth. Finally, individual-level survey data are used to estimate whether the link between educational attainments and inequality depends on parents' educational background. Panel regressions show that increasing income disparities reduce the educational outcomes of people in need (with low parental income) but do not affect those of medium and high background individuals. Education is thus an important determinant of growth.

The overall conclusion is that high income inequality is bad for growth and redistribution will increase the growth rate.

6. Increasing inequality as a cause of the Great Recession

What can be said about the impact of increasing inequality on the level of short-run, as opposed to long-run, economic activity? Interestingly, there was concern about the increasing buildup of household debt in the US to unsustainable levels in the years immediately preceding the crash. Piketty (2014a, p.297) is in no doubt that the increased inequality contributed to, rather than necessarily caused, the financial crisis. "The reason is simple: one consequence of increasing inequality was virtual stagnation of the purchasing power of the lower and middle classes in the United States, which invariably made it more likely that modest households would take on debt, especially since unscrupulous banks and financial intermediaries, freed from regulation and eager to earn good yields on enormous savings interjected into the system by the well-to-do, offered credit on increasingly generous terms."

When considering the interaction of aggregate demand and income inequality, we find there is a contradiction between what standard economic theory would lead us to expect and what actually occurred. A rapid increase of the share of income accruing to the top 5 percent should have led to a rise in total aggregate savings. This is because those with higher incomes are normally assumed to save a greater proportion of their income. But this did not happen. The higher savings of the top 5 percent was more than offset by the collapse in savings of the bottom 95 percent and also by their increased borrowing for consumption expenditure (largely on consumer non-durables). In other words, the change in the inequality in consumption was considerably less than the change in income inequality. The increase in household debt had the immediate beneficial effect of generating the growth of demand necessary to maintain full employment in the US, but at the cost of long-term problems. This is because, as a consequence, the increase in the household debt-to-income ratio became so large as to become eventually unsustainable.

The increase in debt was encouraged by the low interest rates, the result of the world savings glut and especially, in the US, the inflow of capital. It was also aided by the development of financial instruments, such as the securitization of low income sub-prime mortgages and, more generally, financial deregulation and the increase in structured finance. Furthermore, the search for high returns by the wealthy led to asset and housing bubbles. These may have given the misleading impression that the debt was largely sustainable, as the bubbles were seen by many as being driven by fundamentals.

Thus, it is difficult to gain a complete picture of the causes of the Great Recession without examining the role of the interaction in the increase in inequality and household debt. While much attention has been focused on the US, this pattern was also replicated in the EU countries to a certain extent, although the outcomes were very different in, especially, the Eurozone (Fitoussi and Saraceno, 2010). This issue has attracted a great deal of recent work and all we

can do here is to outline the main arguments (see, in particular, the comprehensive survey by van Treeck, 2013).

Cynamon and Fazzari (2013) focus on the savings and income of the top 5 percent and the remaining bottom 95 percent of the income distribution in the US. They find that, after remaining stable until about 1980, the debt-to-income ratio rose steadily, accelerating after 2000, until falling sharply with the crash of 2007.

The growth of aggregate demand in US became increasingly dependent upon the growth of domestic consumer spending of the bottom 95 percent, with, in turn, its growing reliance on borrowing. They calculate that if the bottom 95 percent had maintained their saving rate at a benchmark figure, which would have ensured that the degree of household debt was sustainable, there would have been a shortfall of aggregate demand of about 8% of GDP in the peak years of 2005 and 2006. The crash and the collapse of expenditure and borrowing of the 95 percent group, led to an equivalent fall of 8 percent of demand of GDP by 2009. The importance of the increase in income inequality is that if the share of income of the bottom 95 percent had not declined, there would not have been a collapse in the saving rate and a concomitant rise in debt to maintain the desired pattern of expenditure.

Table 2 shows the increase in household debt as a percentage of GDP for a selection of advanced countries. It can be seen that it was only Austria, Germany, Switzerland and, to a certain extent, Italy that escaped the buildup in household debt.

Table 2 Household Debt as a Percentage of GDP: OECD Countries, 2000-08

	2000	2008	Change 2000-08 Percentage Point
USA	70.21	96.35	26.13
United Kingdom	75.16	107.43	32.27
Ireland	51.55	114.26	62.71
Greece	19.83	55.29	35.46
Spain	54.22	88.06	33.84
Portugal	74.96	102.34	27.38
Italy	35.29	53.61	18.32
Germany	73.41	61.70	-11.71
Austria	47.13	55.04	7.91
Switzerland	74.76	77.70	2.94
Netherlands	86.98	119.81	32.83

Note: Ireland 2001-08
Source: Stockhammer (2012)

Turning to the buildup of debt and its effect on economic growth, Fitoussi and Saraceno (2010) show that those countries whose cumulative percentage change in short-term loans was the greatest, experienced the greatest change in real GDP. The countries in the sample are the

UK, Spain, (both of which had a greater change in short-term loans than the US), the US, France, Italy and Germany. Of course, with only six observations, the degrees of freedom are limited, so the relationship should be regarded as suggestive, rather than definitive. But nevertheless, it indicates that the debt build up was crucial to maintain the level of aggregative demand.

Consequently, the Great Recession may not have occurred or, at least, may not have been so severe in some countries if the degree of income inequality had not increased as much as it did. It is interesting that there is a remarkable similarity between what happened to income inequality and the household debt of the bottom 95 percent in the run up to the 2007 Great Recession and in the period 1920-1928, immediately prior to the Great Depression. In both periods, with the onset of the crises, there was an increase in the household default rate, and there is an element of history repeating itself. Nevertheless, there was one significant difference, which was that from 1936 to 1944 there was almost a complete reversal in the inequality gains of the top 5 percent. This has not occurred so far in the US to date (Kumhof, Rancière, and Winant, 2013. See also Galbraith, 1954).

An interesting debate was generated by Rajan (2010) over the precise nature of the relationship between income inequality and demand. We have seen that, in the short run, the increase in inequality was, if not the initiating factor of the crash, a substantial cause of the exceptional depth of the recession because of the debt it generated. Rajan (2010, p. 9) places the blame for this squarely at the door of the government, "Cynical as it may seem, easy credit has been used as a palliative throughout history by governments that are unable to address the deeper anxieties of the middle class directly". He argues that rather than make this subsidy explicit, it was dressed up as furthering the American dream of home ownership for all. But it was nonetheless "a credit expansion … used to assuage the concerns of a group that is being left behind". This interpretation not surprisingly led to a lively academic and political debate.

This leads to the important question: why exactly did the household debt-to-income ratio rise so much?

The orthodox explanation is in terms of the representative agent maximizing inter-temporal utility under conditions of risk. Rational agents optimally allocate their current assets, current income and intertemporal work effort to maximize their lifetime consumption. Thus, as the capital markets became more efficient, so consumption was smoothed to a greater extent by greater lending and borrowing. "A very influential view up until the Great Recession was that the rise in measured inequality reflected mainly a high dispersion in the transitory components in income, which households could insure against through credit markets" (van Treeck, 2013, p.7). Indeed, two exponents of this view go so far as to suggest that the development of the availability of the credit markets actually developed in response to the greater volatility in transitory income (Kreuger and Perri, 2006). Thus, the fact that there was less volatility in

consumption expenditure is interpreted, it must be emphasized prior to the Great Crash, as being due to the efficient working of the credit markets. Hence, given the paradigmatic assumptions of this approach, according to this view, there was no major cause for concern over this extensive borrowing as late as 2005 and "the results of Krueger and Perri (2003, 2006) were literally treated as accomplished facts by the press" (van Treeck, 2013, p.10; see van Treek, 2013, pp.7 - 10 for a discussion of the empirical studies concerning this issue).

The consensus of opinion now, however, seems to be that rather than the result of a conscious government decision *per se,* a là Rajan, the increasing in borrowing was a direct result of the increasing wealth of the top one percent, to a not inconsiderable effect driven by the financial sector and deregulation. The greater emphasis on providing, especially, subprime mortgages and the effect of rising house prices, both led to widespread refinancing and equity withdrawal. (For a detailed study of financialization and US private consumption, see Bibow, 2010.) A large proportion of new and re-mortgages were used for consumption purposes, leading to a rapid increase in household debt. The debt-income ratio in the US rose by 68 percentage points for the bottom 95 percent between 1989 and 2007 (Cynamon and Fazzari, 2013). It is also interesting to note that in 1983 the top 5 percent was more indebted compared with the bottom 95 percent by 15 percentage points, but by 2007 the debt-to-income ratio of the bottom group had increased to 140%, which by then was twice as high as the top group (which was around 70%) (Kumhof and Ranciére, 2010, pp. 7-8). A corollary of this is that the income inequality from 1980 to 2006 increased more rapidly than consumption inequality.

Kumhof and Ranciére (2010) and Kumhof, Ranciére and Winant (2013) construct formal models along the lines where the wealthy (the top 5% who are designated "investors") buy financial assets that allow the less well-off to increase their consumption by extensive borrowing, in spite of low or zero growth of their incomes. Wealth enters directly into the utility function of the top 5 percent for reasons of social status and the power that the wealth confers. This process maintains aggregate demand and growth, but at the cost of increasing financial fragility. A key assumption of the model is that workers' bargaining power is eroded over a ten-year period, followed by a twenty-year period when it gradually recovers. The probability of a crisis and a crash increases with the rise in the household debt-to-income ratio. The crisis is accompanied by households rationally anticipating debt defaults that will occur on a large scale. The fall in output in the post-crash period is generated in the model by a rather implausible 10 percent destruction of the capital stock. The policy implications are dramatic. "Because crises are costly, redistribution policies that prevent excessive household indebtedness and reduce crisis-risk ex-ante can be more desirable from a macrostabilization point of view than ex-post policies such as bailouts or debt restructurings" (Kumhof and Ranciére, 2010, p. 4). However, importantly, in this model there is no explicit role for the financial sector and, crucially, there is no need for the bailout of banks and no collapse of the interbank market. (See

Palley (2013) for a further criticism of this model along Keynesian lines for its failure to, *inter alia*, be able to model the failure of aggregate demand.)

The alternative explanation for increasing indebtedness to the Kreuger and Perri intertemporal consumption smoothing model is that the consumption level of a household is primarily determined by the expenditure patterns of other households and reference groups. The types of goods bought by the wealthy cascade down the income ladder, generating similar demands by poorer households (Frank, 2007). People are influenced by the type of expenditure patterns of income groups that are above, rather than below, them in the income ladder. Preferences are thus endogenous and are affected by social references and norms. This approach is an extension of Duesenberry's (1949) relative income hypothesis, which at one time rivaled Friedman's permanent income hypothesis. Consumption also has a persistence effect in the face of falling incomes and is influenced by social factors and habits other than just the level of income. Hence, with the development of new types of goods, the demonstration effect means that those in the lower income group will strive to obtain them. Given stagnating real incomes and in the absence of the ability to increase their income through increasing the household participation rate, the bottom 95% will take the option of dissaving and borrow to purchase these positional goods (van Treek, 2013).

Of the two competing explanations, it seems that the orthodox one is not compelling. Empirical evidence suggests that the increase in inequality was due to changes in permanent and not transitory income (Kopczuk, Saez, and Song 2010). Consequently, borrowing for consumption smoothing seems implausible. The composition of the two income groups, *i.e.* the 5 percent and the 95 percent remained the same (there was little intergenerational migration between the two groups) so there was little movement between the groups due to exogenous shocks. Furthermore, it is difficult to see how rational actors would interpret a sustained low income growth over a number of years as transitory. van Treeck (2013, p. 12) notes that an annual Gallup poll found that the income that individuals considered to be satisfactory rose dramatically after 1987 (roughly when the increased in inequality began) and above the actual income received. As van Treeck (2013, p. 14) implies, it surely cannot be coincidental that the increase in debt happened at the same time as inequality rose. He further surveys the substantial and compelling evidence that supports the relative income hypothesis (van Treek, 2013, pp. 15-19).

Stockhammer (2012) presents a broader Keynesian framework to analyse these developments, distinguishing between what is termed "debt-led" growth and "export-led" growth. The US is an example, par excellence, of the former and Germany of the latter. As far as the last is concerned, deregulation of the international financial markets has allowed countries to run current account deficits for much longer than they had in the past. In 2007, the US was running a current account deficit of 5.1 percent of GDP and Germany a surplus of 7.5 percent. With the increase

in income inequality, not reversed by the Great Recession, the economies of the US and the UK were driven by consumption-led demand, supported by a fall in the aggregate saving rate and increased debt larger for the lower income groups for reasons outlined above. In the case of Germany, the focus was on increasing the growth of demand through holding wages down and increasing the price competitiveness of its exports. One reason why the US did not pursue an export-led growth strategy is that the current account deficit and overvalued exchange rate were driven by short-term capital inflows resulting from the global savings imbalances.

In conclusion, it seems that the increase in income inequality has had an impact on the level of economic activity.

7. Empirical studies on the causes of inequality

Understanding the causes of income inequality, *per se,* has recently become of increasing importance. Income inequality has become a major policy issue as the gap between the rich and the poor keeps on widening, which is happening in most OECD and Asian countries (OECD, 2011; ADB, 2012; and Oxfam, 2013).

Confining our attention first to the OECD countries, real disposable income, on average, has increased by 1.7 percent per year during the two decades prior to the Great Recession (OECD, 2011). In most of them, however, the share of household income held by the wealthiest 10 percent has grown faster than that of the poorest 10 percent. At present, in the advanced countries, the average income of the richest 10 percent is about nine times greater than that of the poorest 10 percent (in the 1980s, the ratio was 7:1). For Italy and the United Kingdom, the ratio is 10 to 1; for the US, the ratio is as high as 14 to 1 (OECD, 2011).

The 2011 OECD report *Divided We Stand. Why Inequality Keeps on Rising* studies the driving forces behind this rising income inequality. It starts from the analysis of the drivers that may affect wage and earnings inequalities, studying the role played by the trends in globalization, technological change, and the change in labor market institutions. It also considers the effect of tax-benefit policies and public services in offsetting market-based (pre-tax) inequality.

Household income distribution depends on the evolution of earnings as wages and salaries account for three-quarters of households' income. From the early 1980s to the start of the Great Recession in 2007, in 16 out of 23 of the OECD countries, the decile ratio of the 10 percent highest-paid workers to the 10 percent lowest-paid workers has risen. This was due to both increasing earnings shares at the top and decreasing shares at the bottom. But high-wage earners saw a particularly rapid growth in their incomes (Atkinson, 2009). In terms of the overall distribution, top-wages earners have been drifting away from those in the middle faster than the lowest earners have been falling behind the middle earners.

Over the last twenty-five years or so, beside this general trend towards greater earnings inequality, there have been other notable economics changes. First, there is the trend towards greater economic globalization. There has been an increase of the share of trade to GDP ratio in all OECD countries (especially starting from the 1990s) and a fast growth in international financial transactions. "Total cross-border liabilities increased exponentially, from 50% of GDP (average across 23 OECD countries) in 1980 to nearly 300% in 2007" (OECD, 2011, p.91). This rapid growth in the transfer of financial capital across national borders is due both to increases in foreign portfolio investment (FPI) and foreign direct investment (FDI). FPI has accounted for the majority of this increase, but nevertheless an important role has been also played by FDI, "with the GDP share of FDI doubling to 50% between the mid-1990s and the mid-2000s" (OECD 2011, p.104). Secondly, the rate of technological progress, measured either by investment in R&D expenditure, the output of knowledge production (patents) or by the degree of computerisation (the use of ICT by firms), has experienced a notable increase over the recent decades. Finally, there have been major changes in labor market institutions, policies and regulations. Since 1980s, labor markets have become increasingly deregulated, trade union density rates have fallen; employment protection legislation has decreased; product market regulation has become more relaxed; and tax wedges have been reduced.

This leads to the following question. Might these trends in globalization, technological change and labor market institutions and policies be the driving forces of increased wage and earnings inequality *within* countries?

To begin with, if we focus exclusively on the trend of economic globalization and just on one of its aspects, that is, *trade integration*, the literature (with more or less strong empirical support) has reached the conclusion that pro-openness policies seem to increase wage inequality.

There has been a long debate about the relationship between the distribution of income and trade liberalization. Milanovic and Squire (2005) take stock of this literature and present an empirical analysis of the relationship between trade liberalization and distribution of income, aiming at addressing some of the concerns related to the previous work that has led to inconclusive results (see, *inter alios*, Edwards 1997; Londono, 2002; Dollar and Kraay, 2001; Barro, 2000; Spilimbergo *et al*., 1999; Lundberg and Squire, 2003). First, they assess the impact of the change in trade liberalization on the change in *inter-occupational* income inequality (*i.e.,* measured by the annual change in the Gini coefficient) and find that a decrease in trade protection increases inequality, once the estimates are controlled for the interaction term between the change in trade protection and level of income, and trade union membership (or the percentage of workers covered by collective bargaining agreements). Specifically, although this result has to be viewed cautiously as the statistical properties of the regressions are not robust, it is found that a reduction of tariffs increases *inter-occupational* wage inequality in poor

countries. Secondly, they assess the effect of trade protection on *inter-industry* inequality (measured by the annual change in the Theil index). As before, when the regression results are controlled for the same interaction terms, the effect of change in trade protection on *inter-industry* wage inequality is statistically significant. This is to say that a reduction in trade protection leads to greater *inter-industry* inequality. Moreover, reduction of tariffs contributes to *inter-industry* inequality more strongly in countries with a high density of the trade unions.

The more recent OECD (2011) report provides an extensive analysis of the determinants of wage inequality.

The following results were obtained using regression analysis, where the dependent variable is the decile ratio (D9/D1) of weekly earnings among full-time workers (i.e., a measure wage dispersion) and independent variables are a set of globalisation indicators (including measures for both trade and financial transactions), an indicator of technological progress (proxied by the expenditure on business sector R&D as a share of GDP), a set of labor market institutional variables and policy variables, and a vector of controls (the sectoral share of employment, education proxied by the percentage of population with post-secondary education, the share of female employment and the output gap).

Trade integration has no distributional effect at an aggregate level. This is confirmed both when imports and exports are measured separately or further disaggregated. However, increased imports from low-income developing countries worsen wage dispersion in those OECD economies with weaker employment protection legislation. Both *de jure* and *de facto* measures of financial integration have no significant impact on within-country trends in wage disparity. It seems that inward FDI tend to reduce wage dispersion, whereas outward FDI tend to increase it. Moreover, to the extent that increases in trade are accompanied by greater financial flows, there may be an interplay between trade exposure and inward FDI.

On the one hand, business expenditure on R&D, which, as we noted above, is sometimes taken as a measure of technical progress, adversely affects the degree of wage dispersion. On the other hand, an increase in the supply of skilled labor, and the share of employed women, tend to offset the increase in wage inequality. Hence, this partly reflects the well-known race between education and technology (Goldin and Katz, 2009).

The weakening of labor and product market policies and institutions adversely affect the trend in wage dispersion within countries. More lenient employment protection and product market regulation, and reduced tax wedges, have increased wage inequality among full-time workers. As for employment legislation protection (EPL), its impact is entirely due to the reduced employment protection for temporary workers. Wage inequality is, not surprisingly, increased by not only a lower union coverage, but also lower unemployment benefit replacement rates for low-wage, but not average-wage, workers.

When, instead of the D9/D1 decile ratio, the dependent variables are the D9/D5 and D5/D1 decile ratios of earnings, it is again found that trade exposure has little impact on both end of the wage distribution. Both increased outward FDI and technical progress adversely affects the higher part of the wage distribution. More flexible product market and employment protection regulations are again related to an increase in wage inequality, but only in the lower part of the wage distribution. The upper half of wage distribution is more sensitive to changes in average tax wedges and union coverage. Lower unemployment replacement rates increases wage inequality with similar quantitative effects on lower and upper wages. Both the rise of female employment and the up-skilling of the workforce are associated with inequality reduction in the two halves of the wage distribution.

The evidence shows the crucial role of education in offsetting those factors leading to greater wage inequality. The up-skilling of the workforce has largely compensated for the increase in wage dispersion due to technological change, regulatory and institutional arrangements. Over the period studied, this is found to be the only factor able not only to reduce wage dispersion among the employed but also to increase employment rates.

Social security payments have been an important factor in helping households maintain their living standards, such that the dispersion of *net in*comes (after taxes and benefits) shows less inequality than market-place income inequality. Redistribution through social policies has increased over time, but so also have those households requiring support, reducing the effect of the former. It is found that these redistribution schemes reduce inequality on average by a quarter, with a greatest degree of income redistribution in the Nordic countries and less in Chile, Iceland, Korea, Switzerland and the US.

In particular, since the mid-1980s to 2005, the extent of redistribution increased, but since the mid-1990s tax-benefit policies have become increasingly less effective at offsetting the large increases in market (household) income inequality. Over the same period, redistribution succeeded better at offsetting rising income gaps at the bottom, rather than in the upper part of the income distribution.

Among the instruments, benefits had a more effective impact on inequality than social contribution or taxes. The evidence shows that benefit entitlements became more generous through changes in the receipt patterns. In fact, considering the overall distribution, the most important factor is the number of people entitled to transfers instead of the level of the benefit itself.

As far as income taxes are concerned, notwithstanding the trend towards a considerable concentration of income in the upper part of the distribution, these were not able significantly to lessen net income inequality. This was due to both lower income taxes and more progressive taxation, which seemed to have partly cancelled each other out. Finally, redistribution due to social security contributions was very little, mainly because of their flat-rate structure.

The distribution of resources across households is also affected by public social services, namely education, health and care services. On average, OECD countries spend on publicly provided services about 13% of GDP (OECD, 2011). Although the primary goal of the provision of these in-kind services is not redistribution, their provision is ultimately redistributive. Publicly provided services contribute to reducing income inequality by one-fifth and one-third. In particular, education and health are found to contribute the most to lowering inequality. Expenditure on care for the elderly, social housing and childcare, have, on the whole, less effect.

The concern with increasing income equality is also found with respect to the rapidly growing Asian economies to such an extent that Balakrishnan *et al.* (2013) describe it as "an Achilles' Heel" of Asian economic growth. These concerns have also been documented by the Asian Development Bank (ADB, 2012) and a parallel with the advanced countries can be found.

Over the past twenty five years, Asia's growth rates have been remarkable and most of Asian economies have grown faster than other emerging countries. "From 1990 to 2010, the average annual growth rate of gross domestic product (GDP) for developing Asia reached 7% in 2005 purchasing power parity (PPP) terms, more than double the 3.4% for Latin America and the Caribbean" (ADB,, 2012, p. 38). The positive outcome of this has been a considerable increase in the living standards and a reduction in poverty. In fact, during the same period, "the region's average per capita GDP in 2005 PPP terms increased from $1,633 to $5,133. The proportion of the population living on or below the $1.25-a-day poverty line fell from 53.9% in 1990 to 21.5% around 2008, as 716 million people were lifted out of poverty" (ADB, 2012, p.38).

Notwithstanding this, the gap between the rich and the poor has widened suggesting that the benefits of that economic growth have not been shared "equally" by all the people on the income ladder, *i.e.* economic growth has not been "inclusive" and "pro-poor" (Balakrishnan *et al.*, 2013). According to official estimates, the Gini coefficient of per capita expenditure[10] of the People's Republic of China went from about 32 in 1990 to 43 in 2008; in India, it ranged from 33 in 1993 to 37 in 2010; in Indonesia, from 29 to 39 (ADB, 2012). Considering Asia as a whole, the Gini coefficient worsened from 39 to 46 (ADB, 2012).

In a global context[11], Asia's Gini coefficient is on average lower than that of Sub-Saharan Africa and Latin America and Caribbean countries. But once changes in inequality are considered, while the Gini coefficient has declined in most Sub-Saharan African countries and Latin American and Caribbean economies, it has increased in developing Asia (ADB, 2012). Inequality in developing Asia is higher than that of the OECD countries (ADB, 2012), which, as

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[10] Measures of inequality are based on per capita expenditure in most Asian economies and in Sub-Saharan Africa. They are based on incomes per head in OECD and Latin America countries.

[11] It must be taken into account that income-based and expenditure-based measures of income inequality are used. The Asian Development Bank Outlook (2012) observes that "income-based inequality measures tend to run higher than expenditure-based ones" (p.50).

we noted above, are experiencing an increasing inequality driven by the top of the income ladder as well.

What are the drivers of inequality in Asia?

According to the Asian Development Bank Outlook (2012), the three key drivers of Asia's remarkable growth - *globalization*, *market oriented reform* and *technological change* - together with differences in terms of *opportunity*, have determined the sharp increase in income inequality. On the whole, these have impacted on income inequality through four channels.

First, although efforts have been done to improve the average achievements in education and health, inequalities of education and wealth remain considerable. Inequality in education and health unfold as inequality by wealth quintile (the proportion of non-attending school children between rich and poor households has widened; the mortality rates of the top quintile is much lower than those for the bottom quintile), inequality by location (urban versus rural regions), and inequality by gender (differences between boys' and girls' enrolment and under-five mortality rates exist in some developing Asian countries). Disparities in education and health matter as the access to basic services shape the distribution of opportunities. Inequality of opportunity matters as it leads to inequality of outcome, which in turn leads to a chain of inequality of opportunity and then to outcome, from one generation to the next.

Secondly, the gap between the wages of the skilled and unskilled labor has increased, as in the advanced countries. This is (in part) due to skill-biased technological progress. In fact, whenever technological change favors more educated or more experienced labor compared with unskilled labor, the skill premium increases and this adversely affects income inequality. This process can be exacerbated by globalization in so far as the latter affects relative demand for skilled and unskilled labor.

Thirdly, during the mid-1990s to mid-2000s, the labor income share has declined, which happened because technological progress has been "labor saving and capital using" (p. 66, ADB 2012). This has caused the employment growth required to generate each percentage point of GDP growth to decline, which, in turn, has implied increasing labor productivity. An increasing labor productivity and a declining labor income share imply that the growth of real wages is falling behind the growth of labor productivity. Furthermore, a decline in labor's share in income and an increase in capital's share make inequality rise, as capital income is very unequally distributed.

Finally, the last driver of inequality is the spatial dimension. The increasing income gaps between provinces and states, on one hand, and between urban and rural regions, on the other, constitute a significant part of observed inequality in Asia. Opportunities stemming from technological change, globalization and market oriented reforms interact with the geographic structure of the economy and make inequality rise as they may favor some locations instead of others (for instance, if human capital is higher in urban areas than in rural areas or if coastal

regions are preferred by interior regions) (World Bank, 2009). There is thus a spatial trade-off between spatial growth and spatial equality.

8. Conclusions

This paper began with a consideration of the marked increase in income inequality in the US over the last thirty years or so and especially in the share of the top one percent that has reached levels last seen in the 1930s. It argued that this increase has been achieved largely through rent extraction. We showed that the recourse to the argument that labor is paid its marginal product and therefore high salaries are justified in terms of the contribution made to output are problematic on theoretical grounds. First, as Thurow (1975) and Stiglitz (2012) emphasize, there are many theoretical difficulties in explicitly testing this hypothesis for individuals, or groups of individuals, and to the best of our knowledge this has nowhere been successfully undertaken. Moreover, we have shown that no reliance can be placed on estimates of the aggregate production function, including the erroneous conclusion that if the estimates of the "output elasticities" are close to the factor shares, labor and capital may be treated as if they receive their marginal products.

If the large incomes of those of at the top of the income ladder, which cause a high degree of income inequality, are due to rent extraction, then redistribution will not cause growth rates to fall. In other words, there is no equity-efficiency trade off. In fact, the evidence suggests that greater income inequality actually impedes growth. Over a shorter time scale, it is shown that in the US the increase in income inequality led to greater borrowing and household debt by the lower and middle classes immediately prior to the crash of 2007. This maintained the growth of aggregate demand and output, but brought with it the seeds of its own destruction as the household debt became unsustainable.

Inequality may be excessive but it is unlikely to be reduced anytime soon in the US (and indeed in the UK). It is here to stay. In the advanced countries, there is unlikely to be any major change in the share of the top one percent, given the undue political influence this group holds on the political system. Hacker and Pierson (2010) have shown how unequal influence on the political system was a major factor in the policies that led to the increase in income inequality. Bartels (2008), Gilens (2012) and Gilens and Page (2014) present substantial empirical evidence demonstrating how the wealthy elite determine the whole political agenda. The median voter theorem bears no resemblance to the actual political process. (Bonica *et al.* (2013) provide a survey that confirms these views.)

Recent events have shown that there can be no dichotomy between economics and social norms and behavior. They have shown that income inequality does matter and that distributional

issues should be of a major concern to economics. This has thrown up numerous theoretical and empirical challenges. We must start from here.

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