Globalisation, inequality and redistribution

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June 23, 2004

Abstract

The present paper seeks to explain the pattern of income redistribution in a globalised world of increased market income inequality and lower costs of factor mobility. In some countries, larger market income inequality has been met by an increased redistributive effort, thus keeping the distribution of disposable incomes relatively stable. In other countries, larger market inequality has been accompanied by a reduction in transfers, thus leading to growth in disposable income inequality. In our model, the initial level of market income inequality is crucial in explaining how an increase in this variable affects redistribution.

JEL codes: F21, H2

Keywords: Globalisation; Inequality; Redistribution; Majority voting

1   Introduction

Income inequality has increased in most OECD countries during the last decades, as documented by for instance Atkinson (2003) and Gottschalk and Smeeding (1997). In some countries, redistribution programs have been relatively successful in reducing the impact of lower wages or unemployment on people's disposable incomes. In other countries, the increase in market income inequality has led to a sharp increase also in disposable income inequality.

Consider, for instance, the United States and Canada. Both countries have experienced significant increases in market income inequality during the

1980s and 1990s. In the United States, this development was accompanied by an increase in the inequality of disposable incomes of a similar magnitude, whereas Canada managed to keep the distribution of disposable incomes stable through active redistribution policies, at least until the mid-1990s.[1] Since then, Canada has also seen a sharp increase in both pre-tax and post-tax income inequality.

In Europe, comparing the United Kingdom and Finland, we find a similar development. In the United Kingdom, there has been a significant increase in both market income inequality and disposable income inequality in the 1980s and 1990s. Like Canada, Finland managed for a while to stabilize the distribution of disposable incomes despite an increase in market income inequality. However, since the mid-1990s, the disposable income inequality has increased also in Finland.[2]

It is interesting to note that Canada has a lower level of market income inequality than the United States. The same is true for Finland compared to the United Kingdom. Is this a coincidence? The quality of data makes it difficult to give a definite answer to this question. As emphasized by Atkinson (2003), different definitions of income across countries and changes in definitions within countries over time, make an international comparison of income inequality and redistribution across countries over time very difficult. The present paper approaches the question from a theoretical angle, asking: Is there a reason to believe that countries with different levels of pre-tax inequality would respond differently to increases in pre-tax inequality?

The starting point of our explanation is the effects of globalisation. Globalisation, in the form of increased competition from low-wage countries and technological advances in information and communication technology, raises the demand for skilled workers relative to unskilled workers in developed economies.[3] In this way, globalisation is often viewed as the main cause of ris-

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[1] From 1981 to 1994, the market income Gini-coefficient for Canada increased from 0.38 to 0.43. The disposable income Gini coefficient, however, remained stable at 0.29 in this time period. From 1979 to 1994, the market income Gini-coefficient for the United States increased from 0.41 to 0.47. The Gini for disposable income increased from 0.3 to 0.36. (Ruiz-Huerta et al, 1999, Table 5, page 20-21). See also Gottschalk and Smeeding (1997) table 4, page 666, for changes in market and disposable income inequality for a selection of countries in the 1980s.

[2] For the development in income inequality in the United States, Canada, the United Kingdom and Finland, see Atkinson, 2003, in particular Tables 1, 2, 3, and 6.

[3] Feenstra and Hanson (1999) show that technological change, rather than trade or migration, is the main cause of rising inequality in market incomes in the United States.

ing inequality in market incomes. Globalisation is also associated with growth in international production networks. This has contributed to increased international demand for managers, and an increase in their earnings. The fact that upper-level employees working in multinational companies fairly easily can choose country of residency without leaving the firm makes these people more mobile. The expansion of scale associated with globalisation may also pave the ground for "superstars", i.e. the highest skilled people, who increase their market shares and rents at the expense of the earnings of the second best performers (Rosen, 1981). This, too, may explain why globalisation causes more income inequality.

Globalisation also poses a challenge to national taxation and redistribution programs. The increase in factor mobility and improved communication systems make tax bases more mobile, thus limiting the ability of countries to implement ambitious redistribution programs. There is a widespread perception in many developed countries that their welfare states are threatened by globalisation, and that governments have lost much of their freedom of manoeuvre.

Wildasin (2003), discussing the impact of economic integration on redistribution, emphasizes the effect of integration on the mobility of the highly skilled, highly paid workers. By choosing residency, a worker can often choose where to pay taxes. Since the taxation of highly-compensated workers accounts for a very large fraction of tax revenues, the fiscal implications of such relocation can be very high. The importance of high-income tax payers for the total tax income in developed countries can be illustrated by some numbers from the United States. In 1999, one-fifth of personal income taxes were paid by only 0.16 percent of the taxpayers; the top 2 percent of the taxpayers paid over 40 percent of all personal income taxes. The presence or absence of these high income taxpayers is thus a matter of great importance to the US tax system.

In the present paper we take globalisation and its effect on market income inequality as given. Our focus is on how the redistributive effort is affected by a given change in market income inequality. Globalisation is assumed to affect the mobility of the tax base through two channels. First, there is a direct effect: Globalisation means increased factor mobility and thereby increased mobility of the tax base. Second, there is an indirect effect: Globalisation leads to a greater concentration of income, which in turn reduces the relative importance of mobility costs for tax payers.

The central result of our model is that redistributive tax rates are high-

est for intermediate levels of pre-tax inequality. In other words, the level of taxation and redistribution is a hump-shaped function of pre-tax inequality. Hence, the model predicts that for a country like Canada, starting with a relatively low level of pre-tax income inequality, the policy response to increased market income inequality is first to implement more ambitious redistribution programs to reduce the impact of globalisation on disposable incomes. As the process of globalisation and increased inequality in market incomes continues, however, the policy response will at some point be reversed. The less ambitious redistribution program will then cause disposable income inequalities to rise sharply. For a country like the United States, however, starting with a higher level of market income inequality, the prediction of the model is that an increase in inequality will be associated with a reduction in transfers and hence a sharp increase in disposable income inequality.

We also show that globalisation in the form of lower mobility costs may lead to larger international differences in tax rates and redistribution. This result runs contrary to the commonly held view that globalization represents a particularly strong challenge for countries with high tax rates, and therefore is a force of harmonization of tax rates across countries.

Our study is related to theoretical work seeking to explain what is sometimes called the "redistribution puzzle". This puzzle refers to the observation that countries with a high degree of pre-tax income inequality typically have fairly limited redistribution programs, in many cases less redistribution than in countries with a higher degree of pre-tax equality (Perotti, 1996; Bassett et al., 1999). In Bjorvatn and Cappelen (2003) we offer one explanation to the link between inequality and redistribution, arguing that inequality may create residential segregation, which in turn may affect people's preferences for redistribution. Moene and Wallerstein (2001) point to a different mechanism, emphasizing the role of tax and transfer programs as a form of publicly financed insurance. If insurance is a normal good, then more inequality may lead to less taxation, as the median voter becomes poorer and therefore demands less publicly financed insurance. In contrast to these articles inspired by the cross-country evidence on inequality and redistribution, the focus of the present paper is on explaining the development of income inequality and redistribution over time.

2 The model

Consider a country populated by n people. Income levels differ, perhaps because of differences in talents and skills. Some people in the economy, measured by p, are poor. For simplicity, we assume that the poor have no income at all, and hence are dependent on transfers to meet their needs. The remaining part of the population, $n - p$, have positive incomes. Income is uniformly distributed amongst the income earners. We rank people in an increasing order according to their income, so that the nth person is the richest individual, with an income given by $y^{\max}$. Aggregate income in the economy is given by Y. The maximum income can then be written as:

$$y^{\max} = \frac{2Y}{n - p}. \tag{1}$$

The number of poor, p, is our measure of pre-tax inequality. For $p = 0$, which represents the most egalitarian pre-tax income distribution in our model, $y^{\max} = 2Y/n = 2y$, i.e. a situation where the richest individual has twice the average income (y). For $p > 0$, income distribution will be skewed to the left for the population as a whole. The income of a person $n_i > p$ is a fraction $(n_i - p) / (n - p)$ of the maximum income. Hence, we can express the income of individual i as

$$y_i = \begin{array}{ll} \frac{2Y(n_i - p)}{(n - p)^2} & \text{for } n_i > p \\ 0 & \text{for } n_i \leq p \end{array}. \tag{2}$$

People make two choices. First, they vote on tax policy. Second, responding to differences in taxes at home and abroad, people may decide to relocate to a low-tax country in order to reduce their tax bills. For concreteness, we shall in the remainder refer to the tax base as labor income and mobility of the tax base as migration of people. The mechanisms we highlight are, however, also relevant for the case of capital taxation and capital mobility. The median voter is given by $n_m = n/2$, and from (2) we see that her income, y_m, is

$$y_m = \begin{array}{ll} \frac{2Y\left(\frac{n}{2} - p\right)}{(n - p)^2} & \text{for } \frac{n}{2} > p \\ 0 & \text{for } \frac{n}{2} \leq p \end{array}. \tag{3}$$

The gap between the median income and average income increases with inequality up to the point where the median voter has zero income, i.e. where

$p = n/2$. Increasing inequality beyond this point does not affect the gap between average and median income.

The redistribution program consists of a linear income tax, $t \in (0, 1)$, and a uniform transfer, T. Only residents of the country pay taxes and receive transfers. The per capita (where by "capita" we refer to the number of people living in the country) tax base is given by $\hat{y}$, which may be lower than or equal to y, depending on whether there is an exodus of the tax base or not.

A deadweight loss drives a wedge between what is collected in taxes and what is left for redistribution. We make the standard assumption that the dead weight loss is a positive function of the tax rate. The transfer that each person receives is given by

$$T = t\hat{y}(1 - bt), \tag{4}$$

where b is a parameter that captures the importance of the dead weight loss in taxation. Since the median voter's contribution to the redistribution program is given by ty_m, her post-tax disposable income, I_m, can be expressed as

$$I_m = (1 - t)y_m + T. \tag{5}$$

The equilibrium tax rate is the one that maximizes I_m. The focus of the present analysis is the relation between pre-tax income distribution and redistribution. Income inequality affects the equilibrium tax rate through two channels. First, by affecting the gap between the average and the median income. Second, by affecting the mobility of the tax base. We start by studying a situation with no international mobility in order to describe the first mechanism.

2.1 Autarky

Under autarky, the per capita tax base is equal to the average pre-tax income, y. From (4) we know that in this case, $T = ty(1 - bt)$. The objective function of the median voter (5) can then be expressed as:

$$I_m = (1 - t)y_m + ty(1 - bt). \tag{6}$$

The median voter's optimal choice of tax rate in autarky, t_a^*, can be found by maximizing I_m in (6) with respect to t, and using the definition of y_m in (3), which results in:

$$t_a^* = \begin{array}{ll} \min\left(\frac{p^2}{2b(p-n)^2}, 1\right) & \text{if} \quad p \leq \frac{n}{2} \\ \min\left(\frac{1}{2b}, 1\right) & \text{if} \quad p > \frac{n}{2} \end{array} \qquad (7)$$

Clearly, irrespective of whether the median voter has a positive market income or not, i.e. whether p is larger than or smaller than $n/2$, the equilibrium tax in autarky is a non-decreasing function of inequality; $\partial t_a^*/\partial p \geq 0$. Intuitively, for low values of p, the median voter's income is not much higher than the average income. Hence, her benefit from the redistribution program is modest. Given the dead weight loss from redistribution, she votes for low taxes. As p increases, the median voter's income, and thus her contribution to the redistribution program, falls, and there is more to gain from redistributive taxes. The vote will then be for a higher tax rate. Obviously, the higher is the dead weight loss parameter b, the lower is the tax rate.

The result that the higher the gap between average and median income, the higher is equilibrium taxes, is not surprising. Indeed, this result can be found in standard median voter models of taxation, see for instance Roberts (1977) and Meltzer and Richard (1981), that describe the median solution when the effect of taxes on incentives to work are taken into account. A similar result can be derived from welfare maximization in the optimal tax literature, see Sandmo (1976).

2.2   Open economy

We now allow for international mobility and thus introduce the second constraint on redistributive taxation, namely mobility of the tax base. Before any migration of labor takes place, people vote on income taxes. Hence, the entire population takes part in the vote.

Emigration means that income will be registered abroad and hence subjected only to foreign taxes, but emigrants are also excluded from the transfer program in their home country. We simplify by assuming that there are zero taxes and no transfers abroad.[4] Changing residency involves a fixed relocation cost m.[5] Note that m may well be a function of globalisation: A reduction in the barriers to factor mobility is likely to reduce m.

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[4]We do not endogenise the tax policy of the tax haven, and therefore do not analyse issues related to tax competition in this model.

[5]Emigration in our model is a legal form of tax evasion. The tax evasion literature also typically operates with a fixed evasion cost, for instance tied to loss of reputation if cought. See for instance Allingham and Sandmo (1972).

A fixed mobility cost captures in the simplest possible way the key assumption that the relative importance of mobility costs falls with income. A concentration of income thus increases the elasticity of the tax base. The important assumption, however, is not that mobility costs are entirely fixed, but that migration costs as a fraction of total income decreases with income. Thus, our model does not preclude the possibility that migration costs *increase* with income, as long as this increase is less than proportional. An income earner is indifferent between paying the tax or moving when

$$m = ty_i, \tag{8}$$

from which we can derive the pre-tax income of the marginal taxpayer, $\hat{y}^{\mathrm{max}}$, as

$$\hat{y}^{\mathrm{max}} = \min(\frac{m}{t}, y^{\mathrm{max}}), \tag{9}$$

with y^{max} defined in (1). If the tax rate is set such that $t > m/y^{\mathrm{max}}$, some high-income people in the economy will choose to leave the country. In this case, $\hat{y}^{\mathrm{max}} = m/t$. Define the marginal tax payer, i.e. the one with income equal to m/t, as $\hat{n}$. Clearly, if $t \leq m/y^{\mathrm{max}}$, then $\hat{y}^{\mathrm{max}} = y$ and $\hat{n} = n$. Substituting for (2) in (8), the marginal tax payer can be identified as:

$$\hat{n} = \begin{array}{ll} \frac{m}{t} \frac{(n-p)^2}{2Y} + p & \text{for } t \geq m/y^{\mathrm{max}} \\ n & \text{for } t < m/y^{\mathrm{max}} \end{array}. \tag{10}$$

Rearranging (1), the average income in the economy can be expressed as $\hat{y} = \frac{\hat{y}^{\mathrm{max}}(\hat{n}-p)}{2\hat{n}}$, where $(\hat{n} - p)$ is the number of tax payers in the economy. Using this information together with (10), we find the per capita tax base as a function of the tax rate as:

$$\hat{y} = \begin{array}{ll} \frac{m^2(n-p)^2}{2mt(n-p)^2+4pt^2Y} & \text{for } t \geq m/y^{\mathrm{max}} \\ y & \text{for } t < m/y^{\mathrm{max}} \end{array}. \tag{11}$$

Since $T = t\hat{y}(1 - bt)$, (5) can now be expressed as:

$$I_m = (1 - t)y_m + t\hat{y}(1 - bt). \tag{12}$$

It is clear from (12) and the definition of $\hat{y}$ in (11), that the disposable income of the median voter is a negative function of the tax rate as long as $t > m/y^{\mathrm{max}}$. Intuitively, the reason is that out-migration of the tax base is very costly since the richest people are the ones to leave first, and these

are also the people who contribute the most to the redistribution program. Hence, an increase in t leads to a reduction in T.

It is therefore evident that the open economy optimal tax rate in the present model framework is never set at a level that causes an out-migration of labor. In other words, the optimal tax rate will satisfy the condition $t \leq m/y^{\mathrm{max}}$. Since income in the economy is fixed in equilibrium, it also clear that there is a one-to-one relation between the tax rate and the level of redistribution in the economy: A higher tax rate means more redistribution, a lower tax rate means less redistribution. Using (1), the condition $t \leq m/y^{\mathrm{max}}$ can be expressed as:

$$t \leq \frac{m\,(n-p)}{2Y} \equiv t_c^*. \tag{13}$$

When (13) is satisfied, $\hat{n} = n$ and $\hat{y} = y$, and the objective function of the median voter given by (12) is exactly as in the autarky situation, given by (6). The maximization problem can therefore be seen as choosing t_a^*, defined by (7), as long as $t_a^* \leq t_c^*$. If $t_a^* \geq t_c^*$, the condition in (13) holds with equality, and the optimal tax rate is given by t_c^*. More formally, the equilibrium tax rate in the economy is given by:

$$t^* = \min(t_a^*, t_c^*). \tag{14}$$

The critical level of p where $t_a^* = t_c^*$ can be expressed as[6]:

$$p^* = n - \frac{t_a^* 2Y}{m} \tag{15}$$

Figure 1 illustrates the tax rate as a function of our measure of pre-tax inequality p.

To the left of p^*, the tax rate increases with higher pre-tax inequality, to the the right of p^*, the tax rate falls. To the left of p^*, the dead weight loss is the binding constraint, and the tax rate follows the upward sloping t_a^*-curve. An increase in the tax rate is possible here without causing relocation of the richest people in the economy, but the dead weight loss constraint limits the median voter's eagerness to implement ambitious tax and redistribution programs. To the right of p^*, the downward sloping t_c^*-line is the binding constraint. A higher tax would clearly not be chosen since, as argued above, this would cause out-migration of the richest tax payers and therefore lower

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[6] The critical level of income inequality, p^*, exists and is unique since t_a^* is non-decreasing in p and $\frac{m(n-p)}{2Y}$ is non-increasing in p.
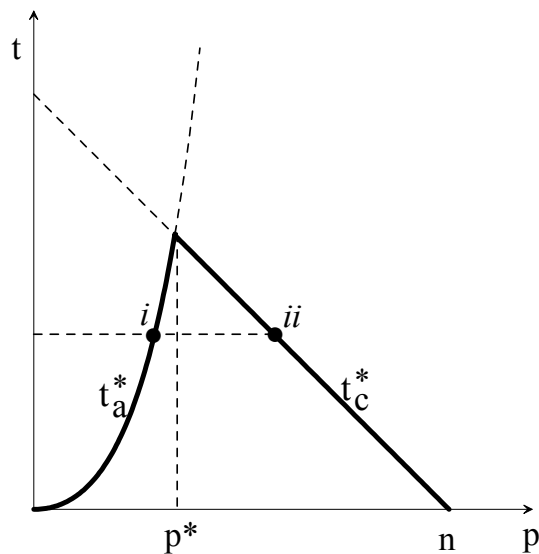
Figure 1: Inequality and redistribution

disposable income for the people remaining in the country, including the median voter.

Figure 1 is consistent with the observations on income inequality and redistribution discussed in the introduction of the paper. It follows from the hump-shaped relationship between income inequality and redistribution that countries with low levels of pre-tax inequality might have higher tax rates than countries with high levels of pre-tax inequality. Typically, however, empirical investigations into the relation between inequality and redistribution fail to generate very robust results. Our model also offers an explanation to why this may be the case. Our prediction is that the relation between inequality and redistribution is non-linear. Using a linear regression model to capture this relationship would represent a functional form mis-specification, which in turn would lead to biased estimators.

2.3   Increased pre-tax income inequality

As discussed in the introduction, globalisation is widely seen as causing increased market income inequality. In our model this would mean an increase in p. From equation (13) we see that an increase in p leads to an increase in

taxation and redistribution for low initial levels of inequality, i.e. for $p < p^*$. In this way, an increase in market income inequality will be partly offset by higher taxes. As the process of globalisation and increased pre-tax inequality increases, however, there will be a qualitative change in policies. When pre-tax inequality is at a level higher than p^*, then an increase in pre-tax inequality will be met by lower taxation. In this case, the changes in tax policy will augment the effect of globalisation on income inequality.

Comparing two countries with different initial levels of pre-tax income inequality, an increase in inequality may have a very different effect on disposable income in the two countries. An increase in market income inequality for a country characterized by $p < p^*$ will lead to higher taxes, which reduces the impact on disposable incomes. Increased market income inequality for a country characterized by $p > p^*$, on the other hand, will lead to a reduction in taxes, thus reinforcing the impact on disposable income inequality.

It is commonly held that globalisation is a force of convergence between countries' tax rates. In our model we see that this is not necessarily true. Consider, for instance, two countries characterized by i and ii in Figure 1. The two countries have equal tax rates. Increased pre-tax inequality in both countries leads to an increase in the tax rate of the country starting at point i, and a reduced tax for the country starting at ii. Hence, globalisation will in this case cause a divergence of tax rates between countries. This mechanism provides a possible explanation for the different responses to increased pre-tax inequality in countries such as Canada and USA, Finland and the UK.

Note that increased pre-tax inequality in the present model may lead to lower tax rates even if, in equilibrium, no tax payer actually chooses to relocate. It is *potential* relocation of the tax base rather than actual relocation that affects the taxation and redistribution program. This is an important point since it demonstrates that migration may be an important constraint on redistribution policies even if we do not observe a lot of tax-motivated relocation in practice.

2.4   Reduced mobility costs

An interesting question is how an increase in the mobility of the tax base, captured by a reduction in m, affects international differences in tax rates. From (13) we see that a reduction in m reduces the slope of the t_c^*-line. In Figure 2 this effect is captured by a change from t_c^* to t_c^{**}. This shift also reduces p^*, in the figure from p_1^* to p_2^*. The tax rate goes down for $p > p_2^*$,

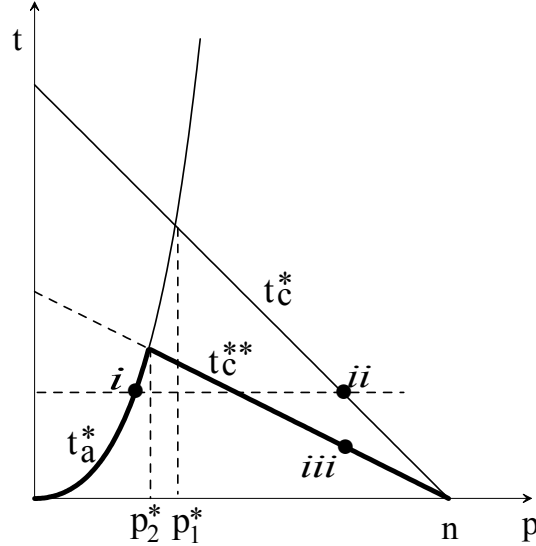and remains unchanged for $p < p_2^*$.

Figure 2: Mobility cost and redistribution

A reduction in mobility costs may result in either convergence or divergence of tax rates internationally. For two countries where both are characterized by $p > p_2^*$, a reduction in m causes the tax rates in the two countries to become more similar. This is clear from the fact that the t_c^*-line becomes less steep. For two countries characterized by $p < p_2^*$, a reduction in m either does not affect tax rates, or leads to a convergence, as the mobility constraint becomes binding for the higher tax country and thus causes a reduction in this country's tax rate.

If one country is characterized by $p < p_2^*$ and the other by $p > p_2^*$, a reduction in m may lead to either convergence or divergence of tax rates. Clearly, as m approaches zero, there will be convergence, since tax rates in both countries approach zero. To demonstrate the possibility of divergence, consider a situation where one country is located in i and the other in ii, with equal tax rates in both countries. A reduction in m now leads to a reduction in the tax rate of the more inegalitarian country, to iii. Clearly, the reduction in m in this case has led to a divergence of tax rates. This demonstrates that not only an international increase in pre-tax income inequality, but also an international reduction in mobility costs may lead to diverging outcomes

between countries. This is important, given the diverging experiences of countries' redistribution policies reported in the introduction to the paper.

3   Conclusion

Market income inequality has risen in most OECD countries, and many attribute this development to increased globalisation. Moreover, globalisation also challenges the ability of the welfare state to implement ambitious tax and redistribution programs. Empirically, we have witnessed a reduction in the redistributional "efforts" of governments. In some countries, like the United States and the United Kingdom, the decline in redistributive policies took place in the 1980s, and these two countries have seen a sharp increase in disposable income inequality since then. Other countries, like Canada, Sweden, Finland, the Netherlands, etc., have managed to dampen the effect of globalisation on people's disposable incomes. But there are signs that even in these more egalitarian societies policies have changed since the mid-1990s, leading to a sharper increase in disposable income inequality also there. The present model offers an explanation to these patterns of redistribution in a time of increased market income inequality.

We show that the optimal tax rate might be a hump-shaped function of pre-tax income inequality when there are fixed costs of mobility. Hence, as the process of globalisation leads to increased pre-tax inequality, the political economy response is first to limit the impact of market income inequality on disposable incomes by increasing redistribution. As the process of globalisation continues, however, there comes a point where the policy response to increased market income inequality is to reduce taxes and transfers. Beyond this point, therefore, there will be a sharp increase in disposable income inequality.

In our model, pre-tax incomes are exogenous. We have tied changes in this exogenous variable to the process of globalisation. An interesting extension would be to make not only taxation and redistribution but also pre-tax incomes a function of policy choices. For instance, health, education, and labor market policies may affect pre-tax income distribution in interesting ways. One interesting question is whether, in an era of globalisation, it is more efficient to try to equalize pre-tax incomes rather than after-tax incomes. We leave this for future research.

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