ANALYSING THE EFFECT OF TRADE ON INCOME INEQUALITY

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In this essay, Robert Cronin looks at the effect of trade on income inequality both between and within countries.While it may prove impossible to answer this question conclusively, in an age of globalisation and rising inequality, it is one nonetheless worth asking. Using theoretical concepts and empirical evidence from developing countries he shows that opening up to trade may lead to increased inequality through a number of different and possibly self-reinforcing channels.

Introduction

Our understanding of the implications of trade for income distribution has taken many leaps since the days of David Ricardo and his idealistic proposal that trade provides overall gains. Abrego and Edwards stated the above in the opening summary of their paper on the wages debate. Such a quote appears inherently pessimistic but does indicate that their paper will not attempt to wow you with impressive results hinging on tenuous assumptions. Instead it attempts to provide framework for future generations of economists to build on.

Models and propositions generally build on previous iterations as society as a whole gravitates towards an acceptable solution. It is interesting to consider that the trade of information in this era of globalisation will may be what allows us to determine whether we even wish to be in a globalisation era.

This essay will focus on the inequality within countries around the world and provide plausible reasoning for why trade may be an underlying cause. The proposals discussed will be extensions of well-established trade models; the significance of the Hecksher-Ohlin model and Stolper-Samuelson Theorem on the developing world and how the effects of firms' drive for productivity on inequality are magnified under the Melitz model.

The Intuitive Set-Back

The Hecksher-Ohlin Model (HOM) is a relatively simple framework that has aided important theorems, including the Stolper-Samuelson Theorem. It builds on Ricardo's theory of comparative advantage, albeit under slightly more realistic assumptions. The HOM es-

sentially takes a 2 country, 2 industries and 2 factor framework. It is a long run model and hence allows the factors to move between industries. Among other things it assumes each country is abundant in a different factor and each industry uses one factor intensively. Each country therefore favours production in the industry which intensively uses the factor it holds in abundance, i.e. the good it has a comparative advantage in.

If we assume perfect competition, then pre-trade the two factors are free to move between industries and so will only move when given an incentive to do so i.e. increased earnings. This implies that at equilibrium, the returns for each factor are equalised across industry.

When these two countries open up to free trade, the relative price of our favoured good increases due to our comparative advantage in it over our trade partners. It can be shown relatively easily that the owners of the factor used intensively in the good whose price increased, gain in real terms while the other owners lose in real terms. This is effectively the Stolper-Samuelson Theorem (Stolper and Samuelson, 1941).

There is nothing inherently difficult about the reasoning or the maths behind the Stolper-Samuelson Theorem. The intuitive logic presents the first setback to an argument for universal gains from trade. In the standard usage of the HOM the two factors used are Labour and Capital and so opening to trade will either see capital owners or workers losing out. In either case it will lead to a divide in real money earned by different citizens.

Inequality within Developing Countries

Skill Premium

Wood (1998) put forward the idea of modelling a worker's skill level with the HOM to demonstrate the effect of trade on income inequality. He proposed using skilled and unskilled labour as the two factors in the HOM and the rich North and poor South as the two countries. Here it seems reasonable to assume that the North is relatively abundant in skilled workers while the South is relatively abundant in unskilled workers.

Applying the Stolper-Samuelson Theorem to this model suggests that if these two countries open up to trade (i.e. the developed world begins trading with the developing world) then the wage gap will shrink in the South and increase in the North. The South has a comparative advantage in unskilled work due to its abundance in this factor and therefore the real return on unskilled labour increases while the real return on skilled labour falls. This has the effect of reducing the wage gap between the skilled and unskilled, which is also known as reducing the skill premium. This suggests that trade is a good policy for developing countries (assuming that income inequality is a bad thing) whereby they not only receive overall gains but they receive them in such a way that aids the process of redistributing income.

Contradictions to Theory-Colombia

Attanasio, Goldberg and Pavcnik (2003) chose to test this theory in Colombia, a developing country which had radical tariff cuts in 1990-91, as it provided a case with conditions as good as could be expected in reality. Prior to 1990 Columbia had relatively high tariffs so a drastic cut was roughly equivalent to opening up to trade. Colombia negotiated the terms of their tariff reduction with the WTO and as a result eliminated the chance of lobbying affecting the resulting tariffs meaning the final tariffs were 'exogenously predetermined'. Before this they used tariffs in an attempt to protect their unskilled citizens. When they reduced tariffs they cut them so that all tariffs were roughly the same, resulting in a change in tariff structure and a simulation of opening to trade.

The theory discussed indicates that the skill premium should reduce as a result of being exposed to trade. Unfortunately Attanasio, Goldberg and Pavcnik's (AGP) data shows the exact opposite occurring which will potentially discourage other developing countries from opening to trade in the future but it is intriguing from a theoretical perspective.

Plausible Explanations

AGP claim the evidence completely follows the theory due to the manner in which the trade barriers were taken down. When a tariff is placed on a good, it effectively increases the world price that the domestic consumers face. In economic terms Colombia is small and holds no influence on the world price forcing it to 'take' this increased price. The tariff allows domestic producers to also charge at this higher price. Given Colombia pre-1990 was protecting its unskilled labour by placing higher tariffs on these goods it meant that they were the goods most affected by the cut in tariffs. Colombia's attempt to reduce all tariffs to roughly the same point meant these unskilled-intensive goods saw the largest fall in tariffs and consequently the largest fall in price as shown by AGP.

The mechanics behind the HOM predicted that Colombia's abundance in unskilled work gave them a comparative advantage in unskilled products. This would mean that when the trade barriers were brought down these products should increase in price. Due to the nature of the tariff cut the opposite actually happened meaning the Stolper-Samuelson Theorem should be applied to a fall in price of unskilled products. Therefore a reduction in wages for unskilled labour should be seen relative to skilled wages which conforms to the data provided.

Further Evaluation of Theory

The HOM is a long run model which assumes all factors are mobile and hence can move between industries. Opening to trade, which increases the price of one good, therefore causes the two factors to shift towards the more profitable industry to the point that re-

turns equalise for each factor. In our Colombian model (accounting for the reversal in expected price movements) we should then see all labour (skilled and unskilled) shift towards the good which increased in price. However as expected when testing any model, the model doesn't explain all the data and in fact we observe labour to be relatively constant. AGP claim the change in price due to tariff cut to be statistically insignificant as an explanatory variable to change in employment shares. The fact that this shift did not occur implies trade may not be the underlying reason for the increase in inequality.

Additionally the HOM predicts that both industries will increase their share of the now cheaper factor post-trade implying Colombian firms should begin hiring a lower proportion of skilled workers. Unsurprisingly the data continues to disagree with the model and we actually saw an increase in the share of skilled workers in most industries (AGP).

Peering from the Giant's Shoulders

AGP attempted to apply these well-established theories to the Colombian data at every step and continued to stumble. This stumbling only spurred them to investigate further and brought them to the idea of skill-based technological change. While the HOM assumes identical technologies across countries it is fairly logical to assume that a developing country like Colombia does not have access to the same technologies as the USA say. Allowing trade of goods between your borders has the added benefit of encouraging exchange of information, exchange of capital and foreign direct investment. All of these inevitably increase the technologies present in Colombia.

AGP adapted Wood's idea of 'defensive innovation' and inferred that the reduction of tariffs brought increased import competition most heavily upon the industries that saw the biggest cuts. In this case, unskilled labour intensive goods. As a result they were forced to adapt these new technologies and 'look for new methods of production that economise on unskilled labour'. This defensive innovation naturally requires more skilled labour and hence it became the factor with increased demand and thus increased returns providing an explanation to the increase in skill premium.

When Colombia reduced its tariffs industry wide and effectively opened itself to trade it saw a gradual increase in income inequality which standard trade theory couldn't effectively explain at every point. This suggests that trade may be a red herring and just coincidentally increased at the same time as income inequality. We find however that although trade didn't work the traditional channels it indirectly affected inequality by promoting innovation and forcing firms to either adapt or fail.

Implications for the Developing World

The Colombian conclusion appears to be very specific to strict conditions related to the

structure of tariff cuts. The research, though fascinating and thorough, may then be inconsequential for trade theory moving forward. However AGP drew many comparisons with Hanson and Harrison's (1999) analysis of Mexico. Mexico opened to trade by cutting tariffs drastically and they saw even bigger increases in inequality than Colombia. Given they also protected their unskilled labour pre-cut they ended up having the largest cuts in these sectors. As a result of this, after the reversed price changes employment did not move as predicted by the HOM and stayed relatively constant. The theory constructed by AGP is therefore equally applicable to Mexico and perhaps many other developing countries considering a tariff reform.

'Within Group' Inequality

Melitz Model: A Summary

The Melitz model (Melitz, 2003) shows the relationship between firms' productivity and likelihood to produce. It assumes heterogeneous firms with varying productivities and shows that only the most productive firms can afford to produce. The more efficient a firm is, the more profits they will earn. Opening to trade leads to a larger market but also higher production and transport costs which only highly productive firms can afford. This encourages the top firms to produce more which increases labour demand and hence wages for all firms. This increased cost of production however forces some low-productivity firms to exit the market.

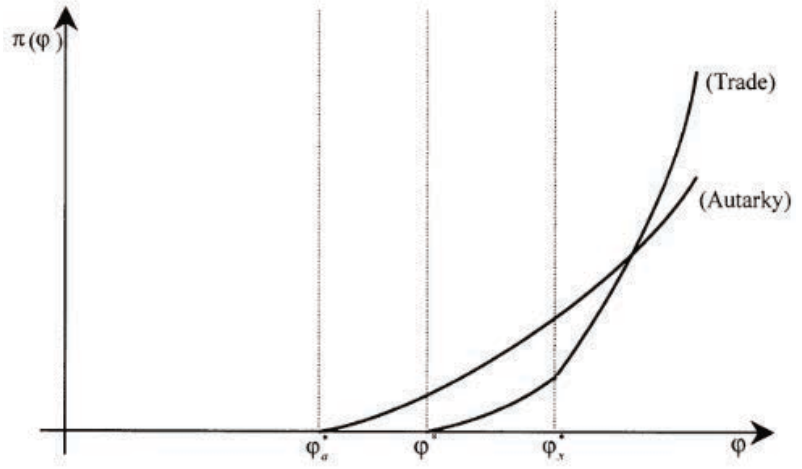

Figure 1: Profits versus productivity under the Melitz model (Source: Melitz, 2003)

There are some benefits to trade here as we see real wages do increase and given the low productivity firms exit the market, the overall level of productivity increases. However it also conveys how trade can create income inequality between firm owners/investors. The most productive firms were originally earning more but after opening to trade the income redistributes even more in favour of these top firms. Those who can still produce profitably but can't export are facing increased costs without any extra gain and even some firms who can export are still earning less than before as the gain doesn't outweigh the loss. The top firms reap all the gains and while there is overall gains from trade it all sits in the pockets of the top firms. Melitz demonstrates these effects in Figure 1 (ϕa^* is original productivity cut-off, ϕ^* is after trade, ϕx^* is export cut-off).

Further Melitz Inequality

Helpman, Itskhoki & Redding (2010) built on this Melitz model to demonstrate how there is potentially a further effect on inequality. They use a reasonable assumption that workers' abilities are not homogenous and firms must screen their workers to get an idea of their ability. This is effectively describing the interview process. Interviewing is expensive but given the importance of a worker's ability to the profitability of a firm, it is an efficient investment of time and money. Small firms have less incentive to screen thoroughly as they do not have the same resources as larger firms and may not be able to afford a lengthy interview process, despite the long term gains.

So firms who can afford to spend more time screening potential employees will end up hiring more competent workers and hence are far more likely to be highly productive. As Melitz reasonably implied, more productive firms earn higher profits. They are then inclined to continue intensive screening with higher resources. However, given the added expense of hiring a worker through this process, they are inclined to pay their workers a higher wage to encourage them to stay with the firm, known as an efficiency wage.

An ability premium is thus in effect as the most able workers will be employed by the more productive firms who pay their workers higher wages. This is a form of 'within group inequality' since workers who have the same skill level (education etc.) will not all be paid the same wage. This result is intuitive and efficient in the sense that the best workers get paid the highest amount which incentivises workers to pursue a career in their most productive field.

Using this model to determine the consequences of opening to trade leads to worrying results. The Melitz model shows that trade liberalisation redistributes income towards more productive firms. These top firms, who suddenly boost their income through exporting, are further motivated to interview their employees more comprehensively. The bigger a firm becomes the more they stand to win or lose from the decis-

ion making/competency of its employees. The increased screening process further boosts the cost of hiring which encourages them to pay their employees even higher wages.

At the other end of the spectrum, firms who were previously making respectable profits find themselves scraping by, near the zero profit cut-off. They can no longer afford to screen their employees as meticulously. As a result their productivity levels (and hence profits) fall. They then have less incentive to pay their employees to stay as the interview process will be less complex and it is cheaper to rehire than pay higher wages. As a result the less able workers who work for the less productive firms potentially face a wage decrease, further widening the income gap. Helpman *et al* (2010) reference findings from Menezes-Filho and colleagues (2006) which provide empirical evidence for increased within group inequality after trade.

Melitz (2003) assumed lower productivity firms went out of business due to higher wages whereas this suggests they face lower wages when the country opens to trade. However Melitz does propose an alternative as to why these firms exit whereby they face an 'increase in product market competition associated with trade' so this model is still plausible and intuitive.

This model does however suggest that firms who face lower profits due to having low productivity levels initially not only lose once trade begins, but also slowly become less productive over time due to less screening of employees and inadvertently hiring less productive workers. So opening to trade has the initial Melitz inequality effect of rich firm owners becoming richer due to higher productivities. Then we also see an increase in income inequality for workers due to efficiency wages. Finally, over time the productive firms become more productive due to increased screening and unproductive firms become less productive. This leads to further income inequality for both firm owners and employees developing in the time period after trade liberalisation, an extremely unfavourable result of trade.

Conclusion

David Ricardo's original ideas of comparative advantage from the early nineteenth century represent a very positive view of the potential gains from trade. The prevalence of global trade today is perhaps the best endorsement for Ricardo's theory. However the world has since learned that these gains from trade can come at the cost of increased income inequality.

In all the cases encountered in this essay, inequality of some form increased after a country lowered its trade barriers. However it is difficult to prove conclusively that trade is the underlying reason for this effect. A country that opens to trade is likely to be attempting to boost their economy in more ways than just trade. In an attempt to integrate their country into the global market, the government are possibly implementing many

new policies to increase productivity and profitability. This was evident in Colombia where we concluded that trade indirectly caused firms to adapt new technologies to compete on a global scale. So while Colombia was opening up it was also attempting to boost its output in other ways.

Perhaps a stronger case for this is the results of the Melitz model which when appropriately tweaked reveal that trade can effectively increase inequalities for the two standard sectors of the economy, Capital and Labour. Governments can claim they plan to redistribute the gains from trade fairly, through taxes and subsidies, but doing this in practice is a near impossible task. The evidence presented in this article implies that trade is likely to increase income inequality, but ultimately free trade policies must evaluated on a case by case basis and depending on your confidence in the political system there may be some comfort in the fact that the vast majority of countries around the world have opted in favour of trade.

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