Labour Unions and Unemployment in a Globalized Economy

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Abstract

In this paper I analyse how trade, migration and firm mobility simultaneously influence unemployment and real wages in unionised labour markets. As in the core periphery model of economic geography, if trade costs are sufficiently low, immigration and firm relocation reinforce each other and lead to agglomeration, which in my model decreases unemployment. Whether agglomeration will take place in a country depends on its relative size before trade and factor flow liberalisation, but also on the strength of unions in this country. High bargaining power of unions deters firms and attracts workers to a country. I show that depending on whether firms or migrants relocate faster, high bargaining power in a country makes agglomeration there more or less likely.

1 Introduction

Does globalisation harm or benefit workers? There is a striking disagreement between economists and the public on this question. Whereas many people fear the competition of cheap Chinese exports, immigrants from less developed countries or relocation of factories to countries with cheap labour force, economists point to the welfare increasing effects of trade through better allocation of resources or more variety of available goods. The public concerns are especially pronounced in countries where labour unions are strong. The common belief there is that since in these countries wages are high and firms' profits are low, they cannot withstand competition from markets where workers' bargaining position is weaker.

In this paper I am going to address those concerns in a theoretical model with all three aforementioned aspects of globalisation: international trade, migration and firm relocation. As shown by Krugman (1991) in this set-up economic activity tends to be distributed unevenly between countries if trade costs are sufficiently low. I will argue that also unemployment rates will be different between regions with relatively low unemployment in the region where both firms and workers are concentrated. Moreover I will show that under some circumstances strong labour unions may actually attract economic activity to a given location. This means that strong labour unions may actually be an advantage in international competition.

The concerns about adverse effects of globalization on local labour markets have recently received much attention in economic theory. So far, however, most papers in this strand of literature analyse only one aspect of globalization assuming that an economy is closed in any other dimension.

For instance, models incorporating labour market frictions and trade usually show that opening goods markets may increase unemployment and income inequality. This has been shown e.g. by Davidson et al. (1999), who introduce search unemployment into the Hecksher-Ohlin framework. Egger and Kreickemeier (2009) show that trade increases unemployment and profits as well as inequality in a model with heterogeneous firms where unemployment is caused by workers demanding fair wages. Gaston and Nelson (2004) analyse the effects of trade liberalization on a unionised labour market, with efficient bargaining. They argue that trade has not only a direct effect through the change in relative prices but also an indirect effect through the altered environment in which lobbying takes place. In all of these models, however, the number and characteristics of firms in a given region are fixed by assumption. Firms cannot move to take advantage of the more entrepreneur-friendly labour markets. However, if they could they would probably move to locations with higher unemployment creating new vacancies there.

Helpman and Itskhoki (2010) make a step to overcome this problem by allowing the number of firms to be endogenously determined. They develop a model with search frictions in the labour market and two sectors - one with heterogeneous firms and monopolistic competition and one with perfect competition and homogeneous products. In this set-up trade may increase unemployment if search frictions in the monopolistically competitive sector are higher than in the perfect-competition sector. Again, however, whereas firms can choose a profit-maximizing location, workers in this model cannot move to countries with better employment conditions.

Also the effects of outsourcing on unemployment have been studied extensively, although the results are more mixed here. For instance,Koskela and Stenbacka (2008) argue that in a strongly unionised country outsourcing decreases wages, but increases employment. Skaksen and Sørensen (2001), on the other hand, point out that the effect of outsourcing on the local labour market depends on the degree of substitutability between the local and outsourced production. If goods produced abroad are complements to those produced locally, outsourcing increases local income and thus is desirable from the point of view of a labour union even though outsourcing increases unemployment. Eckel and Egger (2009) show that even outsourcing to countries with similarly strong labour unions, weakens labour unions and decreases wages. With this weaker bargaining power of the unions, however, again unemployment is lower. Keuschnigg and Ribi (2009) analyse the effects of outsourcing on welfare states. They show that in the presence of search frictions outsourcing increases unemployment and and income inequalities. It thus increases the importance redistribution and insurance functions of a welfare state causing even more outsourcing. Note that in these models again workers are immobile. It is, however, possible that if they could migrate they would follow the outsourcing firms and unemployment would not rise.

The adverse effect of labour migration on employment in the presence of minimum wages has been shown already by Harris and Todaro (1970). Razin and Sadka (1995)confirm this result in a model with skilled and unskilled labour force and unskilled migration. Schmidt et al. (1994), on the other hand, show that the effect of migration on unemployment depends

on whether migrant and native workers are complements or substitutes. Ortega (2000) even shows that migration may be Pareto-improving. He argues that if migrants have a lower reservation wage, firms will find it more profitable to open more vacancies thereby reducing the equilibrium unemployment rate. This models again concentrate only on the openness in one market, namely the labour market. Neither trade nor the international relocation of firms is explicitly modelled.

In my model I will allow for trade as well as workers and firms mobility. A good starting point for this kind of analysis is the core-periphery model of Paul Krugman (Krugman (1991)) in which trade, migration and the number of firms in each location are determined in equilibrium. This model shows that in the presence of trade costs and increasing returns all mobile economic activity might end up agglomerated in one region increasing welfare for all inhabitants in this region. This contradicts the widespread belief that migration and outsourcing will decrease real wages in countries with better living conditions.

The core-periphery model assumes perfect labour markets. In this paper I will extend this model to include labour market imperfections. This is not completely unexplored ground. Epifani and Gancia (2005) develop a model of search unemployment in an interregional environment with labour migration and firm relocation. They show that for sufficiently low transport costs, opening to trade and migration increases unemployment and lowers average real income in more developed regions in the short run, but in the long run the opposite is the case. Suedekum (2005) obtains the same results using efficiency wages.

I, on the other hand, analyse the effects of open goods, labour and capital markets in a unionised labour market. This topic is especially important in the European context where many countries have strong labour unions. For instance in France, Austria, Finland, Belgium, Denmark and Italy over 90 percent of workers are covered by collective bargaining[1].

I combine the core-periphery model (Krugman (1991)) with a model of collective, efficient bargaining as developed by Blanchard and Giavazzi (2003). These authors show, that in a closed economy an increase in union bargaining power has no effects on unemployment in the short run. Higher bargaining power of the unions merely reallocates profits from firms to workers. In the long run, however, the decreased operating profits of firms will induce firms to exit the market and thus unemployment will increase. Countries with high bargaining powers should thus have higher unemployment levels.

Does this result still hold if countries are open to trade, migration and firm relocation? In my model I show, that trade and factor flow liberalisation may overrule the mechanism shown by Blanchard and Giavazzi (2003). First, it follows from the CP model that if trade is costly, but not too costly, firms prefer to locate close to large markets. This means that after the liberalisation economic activity may end up agglomerated in the country with high bargaining power just because it was large before. In my model clustering of firms in one region increases labour demand and thus increases employment. This means that in an open economy size may be more important for the determination of unemployment than unions' bargaining power.

Second, in my model an increase unions bargaining power does not necessarily lead to higher unemployment. This is due to the following mechanism. In the short run increased bargaining power does not influence unemployment, but merely redistributes profits from

[1]See Hayter and Stoevska (2011) for details

firms to employees. In an open economy it is thus important to determine who of the two reacts faster to the new situation on the labour market. If firms react faster, they would relocate their production to other countries. This increases unemployment and under certain circumstances causes the economy to agglomerate in the country with weaker labour unions. If, on the other hand workers react faster, a higher wage induces immigration. This increases unemployment in the short run, but immigration can also, under certain circumstances, increase the market size and thus attract new firms to the country eventually cause agglomeration there. Thus if workers react faster an increase in bargaining power can increase employment, which is contrary to the intuition of Blanchard and Giavazzi (2003).

The remainder of this paper is structured as follows. In the next section I set up the formal model. In the following section I discuss the equilibrium outcomes with free trade as well as with intentional firms' and workers' mobility. In section 4 I introduce international differences in labour unions' bargaining powers and analyse, how these influence distribution of economic activity between countries as well as the resulting labour market performance. Section 5 concludes.

2 The Model

The model follows closely the set-up of Krugman (1991) and Blanchard and Giavazzi (2003) in the description of the labour market. For simplicity, I assume, however, that the number of firms worldwide is fixed and that firms move from one location to another as long as there are international profit differences.

As in the CP model there are two countries. The economy in each country consists of two sectors, a perfectly competitive, freely tradable agricultural sector and a monopolistically competitive manufacturing sector. In each sector, each worker produces one good.

Consumers have the following Cobb-Douglas utility function:

$$U = \frac{A^{1-\alpha} Y^{\alpha}}{\alpha^{\alpha}(1-\alpha)^{(1-\alpha)}}$$

where A is the consumption of agricultural goods and Y is a composite of manufacturing goods given by CES utility function

$$Y = \left(\sum_{i=1}^{m} y_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

where y_i is the consumption of one variety of the manufacturing good. I assume that all firms are symmetric and skip the subscript i.

The Cobb-Douglas utility function implies that each consumer spends the share $(1-\alpha)$ of his or her income on agricultural goods and α on manufactures.

With the CES utility function the demand for one variety of the manufacturing good is given by

$$y(p) = \frac{\alpha I}{P_I} \left(\frac{p}{P_I} \right)^{-\sigma} \tag{2.1}$$

where

$$P_I = (np^{1-\sigma} + n^* p_f^{*1-\sigma})^{\frac{1}{1-\sigma}} \tag{2.2}$$

is the price index in the manufacturing sector(p - price of a home-produced good charged at home, p_f^* - price of a foreign-produced good charged at home), which is assumed to be taken as given by the firms and I denotes income.

If the price of the agricultural good is normalized to one then the cost of one unit of utility is given by the following price index

$$P = P_I^{\alpha}$$

2.1 Labour supply

The number of workers worldwide is normalized to 1. A fraction d of those workers work in the agricultural sector. I assume that these workers are immobile and evenly distributed among countries and thus in each country there are $0.5(1-d)$ agricultural workers. In the manufacturing sector workers are mobile. Let λ denote the number of manufacturing workers in the home country. Independent of the sector, each worker produces 1 good.

2.2 Agricultural sector

This sector serves as a numeraire. Trade in agriculture is costless. Workers are paid just their marginal product. They also do not have any alternative to working and thus they are all employed. The production in this sector amounts to $0.5(1-d)$ in both countries and, as mentioned before, the price is 1 by assumption.

2.3 Manufacturing sector

Trade in this sector is possible but costly. Let t denote the amount of goods that have to be shipped in order for one good to arrive at the destination. A firm operating in this sector makes thus the operating profit

$$\pi = py(p) + p^* y^*(p^*) - w(y(p) + ty^*(p))$$

In the manufacturing sector the labour market is regulated in two ways. First, labour supply is elastic due to an unemployment benefit. Employed workers receive a wage and pay a fixed real contribution (B) to a social fund. Unemployed workers receive an unemployment benefit from this fund. Both the nominal contribution and the nominal benefit depend on the price level. An employed worker pays thus PB and an unemployed person receives $\frac{ePB}{1-e}$, where e is the employment level. This formulation of the unemployed' income might seem very particular, but it has the crucial features of the more general non-labour income function used by Blanchard and Giavazzi (2003): it is a decreasing function of unemployment and it is adjusted by the price level, so the real non-labour income does not depend on the price level. Any other function with these properties would yield the same results.

Both wages and employment are determined collective bargaining. Workers and producers maximise their joint surplus given by the following Nash product:

$$S = \beta \log((w - PB - \frac{ePB}{1-e})l) + (1-\beta)\log \pi \tag{2.3}$$

The first term on the right-hand side in equation 2.3 is the workers surplus. Each worker will be paid a wage w from which he has to pay PB to the social fund, so for a given employment rate her surplus from working will be $w - PB - \frac{ePB}{1-e}$. Each firm employs l workers and thus the surplus of workers equals $(w - PB - \frac{ePB}{1-e})l$. The second term is the firms surplus i.e. the profit. β denotes the bargaining power. Since the production function is

$$y + ty^* = l$$

the surplus can be rewritten as

$$S = \beta \log \left((w - PB - \frac{ePB}{1-e}) \left(y(p) + y^*(p^*) \right) \right) + (1 - \beta) \log \pi$$

Maximization of the surplus with respect to w, p and p^*[2] yields the following expressions for wages and prices set at home and abroad:

$$w = (1 + \beta\mu)\frac{PB}{1-e} \tag{2.4}$$

and

$$p = (1 + \mu)\frac{PB}{1-e} \tag{2.5}$$

and

$$p^* = tp$$

where $\mu = \frac{1}{\sigma - 1}$. Note that the price p does not depend on β. This implies that also demand, production and employment in this firm does not depend on β. Why is that the case? The surplus generated by one worker equals $\mu\frac{PB}{1-e}$. Each worker is paid his reservation wage (the equivalent of the unemployment benefit plus the contribution to the social fund) and a share of this surplus. An increase in β will only redistribute the surplus from firms to workers. This result is standard for labour markets, where unions bargain over wages and employment (efficient bargaining).

3 Equilibrium

3.1 Equilibrium with trade

All manufacturing firms are the same and thus they will set the same wages, prices and production levels in equilibrium. Since by assumption each worker produces one good the total production level in an economy equals the total labour demand the equilibrium rate of employment can be obtained from the following equation:

$$ed\lambda = n(y + ty^*) \tag{3.1}$$

where the right-hand side is the production level in one firm times the number of firms n and the left-hand side is the total labour supply.

[2] which is equivalent to maximization with respect to w, y and y^*, since firms have monopoly over their variety

Further, total income I in each country comes from three sources: workers in manufacturing sector, agricultural workers and firms profits. Workers in the manufacturing sector either earn the wage from which they pay a contribution to the social fund or they or they are unemployed and get the unemployment benefit. Since the latter is financed entirely by the contribution of the employed workers the entire income in the home manufacturing sector is $\lambda d(1+\beta\mu)\frac{ePB}{1-e}$. The profit a firm at home makes equals, by substituting the home and foreign price as well as using (3.1),

$$\pi = (1-\beta)\mu\frac{PB}{1-e}\frac{ed\lambda}{n} \tag{3.2}$$

and the income of agricultural workers is $\frac{(1-d)}{2}$. Thus the overall income in the home country equals

$$I = \lambda d(1+\beta\mu)\frac{ePB}{1-e} + n(1-\beta)\mu\frac{PB}{1-e}\frac{ed\lambda}{n} + \frac{(1-d)}{2}$$

Combining this with the equilibrium price (2.5), and the demand for manufacturing goods (2.1), I obtain the following formula for the quantity produced by a domestic manufacturing firm

$$\begin{aligned} y + ty^* = &\left(\frac{\alpha\left(\lambda d\frac{ePB}{1-e}(1+\mu) + \frac{(1-d)}{2}\right)}{P_I}\right)\left(\frac{(1+\mu)PB}{P_I(1-e)}\right)^{-\sigma} + \\ &+ t\left(\frac{\alpha\left((1-\lambda)d\frac{e^*P^*B^*}{1-e^*}(1+\mu) + \frac{(1-d)}{2}\right)}{P_I^*}\right)\left(\frac{t(1+\mu)PB}{P_I^*(1-e)}\right)^{-\sigma} \end{aligned} \tag{3.3}$$

and analogously for the foreign manufacturing firm:

$$\begin{aligned} ty + y^* = t&\left(\frac{\alpha\left(\lambda d\frac{ePB}{1-e}(1+\mu) + \frac{(1-d)}{2}\right)}{P_I}\right)\left(\frac{t(1+\mu)P^*B^*}{P_I(1-e^*)}\right)^{-\sigma} + \\ &+ \left(\frac{\alpha\left((1-\lambda)d\frac{e^*P^*B^*}{1-e^*}(1+\mu) + \frac{(1-d)}{2}\right)}{P_I^*}\right)\left(\frac{(1+\mu)P^*B^*}{P_I^*(1-e^*)}\right)^{-\sigma} \end{aligned} \tag{3.4}$$

By substituting prices (2.5), the manufacturing price indices (2.2) become

$$P_I = (1+\mu)\left(n\left(\frac{PB}{1-e}\right)^{1-\sigma} + n^*\left(\frac{tP^*B^*}{1-e^*}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}}$$

and analogously for the foreign country

$$P_I^* = (1+\mu)\left(n\left(\frac{tPB}{1-e}\right)^{1-\sigma} + n^*\left(\frac{P^*B^*}{1-e^*}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \tag{3.5}$$

Equations (3.3) to (3.5) fully describe the equilibrium with trade but without migration or firm relocation. Unfortunately, due to non-linearity, this system cannot be solved analytically. Therefore in the remainder of the paper I will have to resort to numerical simulations. Simulations are done with the following parameter values: $\alpha = 0.6$, $\beta = \beta^* = 0.3$, $d = 0.4$, $\sigma = 7$, $B = B* = 0.1$ if not indicated otherwise.

3.2 Equilibrium with migration and firm relocation

What remains exogenously given in the previous subsection is the number of firms in each region as well as the distribution of manufacturing workers between the regions. In what follows I will assume that the worldwide number of firms is fixed and I will normalise this number to 1. This means that $n^* = 1 - n$. What remains to be determined is thus n and l.

Firms choose locations depending on the real profit they make there. Migrants choose their place of living based on the expected real wage differences. They take into account not only their disposable real income if they are employed, but also the probability of being unemployed and unemployment benefit they get in this case.

If all firms and all workers adjust instantly to changes in wages and profits, expected real wages and real profits equalize at all times and the equilibrium distribution of workers and firms can be calculated from the following two equations:

$$\frac{\pi}{P} = \frac{\pi^*}{P^*}$$

$$(1 + \beta\mu)\frac{eB}{1-e} = (1 + \beta^*\mu)\frac{e^*B^*}{1-e^*}$$

This system has an interior solution as long as labour market institutions (as expressed in B and β) are not too different in the two countries. There will be thus an equilibrium, where some manufacturing is located in both regions. If labour market institutions are the same in both countries both firms and labour will be evenly distributed between the two countries ($n = 0.5$ and $l = 0.5$).

However, if either workers or firms (or both) move sequentially from one country to another in reaction to those changes, this symmetric equilibrium may be unstable and any relocation of firms or workers can induce a cumulative process leading to the agglomeration of the entire manufacturing sector in one country.

In what follows I will let both workers and firms adjust gradually to differences in real expected wages and profits. I will analyse two cases:

- firms adjust instantly and migrants adapt slowly, i.e.

$$\frac{\pi}{P} = \frac{\pi^*}{P^*}$$

  at all times and migration is a slow process which will continue as long as

$$(1 + \beta\mu)\frac{eB}{1-e} \neq (1 + \beta^*\mu)\frac{e^*B^*}{1-e^*}$$

- migrants adjust instantly and firms adapt slowly, i.e.

$$(1+\beta\mu)\frac{eB}{1-e} = (1+\beta^*\mu)\frac{e^*B^*}{1-e^*}$$

at all times and the number of firms in each region adapts slowly as long as

$$\frac{\pi}{P} \neq \frac{\pi^*}{P^*}$$

As I will argue in the following sections in either case, the stability of the symmetric equilibrium depends on the freeness of trade (the level of t).

3.2.1 Instant firms relocation and slow migration

The first case I will analyse is the one where workers move sequentially and firms react immediately to those changes. The symmetric equilibrium becomes unstable if the effect of a relocation of one worker on the expected real wage differential is positive[3]. If countries are the same with respect to their labour market regulations, differences in real wages are caused only by differences in employment. For the symmetric equilibrium to become unstable immigration must increase employment. This is the case if $\frac{\partial n}{\partial l} > 1$. To see this note the following. Since $\frac{\pi}{P} = \frac{\pi^*}{P^*}$, it is also true that $(1-\beta)\mu\frac{B}{1-e}\frac{ed\lambda}{n} = (1-\beta^*)\mu\frac{B}{1-e^*}\frac{e^*d(1-\lambda)}{1-n}$, which in the symmetric case reduces to $\frac{e\lambda}{(1-e)n} = \frac{e^*(1-\lambda)}{(1-e^*)(1-n)}$. Plugging this into the formula for real wage difference $(1+\beta\mu)\frac{eB}{1-e} - (1+\beta^*\mu)\frac{e^*B^*}{1-e^*}$ I obtain $(1+\beta)\mu\left(\frac{n-\lambda}{(1-\lambda)n}\frac{eB}{1-e}\right)$. This is positive only if $n > \lambda$, i.e. the share of firms in a country increases more than the share of industrial workers in this country. Intuitively this means that the increased labour supply caused by immigration must be more than offset by the increase in labour demand caused by the relocation of firms.

The mechanism which determines $\frac{\partial n}{\partial l}$ can be decomposed in the following effects.

The relocation of one worker leads to:

a) an increase labour supply which ceteris paribus increases unemployment

b) a decrease in domestic prices and a demand shift from foreign to domestic goods through this higher unemployment

c) increased local demand

The last two effects will jointly increase local real profits and attract new firms. These in turn

d) create new jobs and decrease unemployment

e) increase prices and decrease profits through this decreased unemployment

f) intensify local competition thereby decreasing profits

[3]More precisely it depends on the sign of $\frac{\partial(1+\beta\mu)\frac{eB}{1-e} - (1+\beta^*\mu)\frac{e^*B^*}{1-e^*}}{\partial\lambda}$

Effects d)-f) decrease local real profits back to the level of profits in the foreign country. From this it follows that immigration will induce an overproportional firm relocation if the profit differential reacts stronger to increases in λ than to increases in n, i.e. $\frac{\partial n}{\partial l} > 1$ if $\left|\frac{\partial \frac{\pi}{P} - \frac{\pi^*}{P^*}}{\partial l}\right| > \left|\frac{\partial \frac{\pi}{P} - \frac{\pi^*}{P^*}}{\partial n}\right|$.

The relative strength of the different effects depends on transportation costs. The direct effects on employment (a and d) as well as the effects of employment changes (b and e) become stronger when trade costs decrease. This is due to the fact that when competition is global changes in relative prices influence a much larger market. The local demand and local competition effect (c and f) decrease when trade costs decrease. If markets are not separated by high transportation costs immigration firms sell similar quantities to domestic and foreign consumers and thus migration and firm relocation do not strongly alter neither the demand for locally produced goods nor the competitive environment.

Numerical simulation shows that effects a), b) and c) are stronger than d), e) and f) for low transportation costs (see Figure 3.1).

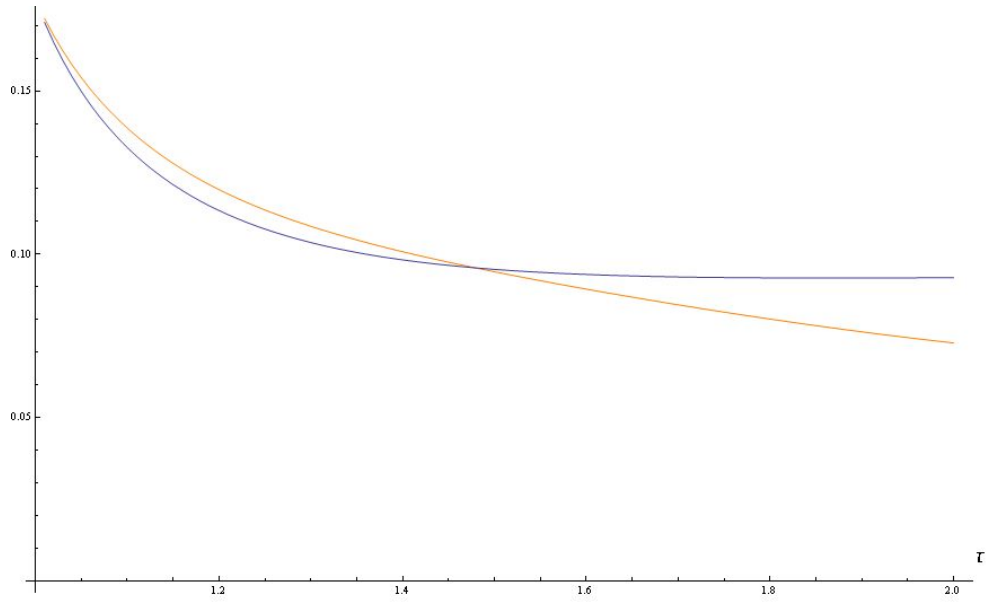

Figure 3.1: The effects of immigration and firm relocation on the profit differential: $\left|\frac{\partial \frac{\pi}{P} - \frac{\pi^*}{P^*}}{\partial l}\right|$(orange line) $\left|\frac{\partial \frac{\pi}{P} - \frac{\pi^*}{P^*}}{\partial n}\right|$(blue line)

It follows that for low transportation costs immigration will increase employment and real wages. This is shown in Figures 3.2 and 3.3. For low transportation costs ($\tau = 1.25$) immigration increases employment and real wages. This attracts new workers. Immigration induces a cumulative process which leads to agglomeration. For high transportation costs ($\tau = 2$), on the other hand, immigration decreases employment and real wages and thus the migrants will return to their home country. The symmetric equilibrium is stable. For intermediate transport costs ($\tau = 1.75$) there are three equilibria with wages and profits equalisation, but it follows from Figure 3.2, that only the symmetric one is stable. Moreover, in this case the

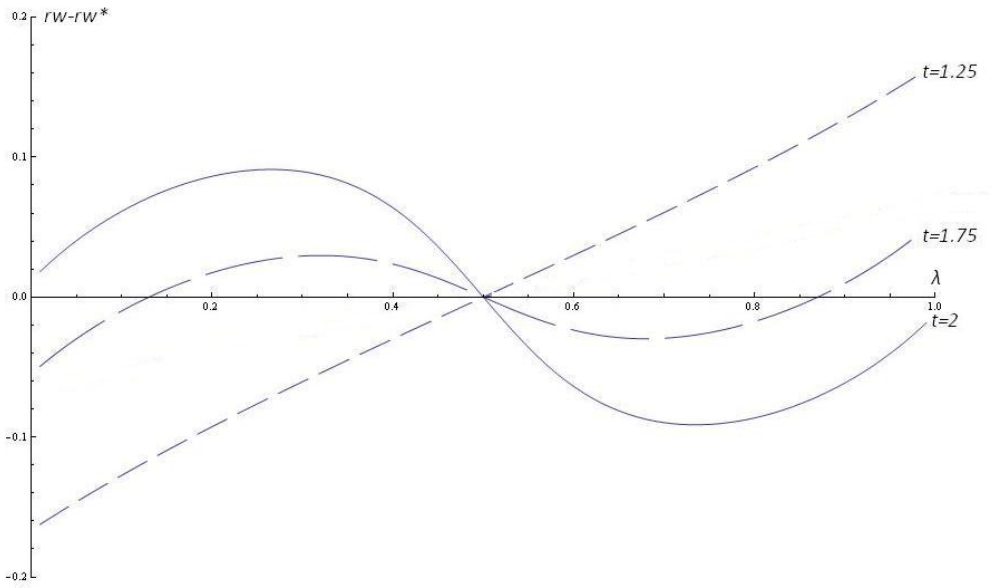

Figure 3.2: The difference in expected real wages for different distributions of manufacturing workers

relative strength of the effects mentioned before depends on the initial distribution of workers. If prior to opening the labour market and allowing for firms to move between countries manufacturing workers were relatively concentrated in one region ($\lambda = 0.87$in Figure 3.2), immigration will induce an overproportional relocation of firms to that country and lead to agglomeration there. For rather symmetric initial conditions the symmetric equilibrium is stable.

The corresponding evolution of employment is shown in in Figure 3.3. For low transport costs ($\tau = 1.25$) immigration i.e. an increase in λ increases employment. For high transport costs the symmetric equilibrium is the stable one. Workers will move from one country to another until their are evenly distributed ($\lambda = 0.5$). It can be seen from Figure 3.3 that in this case immigration decreases unemployment. The solid line ($\tau = 2$) has a negative slope for $\lambda < 0.5$. For intermediate transport costs the effect of immigration on employment depends on whether the initial distribution of labour is such that agglomeration in one region is stable or it is such that the symmetric equilibrium is stable.

3.2.2 Instant migration and slow firms relocation

The analysis in the case where workers adjust immediately and firms move sequentially is analogous to the one presented in the previous section. The symmetric equilibrium is stable if the relocation of one firm to the home country decreases domestic profits. This happens if the immigration is less than proportional to firm relocation, i.e. if $\frac{\partial l}{\partial n} < 1$. If the arrival of one firm will attract less than one worker, the negative effect of increased competition for consumers and workers on profits will outweigh the positive effects of a larger domestic market and a more labour supply induced by immigration.

The relocation of one firm to the home country leads to:

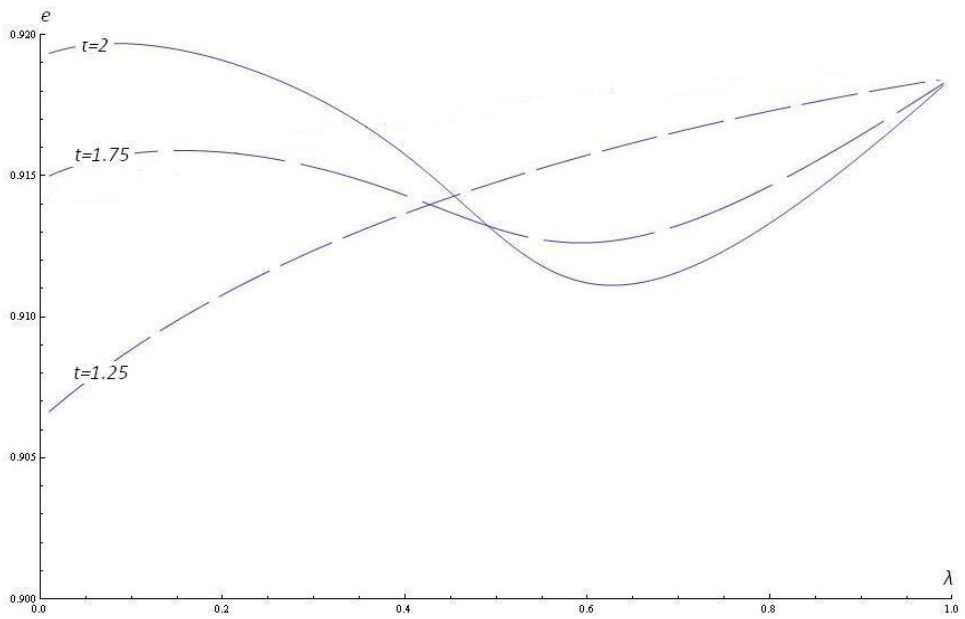

Figure 3.3: Employment in the home country for different distributions of manufacturing workers

a') an increase in labour demand in increase in employment

b') an increase in prices and demand shift from domestic to foreign goods through this higher employment

c') more local competition and more demand for local goods

Effects a') and c') increase employment and domestic real wages inducing immigration. An immigrant

d') increases labour supply which ceteris paribus increases unemployment

e') decreases domestic prices increases and demand for domestic goods through this higher unemployment

f') increases local demand

Again the stability of the symmetric equilibrium depends on whether the overall effect of new firms on the real wage differentials is stronger than the negative effect of the associated immigration. For the symmetric equilibrium to be stable it must be that $\left|\frac{\partial*(1+\beta\mu)\left(\frac{eB}{1-e}-\frac{e^*B^*}{1-e^*}\right)}{\partial l}\right| > \left|\frac{\partial(1+\beta\mu)\left(\frac{eB}{1-e}-\frac{e^*B^*}{1-e^*}\right)}{\partial n}\right|$. Also in this case numerical analysis shows that for low transportation costs the positive effects of firm relocation on employment will outweigh the negative effects of immigration. This is illustrated in Figure 3.4

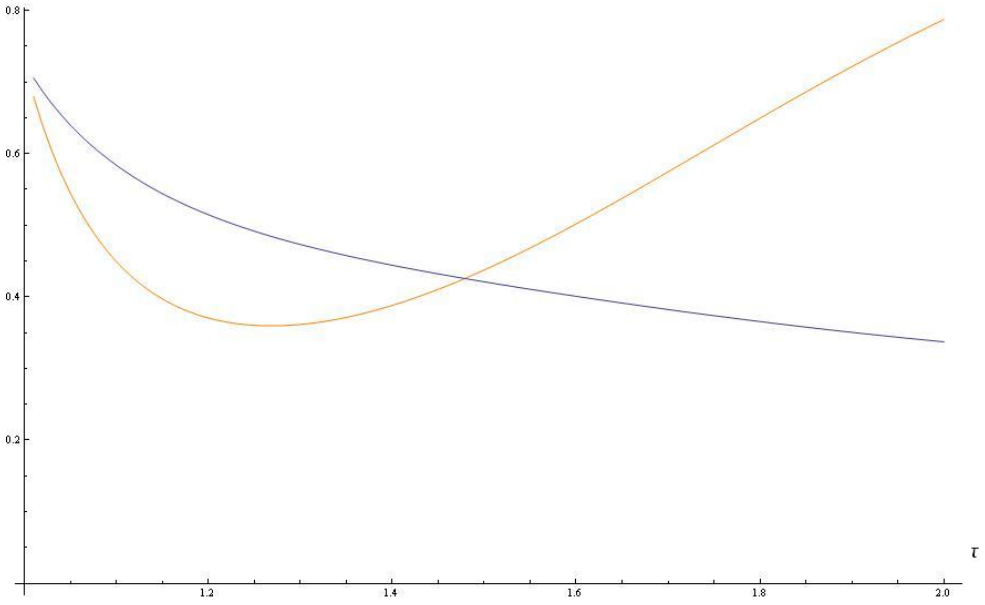

Figure 3.4: The effects of firm arrival and immigration on real wage differential: $\left|\frac{\partial(1+\beta\mu)\left(\frac{eB}{1-e}-\frac{e^*B^*}{1-e^*}\right)}{\partial n}\right|$(blue), $\left|\frac{\partial*(1+\beta\mu)\left(\frac{eB}{1-e}-\frac{e^*B^*}{1-e^*}\right)}{\partial l}\right|$(orange)

Figure 3.5 shows the differences in real profits for different distributions of international labour and different trade costs. It has a similar interpretation as Figure 3.2. For low transportation costs the arrival of new firms from abroad induces an overproportional immigration. This increases local real profits and thus attracts even more firms. The opposite is true for high transportation costs.

Whereas the profit differential looks similar to the wage differential in the previous section, the evolution of employment looks very different. Since workers will immediately adapt to the new distribution of firms migration, employment levels will always equalize between countries with the same labour market institutions. The concentration of firms in one region increases employment in that region in most cases and thus it will also increase employment in the other region through instant migration. This means that employment in both countries is the lowest if firms are distributed equally between countries. This is shown in Figure 3.6. This result comes from the fact that if consumers are concentrated in one country, less goods have to be shipped around the world and thus less goods are lost in transportation. In this case it is profitable to produce more and higher production increases employment. [4]

The analysis so far shows that as soon as trade is sufficiently liberalised, free migration and firm relocation is beneficial for manufacturing workers. In the case where workers move

[4]For very high levels of transport costs ($\tau = 4$ in my simulation) employment increases as the distribution of firms becomes more equal. For very high transport costs the demand effect is very weak and the relocation of one firm to the home country substantially decreases each firm's employment there. Therefore even if the overall number of firms in a region increases, employment per firm decreases so strongly that the overall effect of firm relocation on employment is negative. Since, however this level of transport cost seems unrealistic I will not discuss this result further here.

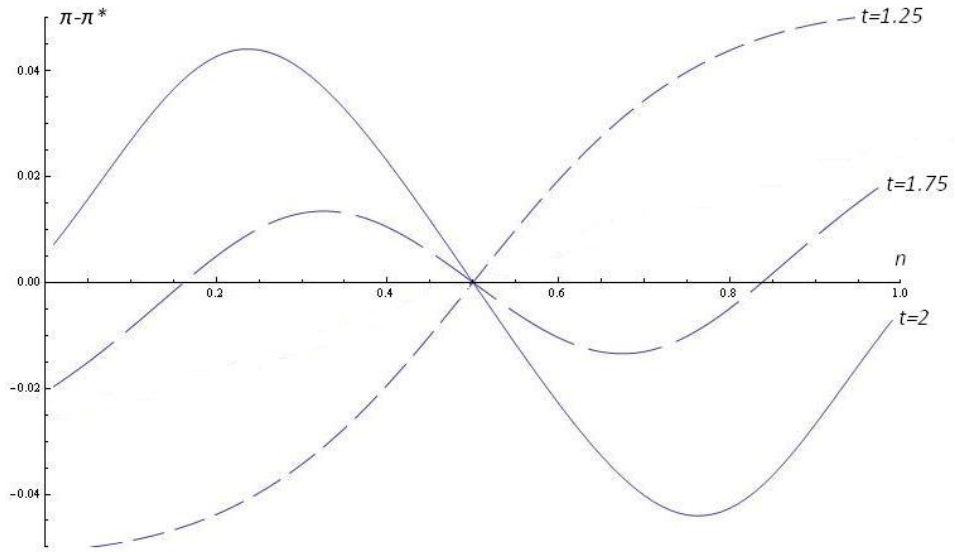

Figure 3.5: Profit differential for different international distributions of firms

first agglomeration leads to higher employment both in the shrinking and growing country. If firms move faster, employment increases in the growing region and decreases in the shrinking region. Temporarily agglomeration deteriorates the situation of workers in the shrinking region. But since they are all free to move to the growing region, eventually all manufacturing workers will end up in a region with higher employment.

In the case of equal labour market regulations analysed here the real wage depends only on employment levels. This means that the higher employment caused by migration and firm relocation will translate also into higher real wages for manufacturing workers.

One group has been neglected in this analysis so far. The immobile agricultural workers are also affected by the agglomeration through the changes in prices of manufacturing goods. With agglomeration the price index P decreases as more and more goods are produced locally and this benefits also the agricultural workers in the growing region. The only losers of this agglomeration process are the agricultural workers in the shrinking region. In the end they will have to import all the manufacturing goods.

4 Asymmetries

So far I have assumed that the two countries have the same labour market institutions. I have thus not yet analysed whether countries with relatively strong labour unions will loose or gain if they allow for free migration and firm relocation. I will turn to this question now.

Assume that both countries are symmetric in every respect (i.e. they also host the same number of workers and firms) except for the bargaining power of the unions β. This means that in the country with higher bargaining power (let it be the home country) wages are higher and profits are lower. What will happen if these two countries open to migration and firm relocation? Firms will have an incentive to leave this country and workers will want to

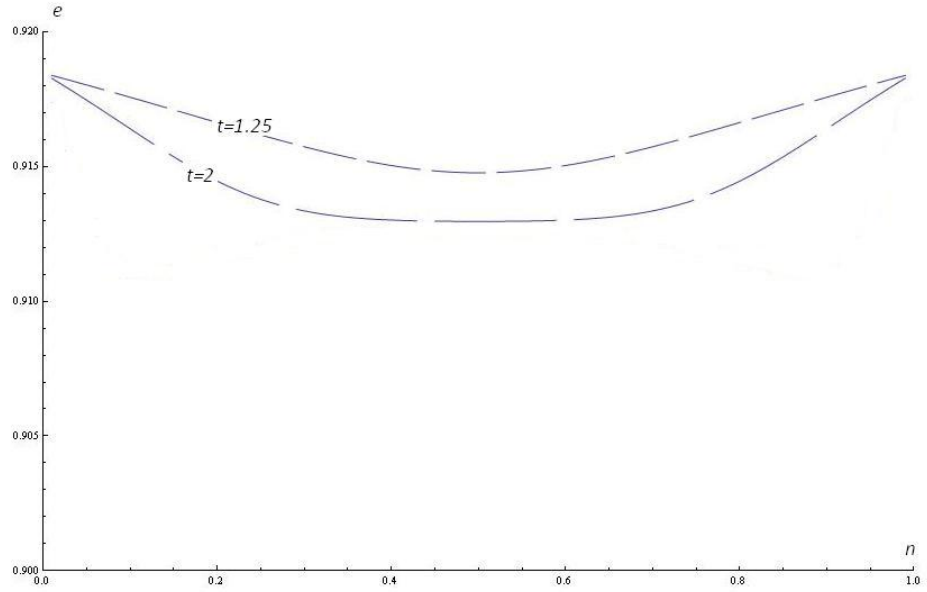

Figure 3.6: Employment in the home country for different international distributions of firms

migrate to this country. And thus to asses the effects of opening in a country with strong labour unions it is crucial to determine who moves first: firms or workers.

Let us start with an even distribution of workers. If firms move first they will be relocating to the foreign country as long as profits there are higher. This will increase unemployment in the home country and decrease wages. The opposite will happen in the foreign country. As a consequence the expected real wage in the home country will fall below the new expected real wage in the foreign country[5]. This will trigger emigration and depending on the level of transport costs lead to a new equilibrium with lower share of workers living in the home country (if transport costs are high) or to relocation of the entire manufacturing in the foreign country (for low transportation costs). The corresponding diagrams for real wage differentials are shown in Figure 4.1.

Note that the relocation of the entire manufacturing industry to the foreign country will take place only if firms and workers were distributed sufficiently evenly between countries before opening. As can be seen from the green line of the right panel in Figure 4.1, if λ was sufficiently large before opening firms might still move to the country with strong labour unions after opening to take advantage of the larger local market. Agglomeration increases employment in this country and as immigration progresses employment in the home country will surpass that in the foreign country. This contradicts the belief that firms will always want to relocate to cheap labour countries. The size of the local market is a factor which may attract firms to countries with strong unions.

An even more interesting picture emerges if workers move first. In this case, starting from an even distribution of firms and labour, higher bargaining power in the home country

[5]For very high levels of transport costs the opposite may happen. However, since I consider these levels unrealistic, I will not discuss this further.

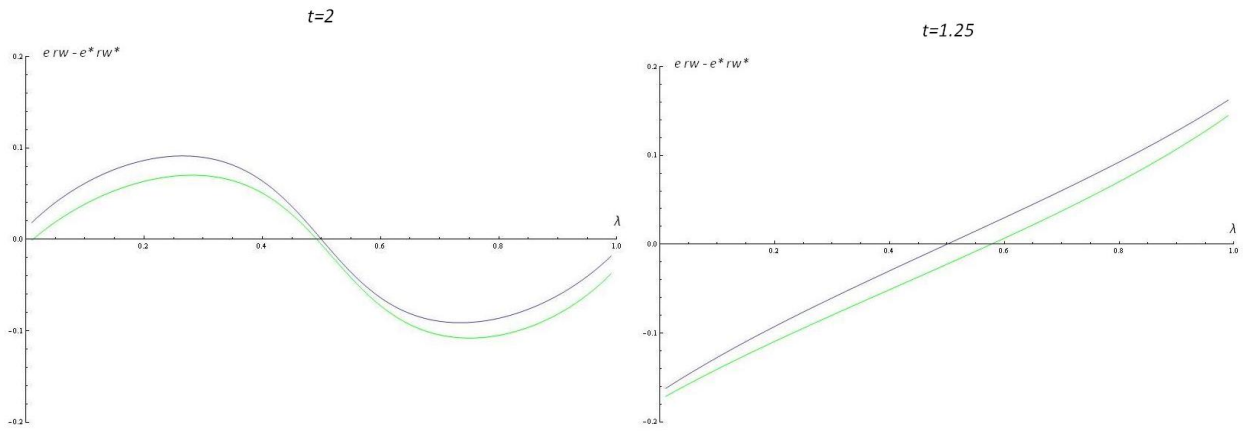

Figure 4.1: The difference in expected real wages for different distributions of manufacturing workers(blue:$\beta = \beta^* = 0.3$, green: β=0.3, $\beta^* = 0$)

will attract new workers and increase the demand for manufacturing goods. This increases profits in the home country. On the other hand, profits in the home country were lower before opening because of the stronger labour unions. The effect of this initial immigration on the number of firms at home is thus indeterminate. If the changes in demands faced by firms in both countries are large then profits in the home country will increase so strongly that they will be now higher than in the foreign country and the initial immigration will attract new firms. New firms again increase employment and attract even more workers.

When does demand change strong enough for higher bargaining power to induce agglomeration? Figure 4.2 shows that this is the case for low, but not too low transportation costs. For $t = 1.05$ the effect of higher bargaining power on profits cannot be overruled by higher demand associated with immigration. This intuitive because if trade is almost free, firms face almost the same demands in both locations. If transport costs increase a little to $t = 1.25$ immigration triggers so strong demand changes that even though the profits per unit are lower (due to higher bargaining power), the overall profit in the home country becomes higher than abroad. For higher transportation costs ($t = 1.75$ and $t = 2$) the competition effect kicks in thus the increase in demand cannot off-set the effect of higher bargaining power on profits any more.

The right upper panel has one another interesting implication. Assume that prior to opening to migration and relocation the bargaining powers in the two countries were equal, but the home country has a slightly smaller share of manufacturing workers ($\lambda < 0.5$). As depicted by the blue line, after opening firms would leave the country because of the smaller local market, which would in turn decrease wages and cause the entire manufacturing industry to leave the home country. The home country can, however inverse this unfavourable process by increasing the bargaining power of unions. This is indicated by the fact that close to $\lambda = 0.5$ the blue line lies below the equal real wages line,whereas the green one lies above it. It can be shown that this is also true if the home country had stronger unions to begin with. This implies that if a strongly unionised country observes that firms move their production to other locations, its optimal reaction may actually be strengthening the labour unions.

It should be noted that the pattern shown in Figure 4.2 ($t = 1.25$) emerges only if

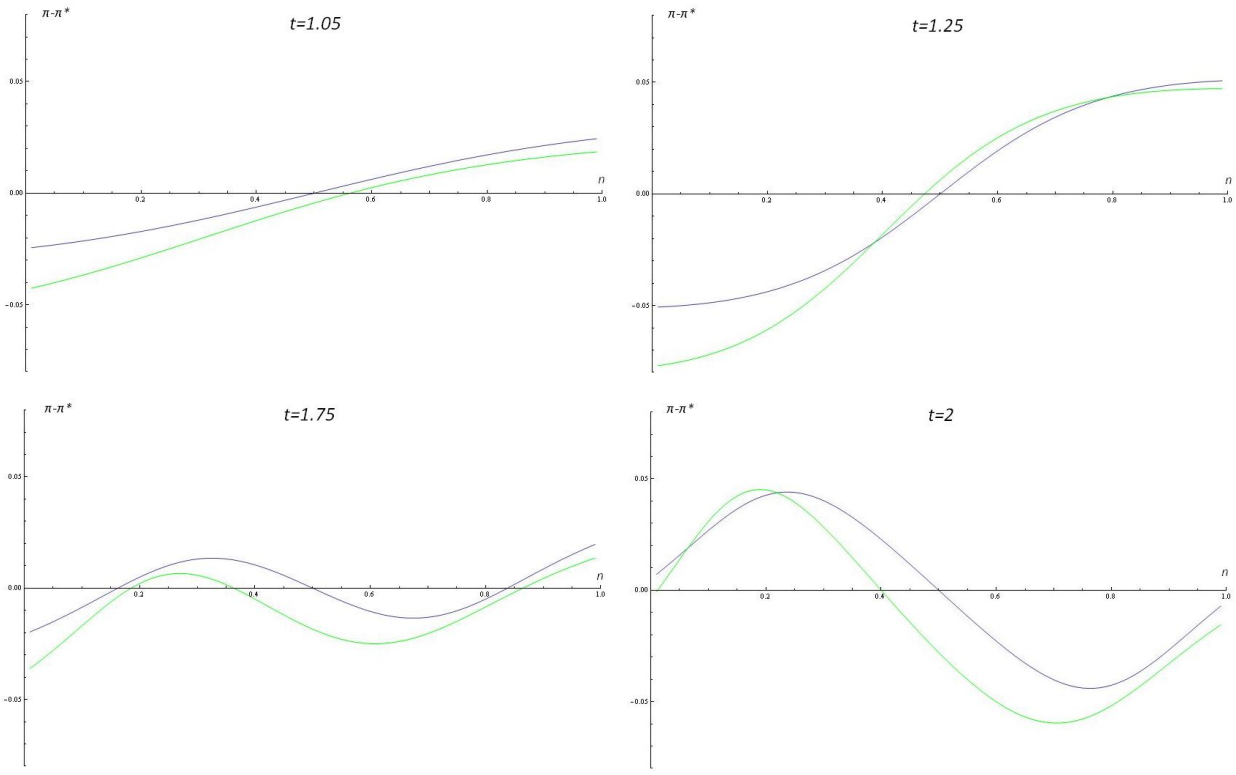

Figure 4.2: Profit differential for different international distributions of firms(blue:$\beta = \beta^* = 0.3$, green: β=0.3, $\beta^* = 0$)

differences in bargaining powers between the countries are not to high. If the differences are too high the demand effect cannot outweigh the effect of higher bargaining power on profits. This is shown in Figure 4.3. Assume that firms are equally distributed between countries and that in the foreign country workers have no bargaining power ($\beta^* = 0$). This Figure depicts how profits in the home country relative to those in the foreign country will change after migration for different levels of bargaining power in the home country. Thus if β exceeds 4.77 even after migration profits will remain lower at home firms will want to relocate to the foreign country. It can be also shown that for the increased demand to overrule the negative effect of higher bargaining power on profits, the share of income spent on manufacturing goods must also be high enough. For low shares of manufacturing in total consumptions the effect of demand on profits will be to weak.

5 Empirical relevance

A thorough econometric analysis of this model's prediction are beyond the scope of this paper. There are, however, empirical contributions which are in line with my theoretical results. First the predictions of the core periphery model without unemployment find confirmation in the data. See Head and Mayer (2004) for a comprehensive survey. Fingleton and Fischer (2010) test the NEG against other explanations of regional wage differences and show that the NEG provides a better explanation of this variation in the European case.

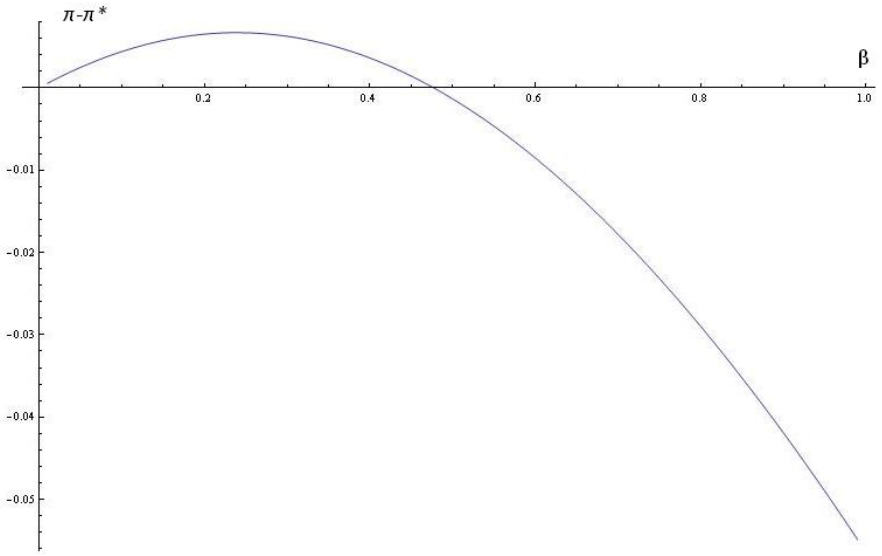

Figure 4.3: The difference in profits for n=0.5 as a function of β ($\beta* = 0$)

There is also empirical evidence suggesting that immigration does not increase unemployment. D'Amuri et al. (2010) get this finding for Germany. Heid and Larch (2012) obtain the same result for OECD countries. Additionally their analysis reveals that neither employment protection nor labour unions density or centrality of wage bargaining have an effect on unemployment. This would be in line with my theoretical prediction that differences in labour market regulation are secondary to differences in the size of local market demand. Also Jean and Jimenez (2011) find no significant long-run impact of immigration on unemployment. They show, however, that in the short run unemployment may increase, especially if replacement rates of unemployment benefits are high. This result can also be obtained in my model.

There is also evidence suggesting that trade openness increases employment. This has been shown e.g. by Felbermayr et al. (2011). In my model this translates to a lower τ. Indeed in the version of my model with trade only a lower τ leads to lower unemployment. Additionally Felbermayr et al. (2011) show that an increase in population decreases unemployment, which is also in line with the prediction of my model for low transportation costs. Finally for the OECD their analysis suggests that whereas employment protection and union density have no effect on employment, centralisation of wage bargaining actually decreases it. If a high level of corporatism increases the unions bargaining power, this is in line with the prediction of my model that countries with strong labour unions and high share of world population actually have experience lower unemployment.

Results which are very much in line with the theoretical predictions of my model were obtained by Basile and De Benedictis (2008), although this authors build their estimations on a different model. They show that high market potential and labour regulation decrease unemployment. Whereas unemployment is higher in peripheral regions.

6 Conclusions

In this paper I have shown that trade openness and factor mobility can overrule the negative effects of labour unions on employment and wages shown by Blanchard and Giavazzi (2003). In a globalized world it is thus not necessarily the case that countries with high union bargaining power have higher unemployment. In particular the size of countries and the relative speed at which firms and workers react to international profit and real wage differences becomes important once countries liberalise trade and factor flows. Large local markets attract new firms, which in turn create new jobs. Thus high bargaining power countries could have lower unemployment just because they were large before the liberalisation took place. Moreover high bargaining power means higher real wages in the short run. If workers adjust fast to the international differences in wages they would migrate to high-bargaining-power countries. This in turn can, under some circumstances attract new firms to those countries and decrease unemployment there. Thus if workers are internationally more mobile than firms, strong unions may even be a competitive advantage for countries trying to attract business.

In this paper I have also argued that in order to asses the effects of globalisation on labour markets one has to analyse different channels of openness simultaneously. In particular, I have shown that whereas immigration alone increases unemployment, combined with firm relocation it can actually decrease unemployment because immigrants attract new firms, which create new jobs. Whether the entrance of new firms can indeed overrule the negative effect immigration has on unemployment depends in turn on the level of trade openness. For low transport costs this will indeed be the case. Thus the effects of all three aspects of globalisation are linked.

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