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Marjit, Sugata; Yang, Lei

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Trade, Inequality and Distribution-Neutral Fiscal Policy - An Elementary Framework

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Sugata Marjit, Lei Yang

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Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
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Abstract

Theoretical discussion on compensating mechanisms involving the Pareto criterion that address inequality rather than absolute welfare is non-existent in trade literature. In a simple HOS model we consider tax-transfer policies that keep the pre-trade degree of inequality unchanged between skilled and unskilled workers rather than the absolute income of the losing group. We discuss the problem of existence of such an inequality-neutral tax rate which generates a positive increment in the after tax skilled wage and unskilled wage. Such a mechanism exists and is independent of whether the tax is progressive or proportional. Thus the compensating mechanism that is available in this standard model is stronger than the conventional Pareto criterion.

JEL-Codes: F110, J310, D630, H200, H230.

Keywords: trade model, wage inequality, compensation mechanism, tax policy.

*Sugata Marjit**
CTRPFP, Centre for Studies in Social Sciences, CSSSC, R 1 B.P. Township
India – Kolkata -700094
marjit@gmail.com

Lei Yang
Hong Kong Polytechnic University
Kowloon / Hong Kong
liveyang@polyu.edu.hk

*corresponding author

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Section 1 Introduction

The recent decision by UK to exit from the great coalition of European Union marks a rare event in the history of economic thought. This is the first formal vote of no-confidence against the policy of free trade in goods, services and factors. The voting pattern, as discussed and analysed by many suggests as follows. London voted to remain in EU and many industrial workers, low-skilled, less educated citizens voted to move out. Many have interpreted it as a decision against rising inequality within the country, effects on labor market and social provisions by the government due to immigration from other countries in Europe, particularly from the poorer regions. Information available in the net will reflect the points of division between London and the rest of UK. Apart from the usual rhetoric of whether this is good or bad for UK, whether the voters were misinformed, whether membership of EU has meant substantial gain for the British people etc. have been and will be discussed for many years to come as post-exit Britain and EU would come to terms with fresh problems and prospects. This article is not to add yet another opinion to this great debate, but to assess how the event has enriched our understanding of standard trade and welfare theories and to what extent inequality becomes a pivotal theoretical issue in such matters.

Certain facts need to be stated at the very outset. That free trade leads to gains for everyone is an incorrect, misunderstood and superficial proposition. Economic theory has always argued that under very ideal conditions free trade does lead to an increase in aggregate real income for the country that engages in trade. It is all about the aggregate and it usually states that if the government sits idle on the fence and does not

intervene some will definitely lose. For example those who currently produce goods and services which will be imported and sold at a lower price, those workers who will face competition because their products are cheaper or activities are being outsourced will face hardship. Also those who face competition in labour market because many are arriving from Eastern Europe or from ISIS infested Syria and entering illegally through EU will have to suffer. Add to that the burden British health system has to endure because of blanket social coverage and also due to the fraction of GDP UK has to donate to the EU treasury. The natural query should be whether the aggregate gains from trade from integration with EU to UK is good enough to compensate each and every group for their loss and still generate a surplus for the nation. This is popularly coined in the literature on international trade as a process where the "gainers bribe the losers". The state has to design a compensation mechanism which guarantees that if everyone remains at the pre-trade level of welfare, the society will still have some surplus. Such a mechanism actually implies that the state will tax the gainers and transfer the amount to the losers so that the losers do not lose and if none is worse off and some are better, society will be better off, a welfare criterion suggested by Pareto, known as the Pareto Criterion.

Although Mr. Pareto's initial interest was in matters of inequality, his criterion that is followed with biblical devotion in the academic profession does not mention inequality of any sort. The fact that someone has gained a substantial amount, with Britain entering EU and "I am stuck with what I used to have" may not allow me to feel that I am as well off as before. Thus absolute versus the relative can become a great point of concern at the individual level. Mr. Pareto may appeal to my common sense suggesting that I am not worse off, but if I am in the lower branch of the distribution ladder, I would be concerned. Thus

inequality has become the real culprit of the so called globalization process. It is no longer about how I am doing it is about “how come you can do so much better than me”. This brings in even more fundamental question regarding the perception of social inequality at the individual level.

As a civilized human being I may not like rising inequality in the society independent of whether I am personally affected by such a process or I may be directly affected if my neighbour or relative who does better than me. In both cases the simple Pareto criterion will not do. I am not happy simply because my own welfare level has been kept intact even if others have moved ahead. I can accept the change if and only if the degree of inequality is also kept unchanged, at the least! Thus Mr. Pareto should have laid a stronger rule for individual happiness, to provide enough so that the individual will not be concerned about inequality i.e. the relative position must remain unchanged and on top of that people should gain. Therefore, many allocations that tend to change the existing distribution will disturb one or the other. Then we ask the following question. Does trade promise enough gain to maintain the degree of inequality or the initial distribution and provide more to everyone?

This paper uses the well-known Heckscher-Ohlin-Samuelson (HOS) model of international trade at a very elementary level to argue that it is always feasible.

The idea that trade increases aggregate real income of the trading nation implies that we can redistribute the addition in a way so that everyone gets the same level of income as before and some can get higher income because the total has increased. But that does not necessarily guarantee that the relative income also remains the same. Hence the degree of inequality might be easily disturbed. Technically speaking the associated

“Lorenz Curve” or the “Gini Index” may change. Thus someone who feels that the job is done once the Pareto principle is in place, might be mistaken because some people will not like if their relative income falls in relation to others. In this paper we provide a concrete example of such an allocation by appealing to a textbook model of international trade.

Free trade under ideal conditions generates overall gains from trade increasing real national income. This is a standard proposition in international trade. However, there are distributional consequences. Some gain and some lose. The general proposition is that gainers can bribe the losers. Thus political authorities should be able to generate compensation mechanisms to help the losers. As aggregate real income increases relative to autarky, potentially everyone can be made better off. Thus free trade benefits all in the sense that even those who do not gain by trade, can be compensated by the State, if needed. This is as much trade theory can tell us.

International trade theory does not suggest anything to take care of rising inequality after trade. If trade increases wage inequality between the skilled and the unskilled, absolute compensation is very unlikely to do the job. Theory of trade does not give any clue as to how gains from trade may be redistributed to contain rising inequality, if any. Hence one needs to integrate public finance with trade i.e. to explore the feasibility of a proper tax-transfer mechanism which this paper intends to do. Interfacing trade and public finance, for understanding both problems better. It is necessary as mentioned by Atkinson(2000,2009) and very recently elegantly elaborated in Pol Antras et al.(2015) who have gone into the details of welfare consequences of tax policies in an extended trade model when such taxes create distortions. However, they do not discuss this elementary case which poses a fundamental question i.e.

whether a compensation mechanism which keeps inequality in check and increases after-tax income of skilled labor is at all feasible in the standard Heckscher-Ohlin-Samuelson model.

The traditional gains from trade theorem is directly related to Pareto criterion. If a change makes no one worse off and at least one better off, the change is Pareto superior to no change. If aggregate real income increases in free trade relative to autarky, one can distribute the gain in a way to make everyone as well off as before and at least one better off. Economists were concerned with the decline in the absolute value of real income and keeping everyone at the same level of welfare as in autarky was good enough policy to counter agitation against trade. The problem is that modern trade theorists could not anticipate that status quo in terms of the initial level of income was not good enough since everyone except the person who is better off, will feel deprived as his relative position will worsen even if their absolute income remains pegged at the old level. Inequality has become more of a concern than to remain as well off as before. Those who directly gain from trade need to be taxed more heavily if one has to satisfy an inequality-neutral condition given that the degree of inequality remains the same as before, which necessarily means that those who are hurt by trade are duly compensated. At the same time one has to make sure that those who have directly gained from trade are not losing. This will put an upper bound on the quantum of redistribution. Redistributive policy must not make the tax payers worse off relative to autarky. Thus we introduce a new welfare criterion involving inequality that is an extension of the famous Pareto criterion. This is stated as follows.

Consider two social situations A and B. A will promise greater social welfare than B iff taxes , collected from better off people in A relative to

B, are transferred to the worse off people in A relative to B to keep the degree of inequality in A same as in B and the tax payers have a greater after tax real income. We apply this principle in our exercise on tax policy in an open economy.

The specific purpose of this paper is to look for distribution neutral income tax rate under free trade as compared to autarky. It is now more or less recognised that the wage inequality between the skilled and unskilled workers in the developed countries has widened considerably along with the rising volume of trade. One can refer to a huge literature dealing theoretically and empirically with the problem in the context of relatively rich skill and capital abundant countries. A representative sample will be Krugman(2000), Davis(1998, 2011),Jones and Engerman(1996),Feenstra(2010) etc.

Even if by aggregate measure trade benefits a nation, the affected groups would continue to suffer and agitate if sufficient compensation is not made available to them at least in the short run to cope up with the adjustments even if trade guarantees longer run benefits. Adjustment problems in trade and effects of outsourcing have been discussed by Chakrabarty (2004), Marjit, Beladi and Chakrabarty (2004), Badopadhyaya , Marjit and Yang (2014) etc.

It goes without saying that in a democracy rising inequality is a critical issue to the political competitors and without proper attention such inequality can jeopardize good economic strategies. Thus it seems natural that one would look for compensating policies to counter rising inequality, due to trade. i.e. due to increasing export of skilled products and import of cheaper unskilled items from abroad.

In terms of a text book model of international trade and with a standard tax-transfer mechanism we try to characterize distribution neutral tax

policy which taxes skilled workers and transfers the proceeds to the unskilled workers. We find out the necessary increase in the tax rate which keeps the wage distribution unchanged at the pre-trade level and try to characterize such a tax in terms of underlying parameters. The interesting part of the problem is to check the existence of a distribution or inequality neutral tax-rate that is low enough to increase net of tax skilled wage relative to autarky. We argue that such a win-win situation will exist. We consider proportional as well as progressive tax rates and condition for existence is met independent of such difference.

Section 2 develops the model and results with proportional and progressive tax. Section 3 provides a general perspective and concludes.

Section 2: Model and Results

Two products X and Y use skilled and unskilled labor for production via CRS and diminishing marginal productivity conditions. X is skilled labor intensive and Y is unskilled labor intensive. The competitive price equation with Y as the numeraire yields

$$w_s\, a_{sx} + w a_{lx} = p \qquad (1)$$

$$w_s a_{sy} + w a_{ly} = 1 \qquad (2)$$

The symbols have usual meaning a la Jones (1965). The country concerned is skilled labor abundant and as trade opens up with $\hat{p} > 0$, $'\wedge'$ denotes percentage change. $\widehat{w}_s = \theta_{Ly} \frac{\hat{p}}{|\theta|}$ and $\widehat{w} = -\theta_{sy} \frac{\hat{p}}{|\theta|}$ (3)

With $|\theta| = \theta_{sx} - \theta_{sy} > 0$ by the factor intensity assumption. This is the standard Stolper-Samuelson result. Opening up to trade

increases inequality betweenw_s and w,with $\widehat{w}_s > 0$, $\widehat{w} < 0$. We now turn to the welfare policy of the government to compensate the unskilled workers.

Suppose the govt. taxes the skilled workers by taxing w_s with a proportional tax $t$and redistributes the tax proceeds to the unskilled workers.If S and$L$ are the numbers of skilled and unskilled workers respectively then the after transfer wage to the unskilled worker is given by (4)

$\widetilde{w} = w + t\frac{w_s.S}{L}$ (4)

and after tax wage rate of the skilled labor is

$\widetilde{w_s} = w_s(1-t)$ (5)

We can easily prove the following proposition.

Proposition 1: If t is kept unchanged, increase in $w_s$will be enough to compensate for a decline in w iff $\theta_{Ly} \geq \lambda$,

where $\lambda = \frac{w}{w+t\frac{w_s S}{L}}$

Proof:$\widehat{\widetilde{w}} = \lambda\widehat{w} + (1-\lambda)\widehat{w_s}$ (6)

$= \widehat{w}_s - \lambda(\widehat{w}_s - \widehat{w})$

$= \frac{\hat{p}}{|\theta|}\left[\theta_{Ly} - \lambda(\theta_{sy} + \theta_{Ly})\right]$

$= \frac{\hat{p}}{|\theta|}(\theta_{Ly} - \lambda)$ (7)

If $\theta_{Ly} \geq \lambda$,increase in w_s due to trade provides full compensation to the unskilled workers for the initial loss due to trade. Thus, if the objective is to insulate the unskilled wage, a high θ_{Ly} or low λshould be desirable. Following observations are in order.

If initial tax rate is fairly low, then λ will be close to 1 and as$\theta_{Ly} < 1$,with the same t, govt. will not be able to compensate the loss. Such critical t, , say $\bar{t}$ is solved as follows.

For θ_{Ly}=$\lambda \Rightarrow \theta_{Ly} = \frac{w}{w+t\frac{w_S S}{L}}$

Or,$t = \bar{t} = \frac{(1-\theta_{Ly})}{\theta_{Ly}\frac{w_S}{w}.\frac{S}{L}}$ (8)

Thus initial tax rate has to be equal to $\bar{t}$ for $\hat{\tilde{w}} = 0$. Note that such a $\bar{t}$ depends on initial relative wage$\left(\frac{w_S}{w}\right)$. Higher initial $\frac{w_S}{w}$ will reduce $\bar{t}$, because there is more to redistribute. Very high value of $\frac{L}{S}$ will demand a much higher initial tax rate to be in place for neutralizing the impact on w. The next step is to consider the case when raising w is not enough and the govt. tries to contain inequality.

<u>Distribution-Neutral tax rate</u>

We shall consider the case when the govt. worries about the inequality between after tax skilled wage and transfer supported unskilled wage. Thus the measure is given by $\frac{\tilde{w}_S}{\tilde{w}}$ instead of $\frac{w_S}{w}$. To start with before trade there was an initial value of $\frac{\widetilde{w_S}}{\tilde{w}}$ and the govt. looks at the post trade value of $\frac{\tilde{w}_S}{\tilde{w}}$. Note that even if t is kept unchanged, increase in $w_S$by itself will raise income of the unskilled. But let us see to what extent.

Proposition 2: If t is kept unchanged, ($\hat{\tilde{w}}_S$-$\hat{\tilde{w}}$) > 0 i.e. inequality must increase.

Proof: We know $\hat{\tilde{w}} = \frac{\hat{p}}{|\theta|}(\theta_{Ly} - \lambda)$for $\hat{t}$ =0(9)

Hence $(\widehat{\widetilde{w}}_s - \widehat{\widetilde{w}}) = \theta_{Ly}\frac{\hat{p}}{|\theta|} - \frac{\hat{p}}{|\theta|}(\theta_{Ly} - \lambda)$

$= \lambda\frac{\hat{p}}{|\theta|} > 0$ ***QED***.

Proposition 2 suggests that to counter rising inequality t must increase.

Let us now consider the problem of existence of a distribution-neutral tax rate t_n such that it satisfies two conditions.

$(\widehat{\widetilde{w}}_s - \widehat{\widetilde{w}}) = 0$ (10) and $\widehat{\widetilde{w}}_s > 0$ (11)

(10) implies that the degree of inequality is kept at the initial level neutralising the trade impact. (11) implies that after tax skilled wage is still greater under trade.

$\widehat{\widetilde{w}}_s = \widehat{w}_s - \hat{t}\frac{t}{(1-t)}$ (12)

$\widehat{\widetilde{w}} = \lambda\widehat{w} + (1-\lambda)(\hat{t} + \widehat{w}_s)$ (13)

Now $(\widehat{\widetilde{w}}_s - \widehat{\widetilde{w}}) = 0 \Rightarrow \widehat{w}_s - \hat{t}\frac{t}{(1-t)} - \lambda\widehat{w} - (1-\lambda)(\hat{t} + \widehat{w}_s) = 0$

Or, $\hat{t} = \frac{\lambda(\widehat{w}_s - \widehat{w})}{(1-\lambda) + \frac{t}{(1-t)}}$

$= \frac{\lambda(\frac{\hat{p}}{|\theta|})}{(1-\lambda) + \frac{t}{(1-t)}}$ (14)

The neutral tax rate t_n is given by $t_n = t(1 + \hat{t})$

$\widehat{w}_s - \hat{t}\frac{t}{(1-t)} > 0$ [from (11) & (12)]

$\Rightarrow \theta_{Ly}\frac{\hat{p}}{|\theta|} > \hat{t}\frac{t}{(1-t)}$(15)

Substituting for $\hat{t}$from (14) we get

$\theta_{Ly} > \frac{\lambda t}{\lambda t + (1-\lambda)}$ (16)

Equation (16) summarises two conditions. First, inequality is contained at the pre trade level and such taxation is fair in the sense that the skilled workers' after-tax income has been allowed to grow. But the problem is that whether such condition is likely to be satisfied, which will guarantee the existence of a t_n.

We simplify condition (16) further

$$\theta_{Ly} > \frac{\lambda t}{\lambda t+(1-\lambda)} = \frac{1}{1+\frac{1}{t}(\frac{1}{\lambda}-1)} \quad (17)$$

From the definition of $\lambda \equiv \frac{w}{w+t\frac{w_S S}{L}}$, equation (17) boils down to

$$\theta_{Ly} > \frac{1}{1+\frac{1}{t}(t\frac{w_S}{w}\cdot\frac{S}{L})} = \frac{1}{1+\frac{w_S}{w}\cdot\frac{S}{L}} \quad (18)$$

Proposition 3: Such a tax- transfer mechanism will always exist.

Proof : Following from (18) that does not contain t, a little manipulation yields that for (18) to hold $\frac{w_s}{w} > \left(\frac{1}{\theta_{Ly}} - 1\right)\frac{L}{s}$ (19)

This boils down to (S/L) > (a_{sy} / a_{sy})

Note that as the country is a typical HOS economy exporting skill intensive good and is incompletely specialized this must hold as the endowment ratio must lie within the cone of diversification i.e. (a_{sx} / a_{lx}) > S/L > (a_{sy} / a_{ly}). QED

We know that free trade does not guarantee that everyone will gain due to trade, some will and some won't. But gainers should be able to bribe losers. Problem is that such compensation is not enough to tackle rising

inequality due to trade. This is a different parameter which compensation schemes in the context of trade theory never took account of. Thus the standard compensation criteria did not have any formulation to design distribution-neutral compensation mechanism. We have proved that a distribution neutral tax transfer mechanism that guarantees a rise in after tax wage of the skilled worker and maintains the degree of inequality at the pre-trade level does exist.

Progressive Tax

Now we redo the exercise with a progressive tax that increases with w_s. In particular we propose a tax elasticity ϵ such that $\hat{t} = \epsilon\hat{w}_s$ Working through the same process as before we get

$\hat{\tilde{w}}_s = \hat{w}_s(1-\epsilon a)(20)$; where $a = \frac{t}{(1-t)}$

$\hat{\tilde{w}} = \lambda\hat{w} + (1-\lambda)(1+\epsilon)\hat{w}_s(21)$

$\hat{\tilde{w}}_s - \hat{\tilde{w}} = \lambda\frac{\hat{p}}{|Q|} - \epsilon(1-\lambda+a)\frac{\hat{p}}{|Q|}\theta_{Ly}(22)$; [by (20)-(21)& substituting for $\hat{w}_s$and$\hat{w}$ from(3)]

Note that with $\epsilon = 0$ equation (22) boils down to the case of a proportional tax.

$\hat{\tilde{w}}_s - \hat{\tilde{w}} = 0$ iff $\epsilon = \frac{\lambda}{\theta_{Ly}(1+a-\lambda)}$ (23)

$\hat{\tilde{w}}_s > 0$ iff $1 > \epsilon a$ (24)

$1 - \epsilon a > 0$ iff $\frac{1+a-\lambda}{\lambda a} > \frac{1}{\theta_{Ly}}$

Substituting for a and λ we get

$1 - \epsilon a > 0$ iff

$\frac{w_s}{w} > \left(\frac{1}{\theta_{Ly}} - 1\right)\frac{L}{s}$ (25) [using (23)]

Note that condition (25) is exactly the same condition required in the case of proportional tax.

Section 3: Conclusion

We started with the question whether one can design a compensation mechanism that not only protects absolute income of those who are adversely affected by trade, but also guarantees that the degree of inequality remains unchanged at the autarchic level and at the same time those who gain from trade continue to enjoy a higher after-tax income. We have used a standard HOS model with skilled and unskilled labor and a trade induced rise in skilled wage and a decline in unskilled wage to show that without increase in the tax rate, the rise in skilled wage will not give enough resources to keep inequality under control. However, a tax rate proportional or progressive will always exist which, if implemented, will serve the purpose. Inequality will remain the same and skilled workers would still gain.

This result modifies the well-known Pareto ranking hypothesis which does not consider rising inequality while making welfare comparisons. One must compensate the losers more than what is needed to keep them on the same level of real income as before if inequality is on the rise. The simple workhorse of trade theory shows that even such a compensation can be designed through a transfer from gainers.

Recently Marjit and Sarkar (2017) have generalized the latent idea of this paper and proposed the concept of Strongly Pareto Superior (SPS) allocation which improves individual welfare but preserves the initial degree of inequality. Thus it is distribution neutral Pareto allocation that one looks for. What they show is that if there is gain in aggregate welfare due to either trade or growth or any other change, one could always use a tax-transfer policy that implements SPS allocation. Viewed this way the result of the paper is a special case of the general proposition.

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