Why economic theory has little to say about the causes and effects of inequality

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Abstract: In this paper we discuss and critique the theory (and lack thereof) on inequality in economics. We suggest that the discipline is uncomfortable on the whole with analysing the phenomenon and that those theorists who *have* asked how inequality arises and what its economic consequences are do so without analytical depth. This, we hazard, is because of a fundamental constraint on what phenomena standard economic theory can address, stemming from the core assumption that the economy can be studied as if it functions like a classical mechanical system, not a complex adaptive system.

1.   Introduction

In the post financial crisis era the intelligentsia have once again dusted off the long-standing debates surrounding inequality. In the lead-up to the US presidential elections in 2012 the commentariat ensured that concerns over rising income inequality were front and centre of the campaign. Similar concerns were raised in the run-up to the French presidential poll and continue to attract major attention across the developed world. From Tony Judt's *Ill Fares the Land* (2010), a social democratic plea for a return to moral argument in politics, to the Tea Party's fire-breathing rhetoric preaching economic freedom in the US, interest has been revived in a vast socio-political literature concerning inequality and its effects.

However, in mainstream economics, there is something of a lacuna of theorising about inequality which restricts the ability of economists to contribute much to this debate as

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scientists. We suggest here that this stems from a discomfort within the profession about expressing a view on inequality because the phenomenon cannot be adequately represented in the favoured body of economic theorizing. In fact, there has been so little interest within the economics discipline that in the introduction to the *Oxford Handbook on Economic Inequality* the editors remarked that

> 'There is a risk that the…field in itself can become somewhat separated
> from the broader field of economics'

> (Salverda, Nolan, & Smeeding, 2009)

In recent decades, some economists with a less orthodox economic perspective have explored the links between the inequality and wellbeing. Lord Layard, drawing on the insights of Richard Easterlin, in his review of the literature on happiness studies (Layard, 2005), examines the link between inequalities of income and people's life satisfaction. Relative wealth, he concludes, rather than absolute wealth is more important for wellbeing. This is an old idea explored over a century ago in Veblen (1899) but somewhat neglected in economics. Layard speculated that the resultant 'arms-race' between people may explain the explosion of mental illness in the developed world.

Happiness research has provided us with valuable insights with regard to the psychological problems inequality can create. But the solution usually offered to fix the inequality problem and, thus, related psychological problems, namely, a highly progressive tax system, is simplistic because it does not account for the various causes of inequality or potentially beneficial effects. Moreover, the literature tends to look at the consequences of inequality in only one direction, as an economic phenomenon which has psychological impacts. It leaves untreated two important questions: where does inequality come from and what (if any) effects does it have on the economy? If, as economists, we are concerned with the study of the how an economy functions, it is curious that we largely neglect the question of how inequality affects an economy. Indeed many mainstream economists tend to consider such questions to be outside of

the realm of what economics can study[3]. Distributional concerns are, under this view, purely political[4], so that

> 'It has been remarked that if one tells and economist that inequality has increased the doctrinaire response is "so what"'

> (Salverda et al., 2009)

Why is this so? We suggest that the combined effects of the second fundamental welfare theorem, the Hicks-Kaldor criterion, the equity-efficiency trade-off and, finally, Arrow's famed impossibility theorem form a block in the mind of the conventional economist when analysing income distribution. While some mainstream economists in the field of new growth theory have considered these questions, the discipline as a whole now seems much less concerned with addressing them than, for example, David Ricardo was in setting down what he felt economics should be about[5]. We further hazard the suggestion that those theories which *do* consider distributional issues lack much analytical content because they depend critically on a fundamental ontological assumption. That assumption is that the economy is a fully connected network, not unlike an electromagnetic field, where every individual is directly connected to all the others in a market 'space' (Potts, 2000).

2.   Current theories of inequality, its causes and effects

It is curious that there is so little interest within economics in theorising about inequality, its origins and its economic consequences. Salverda et al. (2009) note that the majority of research on economic inequality is empirical, keeping track of income and wealth inequalities and drawing broad correlations between them and possible explanatory variables. In fact, a case in point is that, in their own *Oxford Handbook of Economic Inequality*, only one chapter in a 700 page volume is devoted to the problems

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[3] Adherents of the teachings of Lionel Robbins tend to define economics as a synonym for decision theory, focusing upon constrained optimisation.
[4] This is to say the profession is uncomfortable considering questions that could be seen as expressing a view on inequality, not with positive questions of what inequality is and what it correlates with.
[5] David Ricardo famously stated that understanding the distribution of income is the fundamental question of economic theory (Kaldor, 1955).

economic inequality poses for growth[6]. We would suggest that it is not because economists do not care about inequality of income and wealth, but rather that it is because the core of the modern economics research program[7] places concerns about distribution firmly within the political sphere so that economists *as economists* can say little about inequality.

2.1   The view from the core: the welfare and impossibility theorems

The fundamental model at the core of the research program is the Debreu 'Walrasian general equilibrium' economy[8] summarised by the tuple E_S^D

$$E_S^D = \left\{ [X_i \succcurlyeq_i \omega_i]_{i=1}^I [Y_j]_{j=1}^J \right\}$$

$X_i \subseteq \mathbb{R}_+^N$ being the commodity space, $\succcurlyeq_i$ locally non-satiated preferences on this space[9] and ω_i of consumer i respectively, and Y_j the production set of firm j in $\mathbb{R}^{N}$[10].   This model has a general equilibrium allocation $(x^* \, y^*)$[11] supported by a price vector p such that consumers maximise their preferences on their budget set $B_{p,w} = \{x_i \in X : px \leq p\omega_i\}$ while firms maximise profits $\pi = py_j, y_j \in \mathbb{R}^N$ and markets clear ($\sum_i x_i = \sum_i \omega_i + \sum_j y_j$) (this result was proved by (Arrow & Debreu, 1954)). Closely related is the notion of Pareto optimality. An allocation $(x^* \, y^*)$ is Pareto optimal if no agent can be made better off without making another worse off, i.e. $\nexists \, x' : \{x'_i \succcurlyeq_i x_i^* \, \forall \, i\} \, \& \, \{j : x'_j >_j x_j^*\}$. So a Pareto optimal situation is when there is no 'cash on the table' or 'hundred dollar bill on the pathway' as it were.

What is it about this mathematics makes economists think that there is nothing scientific to be said about inequality? Part of the answer lies at the core of economics,

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[6] That reference is Voitchovsky (2009). Another example is *Income Distribution* (Campano & Salvatore, 2006), intended as a textbook for advanced undergraduate students which is concerned with measurement issues, touching briefly, without analytical depth, on the determinants and effects of income distribution.

[7] Core in the sense of being the core of a Lakatosian research program, see Lakatos (1968).

[8] From here we call this the 'Debreu economy'.

[9] So that if $x_i \succcurlyeq x_i'$ we say 'person i prefers x_i to x_i', *or* is indifferent between the two'. Strict preference, $x_i > x_i'$ says that 'person i prefers x_i to x_i'''.   Local nonsatiation means the consumer will never be completely satisfied with any point in the commodity space.

[10] This vector is not restricted to the non-negative orthant of the commodity space so that a negative entry can represent an input.

[11] $(x^* \, y^*) = [\{x_1^*, \dots, x_I^*\}, \{y_1^*, \dots, y_J^*\}]$ where $x \in X = \cap_{i=1}^I X_i$ and $y \in Y = \cap_{j=1}^J Y_j$

namely, in the first and second welfare theorems. The first welfare theorem states that any Walrasian equilibrium is Pareto optimal, which follows quite simply from the fact that under locally non-satiated preferences anything preferred to a Walrasian equilibrium (where resources are fully allocated and payoffs maximised) by the consumers must be infeasible. The second welfare theorem, while not an exact converse, says that if preferences are convex and continuous[12] then *any* Pareto optimal allocation (which may be utterly inequitable) will be a Walrasian equilibrium with endowments transferred in some manner. The proof uses similar reasoning to the first welfare theorem, effectively that at a Pareto optimal allocation, resources must be fully allocated for profits to be maximised and consumers to maximise their preferences (Mas-Colell, Whinston, & Green, 1995).

The basic advice offered by economists to governments is to make transfers using lump sum taxes, then allow trade to occur with the presumption that the economy will tend to the equilibrium allocation that *the government* has deemed a *desirable* Pareto optimal outcome out of many. But the government must know: the preferences of all citizens, the production methods of all firms and what exact endowments will lead to the Pareto optimal allocation and equilibrium desired. Incidentally, the government must also have the ability to levy lump sum taxes on its citizens for redistributive purposes.

If, for some reason, the price vector does not induce the efficient allocation of resources, the standard advice is to introduce some policy which will do so by effectively correcting the price vector. But when that policy, often called a 'Pigouvian tax', is introduced some consumers will gain resources and others will lose them in the move to an efficient equilibrium, which violates Pareto optimality. Here the Hicks-Kaldor criterion is applied. The Hicks-Kaldor criterion *asserts* the primacy of efficient equilibrium as a policy objective by stating that one should undertake a policy that will nudge the economy toward an efficient equilibrium if the net improvement in use of resources is positive (Rosen & Gayer, 2008). If society has distributive concerns, then the 'winners' from such a policy *may* compensate the 'losers' if society chooses to. Such a criterion has (perhaps not without reason) been criticised for implicitly expressing a

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[12] Convexity occurs when $\alpha x_i + (1 - \alpha)x_i' \succeq_i x_i'$ for some $x_i \succeq x_i'$ and for all $\alpha \in [0,1]$ so that consumers would prefer a combination of allocations to any one given allocation. Continuity occurs when the sets $\{x_i : x_i \succeq x_i'\}$ and $\{x_i : x_i' \succeq x_i\}$ are closed, effectively saying that preferences behave in a regularised manner.

sympathy against redistribution. If the winners are the majority or are simply more politically potent than the losers, (especially in the context of the *homo economicus* representation of behaviour) it seems unlikely that they would compensate without coercion.

But assuming that the price vector p induces an efficient outcome, welfare economists tend to assume that policymakers will be bequeathed a social welfare function, which will allow them to identify what Pareto optimal allocation the government would like the economy to achieve as equilibrium. A social welfare function $W(\cdot)$ defined across the commodity allocation vector $x \in X \subseteq \mathbb{R}_+^I$ [13] will be sensitive to inequality under a simple assumption of convexity (Bojer, 2003). Under convexity, as we allocate more of the commodities to i, we will need increasingly more to be allocated to this individual to keep social welfare constant, indicating that society prefers a more equal distribution[14].

However, even here there is a trade-off between what society would consider fair and what is economically efficient. Hal Varian (1976) showed succinctly how if we take the 'nicest' of the social welfare functions which captures concern for Pareto optimality, and then modify it to take account of concerns for fairness there is a clear trade-off between equity and efficiency. Specifically, this welfare function is the simple utilitarian weighted sum $W(x) = \sum_i \alpha_i u_i(x_i)$. If preferences were all monotone increasing or even locally nonsatiated this could introduce some envy into society, since some consumers may have a higher utility if they were granted the commodity bundle of others. If one acknowledges such situations may be harmful to social welfare then we adjust the social welfare function to account for this, for example:

$$V(x) = \sum_i \alpha_i u_i(x_i) - b \sum_i \sum_j \alpha_i \big[u_i(x_j) - u_i(x_i)\big]\delta_{ij}, \qquad \delta_{ij} = \begin{cases} 0 \; \forall \; u_i(x_j) \le u_i(x_i) \\ 1 \; \forall \; u_i(x_j) > u_i(x_i) \end{cases}$$

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[13] I being the set of individuals i

[14] Formally, convexity of $W(\cdot)$ is satisfied if $\alpha W(x) + (1-\alpha)W(x') \ge W(\alpha x + (1-\alpha)x') \; \forall \; \alpha \in [0,1]$. It is a well known mathematical fact that convexity of $W(\cdot)$ implies that $W''(x) > 0$. We know that the marginal rate of substitution between two individuals' commodities for society is $|MRSij| = W_i'/W_j'$. Now since $W''(x) > 0$ we have

$$W'(\cdot) > 0 \Rightarrow \frac{\partial}{\partial x_i}\left\{\frac{\partial W/\partial x_i}{\partial W/\partial x_j}\right\} = \frac{\partial^2 W}{\partial x_i^2}\frac{\partial W}{\partial x_j} > 0$$

Here there is necessarily a trade-off between Pareto optimality which would demand the first term be maximised through a *potentially unequal distribution* of resources, and equality, which would demand the second term be minimised through a *more equal distribution*. Several economists and philosophers have tried various bewildering definitions of the notion of 'fairness' in order to eliminate this trade-off, though few have succeeded without moving an (arguably) large distance from the conventional idea of fairness, as can be seen in Pazner (1977).

Taking these theories together, we can fairly safely suggest that, while 'the economy' E_S^D can support more or less any distribution, we can select a desired set guided by a social welfare function which may or may not express a desire for redistribution as opposed to efficiency. Essentially, this is why the doctrinaire response to the statement 'inequality has increased' is 'so what'. Allocation is a matter for social preference, as any allocation can be efficient, and efficiency is what modern economics is concerned with. But why not look to social choice theory to give us a welfare function?

Alas, the last straw, as it were, for the modern economist is Arrow's famed impossibility theorem. This theorem shows that under some fairly mild looking assumptions about social rationality, it is impossible to find a welfare function $W(x)$ which satisfies all of them. Following Sen (1970), the social welfare function is a mapping $W: X \times Y \rightarrow \mathbb{R}$ which defines societies preference ordering over allocations. The first condition which is to be placed on this ordering is that it must be complete, that is $W(\cdot)$ must be defined over all possible allocations. Second, the ordering must reflect Pareto optimality such that if $x_i' \succ_i x_i \; \forall \, i$ then $W(x') > W(x)$. Third, and perhaps most crucially, in a choice between two alternatives x' and x such that it is always the case that $x_i' \succ x_i \; \forall \, i$, the ranking of the two alternatives must not change even when rankings over the rest of the space do, that is $W_k(x') > W_k(x) \; \forall \, k$. Finally, there must be no dictator such that $\forall \, x, x' \in X, \exists \, i: x_i' \succ_i x_i \Rightarrow W(x') > W(x)$, that is, there must not be a single individual whose preference determines the social preference regardless of any other individual.

The proof that these four conditions cannot simultaneously hold is to show that, for the independence of irrelevant alternatives, the social welfare function to rank all possible alternatives and the Pareto principle to hold, there must be a dictator (Sen, 1970). Essentially, this is due to the fact that a dictator must exist for the social preference

ordering to be independent of irrelevant alternatives (Sen & Foster, 1973). Hence, it is not possible for $W(x)$ to exist as economists would like it to exist and so some inherently political assumption has to be made as to its form.

So it seems that, in the core of the economic research program, there can be no statement on questions concerning the distribution of income and wealth that does not involve some political assumption about the desirability of inequality. That said, if we tinker with the underlying assumptions of the Debreu equilibrium economy, the distribution of income can have significant *economic* effects and we *can* make statements concerning it from an economic standpoint. However, as we will now argue, the 'modifications' do not allow us to obtain satisfactory theories of how inequality emerges and affects the economy.

2.2   *The view from the protective belt: neoclassical macroeconomics*

Neoclassically-founded macroeconomics for a long period of time could not explain the phenomenon of economic growth without simply assuming that technology improved at some exogenous rate, following Solow (1956). The key driver of economic growth, thus, has no economic explanation. This problem persisted until the late 1980's, when Paul Romer argued that, in order to provide an explanation of continuous economic growth building on a neoclassical production function, some departure was needed from the standard assumptions of a Debreu economy. The 'new growth theorists' began to modify the assumptions in two ways. The first strand of new growth theory introduced some form of externality in productivity gains which could compensate for the effects of diminishing marginal returns. For instance Romer (1986), introduced knowledge spill-overs in the context of learning by doing, and Lucas (1988) introduced an externality in the accumulation of human capital. The second strand emphasised the point that technological change emanates from the choices made by those involved in R&D and the capital goods industries and that these choices generate economic growth which is endogenous in character. Perfectly competitive conditions were restricted to the consumption goods sector with pervasive market power present upstream in the innovation process. Both Romer (1990) and Aghion & Howitt (1992) assumed that there is a monopoly factor in the production of intermediate goods of differing (or advancing) qualities, providing an incentive to innovate.

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However, it is striking that none of these authors considered distributional issues in any sense, since their contributions mainly consisted of playing with the mechanics of a Debreu economy to permit growth. Indeed, to make the mathematics of their models tractable they had to preclude any possibility of meaningful analysis of income or wealth distribution by dealing only with an assumed representative agent. That said, authors within this school *have* attempted to consider distributional questions (though it remains understudied) and have come up with two main channels through which inequality may have an effect on growth[15].

2.2.1   New growth theory

The data on growth and inequality usually reveal a negative correlation between higher inequality and economic growth (Aghion, Caroli, & Garcia-Penalosa, 1999), especially once the effects of political instability, voting behaviour and uncertainty over property rights have been controlled for (Thorbecke & Charumilind, 2002).

From a political economy perspective, there is strong evidence supporting the hypothesis that inequality will stir political instability, and affect growth through distortionary redistributive policies and through the need to capture the government to protect individual interests (Thorbecke & Charumilind, 2002). Voitchovsky (2009) argues that if there is a sizeable middle class, or there is considerable antagonism between a privileged minority and the majority, a democratic government (or a weak authoritarian one for that matter) would be likely to raise distortionary taxes and confiscate property as part of a redistributive policy. In general, greater inequality tends to go hand in hand with a tendency towards conflict and instability, which Collier (2007) noted are singularly ill-conducive to growth.

The purely economic argument of new growth theory vis-à-vis the growth effects of inequality can be found in Aghion et al. (1999) who suggest two broad ways in which growth can be affected. The first occurs when poorer individuals are prevented from taking advantage of higher marginal returns to capital (the investment opportunities theory) while the second introduces moral hazard where the poor have had to finance projects through borrowing.

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[15] A good non-technical summary of this literature is given in Voitchovsky (2009).

To illustrate, suppose the composite per-capita production function is $y_t = \int_0^1 y_{it}\, di$. Endogenous growth is introduced through learning by doing so that knowledge accumulates through the process of growth, hence $A_t = y_{t-1}$ and so the growth rate $g \approx \ln y_t / y_{t-1}$ can be written as

$$g \approx \ln y_t / A_t \tag{1}$$

Inequality is assumed to exist in the endowments of the agents ω_{it} and decided stochastically. To illustrate the investment opportunities argument, we can set per capita output to be a function of knowledge and per capita capital

$$y_{it} = A_t k_{it}^\alpha \tag{2}$$

so that $g = \ln \int_0^1 k_{it}^\alpha\, di$. Now assume that capital markets are *so* imperfect that all investment must be made through saving of endowments so, if s is the marginal propensity to save, $k_{it} = s\omega_{it}$ and hence

$$g = \alpha \ln s + \ln \int_0^1 \omega_{it}^\alpha\, di \tag{3}$$

Now, by writing (3) in per capita form we have assumed its concavity.[16] It is a mathematical fact that, under the concavity assumption

$$\int_0^1 \omega_{it}^\alpha\, di \leq \left[\int_0^1 \bar{\omega}\, di \right]^\alpha$$

So we can see from (2) that an equal distribution will produce a higher growth rate. The reason for this is redistribution to the poor induces them to invest, and their higher marginal product of capital will contribute more to growth than the decreased investment from the rich with a lower marginal product of capital will subtract from it.

However, this relies on the patently false assumption that markets are so imperfect as to not permit any borrowing. So suppose we reintroduce financial markets into a model

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[16] Writing the production function in per-capita Cobb-Douglas form requires assuming constant returns to scale and hence diminishing marginal products since $Y_t = A_t K_t^\alpha L_t^\beta \Rightarrow y_t = A_t k_t^\alpha \Leftrightarrow \alpha + \beta = 1$

where the success of a firm depends on the effort of the workers who have a utility function in consumption c_{it} and the cost of effort $h(e_{it}) = A_t(e_{it}^2/2)$ such that

$$V_{it} = c_{it} - h(e_{it}) \tag{4}$$

Again wealth is stochastic. Assume that for production to occur there must be a fixed capital outlay $k_{min.} = \varphi A_t$ and that production is stochastic in the effort of workers so

$$\begin{cases} P([y_{it} = \sigma A_t]|k_{it} \geq \varphi A_t) = e_{it} \in [0,1] \\ P([y_{it} = 0]|k_{it} < \varphi A_t) = 1 - e_{it} \in [0,1] \end{cases} \tag{5}$$

If $\omega_{it} < \varphi A_t$ then we will assume that i must take a loan $b_{it} = \varphi A_t - \omega_{it}$ at interest rate r. Now, assuming that $c_{it} = y_{it} - b_{it}$ and inputting (5) into (4) along with this information the consumer must solve the problem

$$P_i = \max_e \{e_{it}[\sigma A_t - r(\varphi A_t - \omega_{it})] - A(e_{it}^2/2)\}$$

which yields an optimal effort of $e_i^* = \sigma - r(\varphi - \omega_{it}/A_t)$. This can be substituted back into the production system (5) and then (1) to find the expected rate of growth

$$E[g] = \left\{ \ln \int_0^1 e_{it}\sigma \right\} = \ln \sigma + \ln \int_0^1 \sigma - r(\varphi - \frac{\omega_{it}}{A_t})$$

So $E'_{\omega_{it}}[g] > 0$ such that an increase in inequality due to de-accumulation of endowments for particular workers will induce increased financing of firms, which will lead rational workers to shirk since effort is costly while there is no clawback mechanism. However, note that we cannot say that a more unequal distribution of endowments with the same overall endowment will have an effect on growth[17].

What we can see, therefore, is that there is no unified approach to studying inequality in new growth theory and the allocation of wealth is usually taken as given, which tells us nothing about how the underlying causes of inequality are affecting growth. There must also be some further break from the 'basic' Debreu economy in order to get these results, in one case the effective absence of financial markets, and in the other

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[17] An increase in inequality due to transfers within the total income will have no effect on the growth rate and this is very easy to prove. The expression within the second logarithm will aggregate such that the transfers from one agent to another cancel out to leave the second term unchanged.

information asymmetries. Given that there has already been a break with the neoclassical model to admit endogenous growth (in this case learning by doing constitutes a benefit not internalised by the firm) the view that the "basic" model of reality is a Debreu economy may be misplaced.

Moreover, as expected when we introduce a single (additional) break from the Debreu economy, we only get a simplistic one directional result from these models: inequality is 'bad'. However, Galor (2000) notes that the data suggest in fact the relationship is nonlinear, with inequality encouraging growth in the early stages of development when the accumulation of physical capital is more important, and where redistribution will lower savings. He argues that human capital becomes more important in the latter stages, which requires the poor to either have financing opportunities or sufficient income to invest in their human capital. But this sort of story cannot be easily accommodated within the heuristic of new growth theory, and Galor does not provide a formal treatment of his idea, perhaps for this reason. We would suggest that the 'perfect' Walrasian economy is not an adequate benchmark from which to begin building a theory of inequality in economic systems.

2.2.2   Inequality and financial crises

An interesting new avenue in the study of the economic effects of inequality was started by Raghuram Rajan's (2010) contribution to the best-selling literature on the financial crisis. Professor Rajan suggests that inequality of income was linked to the emergence of a credit boom in part because of the democratic nature of the US government and the relative income concerns of its citizens. Quite simply, governments find it relatively easy to allay concerns about inequality by encouraging the provision of cheap credit to poorer households so that they can make large purchases like that of a house. In the US, aided by the securitisation process, this created a massive exposure in the financial system to the very poorest in American society. When interest rates were raised slightly this caused waves of defaults, bankrupting banks and triggering credit default swaps, which bankrupted insurers and which caused the financial crisis.

The argument of Rajan has been formalised within a simulation model developed by Kumhof and Ranciere (2010). In their economy, there are investors i and workers w.

Investors derive utility from consumption c_t^i above a certain minimum consumption $\tilde{c}_{min.}^i$, and also from holding capital investments k_t and deposits d_t which will be loaned to workers. The probability of a financial crisis occurring is π_t which is increasing at an increasing rate in the debt-income ratio of workers. In the case of a crisis $1 - \gamma_k$ and $1 - \gamma_\ell$ proportions of capital and deposits will be lost to default. Lifetime utility is assumed to take a constant coefficient of relative risk aversion form in consumption and a logarithmic form in wealth :

$$U_0^i = \sum_{t=0}^{\infty} \beta_i^t \left\{ \frac{\left(c_t^i - \tilde{c}_{min.}^i\right)^{1-\sigma}}{1-\sigma} + \xi_d \log[d_t(1 - (1-\gamma_\ell)\pi_t)] + \xi_k \log[k_t(1 - (1-\gamma_\ell)\pi_t)] \right\}$$

Workers, on the other hand, derive utility just from consumption above the minimum $c_t^w - \tilde{c}_{min.}^w$.

$$U_0^w = \sum_{t=0}^{\infty} \beta_i^t \left\{ \frac{(c_t^w - \tilde{c}_{min.}^w)^{1-\sigma}}{1-\sigma} \right\}$$

Both these agents maximise subject to fairly standard budget constraints. The representative firm produces output using investors' capital and workers using the standard Cobb-Douglas constant returns to scale technology. The firm's payments to the factors of production are determined in a Nash bargaining game, which gives a wage equal to the marginal product of labour multiplied by the bargaining power of workers η_t, so that when $\eta_t = 1$ the bargaining process yields a competitive outcome

$$w_t = \eta_t \left(\frac{1-\alpha}{1-\chi}\right) y_t$$

Kumhof and Ranciere run various simulations of a scenario where the bargaining power of workers is assumed to decrease from initially $\eta_t = 1$ downward and then back over a period of fifty years. Clearly, this assumption introduces greater inequality into the distribution of income, since workers' wages are depressed. However, as the shares of income of investors rise, rational workers will maintain some level of consumption and will take loans from investors to do so. As the share of these loans to income rises, the probability of a crisis occurs until eventually there is a default.

This is a simple story, but it relies crucially on strong assumptions which are not adequately defended. The most important is that investors are required to split their wealth between non-zero capital investments and loans, which is implicit in the logarithmic form of the utility function in these variables. If investors do not make loans to workers investors (effectively) die

$$\lim_{d_t \to 0} \log[d_t(1 - (1 - \gamma_\ell)\pi_t)] = -\infty \underset{\substack{ceteris \\ paribus}}{\Longrightarrow} \lim_{d_t \to 0} U_0^i = -\infty$$

Even if we assume that investors must keep some deposits as liquidity for consumption (an explanation the authors do not explore), we need to make the additional assumption that these deposits will be sufficiently large to take up such a proportion of workers' income as to cause default. So what other explanation do we have? Following Rajan (2010), it seems that such a logarithmic form must reflect some coercion from the government equivalent to the confiscation of all assets from the investor if they do not make loans to workers. Without this assumption, there is no guarantee that investors will make the loans which will cause the crisis to occur. In fact, they are highly unlikely to do so since within this rational investor framework - capital assets are assumed to yield a higher payoff. The risk-return ratio would be unacceptable to such institutions without some sort of government intervention.

At this early stage, the data are not wholly supportive either. Bordo and Meissner (2012), while not revealing the actual regressions, report that their data set on fourteen advanced countries from 1920-2008 show that, after controlling for various other effects, they 'decisively reject' any relationship between the distribution of income and credit growth. Since they also find that credit growth is the main determinant of financial crises, they conclude that there is no evidence of a relationship, as suggested by Rajan, Kumhof and Ranciere, between inequality and financial crises.

2.4   A critique of the neoclassical theory of distribution

Traditionally, theories of the distribution of income have relied on assuming there is a stochastic process in the allocation of income (von Weizsacker, 1993). A typical example is the model of earnings inequality suggested in Creedy (1998). In this model, wages are determined within a competitive labour market with linear supply and

demand functions. To explain how there can be a non-degenerate distribution of income, there is an assumption made that individual wages are a random deviation from this market price. Clearly, as suggested by von Weizsacker (1993), this is an unsatisfactory explanation of economic inequality, as there is a lacuna of economic meaning in just assuming that the distribution of wealth is unequal. What is needed is an explanation of why inequality arises, not an assumption that it just exists.

The neo-classical explanation for the differentials of income/wealth almost doesn't need stating, it is implicit in every textbook. All the major textbooks of microeconomic theory (the most famous being Mas-Colell et al. (1995) and Jehle and Reny (2011)) tell the exact same story, a rational firm in a competitive market seeking to maximise profits $\pi = pf(q) - c(q)$ will solve a problem

$$P = \max_q \pi = pf(q) - c(q)$$

taking price p as given and choosing inputs $q \in \mathbb{R}_+^{|q|}$ in production $f(\cdot)$ at cost $c(\cdot)$. So the firm must set

$$\frac{\partial \pi}{\partial q_i} = 0 \Leftrightarrow pf'(q) = c'(q) \; \forall \; q_i \in q$$

Now if labour is one of these q inputs, the wage must be equal to the marginal product of that labour[18]. Clearly, it follows that any differences in wages must be accounted for by differing marginal productivities of labour.

However, there is no way for the marginal product of labour to differ in a Debreu economy, since labour must be treated as a simple commodity input for the labour market to be competitive. Thus, any difference in productivity is attributed to specific firm characteristics[19]. But if a subset of firms were permitted to have a higher productivity of labour in a proper Debreu economy, then these firms would actually

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[18] Strictly speaking, the wage is equal to the marginal revenue of labour, so in fact the "real" wage is equal to the marginal product of labour.

[19] Consider for instance the standard Cobb-Douglas production function, $F(K, L) = AK^\alpha L^{1-\alpha}$, labour L will have a marginal productivity of $(1 - \alpha)A \left(\frac{K}{L}\right)^\alpha$, which depends on the characteristics of the firm, since A is firm specific otherwise labour would be a differentiated product and the labour market would not be perfect.

make up the economy since the others would not be able to attract labour and we would again have no difference in wages. In fact, paying a higher wage to one group of workers, due to a difference in firm labour productivities, is impossible in the competitive economy unless there is some *ad-hoc* division of workers into different classes who can only supply their specialised labour commodity in separate markets.

New Growth Theory, in treating technology as a property of the firm and its improvement as a choice made by the said firms, makes differences in labour productivity possible *ipso-facto* by separating workforce into those supplying skilled and unskilled labour commodities. Since firms employing skilled labour will be sourcing this from a separate market to unskilled labour, differences in wages are made possible. As mentioned, this division is largely *ad hoc* with the proportions of skilled and unskilled labour simply assumed to be some fraction of the population. That said, Lucas (1988) does make an attempt to explain what leads to differences in labour productivity and the wage by allowing his 'workers' to educate themselves in the time they are not working. However, in order to make his macroeconomic general equilibrium model solvable he must make the assumption that the representative agent is the owner of the representative firm. Thus, as before, differences in labour productivity are not possible without an *ad hoc* division of the population as this representative firm is constructed from an underlying Debreu economy (see Mas-Colell et al. (1995), chapter 4).

The approach of Lucas, which explains a higher wage as the result of investment in human capital, is a descendent of Gary Becker's pioneering work in the area of labour economics, outlined in the Nobel prize lecture of Becker (1993) and in Becker (1967). His view of inequality, stated in Becker and Tomes (1979), is essentially one of luck. Representative individuals in this model will optimally invest in their human capital over their life-cycle and leave wealth to their children. This would lead to each individual having the same level of human capital as every other if they are perfectly rational, and to rectify this, Becker and Tomes assume that individuals investing in human capital need "luck" to be successful. Hence the distribution of "luck" amongst the investing individuals of the economy introduces inequality in earnings by causing a distribution of human capital levels.

The most sophisticated extension of this explanation of earnings differentials is perhaps found in von Weizsacker (1993), which combines both the human capital and stochastic distribution aspects to derive a skewed distribution in earnings. After solving an optimal human capital investment model, with a Cobb-Douglas human capital production function at its core, von Weizsacker suggests that inequality arises due to differences in the efficiency with which investments are converted into capital, where these differences are dependent on the underlying characteristics of the individuals in question. Using the distribution of 'efficiency', von Weizsacker manages to derive a complicated closed form solution for the distribution of human capital, and hence earnings, which is right-skewed[20].

While the human capital approach does succeed in explaining differences in labour productivity and hence wages at the microeconomic level as the result of labour becoming a differentiated product through investment in human capital, it struggles to have broader applicability. We cannot nest the partial equilibrium models of Becker within general equilibrium analysis without having to make an assumption that some workers will successfully invest in human capital while some will do so to a lesser degree and create separate markets for labour. Moreover, the theory is based on a competitiveness assumption in the labour markets which must be violated in order to achieve endogenous growth (see Romer (1990)), in which case the marginal product of labour is no longer what is being considered.

However, there is clearly some merit in the neo-classical explanation of differential wages. It seems intuitive that as remuneration for labour, wages would differ on the basis of the nature of that labour. The issue is that the interplay between definitively heterogeneous workers and firms in the labour market is too complex for the theory of competitive equilibrium to handle effectively. We would suggest that it might be better to view the labour market, not as mathematical field, similar to an electromagnetic field where everything is directly related to everything else, but instead as a network (mathematically, a graph). A network allows significant wage differentials to appear

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[20] von Weizsacker's book is highly technical, with the book largely concerned with the mathematical properties of the utility function and constraints which admit the skew distribution for human capital to arise. The functions which describe this process are *highly* complicated and not very tractable.

even for relatively similar jobs, since competition is localised within the relevant market space by geographical and informational constraints.

Moreover, in an economy which is growing endogenously, "the" production function is shifting constantly, so wages will not be equal to the marginal productivity since the marginal productivity of labour is simply unknowable to any exact degree. Instead, why wages *do* reflect productivity is because of the hierarchical order of firms in economic systems. Certain jobs are more central to the running of the company and cannot be easily divisible[21]. Indeed this makes sense of Lester Thurow's (1972) observation that individuals invest in education defensively to qualify for acceptance into a higher "tier" of the labour market than others.

Finally, earnings also depend on the profitability of the business itself, such that two positions which are nearly identical in two companies with differing profitability could potentially differ radically. While there are local competitive constraints on earnings in the labour market, we only need to think of the pay differences in the labour market for CEO's or of the different payoffs for company founders to notice that profitability, and hence macroeconomic and market specific conditions, will affect the distribution of income and wealth.

Taking account of such complexity in a market is difficult, if not impossible, for standard equilibrium analysis to handle. There exists: imperfect information (in fact, more often uncertainty rather than mere risk), monopsony/monopoly, endogenous technological change on both sides of the market and macroeconomic/industry specific conditions. These all interact in the determination of the distribution of income. Indeed, while Bertola, Foellmi, and Zweimüller (2006) do consider some of these in their text on income distribution, they have to focus on each in isolation.

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[21] For instance, an executive position is central to the running of the company, and is not divisible to some degree since a divided management structure will quickly become confusing and affect the efficient running of the business (in effect, it is a natural monopoly). Likewise, an inventory clerk is a crucial position, though this position is easily divisible so that any one position alone is not central to the running of a company.

2.3   The view from Cambridge: Post-Keynesian distributional models

It would be incomplete to discuss the role of inequality in the economic system without discussing the somewhat forgotten distribution theories of economic growth promulgated by numerous 'post-Keynesian' economists, beginning with Kaldor (1955) and including many luminaries in the old Cambridge tradition. Modern post-Keynesians tend to employ variants of the models developed by Michal Kalecki and these, in turn, have neo-Marxist roots[22].

In state-of-the-art post Keynesian models, such as those in Palley (2012) and Dutt (2012), following Kalecki, the population is divided between capitalists and workers. Capitalists own the firms which employ workers in production. It is assumed that the price of output produced by these firms is some mark-up over the wage, which is the case because the firms enjoy some degree of monopoly. Workers are assumed to do little or no saving while capitalists achieve their rent income by investing in capital goods. The rent they earn on this capital investment, following Ricardo's theory of distribution (Kaldor, 1955), comes from the mark-up over the wage.

In these models investment in the capital stock, which determines the productive capacity of the economy, is determined itself by the amount of saving done by capitalists (and in some models, workers). In this view of the economy, inequality of income between capitalists and workers is an unambiguously *good* thing because it encourages growth. Simply put, workers consume a greater proportion of their income than capitalists whose savings determine the future income of both. Redistribution of income from capitalists to workers leads to a decrease in capital investment and lower growth. Thus, in this theorizing, the degree of inequality has a very direct effect on the economy. But, there is little overlap between such theorizing and the neoclassical representation of economic growth because there are no market forces at work and perfect competition does not exist. Also, it is a theory founded on the behaviour of two groups, not utility maximizing individuals.

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[22] We will not provide a formal development of these models, since to the unfamiliar they require a fuller development than we could give here.

Inequality is, in essence, imposed by dividing the economic system, in an *ad hoc* way between capitalists who earn rent and workers who earn wages. While this assumption may have seemed self-evident to Kalecki and early developers of the theory, the neo-Marxist origins of Kalecki's thought are clear[23] but is appears to be unsuitable for a modern economy where such sharp class distinctions are not in evidence. Furthermore, although inequality leads to growth, there is no explanation within the theory as to how inequality is determined. It is a product of history along neo-Marxist lines.

What this theorizing does have in common with neoclassical theorising is the adoption of the equilibrium method. It is a theory of equilibrium solutions. Like neoclassical theory, there is silence about what happens in disequilibrium. As such, it is simplistic because it does not deal with the economic processes at work. Despite this, as is the case with many theories dealing with inequality, there is a kernel of truth. The emphasis on the importance of monopoly power in maintaining inequality is a particularly important insight, as is the argument that inequality associated with such monopoly power is what drives an economy's growth. In Schumpeterian evolutionary economics, it is the quest for monopoly power and associated rents that induce entrepreneurs to innovate. Success brings riches and failure poverty: inequality is, thus, associated with growth. However, post-Keynesian distributional theorising provides no explanation of such a process and, therefore, no explanation of how the monopolistic forces that result in both inequality and growth come into being. As in the neoclassical case, there is no attempt to understand an economic system that is complex in any way, a point acknowledged by Kaldor (1985) shortly before his death.

3.   Relative income and welfare literature

Over the past century, there has been a somewhat fragmented flow of thought that has paralleled standard economics on the determination and impact of inequality. The hypothesis is that relative, not absolute, income that determines human happiness and therefore, the distribution of income has an important role to play in human well-being. Many in the mainstream have dismissed these ideas as 'sociology' since a constrained optimising *homo economicus* is rejected as a satisfactory building block for understanding the behaviour of an economic system in any general sense. However,

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[23] Clearly though the conclusion of the model that inequality is good for growth is anything *but* Marxist.

such ideas have gained greater acceptance when the relative income hypothesis has been expressed in the context of the modern "happiness" literature.

3.1   Veblen, Duesenberry and Hirsch

Perhaps the most significant early thinker on relative income was Thorstein Veblen, whose *Theory of the Leisure Class* (1899) still stands as the classic study of relative income effects.   Veblen charted the economic development of man from his tribal origins in order to understand the evolution of the phenomenon he termed 'conspicuous consumption'.   He argued that anthropological evidence suggests in the very earliest tribal stages, rulers distinguished themselves by extraordinary feats of violence and physical strength.   Such rulers would be the hunters and soldiers of the tribe, with drudgery and menial tasks such as domestic duties delegated to the subservient members.

However, as the economy gradually accumulated wealth, survival became less dependent on superior physical strength or the protection of a chieftain, and rulers could therefore no longer be distinguished by such traits alone.   Instead, what became an 'upper class' in larger social groups distinguished itself by abstention from physical labour which was considered to be menial and indicative of low social status.   But members of the leisure class also had to *demonstrate* their superiority, just as the rulers of hunter-gatherer bands demonstrated theirs through displays of violence and fitness. Veblen argued that this need to show social dominance gave birth to the phenomenon of 'conspicuous consumption'; the deliberate overconsumption of expensive commodities to signal higher social status.   Also important was to demonstrate disdain for physical labour through 'conspicuous leisure'.   The employing of servants to take care of menial chores like cooking and cleaning left the upper class to get on with the higher matters of government, priesthood, intellectual pursuits and the keeping of 'society'.

In a similar vein, exactly fifty years after the publication of *Theory of the Leisure Class*, James Duesenberry proposed his now long forgotten 'relative income hypothesis'[24].

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[24] Indeed, the case of the strange disappearance of James Duesenberry from the textbooks is a classic example of the sociology of science (see Lakatos (1968)) since even though much of the evidence supported the relative income hypothesis it was largely ignored and forgotten (on this story, see Frank

Duesenberry (1949), seeking to understand the behaviour of aggregate consumption data, hypothesised what the happiness literature would later confirm. Individuals' consumption depended on what society deemed necessary to maintain a certain physical satisfaction and social status at any given time. In particular, individuals' self-esteem depended on how much they consumed relative to the social standard observed within their neighbourhood. Hence consumption plans were not merely a function of lifetime earnings, as Friedman (1970) would suggest, but rather determined by what those in the neighbourhood of the individual were consuming. But though Duesenberry devoted nearly half of *Income, Saving and the Theory of Consumer Behaviour* to careful testing of his 'relative income hypothesis' and finding it to fit the data well, it was largely neglected as it was viewed as a descendent of Veblen's 'sociology' rather than derived from the 'positive' economics of constrained optimisation, powerfully promoted by Friedman (1953).

Picking up where Duesenberry left off, Fred Hirsch revived the notion that relative income is a determinant of both economic behaviour and wellbeing in his *The Social Limits to Growth* (1977). Hirsch suggested that there was (and, incidentally, remains) a confusion concerning the conception and measurement of production in that only the private aspects of value were captured by summing the value of the output across all sectors. In actuality, the consumption of output almost always delivers satisfaction via two channels. The first is the welfare one gains from satisfying desires, which every economics student recognises as the benefit of consumption. The second is more subtle, and though Hirsch never actually references him, it is the factor that Veblen noted drove conspicuous consumption: social scarcity.

The social scarcity of a good stems directly from a very simple property. Consumption is rivalrous in that one individual consuming a good necessarily deprives another. Conspicuous consumption inevitably results in social scarcity. This stems from the fact that the satisfaction of consumption partly derives from the *symbolism* of that consumption rather than its substance. Thus, consumption has an aesthetic, as well as a material, dimension (Foster (2012)). The value of such consumption is the status conveyed upon its consumer, which requires that another lacks that status. In this

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(2005)). One of the authors (Markey-Towler) struggled for months to find a copy of Duesenberry's book, finally locating it in the *warehouse* of his University's library, not even in the sociology section!

sense, consumption creates a positional externality in that the consumption patterns of others determine the status derived from our own consumption. And as we would expect in the presence of an externality, this leads to overconsumption in order to distinguish oneself from one's peers who will likely be doing the same thing.

A different, but potentially more damaging, form of social scarcity identified by Hirsch arises incidentally. In this case, a positional externality occurs because the income or the attributes of an individual *relative to others* determines how much of a scarce resource will be allocated to them. Tim Jackson in *Prosperity without Growth* (2011) followed this theory to its logical end. Jackson pointed out that this problem of relativity in subjective wellbeing is unsustainable as the basis of an economy's incentive system. Since wellbeing is dependent on gaining an edge on others in a zero sum game, the economy quickly develops the problem of an 'arms race' and ends up in a continuing prisoner's dilemma. In short, the positional externality leads to an unsustainable tendency to overconsumption.

3.2   A "viral" research program: the happiness literature

While the earlier thinkers discusses were certainly viewed as interesting in their own right, their work did not have the same impact on the economics discipline and on policymaking as the more recent happiness literature has had. Perhaps this is because they based their insights, not on the *homo economicus* construct, but on the findings of social psychologists that were not accepted in the mainstream of economics until the emergence of modern behavioural economics, well after these thinkers were set aside.

The idea behind happiness literature is not entirely new to economics. First-year students are assured that economics is really 'the science of choice' and concerns how people make decisions to further their own wellbeing, measured in terms of utility. However, the 'misconception' that economics is 'all about money' (a synonym for income or wealth) is not entirely that; quickly the student is taught that "utility" is more

or less unmeasurable (there being few Benthamite "utilometers") and so we usually take their monetary income or wealth as a proxy[25].

Following the discovery of the Easterlin (1974) 'paradox', the idea that income is an adequate proxy for wellbeing has come under intense scrutiny. Easterlin found that, even though individuals in rich countries on average have a greater self-appraisal of wellbeing than those in poor countries, becoming richer had little or no effect on wellbeing after attaining a certain income. This was affirmed by later results where he found that, even through a period of unprecedented economic expansion from the 1950's to the 1990's, wellbeing was relatively unchanged (Easterlin, 1995). A particularly stunning result was that Japan, which went from being one of the poorest nations after World War II to one of the richest on a per capita basis, enjoyed little improvement in subjective wellbeing.

Therefore, Easterlin (2001) suggested that happiness literature must explain three empirical facts

1. On average, richer people are happier than poor people
2. Happiness is consistently believed to be higher in the future
3. Subjective wellbeing tends to be relatively constant over time

The theoretical literature draws on two possible explanations, both of them being a direct legacy of Veblen and Duesenberry, though they seldom are explicitly mentioned. Both can be captured in a simple extension of a standard utility function, following Clark, Frijters, and Shields (2008)

$$U_t = U\left[u_1(y_t), u_2\left(\frac{y_t}{y^*}\right), u_3(1 - \ell_t)\right]$$

where $1 - \ell_t$ is leisure time (time endowment being normalised to 1), y_t is current income and $u_1(\cdot)$ and $u_3(\cdot)$ are the traditional components of a utility function[26]. The non-traditional component includes income relative to some reference: y_t/y^*, and it is assumed that $u_2(\cdot)$ is monotonically increasing in relative income though at a

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[25] As an example of this idea in practice, observe that the Coase theorem (Coase, 1960) assumes that remuneration can be a proxy for utility lost due to a negative externality.
[26] We assume then that $u_i'(\cdot) > 0 \; u_i''(\cdot) < 0 \; \forall \, i \in \{1,2\}$.

decreasing rate. However, note that, by necessity, $u_2(\cdot)$ is homogenous of degree zero so that increasing income while simultaneously increasing the reference income, say through economic growth, will cancel out the increase in utility from the non-traditional specification.

Suppose, first, that we define the reference income as the average income in the economy. From the discussion of the early thinkers in this field, and the results of Easterlin (1974), we could imagine that the "meta" utility function $U(\cdot)$ be specified such that absolute income will contribute little to wellbeing once income becomes sufficiently large and that, at higher income levels, relative income becomes important[27]. In this manner, we would have explained the Easterlin paradox (the first and third facts above) and how subjective wellbeing will remain relatively constant even with economic growth.

Another explanation is found in Frey and Stutzer (2002) who suggested that the Easterlin paradox can be understood by noticing that happiness seems to depend on the satisfaction of aspirations, and that these aspirations tend to display a 'preference shift'. While income grows and happiness grows too, what is considered 'sufficient' income for happiness also grows and the effect of increased income is temporary. To capture the preference shift Clark et al. (2008) allow relative income to be some geometric average of past incomes. If we allow $y^* = \Pi_{i=1}^{k} y_{t-i}^{\alpha_i}$, $\sum_{i=1}^{k} \alpha_i = 1$ then we see that happiness from an increased income will be temporary, since the evolving reference income will largely cancel out the effect over time. Similarly, if instead, we allowed the reference income to be an expectation of *future* income, for instance $y^* = E[y_{t+1}]$ we can see that, if future income was expected to grow from its present level (and remain constant) then future happiness would be expected to be greater than the present (explaining Easterlin's second fact above). However, as is suggested by the preference shift phenomenon, the individual will repeat the exercise in the future when income increases so that the aspiration is *again* for a higher future income and the individual makes the systematic mistake of overearning in anticipation of future happiness.

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[27] For instance, we may assume that the diminishing returns to income are far stronger than the diminishing returns to relative income $u_1''(\cdot) > u_2''(\cdot)$ and so $\exists \bar{y}: \forall y_t > \bar{y}, u_1'(\cdot) < u_2'(\cdot)$.

So either people will be competing with themselves or with others in the economy to obtain happiness through higher income. In this sense, greater inequality will lead to a decrease in welfare for many, and quite likely the majority since income distributions tend to be skewed so that more than half lie below the medium income. This has serious implications for the wellbeing of society. Layard (2005) suggests that stress related to relative income effects may be part of the explanation for exploding rates of mental illness in the developed world.

Moreover, this inequality can lead to a classic prisoner's dilemma that results in over-earning and over-consumption compared to a state where individuals co-ordinate their actions to maximise utility. This result was elegantly proved by Dupor and Liu (2003), showing that jealousy (defined as a negative marginal utility to the reference income, as we have above) will lead to overconsumption A benevolent dictator could account for the negative externality in gaining extra income by setting a lower income to 'truly' (in a sense) maximise the utility of the individuals. Hence, often without mentioning it, the new happiness literature captures the ideas of Hirsch, Duesenberry and Veblen, about how relative income concerns affect utility due to the positional properties of consumption. So an unequal distribution of income can easily lead to overearning and overconsumption in an effort to keep utility at an acceptable level and inequality can, therefore, have economic effects.

3.3   A critical appraisal of the relative income literature

As suggested above, a simple solution is commonly offered to many of the problems raised by the literature discussed: a more progressive income taxation system. However, this advice is not being implemented with great gusto by many governments. Why is this if it is so clear an unequal distribution has a negative impact upon wellbeing? Perhaps it is because ensuring wellbeing in this sense is in tension with the needs of the economy. It is widely felt that increasing income taxation is a disincentive and, thus, can affect economic growth and, indeed, if inequality results in overconsumption, this will be the outcome. A healthy economic system should exhibit inequality as people succeed and fail in their economic endeavours. So how do we distinguish between 'good' and 'bad' inequality and how do we design a tax that only targets the latter? More progressive taxation is a simplistic solution based upon a

simplistic view of the economic system. It is here we suggest this literature has its constraints. It takes inequality generated within the economy as a given and looks to what psychological and sociological effects it may have on individuals in the economy, and this is indeed a hugely important question to answer. However, with the clear exception of the possibility of overconsumption, the literature does not consider what *economic* role inequality has to play. And indeed it cannot, because it does not explain what is driving this inequality. Is inequality necessary for an economy to function well? Such a question and associated questions concerning the costs and benefits of inequality are rarely asked.

4.   The inequality literature: a final critique

We have observed that mainstream economists often do not deal with the phenomenon of inequality and view it as being outside the boundary of their discipline. Where the literature *does* concern itself with the economic, as opposed to socio-psychological, effects of inequality, in our view the analysis offered is inadequate.

The neoclassically-based literature relies on an *ad hoc* division of the populace into skilled and unskilled workers in order to allow a wage differential to appear within a general equilibrium framework. But we are not told much more about inequality. Gary Becker went further than most in pioneering a neoclassical explanation of inequality, albeit within the context of discussing the optimal investment in human capital. However, he was forced to engage in partial equilibrium analysis, inconsistent with general equilibrium, to gain some insight.

If we probe into the non-mainstream economics literature, we do find discussion of the effects of inequality. Most notably, the Post-Keynesian literature, in line with its Kaleckian foundations, takes it for granted that there is a division of the populace into capitalists and workers emanating, somehow, from history. The perpetuation of inequality is then explained by assuming the existence of some degree of monopoly power. If 'capitalists' are well behaved and sink all of their surpluses into productive capital investment there can be economic growth and increases in the absolute standard of living for all despite the persistence of inequality. However, like neoclassical analysis, it relies upon an *ad hoc* division of the populace to obtain a result.

When studying the *effects* of inequality, the mainstream has to somehow depart from the 'basic' model of the economy as a perfect market, so that inequality only has some effect when there is some 'unnatural' departure from this fundamental state. Perhaps unsurprisingly, it is often some sort of government intervention that is identified as the cause of such a departure from the natural state, be it through encouraging risky loans or through protecting the monopoly rights of some innovator. But, in reality, we know that inequality *does* occur and persist and we know empirically that it *does* affect the economy. Why have economists struggled so much to find a suitable theoretical framework in which these empirical facts can be adequately explained? It is immediately obvious that the sheer complexity of the economic system renders the simplistic nature of both neoclassical and post-Keynesian theories very limited in applicability (Foster, 2005). And this has resulted in a highly fragmented literature. Only uni-directional results, on either the causes or the effects of inequality, tend to be considered under very restrictive assumptions.

We would suggest, following Lawson (2003) that the inability to model inequality and its effects stems from a confused ontological basis in economics. All of the models, including the post-Keynesian distributional growth models, are simple equilibrium-based constructs which do not allow for the complexity of the economic system and do not incorporate the economic processes that are involved. The dominant, neoclassical-based, models discussed are variations of the fundamental Debreu economy with perfect competition for commodities. This 'core' is fundamentally at variance with reality and, thus, the models constructed on such a core must be viewed as part of a 'protective belt' that maintains the mainstream research program (Lakatos, 1968). In this core, the mathematics of classical mechanics is borrowed and applied to the behaviour of human beings, making their actions similar to particles in an integral 'field' (Potts, 2000). This means that the economy is modelled as a very special sort of mathematical structure: a fully connected graph of all the individuals in the economy so that every individual is *directly* linked to every other and every firm is *directly* linked to every other firm. So it is not surprising that, with perfect competition for the commodity 'labour', it is nigh impossible to adequately explain or even generate *any* sort of distribution other than randomly. Moreover, if this 'economy' is perfectly efficient then it is no surprise, given the second welfare theorem, that a Debreu inspired

model will struggle to generate any sort of effect of inequality on the allocation of resources. And then, given this, it is unsurprising that introducing at most two distortions (in new growth theory), an unorthodox utility function (Rajan's work), a 'saving' class (Post-Keynesian models) all only allow highly simplistic predictions of the effects of inequality.

We would suggest strongly that any future theory of inequality must involve a fundamental break with the standard view of the economy as analogous to a field which can be described using the tools of classical mechanics. A new ontology is required. In particular, we must move toward a view more like that of Potts (2000), Foster (2005) and Foster (2006) which sees the economy as a complex system (a network structure with incomplete connections) in which we can examine the structure of a economy and how it evolves along a historical continuum. By breaking from a 'perfect' teleological economy, where allocation is like water settling in a lake, to one in which there is a structure that can be identified empirically, we could integrate many of the good intuitions to be found in the existing literature into a single, simple theory of how inequality emerges and what its economic effects are. As Foster (2005) pointed out, complex systems theory suggests that inequality is a phenomenon that should arise naturally in a complex, networked economy as value-generating connections (transactions, business relationships etc.) are formed, consolidated and broken. Concentrations of market power, skill differentials, luck and rent-seeking can all be dealt with in such an analytical framework.

Moving to a complex systems perspective on the economy requires a fundamental ontological break. There has to be a move away from a body of economic theory that starts with Olympian constrained optimisation at its core, and relaxes strong assumptions in an attempt to move towards reality. The complex systems perspective requires, instead, that a realistic representation of the economic system is obtained, in terms of its 'meso-rules' (Dopfer, Foster, & Potts (2004)) prior to modelling its behaviour. Optimization occurs, but rationality must be bounded (as per Simon (1955)) because of the constant presence of a degree of uncertainty. All conventional constraints, such as income, wealth and prices, remain operative and important in economic analysis but always in the context of the prevailing rule structure and constrained by pre-existing structural commitments.

Decision-making in states of radical uncertainty is crucial for the development of an economic system – this is the context in which entrepreneurship and innovation occur and where constrained optimisation is not useful (Foster & Metcalfe, 2012). We know that this kind of evolutionary process results in winners and losers. The application of even basic complex systems theory tells us that inequality is inevitable in a properly-functioning capitalist economy. What this means is that the distribution of income and wealth cannot be divorced from considerations of economic efficiency, productivity and growth. The challenge is to understand how 'good' and 'bad' states of inequality come about what their effects are on economic growth and well-being. Then we would be able to understand why economies differ so dramatically. This research agenda is only in its infancy but the recent failure of conventional economic analysis to enable us to understand fluctuations in economic growth, shifts in the distribution of income and the state of well-being provides us with an opportunity for progress.

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