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Wolfgang Lechthaler and Mariya Mileva

Trade with China, Inequality and Policy Responses

The integration of China's huge workforce into the global trading system has had profound effects on economies worldwide. Trade with China has been shown to lead to wage losses and declining employment in developed countries. The integration of the Chinese economy into the world trade is also frequently blamed for rising inequality. This article analyses policy instruments that can remedy the rising levels of income inequality in industrialised countries, differentiating between the short-term causes, e.g. the slow reallocation of workers across sectors, and the long-term ones, e.g. the increased demand for skilled workers. Instruments considered include a general wage tax, sector-specific taxes on consumption and profit, tailored subsidies for firms, and training subsidies.

Well before Piketty's book *Capital in the Twenty-First Century* climbed up bestseller lists, the surge in inequality in recent decades was already a topic of heated debate among economists, policy makers and the wider public. This increase in inequality is illustrated in Figure 1, which shows the change in the Gini coefficient since the mid-1980s for a selected group of countries. The Gini coefficient, the most widely used measure of income inequality, measures the extent to which income is concentrated among some individuals. A Gini coefficient of 0 describes an egalitarian income distribution in which everybody earns exactly the same. The larger the Gini coefficient, the more concentrated income is, until it reaches 1, which means that all the income is concentrated in a single individual.

As Figure 1 shows, many countries have experienced significant increases in income inequality since the mid-1980s. The figure also shows that this phenomenon is widespread, affecting not only the Anglo-Saxon countries often associated with large levels of inequality, but also continental European countries.

Increased inequality poses two questions to economic policy makers. First, what is the underlying reason for this development? Second, if a goal of economic policy

is to reverse this trend, what is the best way to achieve this? The two questions are, of course, interrelated. Only through a thorough understanding of the economic mechanisms behind the increased levels of inequality can the appropriate policy response be found.

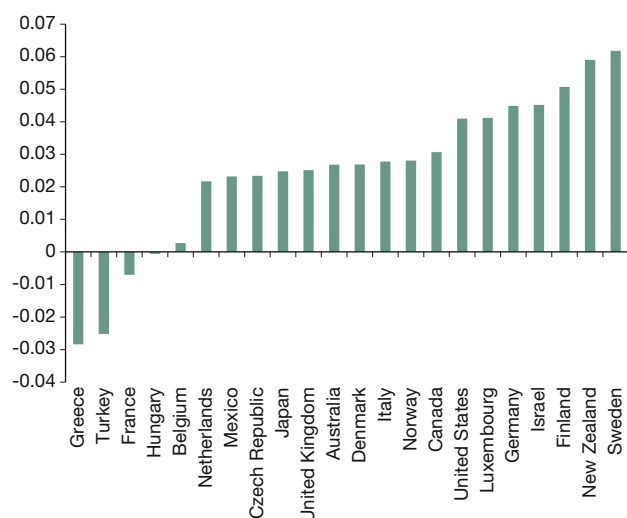
In this article, we focus on one of the most prominent explanations for rising inequality: globalisation, particularly the integration of the Chinese economy into world trade. The rising importance of China for world trade is illustrated in Figure 2, which shows China's share in world manufacturing exports. In the mid-1980s, this share was close to zero, but it has been on an upward trend since then. With the accession of China to the World Trade Organization in 2001, this trend accelerated considerably, with China's share of global manufacturing exports exceeding 15 per cent since 2011.

The integration of a country with such a huge workforce of relatively unskilled labour was destined to have an important global impact. For industrialised countries in particular, this development poses a challenge, since it implies a change in the structure of trade away from intra-industry trade (which is the predominant form of trade among industrialised countries) and towards inter-industry trade based on comparative advantage. This difference matters because inter-industry trade implies a stronger reallocation of resources, since trade that is based on comparative advantage leads some sectors to shrink and other sectors to expand. The reallocation of labour and other production factors across sectors takes time and poses a serious challenge to the affected economies. Indeed, empirical research has shown that trade with China (and other developing countries) has led to wage losses and

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Figure 1
Change in the Gini coefficient in OECD Countries,
mid-1980s to late 2000s



Note: This Gini coefficient is based on disposable household income in cash after transfers and taxes, adjusted for household size. The starting dates vary by country, ranging from 1983 to 1995.

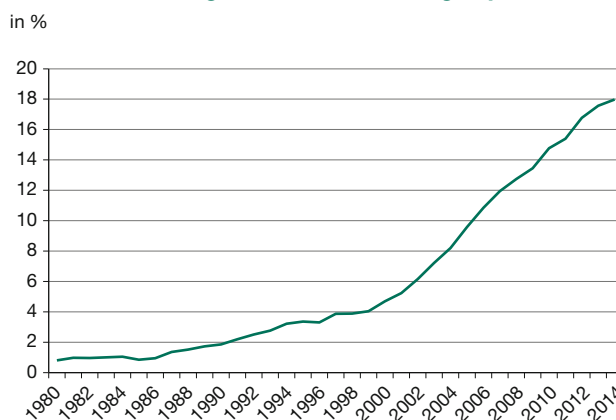
Source: OECD Database on Household Income Distribution and Poverty.

declining employment in the import-competing sectors and expansions in the exporting sectors of developed countries.¹

The purpose of this article is to analyse policy instruments that can potentially affect the changes to the income distributions of industrialised countries in response to the liberalisation of trade with a large developing country. To this end, it is necessary to develop a model that can capture the most important features of trade with developing countries. The model we use does just that and is also able to replicate the large increase in wage inequality experienced in many industrialised countries. We show that trade liberalisation increases wage inequality both in the short and long run. However, the causes of wage inequality differ in the short and long run. The short-term rise in wage inequality is primarily driven by the slow reallocation of workers across sectors, while over the long term, it is primarily driven by the increased demand for skilled workers, which leads to an increased skill premium.

¹ See e.g. D.H. Autor, D. Dorn, G.H. Hanson: The China Syndrome: Local Labor Market Effects of Import Competition in the United States, in: *American Economic Review*, Vol. 103, No. 6, 2013, pp. 2121-68; and W. Dauth, S. Findeisen, J. Suedekum: The rise of the East and the Far East: German labor markets and trade integration, in: *Journal of the European Economic Association*, Vol. 12, No. 6, 2014, pp. 1643-1675.

Figure 2
China's share of global manufacturing exports



Source: World Trade Organization.

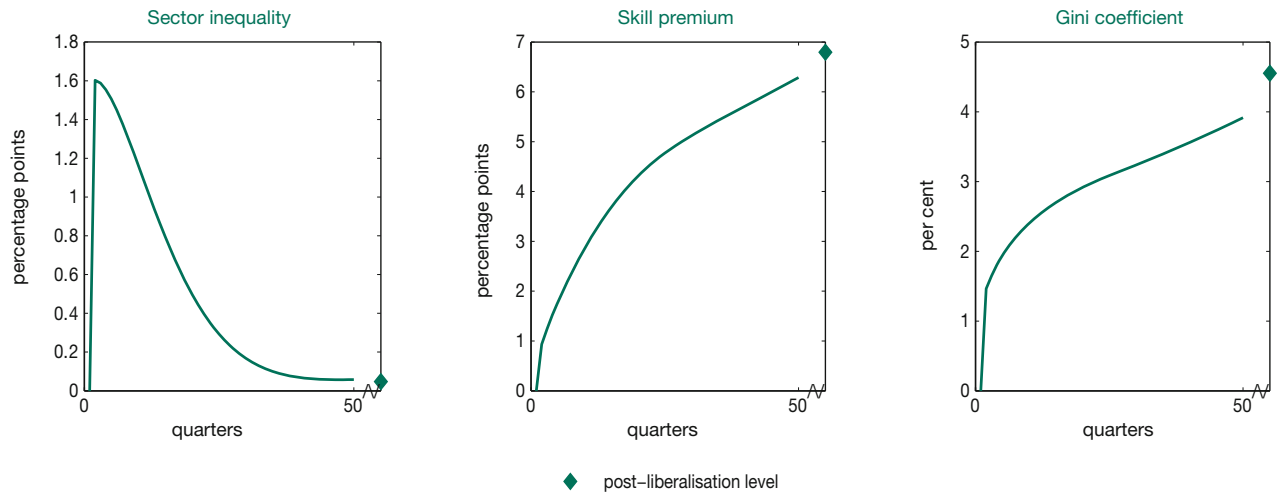
Economic policy in this setting poses a challenge because many instruments imply a trade-off between reducing inequality and speeding up the adjustment process. For instance, sector-specific taxes could be used to reduce inequality across sectors, but they reduce the incentives of production factors to reallocate and thus slow down the adjustment process. Training subsidies, which avoid this kind of trade-off, are the most potent policy instrument, as they reduce wage inequality (primarily in the long run) and simultaneously speed up the adjustment process. However, the effects of training subsidies need a relatively long time to materialise, which prevents them from being very effective in the short run.

Trade liberalisation and wage inequality

The model we are using is described in detail in Lechthaler and Mileva.² It incorporates several features that are important when studying the liberalisation of trade between an industrialised country and a developing country. Most importantly, it allows for adjustment dynamics, inter-industry trade and comparative advantage, which lead to the slow and costly reallocation of resources, documented as a feature of trade liberalisation. It also incorporates workers of different skill groups in order to capture changes in the demand for skills and thus the skill premium. Apart from that, we keep the model as simple as possible to concentrate on the most important mechanisms of trade liberalisation.

² W. Lechthaler, M. Mileva: Trade Liberalization and Wage Inequality: New Insights from a Dynamic Trade Model with Heterogeneous Firms and Comparative Advantage, Kiel Working Paper, No. 1886, 2013.

Figure 3
Measures of inequality



Sector inequality is measured as the average per cent difference between the wages of workers employed in the skill intensive sector and the wages of workers employed in the unskilled sector. The skill premium is the per cent difference between the average wage of skilled and unskilled workers. Both are measured in percentage points relative to their pre-liberalisation level. The Gini coefficient is measured in per cent relative to its pre-liberalisation level.

Source: Authors' simulations.

Wage inequality in our model can stem from two different sources. Workers with higher skills earn higher wages than workers with lower skills, and slow reallocation of production factors across sectors can imply temporary wage differentials across sectors. In the long run, workers will relocate across sectors so that the wage for a given skill class is the same in all sectors, but in the short run, due to slow reallocation, wage differences can arise. However, wage differences across skill levels manifest in the long run as well. Since it is costly to acquire skills, skilled workers will always earn more than unskilled workers, even in the long run.

In this setting, we analyse the consequences of the liberalisation of trade between a large industrialised country and a large developing country. The industrialised country has better training opportunities and therefore has a comparative advantage in the skill-intensive sector. In contrast, the developing country has worse training opportunities and therefore has a comparative advantage in the unskilled sector. International trade is beneficial because it allows both countries to specialise in the production of the goods in which they have a comparative advantage. Specialisation leads to higher global production, and in the aggregate, both countries can enjoy more consumption than under autarky.

However, the gains from international trade can be distributed very unevenly, and some workers might lose from

trade liberalisation. Furthermore, the effects of trade liberalisation differ in the short run and in the long run.

In the short run, production factors are relatively immobile across sectors, because it costs time and resources to relocate to a different sector (production plants have to be altered and workers need to learn new skills). This implies that the supply of production factors in the expanding comparative advantage sector cannot keep pace with the increase in demand. Workers in the comparative advantage sector become relatively scarce, and consequently their wages are pushed upwards. This is true for both skilled and unskilled workers. The development in the comparative disadvantage sector is the exact opposite. Demand in this sector drops quickly, but workers are slow to transition out of it and into the expanding sector. This puts downwards pressure on wages.

In the medium run, more and more workers will relocate to the expanding comparative advantage sector. This has two distinct effects on the wage distribution. On the one hand, the scarcity of workers in the comparative advantage sector and the oversupply of workers in the comparative disadvantage sector are ameliorated. Inequality across sectors starts to recede. On the other hand, the structure of production changes, putting increased importance on skilled workers. The industrialised country has a comparative advantage in the skill-intensive sector. Further specialisation in that sector will yield an increase

in the demand for skilled workers, which puts upward pressure on the skill premium. However, for this effect to manifest, workers need to relocate, and the structure of production (i.e. the relative shares of skilled and unskilled workers) needs to adjust. For this reason, the increase in the skill premium is very small in the short run and slowly builds up over time as workers relocate.

Figure 3 illustrates the discussion so far, showing the development of various measures of wage inequality across time. Sector inequality measures the inequality of wages across sectors, the skill premium refers to the inequality of wages across skill groups and the Gini coefficient pertains to overall wage inequality. Figure 3 shows that overall wage inequality rises both in the short run and in the long run in response to trade liberalisation. In the short run, overall wage inequality is mainly driven by intersectoral wage inequality, which subsides as workers relocate to the expanding comparative advantage sector. Meanwhile, the skill premium rises over time. This increase outweighs the decrease in intersectoral wage inequality, and thus overall wage inequality increases until it reaches a new plateau.

Economic policy and wage inequality

Our analysis so far suggests that trade liberalisation can be an important driver of wage inequality, especially when trade is liberalised between industrialised and developing countries, leading to enhanced specialisation, reallocation of production factors and greater demand for skills. If policy makers consider these trends in wage inequality undesirable, what can economic policy do to counteract these trends?

There are various ways in which economic policy can affect the wage distribution. The most obvious instrument is of course a wage tax that can be used to redistribute income from high-earners to low-earners. However, the impact of such a tax scheme is only effective in reducing the skill premium. As we discussed in the previous section, the increase in short-run wage inequality is mostly driven by intersectoral wage inequality. Since a wage tax can hardly be made specific to the sector in which a worker is employed, it can have only limited impact on intersectoral inequality. To the contrary, consumption taxes and profit taxes can be more easily made sector-specific. By affecting consumer prices and profits, these taxes also have an impact on wages and thus have the potential to affect intersectoral wage inequality. All of the instruments proposed so far not only reduce inequality but also slow down the adjustment process. Economic policy could instead be used to speed up the adjustment process and the reallocation of production factors by subsidising the migration of production factors across sectors or investment in skills.

Our analysis in Lechthaler and Mileva suggests that sector-specific consumption and profit taxes can indeed be used to curb the increase in intersectoral wage inequality in the early periods after trade liberalisation.³ A temporary three per cent increase in the consumption tax in the comparative advantage sector (or a 1.5 per cent increase in the profit tax) almost completely offsets the initial surge in intersectoral wage inequality. However, these instruments reduce the incentives for production factors to relocate across sectors and therefore slow down the adjustment process.

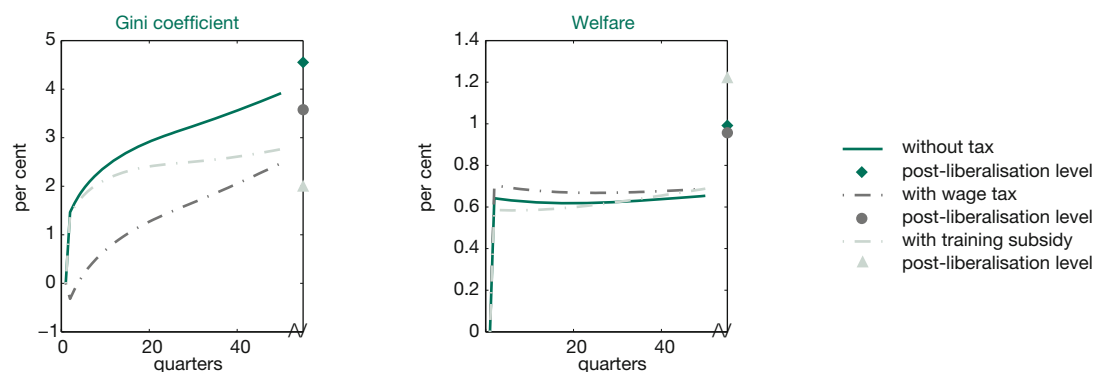
A temporary subsidy for firms entering the comparative advantage sector manages to speed up the adjustment process of both firms and workers, but it does so at the cost of a sharp increase in inequality. Furthermore, this policy has the potential to generate large inefficiencies because firm investment can easily become inefficiently large. In contrast, a subsidy for workers relocating across sectors speeds up the adjustment process without creating a large impact on wage inequality.

The policy instruments mentioned so far either target the rise in short-run inequality across sectors or facilitate and speed up the adjustment process after trade liberalisation. However, they are not suitable for reducing long-term wage inequality, which is driven by the skill premium. Two instruments that can be used to reduce the skill premium are wage taxes and training subsidies. The effects of these two instruments on wage inequality and welfare are illustrated in Figure 4. The figure shows the effects of a permanent increase in the wage tax on skilled workers of 0.63 percentage points, which is then used to finance a wage subsidy for unskilled workers. The increase in the wage tax slows down the increase in wage inequality considerably by reducing the after-tax skill premium. However, this policy cannot offset the short-run increase in intersectoral wage inequality. Furthermore, the tax is costly because by reducing the skill premium it reduces the incentives to invest in skills. Thus, in terms of welfare there are two counteracting effects. On the one hand, redistribution increases welfare because consumption is distributed more equally.⁴ On the other hand, redistribution reduces output because investment in skills is inefficiently low. According to our analysis, the latter effect dominates, so that redistribution through a wage tax ultimately reduces welfare.

3 W. Lechthaler, M. Mileva: Smoothing the adjustment to trade liberalization, Kiel Working Paper, No. 1948, 2014.

4 Our welfare measure is based on the weighted average of the utility of all workers and, therefore, imposes a penalty on unequal distributions (due to the curvature of the utility function, welfare is higher if consumption is distributed equally).

Figure 4
Effect of permanent wage tax and permanent training subsidy



Note: Both variables are measured in per cent deviation from their pre-liberalisation levels. Welfare is measured by calculating the average present discounted value of utility per worker.

Source: Authors' simulations.

The effects of a training subsidy are very different from those of a wage tax (Figure 4 shows the effects of a permanent training subsidy of five per cent of the cost of training). In the short run, the training subsidy has very little impact on wage inequality. The training subsidy increases investment in skills, but the effect on wage inequality is only indirect and, therefore, needs a while to materialise. In the medium run, however, the share of skilled workers is considerably increased, making skilled workers relatively more abundant and unskilled workers relatively scarcer, resulting in a marked drop in the skill premium and hence wage inequality. The effects on welfare are also very different from those of a wage tax. In the very short run, welfare goes down because of a slight overinvestment in skills and because the effect on wage inequality is very small. In the medium to longer run, however, the policy leads to a considerable increase in welfare.

Conclusion

In this article, we have analysed the effects of inter-industry trade on wage inequality and the capacity of several policy instruments to change the income distribution. The focus on inter-industry trade is important because the integration of China and other developing countries has led to a shift in the structure of trade away from intra-industry trade and towards inter-industry trade. Inter-industry trade leads to enhanced specialisation, which necessitates the reallocation of production factors across sectors.

One implication of this is that the long-run and short-run policy challenges are quite different from one another, and policy makers need to take account of the full adjust-

ment process. It also implies that a mix of instruments is necessary to reduce income inequality, since a single instrument cannot be effective both in the short run and in the long run.

More specifically, we find that trade liberalisation between an industrialised country and a developing country leads to larger income inequality in the industrialised country both in the short run and in the long run. However, the underlying mechanisms are very different. In the short run, inequality is mainly driven by intersectoral wage inequality that arises due to the slow reallocation of workers across industries. In the long run, inequality is driven by an increase in the skill premium, because specialisation in the skill-intensive sector raises the demand for skilled workers.

Because the underlying reasons for wage inequality are different in the short and long run, policy instruments meant to reduce inequality work differently in the short and long run. While sector-specific consumption and profit taxes can be very effective in the short run, they are not effective in the long run. Wage taxes can reduce inequality, but they can harm the economy in the long run because they reduce the incentives to invest in skills.

The most suitable instrument to fight income inequality in the long run is a subsidy for training investments. By increasing the supply of skilled workers (and making unskilled workers relatively scarcer), the skill premium will be reduced – and with it overall wage inequality. However, the effects need time to materialise, as the short-term impacts of the subsidy are only minor. Thus, to strike a balance between short-run and long-run effects, a combination of instruments is called for.