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**Globalisation and rigid labour  
markets**

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*The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the Bank of Finland.*



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# 1 Introduction

Globalisation is more than ever an issue that concerns the broad public. Just mentioning China in the debate is enough to raise a feeling of uneasiness among many citizens in developed countries. How can Western workers ever compete with Chinese wages? Can the current standard of living be defended at all? And what can governments do in this apparently hopeless situation?

Indeed, it is not an unjustified feeling that the world has entered a new stage of globalisation. Apart from China, Eastern European countries and India also play an increasingly important role in global labour division. Recent advances in communication technology have brought about a new phenomenon in international trade referred to as offshoring. It is no longer necessary to trade final goods; the complexity of producing single tasks of the value added chain abroad can be handled these days. Naturally, these political and technological developments have caused deeper market integration and will continue to do so in the near future.

The majority of economists praise these developments because a more efficient allocation of production factors around the globe generates higher income for all countries. However, it is also well known from the Heckscher-Ohlin theory that low-skilled workers in industrialised economies tend to lose in both relative and real terms whereas entrepreneurs, capital owners and high-skilled employees reap the benefits from globalisation. As policy makers are not only concerned about efficiency but also about income distribution, increasing market integration brings about a conflict that dominates much of the ongoing policy debate: Gains from globalisation can only be reaped if more inequality is accepted.

Against this background it is understandable that policy makers think about ways to avoid the detrimental effects for low-skilled labour without relinquishing potential gains from market integration. If the market brings about more inequality and favours certain groups at the expense of others, why should one not simply intervene to modify the market outcome? Minimum wages in particular are often proposed as an appropriate tool to defend low-skilled workers' wages. This paper studies the implications of such interventions from several theoretical angles. The central result is that gains from globalisation are foregone if labour markets become (more) rigid. Ironically, those who should be protected against global

market forces lose even more due to (higher) unemployment than with flexible labour markets. The next section lays out a simple model to explain the mechanism of globalisation with both flexible and rigid wages. In Sections 3 and 4, I discuss the implications of offshoring and increasing returns to scale. Section 5 summarises the major findings and offers policy recommendations.

## 2 The standard argument

Let us start with the classical theory. As trade and factor mobility are substitutes, it is sufficient to use a very simple model to make the point. Consider two countries, Europe (E) and China (C), that are endowed with physical capital (K) and labour (L). Both economies produce a homogenous good under a standard constant returns to scale-technology. Europe is assumed to be relatively capital abundant, so that  $k^E > k^C$  with  $k^j = K^j/L^j$ ,  $j \in \{E, C\}$ . Capital is understood as real rather than financial capital in order to capture long run allocations. Relative price changes are faded out as the commodity price is normalised to unity in both regions. Output in country  $j$  is denoted by  $Y^j = f(K^j, L^j)$ . The production function exhibits positive but decreasing marginal returns,  $f_K^j > 0$ ,  $f_L^j > 0$  and  $f_{KK}^j < 0$ ,  $f_{LL}^j < 0$ . The cross derivatives are positive,  $f_{KL}^j > 0$ ,  $f_{LK}^j > 0$ , reflecting labour and capital to be complements in the production process. Due to perfect competition, factors are paid their marginal products,  $f_K^j = r^j$  and  $f_L^j = w^j$ . Since both countries produce the good with the same constant returns to scale technology, marginal products, and hence factor prices, can be expressed as functions of the capital-labour ratio  $k^j$  alone.

$$w^j = \lambda(k^j) \quad \text{with } \lambda' > 0 \quad (1)$$

and

$$r^j = \mu(k^j) \quad \text{with } \mu' < 0 \quad (2)$$

The higher the capital-labour ratio, the more productive the workers and hence, the higher the wage rate. The opposite is true for capital. From the relative endowments in the respective countries we can then derive factor prices directly. As  $k^E > k^C$ , we know that

$w^E > w^C$  and  $r^E < r^C$  in autarky. In other words, as labour is relatively abundant in China we should expect wages to be low there. In Europe, on the other hand, labour is relatively scarce allowing for high labour productivity and hence high wages.

## 2.1 Flexible labour markets

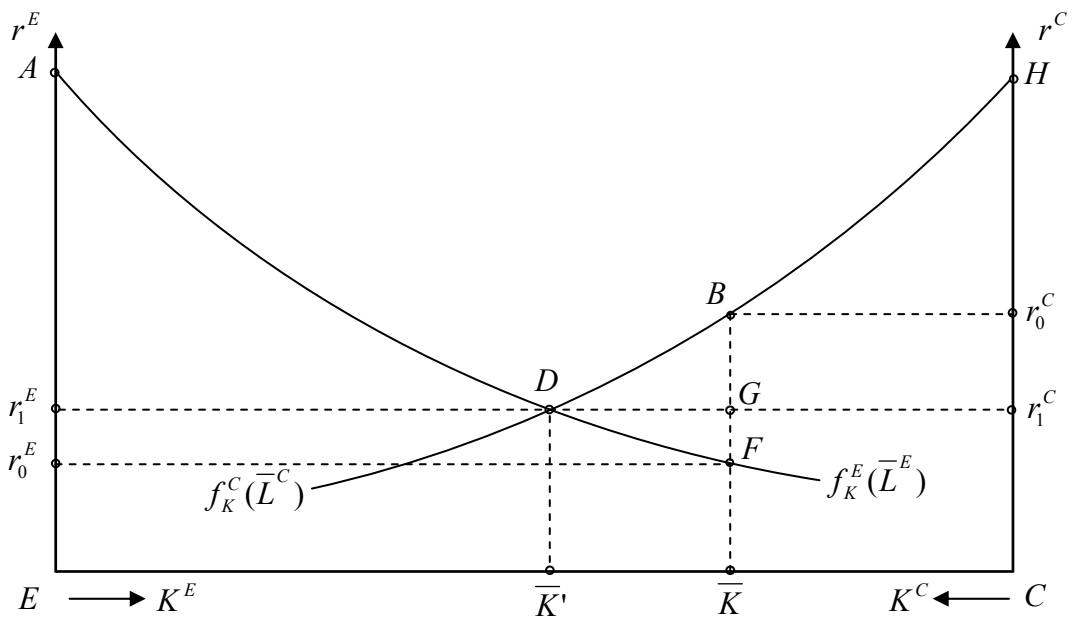
Figure 1 summarises the mechanism of capital mobility with flexible wages.<sup>1</sup> Let us start with the situation in autarky. The width of the box reveals the world capital endowment  $K = K^E + K^C$ . Europe possesses  $E\bar{K}$ , whereas China owns  $\bar{K}C$  units of capital. The downward sloping curves reveal the marginal productivity of capital for given labour inputs,  $\bar{L}^E$  and  $\bar{L}^C$ , respectively. They are identical and homogeneous of degree zero. Europe's GDP is then represented by the integral of  $f_K^E(\bar{L}^E)$  between the boundaries  $E$  and  $\bar{K}$ . This is the value of the output for given  $K$  and  $L$ . According to Euler's theorem we know that  $pY = f_K K + f_L L$ . With  $p = 1$ ,  $Y - f_K K = f_L L$  reflects labour income, represented by the area  $AFr_0^E$ . Capital income is made up by  $r_0^E F\bar{K}E$ . The same analysis applies to China. Workers share the income  $BHr_0^C$  while capital owners earn  $Br_0^C C\bar{K}$ . The higher capital return in China hints to the fact that capital-labour ratios are lower there, as we assumed. Hence,  $B$  and  $F$  characterise the respective equilibria in autarky.

Capital owners shift capital according to factor price differences. Hence, Europe will export some units of capital to China so that marginal productivity increases in Europe and declines in China (according to (2)). Capital exports come to a halt when  $r^E = r^C$  (which holds in D in Figure 1). At this point,  $\bar{K}\bar{K}'$  units have crossed borders causing an increase in Europe's capital return from  $r_0^E$  to  $r_1^E$  whereas the opposite movement takes place in China (from  $r_0^C$  to  $r_1^C$ ). We know from equation (2) that relative endowments must have been equated which in turn means that also wages must be identical in both jurisdictions according to equation (1). Finally, we can take a look at the effects of capital mobility on income. European capital owners clearly benefit as they can employ their capital more efficiently around the globe. Their income rises from  $r_0^E F\bar{K}E$  to  $r_1^E G\bar{K}E$ , while workers face a reduction of their wage sum from  $AFr_0^E$  to  $ADr_1^E$ . The opposite development occurs in

<sup>1</sup> The results we derive here can easily be replicated with migration or international commodity trade.

China where workers benefit from capital imports and thus from higher productivity. Their wage sum rises from  $BHr_0^C$  to  $DHr_1^C$ . Chinese capital owners face more competition from foreign capital so that their income shrinks from  $Br_0^C C\bar{K}$  to  $Gr_1^C C\bar{K}$ . Summing up all effects results in a net increase of global income, represented by the area  $DBF$ . The upper part, namely  $DBG$ , accrues to Chinese citizens whereas the lower part, namely  $DGF$ , to European ones.

**Figure 1 Capital mobility with flexible wages**



These results reflect the central trade-off: Allowing for market integration promises higher world income. However, this can only be realised at the expense of higher income inequality.<sup>2</sup> From this background, it is understandable that policy makers seek to protect potential losers from this reduction in real income. We now take a look at the implications of a policy where firms have to pay statutory minimum wages above the (global) market clearing level.<sup>3</sup>

## 2.2 Rigid labour markets

The key to understanding the mechanism lies in the link between capital-labour ratios  $k^j$  and factor prices. An outflow of capital decreases  $k^j$  which in turn causes a reduction in the marginal productivity of labour. Hence, full employment can only be sustained if wages fall to the same extent. If wages cannot fall due to the statutory minimum, the capital-labour ratio in the capital exporting country must stay constant.<sup>4</sup> How can this be achieved despite the fact that capital can freely move between regions? Simply by unemployment that emerges with every exported unit of capital. In other words, if 10 percent of the domestic capital relocates, 10 percent of the workforce has to become unemployed to keep wages at their previous level in this model.

A numerical example might illustrate this: Let Europe be endowed with 1,000 units of capital and 1,000 units of labour. China possesses 1,200 units of capital, but 1,500 units of labour. Hence,  $k^E = 1 > k^C = 0.8$ , and the aggregate world ratio amounts to  $k = 0.88$ . Each of these endowments imply different wage rates,  $w^E > w > w^C$ . If Europe's wage rate remains constant, relative endowments have to be equated to unity in *both* countries. Again, this implies that factor prices are equated as well.

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<sup>2</sup> I implicitly assume here that capital returns exceed wages in autarky.

<sup>3</sup> Apart from fixing the absolute level of wages, a binding statutory minimum also compresses the distribution of factor prices.

<sup>4</sup> For simplicity reasons, I assume that the autarky wage level equals the statutory minimum.

$$k = \frac{K^E + K^C}{L^E + L^C - U^E} = k^E = k^C = 1$$

$$k = \frac{1,000 + 1,200}{1,000 + 1,500 - U^E} = k^E = k^C = 1$$

$$U^E = 300$$

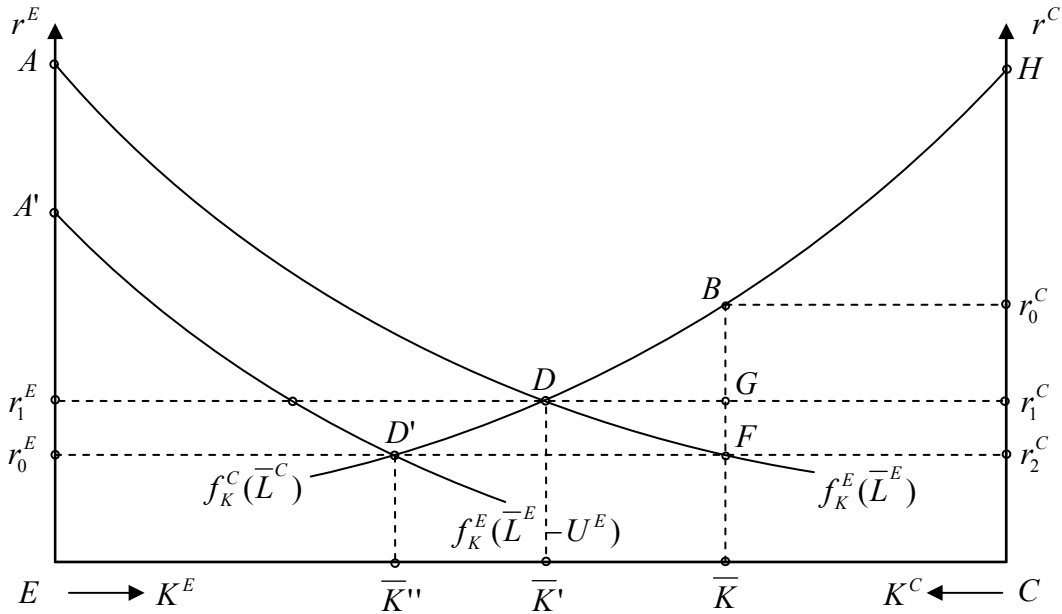
where  $U^E$  denotes European unemployment. In this example, 30 percent of the labour force has to become unemployed in order to equate both countries' relative endowments to the autarky level in Europe.<sup>5</sup>

Figure 2 sheds light on the implications of the minimum wage for the magnitude of capital exports, income and redistribution. Starting in Europe's autarky equilibrium F, we have argued that every unit of capital that relocates to China causes job losses to keep the capital-labour ratio constant. From equations (1) and (2) we know that this not only fixes wages but also capital rentals to their initial levels. This mechanism translates into Figure 2 by shifting the marginal product of capital curve of Europe downward for every employment level of capital. This means that the adjustment towards the new equilibrium takes place along the horizontal line FD'. D' denotes the new equilibrium because factor prices are equated at Europe's autarky level and there is no further incentive to reallocate capital. This implies an excess outflow of capital,  $\overline{KK''}$  instead of  $\overline{KK'}$  with flexible wages in Europe, and unemployment  $U^E$ .

<sup>5</sup> It becomes clear from this numerical exercise that increasing the absolute level of Chinese factor endowments and the difference in relative factor endowment both require a higher equilibrium unemployment rate in Europe.



Figure 2 Capital mobility with minimum wages



Compared to autarky, Europe’s capital owners are prevented from earning higher returns by emerging unemployment. Their income remains fixed at  $r_0^E F \bar{K} E$ . However, European workers face a reduction in their wage sum (due to unemployment) from  $A F r_0^E$  to  $A' D' r_0^E$ . From the Chinese perspective, workers benefit most from minimum wages in Europe as their wages are propped up to the *initial* European level.<sup>6</sup> The wage sum increases from  $H r_0^C B$  to  $H r_2^C D'$  rather than  $H r_1^C D$  with flexible wages everywhere. As Chinese capital owners face even stronger competition due to higher capital imports from Europe, their income has to shrink to  $F r_2^C \bar{C} K$ .

This global ‘rigid wage equilibrium’ cannot be an efficient outcome as labour is underemployed in Europe. This becomes obvious if we compare world income under both flexible and rigid wages. While  $A D H C E$  represents global income in the former case, world income declines to  $A' D' H C E$ . Who gains and who loses now? European workers that lose their job are certainly worse off. In fact, they have to bear the entire burden of defending wages against low-wage competition from China while capital owners keep their initial income. The counterpart to the losers in Europe are Chinese workers whose wages are

higher with European unemployment. The reason can be found in higher capital imports that boost labour productivity. Europe's income declines relative to autarky whereas Chinese income now exceeds the level in the global 'flexible wage equilibrium'. The message is ironic: Those who should be protected from low-wage competition bear the entire burden themselves.<sup>7</sup>

## 2.3 Trade

Since factor mobility and trade are substitutes, it is no surprise that the results of the previous section can be replicated in a neoclassical trade framework. The only difference is that the mechanism now works via relative goods prices rather than via capital-labour ratios. Technically, relative prices must not change to avoid Stolper-Samuelson effects which would exert a detrimental effect on low-skilled workers' wages. This will be achieved by unemployment in the capital-abundant country in order to keep relative supply (and thus prices) constant. The bottom line is that the trade equilibrium resembles the factor mobility outcome – with identical implications for income distribution and welfare. Instead of excess factor flows, however, trade volumes can be shown to reach pathologically high levels in this setting.<sup>8</sup> The public debate is often mistaken by arguing that increasing volumes of trade or factor flows prove that a country benefits from globalisation. It is true for perfect labour markets. But if wage rigidities cause unemployment, then the economy is worse off!

## 3 Offshoring

In contrast to earlier times when markets integrated by trading *final* goods, advances in modern communication technology allow trade in single tasks of the production process these days. There is strong evidence for a rise in *intermediate* goods trade in recent years. Economists summarise this phenomenon under the notion offshoring. This includes foreign (offshore) production both within and outside the boundaries of the firm.

Grossman and Rossi-Hansberg (2006) contributed to this debate by arguing that trade in tasks instead of final goods can lead to a win-win-situation in which all factors gain. This is

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<sup>6</sup> See Davis (1998) for a similar discussion in a Heckscher-Ohlin model.

<sup>7</sup> These strong results also hold in a similar setup with migration or with two commodities.

<sup>8</sup> See Srinivasan (1995) and Sinn (2006).

due to a productivity effect that has been overlooked by much of the literature. Increasing opportunities to offshore have similar implications as labour-augmenting technological progress because firms can save labour costs if they can purchase intermediate products from abroad at lower prices. This by itself would increase demand for low-skilled labour. However, the well-known price and labour supply effects still work against low-skilled workers in advanced countries. Grossman and Rossi-Hansberg show in a theoretical model that the productivity effect can dominate the other two so that low-skilled wages can rise with free trade. This would clearly relax the minimum wage constraint in our analysis so that unemployment rates fall and/or wages increase. However, there is no evidence that clearly finds this productivity effect to be dominant. Low-skilled workers' wages haven't fallen over recent years which is (partly) attributed to trade.<sup>9</sup>

## 4 New trade theory and agglomeration economies

Let us finally introduce increasing returns to scale to see whether previous results are sensitive to the constant returns to scale assumption in the standard theory. Krugman (1979) has argued that trade raises real wages of workers in all countries. The reason is that market integration extends market size so that each firm can exploit economies of scale. In contrast to the standard theory, however, his framework was basically designed to explain intra-industry trade between similar developed countries. In this case, any minimum wage that binds in autarky will be relaxed in the open economy thus reducing the unemployment rate. However, Krugman only considered one factor of production and abstracted from complementarities between capital and labour.

The picture changes if we implement increasing returns to scale into a trade model with two commodities of different factor intensity. Then, as Helpman and Krugman (1985) have demonstrated, the results of the standard theory show up again. Taking two countries that differ in relative factor endowments – like China and Europe from our earlier example – the

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<sup>9</sup> The majority of research in this field detects skill-biased technological change as the main determinant for the reduction in relative wages of the unskilled.

capital-intensive region would still be exporting the capital intensive good and vice versa.<sup>10</sup> As an immediate consequence of this, lower demand for low-skilled labour in the capital-abundant region forces wages to fall. To sum up, increasing returns to scale cannot by itself shield low-skilled workers in industrialised economies from low-wage competition.

In a more recent strand of literature, the new economic geography combines new trade theory with factor mobility. The interplay between agglomeration and dispersion forces can generate a core-periphery pattern although regions have initially been identical. Egger and Seidel (2008) show that labour market rigidity generally fosters agglomeration forces in favour of the region with the less constrained labour market. As a consequence of this, the more constrained country will not be able to host the manufacturing base – implying lower real income for citizens in that region.<sup>11</sup>

## 5 Conclusions

The preceding analysis has shown that rigid labour markets generally make things worse when countries face low-wage competition. The reason is that demand for low-skilled labour declines in advanced economies forcing wages to a lower market-clearing level. If institutional barriers (like minimum wages) prevent this, unemployment would emerge as the residual adjustment mechanism. Thereby, rising income inequality can be avoided – but only at the expense of lower overall income.

Is there any promising strategy for policy makers to both reap the gains from competition with China and Eastern Europe and at the same time keep income inequality limited? This paper has shown that any means that prevents markets from functioning efficiently causes welfare losses when labour-abundant countries open up. Hence, the conclusion must be to abolish these rigidities. But how can one avoid higher inequality then? Wage subsidies in the fashion of the Earned Income Tax Credit in the US promise a way out of this dilemma. The idea is to let labour markets work and supplement income for those who do not manage to earn enough. By now, economists have suggested quite a few different schemes along these lines.

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<sup>10</sup> In addition to inter-industry trade, countries also engage in intra-industry trade now.

<sup>11</sup> See Baldwin et al. (2003) for a detailed discussion of new economic geography models and their policy implications.

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