Exports, Unemployment and the Welfare State

Eckhard Janeba*

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Abstract

The paper analyzes the labor market effects of globalization when foreign market entry is costly and risky. With flexible labor markets, a fall in foreign market entry cost tends to generate more income inequality, but not necessarily so as more firms pay foreign entry cost. By contrast, when labor markets are inflexible in the short run, globalization tends to increase unemployment. In this situation, government unemployment benefits reduce the wages that exporting firm's need to pay workers as risk compensation. Thus more firms within an industry and more industries enter the foreign market which in turn tends to increase unemployment.

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* Department of Economics, University of Mannheim, janeba@uni-mannheim.de, ++49-621-181 1795.

1 Introduction

Exporting is a costly and risky activity. Before being able to sell abroad firms need to make a costly investment, sometimes called 'beachhead cost' (Baldwin 1988), which come on top of variable shipping costs (Anderson and van Wincoop, 2004). Beachhead costs comprise expenditures for the setup of a foreign distribution network or for compliance with local product regulation. Often these investments are sunk, as confirmed by Roberts and Tybout (1997), and need to be made before the ultimate success in foreign market entry is known. For this reason not all firms within an industry enter the foreign market, a stylized fact supported by numerous studies (e.g., Bernard et al., 2003), and some firms are forced to exit which may lead to unemployment when labor markets are not flexible. Sabuhoro, Larue and Gervais (2006) estimate the probability of exit before 12 months to be 42.2% in their analysis of Canadian exporting firms. Girma, Greenaway and Kneller (2003) study the behaviour and characteristics of firms that exit permanently from export markets. Those firms represent about 12% of the firms that continue to export over the same period (not considering temporary exits of firms). The exit of firms from foreign markets has repercussion on labor market outcomes, in particular but not only when those markets do not operate smoothly. Hungerford (1995) discusses trade disruptions and layoff probabilities. Conditional layoff probabilities are higher in net importing industries compared to net exporting industries, while the latter is still 2.2%. Controlling for industry and worker characteristics, trade shocks do not affect net importing industries but have an impact on layoffs in net exporting industries. This suggests that disruptions in firms that export are relevant for labor market outcomes.

The existence of sunk cost and uncertainty about export market survival imply that successful exporters may make pure profits and the labor demand of firms entering the

foreign market is stochastic ex ante. The purpose of this paper is to study how in this context a fall in the costliness of foreign market entry (=globalization) and a change in the unemployment replacement rate affect total profits, and thus income inequality, as well as (un-)employment in the exporting country. Particular emphasis is placed on the labor market institutions of the exporting country, as this is an important difference between Anglo-Saxon and continental European countries (for a discussion see Alesina, Glaeser and Sacerdote, 2001). The model thus considers a new transmission channel for how globalization affects labor market outcomes. While the paper does not seek to exactly match observed labor market outcomes it is interesting to note that the results of the simple model are in line with those empirical findings which demonstrate the absence of a simple link between inequality, globalization and unemployment. Recent surveys and detailed analyses by the IMF (IMF 2007a and b) highlight the various channels and conflicting evidence. For example, since 1980 the reduction in the labor share of GDP has been greater in Japan and Europe than in Anglo-Saxon countries, even though the latter have more flexible labor markets on average. At the same time the biggest decline in the labor share among European countries was observed in Ireland, Austria and the Netherlands, countries which do not have the most protected labor markets in Europe.

In the formal model I show that in the presence of flexible labor markets globalization has no effect on unemployment and total labor income. Workers and wages adjust so that the distributional effect of globalization is solely transmitted via industry profits. There are three effects when beachhead costs fall: The direct effect on profits (for a given number of firms within an industry entering the foreign market, i.e. the intensive margin) is positive, and thus leads to an increase in inequality (between labor income and profit income). The other two effects are indirect ones, as the number of firms in an industry

entering the foreign market changes (i.e. the extensive margin). Industry profits decline because more firms pay the entry cost (the second effect). The third effect reflects the change in the probability that foreign market rents are captured by either of the domestic firms (because of Bertrand competition between two successful exporters), and depends on the probability that any single firm is successful in foreign market entry. The aggregate effects depend on these intra-industry effects as well as the number of industries switching from nonexporters to exporters (inter-industry effects). The latter is the result of ex ante differences in industry productivity. When productivity is relatively low or beachhead costs are relatively high, at most one firm enters the foreign market and only the direct effect survives. Inequality rises with globalization. By contrast, when productivity is relatively high (beachhead cost low) the net effect is a priori unclear. Numerical results show that the indirect effects may dominate the direct effect for some parameter values.

I study next the same model modified by the existence of labor market rigidities. Unemployment is not caused by a government mandated minimum wage, but rather it is the difficulty of reallocating labor across industries after the success or failure of foreign market entry is realized, combined with little wage flexibility in the short run. A fall in beachhead cost drives unemployment and inequality. For high levels of globalization (low beachhead costs) a fall in beachhead costs increases income inequality and unemployment. Globalization does not induce firms of a specific industry to enter "gradually" the foreign market, but firms rather simultaneously enter which avoids the negative effect on the existing exporter's profit under gradual entry when the second firm enters the foreign market. Unemployment rises because workers are drawn into those industries (and are compensated for the unemployment risk through higher wages), yet at the same time more industries (and firms) are exposed to the possible failure in export market entry.

The results are more subtle for low levels of globalization (high beachhead costs) because firms gradually enter the foreign market in the sense that an industry does not switch instantly from being a nonexporter to all firms entering the foreign market. This gradual entry implies that expected unemployment increases in those industries where the first firm enters the foreign market, but decreases in those industries in which the second firm enters. Using again numerical results I show that the second effect may dominate the first effect for some parameter values, leading to a reduction in overall unemployment.

The case of short-run immobile labor and wages provides further interesting insights. Assuming that the government pays released workers unemployment benefits, there is an *inverse relationship* between the replacement rate for unemployed workers and the wage offered by exporting firms. Workers need to be made indifferent between working in the numeraire sector and the risky export sector. The expected income for the latter option depends on how the government treats unemployed workers. Therefore, unemployment benefits allow exporting firms to pay less than in the absence of such government benefits (but still more than in the numeraire sector). The consequence is important: All else equal, a country with the higher replacement rate has lower wages in the exporting sector, induces more firms within an industry to enter the foreign market and, when successful, to increase output due to lower cost. This pulls more workers into the industry, and additional industries to become exporting industries in the first place, which together tend to generate more unemployment and welfare state expenditures in expected terms.[1]

The model and the results thus identify a new link between international competitiveness, wages and the welfare state. In existing analyses (e.g., Sinn 2006) the welfare state affects individual labor supply negatively and acts as a de facto minimum wage. Firms respond by outsourcing labor intensive activity when possible. While this channel

seems relevant for Germany, the present paper shows that in countries with labor market imperfections the welfare state also drives industry labor supply (with inelastic individual labor supply) and may induce firms to export more ceteris paribus. Put differently, the generosity of the welfare state in the presence of short-run immobile labor and wages is here the *cause* to more unemployment, a bigger government sector, and more exports. This is in contrast to Rodrik (1998) who argues that the rising share of government expenditures in GDP in the face of globilization is the *consequence* of mitigating the increase in external risk - measured by the product of the openness of the economy and the volatility of the terms of trade.

The paper is structured as follows. In section 2 I briefly review the related literature. A model with flexible labor markets is introduced in section 3. In section 4 comparative statics with respect to beachhead cost are undertaken. In section 5 I consider the case with inflexible labor markets and the resulting link between exports, unemployment and the generosity of the welfare state. Section 6 concludes.

2 Related Literature: A Short Review

There exists a large literature relating globalization and labor market outcomes. Besides those mentioned in the introduction, I focus here mostly on those studies which feature unemployment.

Most of the early work on globalization and labor markets utilizes variants of a traditional Heckscher-Ohlin framework. The increasing wage gap between skilled and unskilled workers can be rationalized by Stolper-Samuelson effects. Similarly, introducing a minimum wage in a country that trades freely with a flexible economy leads to unemployment

in the former country, a point formally shown within a factor abundance approach by Brecher (1974), Chao and Yu (1997), and Davis (1998). Davis analyzes the consequences of a minimum wage in an integrated world economy, where all countries are fully diversified in production. Factor price equalization holds and the wage of unskilled workers are equalized at the level of the minimum wage. This conflicts with the wide distribution of wages for unskilled workers across countries. In addition, diversified production of all countries appears at odds with the high degree of specialization observed in practice (see Schott, 2003, for a detailed empirical analysis). Two other approaches generating unemployment have been pursued. Matusz (1986) and Fernandez (1992) use the theory of implicit contracts to study wage formation and employment in an open economy. Unlike the present paper the welfare state is not considered explicitly. In Matusz (1996) unemployment is the result of paying efficiency wages. More intra-industry trade due to trade liberalization is shown to reduce unemployment however.

More recent modelling approaches in international trade emphasize worker and/or firm heterogeneity although typically without considering labor market rigities (Melitz, 2003, Baldwin, 2005 and Yeaple, 2005). Exceptions are considered further below. The present modelling approach is somewhat simpler by using an oligopoly model, and thus fits in the context of general ologopolistic equilibrium (GOLE) models as advocated by Neary (2003). The identification and interpretation of the channel through which exporting behavior feeds back to the domestic economy is straightforward.

A number of more recent papers also analyze the effects of labor market policies and globalization. Molana and Montagna (2006) show that expansionary welfare state policies are welfare improving in the presence of unionized workers because an increase in the mass of varieties in the upstream industry improves productivity downstream which in

turn raises consumer welfare. The optimal unemployment replacement rate increases with globalization. In a series of papers Kreickemeier with varying coauthors uses an efficiency wage model to study the effects of globalization on labor market outcomes. Kreickemeier and Nelson (2006) introduce an international trade model with a fair wage constraint and show that unemployment arises endogenously. In Egger and Kreickemeier (2008) the effects of international outsourcing are studied and it is shown that outsourcing may mitigate unemployment of unskilled workers if the country is sufficiently skill intensive. Moreover, a reform of the unemployment benefits system may not generate higher gains under fragmented production compared to integrated production. Perhaps most closely related is the paper by Egger and Kreickemeier (2007) who study trade liberalization in a model where workers receive higher wages when working for more productive firms, thus linking firm and (ex-post) worker heterogeneity. In their model globalization increases wage inequality and unemployment. Similar to the present model unemployment and (rising) profits go hand in hand. The mechanisms differ though.

Another relevant recent contribution is the work by Helpman and Itskhoki (2007). In their model of firm heterogeneity and monopolistic competition unemployment is generated through wage bargaining and costly job search. Similar to the present paper their interests lies in the impact of trade liberalization conditional on labor market institutions. While the model differs profoundly from the present one they also find that trade integration is consistent with higher rates of unemployment, but at the same time unemployment can be higher or lower in the more flexible country. In Helpman, Itskhoki and Redding (2008) the above model is extended to allow for worker heterogeneity.

At a more general level, the paper is related to recent work on the nexus between firm-level output volatility and export or international orientation. For example, Fabbri,

Haskel and Slaughter (2003) find that labor demand for less skilled labor has become more elastic for U.S. and U.K. manufacturing firms during a period in which multinational activity has increased. Buch, Döpke and Strotmann (2006) find that German exporting firms experience less volatility than domestic firms. They focus on macroeconomic shocks and do not explicitly distinguish between firms that enter foreign markets (and may fail) and those who export (and apparently succeeded).

3 The Model

Consider an open economy which produces goods in two *sectors* with one input factor (labor). The Z sector is characterized by constant returns to scale, where one unit of labor is transformed into one unit of output, and is the importing sector in equilibrium. The price of sector Z output is normalized to one. The second sector, called X, consists of a continuum of *industries* I and will be the export sector in equilibrium (as in a Ricardian type model).[2] Firms within an industry have the same productivity, but productivity is allowed to differ across industries. The output of a firm in industry i is

$$x(i) = a(i)l(i) \tag{1}$$

where $a(i)$ is the productivity parameter and $l(i)$ is the amount of labor used. Labor productivity a is distributed continuously on some compact interval $[\underline{a}, \overline{a}]$ with constant density m. Thus there is a mass of industries with identical productivity, but each industry produces a different good. In the following I drop the industry index if a generic industry is considered.

In each industry there are many, *ex ante* symmetric firms producing a homogenous good and competing in prices. Assuming price competition is a matter of convenience, as

quantity competition is likely to generate the same qualitative results (see section 7 for a short discussion). Each firm serves the domestic market, and in addition must decide whether to enter a foreign market. Foreign market entry is costly and requires spending sunk cost F (beachhead cost). Unlike variable trade cost like tariffs or transportation cost, the beachhead cost represent the cost of complying with local market regulations, setting up a sales network, etc. The success of foreign market entry is random however. With probability q a firm is successful and serves the foreign market. With probability $1-q$, however, entry is unsuccessful and the firm is not in a position to sell in the foreign market. Since sunk cost F are paid before the firm finds out about its success, entry is a decision under uncertainty. The probability of success is identical for each firm in each industry, and independent from firm to firm.[3] The export market risk is not endogenously derived here in order to focus on the transmission of riskiness on domestic labor market outcomes. The existence of export market risk is documented by the short survival rates in export markets and frequent entry and exit of firms (see, for example, Sabuhoro et al., 2006, and Girma et al., 2003).

To simplify the analysis I focus on a case where at most two firms enter the foreign market. If both firms enter the foreign market, with probability q^2 both firms are successful and compete in prices, leading to zero profits. With probability $2q(1-q)$ one firm is successful, while the other is not, and with probability $(1-q)^2$ both firms are unsuccessful and do not export. Clearly, a firm can make strictly positive profits in the foreign market only if it is the only firm with a positive draw and is thus a monopolist. In addition, entering the foreign market requires that the additional expected profits cover the fixed cost F of foreign market entry.[4]

I now turn to the consumer side of the economy. There is a mass of L identical indi-

viduals. Each worker supplies one unit of labor inelastically and consumes the numeraire good and all goods from the X sector. Preferences are of the quadratic form

$$u(x,z) = z + \int_{i \in I} \left[\alpha x(i) - \beta x(i)^2 \right] di, \tag{2}$$

where α and β are positive parameters. Consumption is financed through labor income. Given the structure of preferences profits from the X-sector could be distributed to households, which would show up in demand for the numeraire good only. Assuming that profits are accrued by separate owners (and who spend it on the numeraire good only) allows me to address distributional issues, as globalization changes both labor income and profits.[5] Individuals are equally productive across industries and thus there is a uniform wage when labor markets are flexible. Utility maximization implies that demand for any good i from sector X is a linear function of its own price only, $x_d = x_d(p) = (\alpha - p)/2\beta$. All income effects are subsumed into the demand for good z and I assume throughout the paper that the country consumes and produces the numeraire good. Thus total demand for good i is $X_d(p) = Lx_d(p)$ given price p. I assume that foreign demand is generated from a similar demand structure, but allow countries to differ in size. Let foreign's labor force be $L^* = \lambda L$, where $\lambda > 0$ is a scale parameter. Then foreign demand for home's exports of good i is simply $X_d^*(p) = \lambda X_d(p)$ at any common price p.

Overall, the quadratic structure of preferences and the continuum of industries make the model similar to the GOLE structure advocated by Neary (2003), and derived in detail in Neary (2002), albeit with the additional feature of a numeraire good in the present model which pins down the marginal utility of income.

4 Flexible Labor Markets

I begin with an analysis of the case with flexible labor markets. The timing of events is as follows: In a first stage firms make their decison simultaneously about foreign market entry. If entering, a firm has to pay immediately the sunk cost F in terms of the numeraire good. Then the success of those firms entering foreign markets is realized. Firms compete in prices and hire workers to produce goods, which are then sold to consumers who maximize utility by choosing consumption quantities given prices and lump sum profit income. There exists one national labor market and because of worker and wage flexibility there is no unemployment. Any worker released by an unsuccessful firm can find work in the secure numeraire sector. There exists also a continuum of goods markets (one for each industry) and the market for good Z. Trade is balanced by Walras law. The country under consideration necessarily exports sector X output, because the foreign country does not produce but values these goods, and imports the numeraire good.

For each industry of sector X the game is solved backwards to determine the equilibrium entry and pricing decisions. In the domestic market the two firms are Bertrand competitors. In the foreign market there are zero, one or two firms competing after the entry success is determined. Since demand for the homogenous good depends only on own price, competition between two (successful) firms leads to marginal cost pricing, as in the domestic market. Profits π in the domestic market are zero. The wage w is given through sector Z and equals one. Dropping the industry index for expositional convenience, the equilibrium price for an industry with two (successful) firms is

$$p^C(c) = c = \frac{w}{a} = \frac{1}{a},$$

where the superscript C refers to competition and c to marginal cost. When a firm is

monopolist in the foreign market it charges the monopoly price $p^M(a) = (\alpha + wa^{-1})/2$ (assuming for the moment that the monopoly price is less than the willingness to pay for the first unit of a good α). The monopoly profit for a firm serving the foreign market is $\lambda\pi^M$ (because of the linearity of demand), where $\pi^M = (\alpha - wa^{-1})^2/8\beta$, is the monopoly profit in the domestic market. When no firm is successful in entering the foreign market, exports and foreign consumption of the good are zero, and the price is above the consumers reservation price.

The above can be used to determine the expected profits at the foreign market entry stage of the game. Denote by (i, j), $i, j \in \{E, N\}$, the entry decisions of firm i and j, where E stands for entry into the foreign market and N for no entry.

- When both firms do not enter the foreign market (N, N), the expected profit of all firms is zero, $\pi_{NN} = 0$, due to marginal cost pricing.

- If one firm enters the foreign market, but the other does not, (E, N) or (N, E), the domestic firm obtains zero, $\pi_{E\mathbf{N}} = 0$, where the bold subscript denotes the firm under consideration, here the non-exporting, and the exporting firm (bold subscript E) has expected profits of

$$\pi_{\mathbf{E}N} = q\lambda\pi^M - F.$$

  The first term refers to the expected monopoly profit in the foreign market. There is no price arbitrage across markets possible. The value of $\pi_{\mathbf{E}N}$ is positive when F is sufficiently small, but is negative if not.

- When both firms enter the foreign market (E, E), each firms expected profit is

$$\pi_{EE} = q(1-q)\lambda\pi^M - F$$

which may or may not be positive. Recall that $q(1-q)$ is the probability of being a monopolist in the foreign market.

Note that $\pi_{\mathbf{E}N} > \pi_{EE}$, that is, the expected profit of the firm that exclusively enters the foreign market is greater than the expected profit of a firm when also the rival is a potential exporter, holding productivity a constant. A summary of the firms' payoffs at the entry stage is given in *Table 1.*

- Table 1 about here -

The next step is to identify the equilibria of the entry game. It is easy to see that (N, N) is an equilibrium of the entry game if $\pi_{\mathbf{E}N} < 0$ or $q\lambda\pi^M < F$, which simply states that beachhead cost exceed the expected monopoly profit in the foreign market. Both firms entering is an equilibrium if $\pi_{EE} > \pi_{E\mathbf{N}} = 0$, which is equivalent to $q(1-q)\lambda\pi^M \geq F$. Here the beachhead cost must be sufficiently small because for a single firm the probability of being a monopolist is now only $q(1-q)$. Finally, the situation with only one firm entering, (E, N) or (N, E), is an equilibrium if $\pi_{\mathbf{E}N} > \pi_{E\mathbf{N}} = 0 > \pi_{EE}$, that is, $q(1-q)\lambda\pi^M < F \leq q\lambda\pi^M$. The following result follows now immediately, as for each level of beachhead cost there is only one equilibrium in the entry game.

Proposition 1. The pure-strategy equilibrium in the foreign market entry game leads to a unique number of firms in an industry entering the foreign market, given beachhead cost F and industry productivity a.

Of course, when the equilibrium outcome involves only one firm entering the foreign market it is not determined which of the two firms it is. Given symmetry, however, this aspect is of no interest for all results derived further below.[6] Overall, the structure of the

model is fairly simple and, as is shown in the next section, the equilibrium allocation has some reasonable properties.

5 Globalization with Flexible Labor Markets

In this section I do comparative statics with respect to the beachhead cost and thus with the number of firms entering the foreign market. A fall in F can be interpreted as globalization. For any particular industry with productivity a, equilibrium values of important variables change only at two critical points of F, namely when fixed cost equal expected profits of the first, $F_1 = q\lambda\pi^M(a)$, and second firm, $F_2 = q(1-q)\lambda\pi^M(a)$, entering the foreign market. Alternatively, for a given level of sunk cost F there exist industries with cutoff productivity levels a_1 and a_2 such that a firm breaks even when entering the foreign market alone or jointly, that is

$$\begin{aligned} F &= q\lambda\pi^M(a_2) \\ F &= q(1-q)\lambda\pi^M(a_1). \end{aligned} \tag{3}$$

The implicit definition of the two cutoff values, a_1 and a_2, are used extensively in the remainder of the paper.

Analyzing the effects of globalization on equilibrium price, profits, and export volume is of interest to check the plausibility of the model.

Proposition 2. a) The mass of industries entering the foreign market increases (i.e., a_2 declines) when F falls. b) Expected industry exports (weakly) increase when F falls. c) Conditional on exports taking place, the expected export price in an industry decreases

and the variance of the price increases when the number of firms entering the foreign market increases from one to two.

The first result is straightforward given Proposition 1. For given productivity a, there exists a critical threshold level of the fixed entry cost, which makes an industry an exporting one by inducing the first firm to enter the foreign market. Monopoly profit $\pi^M(a)$ is increasing in productivity a. When productivity is continuously distributed, a fall in F has the predicted consequence. Result b) is easy to prove as exports are zero under (N, N), while expected exports equal $qX_d^*(p^M)$ for the case of one firm entering the foreign market. The export volume is even higher when both firms enter the foreign market (E, E) because expected exports amount to

$$q^2 X_d^*(p^C) + 2q(1-q)X_d^*(p^M) = q[q(X_d^*(p^C) - X_d^*(p^M)) + (1-q)X_d^*(p^M)] + qX_d^*(p^M),$$

which is clearly higher than $qX_d^*(p^M)$. The reasons are twofold. Exports are higher when both firms succesfully enter the foreign market since price competition stimulates demand. In addition, the probability of unsuccessful foreign market entry for the entire industry falls from $1-q$ to $(1-q)^2$.[7]

Concerning part c), a single successful firm charges the monopoly price. The expected price is thus the monopoly price and its variance is zero (conditional on exports occurring). By contrast, when both firms enter, with probability q^2 the two firms end up charging a price equal to marginal cost, while with probability $2q(1-q)$ the firm with the good draw charges the monopoly price. Thus, conditional on exports taking place, the expected price is now lower and has positive variance. Taken together the results from Proposition 2 are fairly consistent with other models of trade with heterogenous firms (see Melitz, 2003, and Baldwin 2005).

I now turn to characterizing profits as function of fixed cost.

Proposition 3. Assume that at least one firm enters the foreign market. A fall in F increases expected industry profits holding fixed the number of firms entering the foreign market. Expected industry profits drop discontinuously, however, when entry cost fall below the critical level at which the second firm enters the foreign market, $F = q(1-q)\lambda\pi^M$.

The proof is straightforward. The industry profit level corresponding to one and two firms entering the foreign market is given by

$$\begin{aligned} \pi_{\mathbf{E}N} &= q\lambda\pi^M - F \\ 2\pi_{EE} &= 2[q(1-q)\lambda\pi^M - F] \end{aligned}$$

respectively. The latter is less than the former when the two expressions are evaluated at $F = q(1-q)\lambda\pi^M$, which is the cutoff productivity a level at which the second firm finds entry profitable. *Figure 1* graphs industry profits as a function of beachhead cost (for the case $q < 2/3$ so that maximal industry profits with two firms are higher than with one firm in the foreign market).

- Figure 1 about here -

Proposition 3 suggests an interesting trade off for economic inequality. As F falls, more industries enter foreign markets (a_2 falls) and the number of industries with multiple firms in the foreign market rises (a_1 falls). Aggregate profits are defined as follows (assuming either $a_1 \in [\underline{a}, \overline{a}]$ or $a_2 \in [\underline{a}, \overline{a}]$ or both)

$$\Pi = m \cdot \left[\int_{\min\{a_1, \overline{a}\}}^{\overline{a}} 2\pi_{EE}(a)da + \int_{\max\{a_2, \underline{a}\}}^{\min\{a_1, \overline{a}\}} \pi_{\mathbf{E}N}(a)da \right]. \tag{4}$$

The next result provides a partial characterization for the effect of globalization on income inequality.

Proposition 4. Economy wide expected profits increase when F falls when $\underline{a} < a_2 < \overline{a} < a_1$ (i.e., at most one firm per industry enters the foreign market). In those cases globalization leads to an increase in the country's total income but an increasing gap between labor income and expected profits.

When $a_1 > \overline{a} > a_2 > \underline{a}$, industry profits are simply $\pi = m \int_{a_2}^{\overline{a}} \pi_{\mathbf{E}N}(a)da$, which are decreasing in beachhead cost F,

$$\frac{d\Pi}{dF} = m \left[-\pi_{\mathbf{E}N}(a_2) \frac{da_2}{dF} - (\overline{a} - a_2) \right] < 0,$$

because the indirect effect is zero at a_2.

In other cases the effect is found by differentiating (4) with respect to F and using the definition of a_2 and a_1. The change in economy wide profits equals

$$\begin{aligned} \frac{d\Pi}{dF} &= m \left[(a_1 + a_2 - 2\overline{a}) + \pi_{\mathbf{E}N}(a_1) \frac{da_1}{dF} \right] \\ &= m \left[(a_1 + a_2 - 2\overline{a}) + \frac{da_1}{dF} (F + \lambda \pi^M(a_1)[q(1 - 2(1-q))]) \right] \\ &= m \left[(a_1 + a_2 - 2\overline{a}) + \frac{da_1}{dF} \frac{Fq}{1-q} \right], \end{aligned} \tag{5}$$

where the second equality is explained further below. The first term within the square brackets, $a_1 + a_2 - 2\overline{a}$, is always negative and reflects the *direct* effect (the intensive margin) of an increase in F, that is, the increase in expenditures on fixed costs holding constant the number of firms entering the foreign market. The second term is the *indirect* effect and depends on the mass of industries switching the number of firms in the foreign market (i.e., the extensive margin),

$$\frac{da_1}{dF} = \frac{1}{\lambda q(1-q) \left(\partial \pi^M / \partial a \right)|_{a=a_1}} = \frac{\pi^M / F}{\partial \pi^M / \partial a|_{a=a_1}} > 0, \tag{6}$$

which is found by differentiating (3). Recall that the profit is $\pi^M = (\alpha - w/a)^2/8\beta$. It is easy to show that the size of (6) is larger the bigger the consumer's reservation price α. The indirect effect in (5) has two components (see second line of (5)): (i) the reduction in fixed costs when one firm is no longer entering the foreign market and (ii) the change in probability of having a monopoly in the foreign market from $2q(1-q)$ to q.

The net effect of a change in sunk cost on industry profits is ambiguous. Simple numerical simulations show that economy wide profits are a nonmonotonic function of the beachhead cost in some cases. The following graph is based on the following parameter values: $\alpha = 10, \beta = 1, \lambda = 1, q = 0,5, m = 0.5, \underline{a} = 0, \overline{a} = 1$.[8]

Insert Figure 2 about here

The graph plots total profits as function of F. The value of a_1, the critical value at which the second firm is indifferent between entering and staying out the foreign market, is below the upper bound of industry productivity ($\overline{a} = 1$) for all values of F less than 2.5. For higher values of F there exists no industry in which both firms enter the foreign market and hence Proposition 4 applies. For low values of beachhead costs ($F = 0.1$) most industries enter the foreign market with both firms ($a > a_1 = 0.121$) and few industries enter with only one firm $a \in [a_2, a_1]$, where $a_2 = 0.114$. The critical values a_1 and a_2 rise with higher values of F. The effect on profits is ambiguous however. Total industry profits reach a minimum around $F = 2.1$.

In summary, when labor markets are flexible globalization does not necessarily increase inequality, even though a fall in beachhead cost improves the profits of firms that already enter the foreign market. Yet interindustry effects and an increase in competition in

existing exporting industries may erode this gain. Globalizaton increases profits and thus inequality when in (almost) all industries only one firm is in the foreign market or - as suggested by numerical results - beachhead costs are sufficiently small.

6 Globalization with Short-Run Immobile Labor and Wages

In the previous section it was assumed that the labor market is completely flexible and workers are perfect substitutes across industries. All workers are employed after foreign entry success materializes and the wage is uniform across sectors and industries. In this section I take a different perspective: Workers cannot easily switch jobs across industries and sectors *ex post*. Instead workers must decide in which industry/sector to work before the firms' foreign market entry success is revealed. They become unemployed if not hired by firms in the industry for which they opted. The assumption is reasonable if industries are geographically dispersed and workers do not move easily, as is much more the case in continental Europe than in the U.S.[9] Another reason for sectoral immobility of workers are sector-specific skills. Workers can opt to work in sector Z though (before uncertainty is revealed), which guarantees an income of one because the sector faces no risk. Workers are risk-neutral since all income effects enter the consumption of the numeraire good due to the constant marginal utility of consuming z. Note that the basic issue remains if sector Z had uncertain wages because workers are locked in once the sectoral decision was made.

Even with short run immobile labor unemployment is not an automatic consequence however. If industry labor demand falls short of industry labor supply, the market would

clear when wages fell sufficiently. I assume, however, that this is not the case. One reason could be that flexibility makes wages more volatile, which following Azariadis' (1975) theory of implicit contracts, induces risk averse workers to trade off employment security for income security. Here I follow a similar idea (without formally modelling it). A firm offers a specific wage and hires workers. The promise to pay the wage is enforceable when the firm's labor demand is not less than its initial hiring, given product market competition and foreign market entry success. By contrast, when less workers are needed, some workers need to be released. A firm's excess labor supply can be hired by other firms in the same industry at their wage, which happens only if such firms find themselves in a labor shortage situation. When the latter does not happen the worker becomes unemployed and receives government unemployment benefit $b \in [0, 1)$, and thus less than the wage in the numeraire sector. I do not model explicitly the government sector here. It may be assumed, however, that government spending is financed by a lump sum tax on workers, which affects only demand for the numeraire good.

The timing of the game is as follows: 1) Firms decide whether to enter foreign market, 2) each firm sets a wage, 3) workers choose to work for a particular firm in industry i in sector X or in sector Z, 4) foreign market entry success is resolved, and 5) production, consumption and trade take place.

6.1 Foreign Market Entry

Wages depend on the entry strategy of both firms. For this reason I examine each entry pair separately.

Case (N,N)

Neither firm enters the foreign market. Profits are deterministic (and zero) and the

wage is one ($w_{NN} = 1$). There is no unemployment.

Case (E,N)/(N,E)

Workers hired by the potential exporter face stochastic income. To compensate them, they must be offered a wage $w_{\mathbf{E}N}$ higher than their outside option of one. The bold subscript E refers to the wage of the firm that enters the foreign market. Recall that there are many competitors in the domestic market, such that marginal cost pricing and thus zero profits prevail there.[10] The non-exporting firms' labor demand is deterministic and given by

$$L_{E\mathbf{N}} = \frac{X_d(p^C)}{a},$$

where $p^C = 1/a$ is the competitive price. Consider next the firm entering the foreign market (which for simplicity does not produce for the domestic market as profits are zero from production for local markets). Suppose the firm hires as many workers as necessary to serve the foreign market in case entry is successful, that is,

$$L_{\mathbf{E}N} = \frac{\lambda X_d(p^M(c_{\mathbf{E}N}))}{a}, \tag{7}$$

where $c_{\mathbf{E}N} = w_{\mathbf{E}N}/a$. Then each worker gets the wage $w_{\mathbf{E}N}$ with probability q, and faces unemployment with probability $1 - q$, in which case he is paid b by the government. To attract workers the expected income must equal the outside option of working in sector Z ($w = 1$). The wage of the E firm must therefore satisfy $qw_{\mathbf{E}N} + (1 - q)b = 1$ or

$$w_{\mathbf{E}N} = \frac{1 - (1 - q)b}{q} > 1. \tag{8}$$

All equilibrium conditions are satisfied. Each risk-neutral worker obtains an expected income of one and wages set by firms maximize expected profits: If the exporting firm offered a lower wage, nobody would want to work for the firm given hiring $L_{\mathbf{E}N}$. This is true also if the firm were to hire fewer workers than given in (7) because each worker

would be employed by the firm with probabability one if the firm is successful in market entry. Moreover, paying a higher wage than (8) lowers profits strictly.

For a given industry the exporting and non-exporting firms' profits as well as expected unemployment are

$$\begin{aligned} \pi_{\mathbf{E}N} &= q\lambda\pi^M(c_{\mathbf{E}N}) - F \\ \pi_{E\mathbf{N}} &= 0. \\ U_{EN} &= (1-q)L_{\mathbf{E}N} = \frac{(1-q)\lambda X_d(p^M(c_{\mathbf{E}N}))}{a}, \end{aligned} \tag{9}$$

where $c_{\mathbf{E}N} = w_{\mathbf{E}N}/a$ and $w_{\mathbf{E}N}$ given by (8).

Case (E,E)

The entry strategy is symmetric and I therefore focus on a symmetric equilibrium in terms of the wage paid w_{EE}. Instead of deriving the equilibrium step by step, I propose the following equilibrium allocation: Labor hiring by the domestic firms equals the one in the previous case and potential exporters hire

$$L_{EE} = \frac{\lambda X_d(p^M(c_{EE}))}{a}, \tag{10}$$

where $c_{EE} = w_{EE}/a$ and each of the two firms entering the foreign market hires one half of L_{EE}. Notice the superscripts on prices in (10). The expected income of a worker in a firm entering the foreign market is b with probability $(1-q)^2$ because both firms are unsuccessful. With probability $2q(1-q)$ one firm is successful and the other is not, leading to industry labor demand equal to industry labor supply. There is no unemployment because workers can switch from the unsuccessful firm to the successful firm at the same wage. Finally, when both firms are successful in foreign market entry, they compete in Bertrand fashion abroad. In this case labor demand by exporting firms exceeds industry

labor supply. By assumption the wage cannot adjust as it was set previously.[11] All workers are employed.

The last step is to determine the wage consistent with entry of L_{EE} workers. To find the wage, the expected income of a worker must equal one, that is $q^2 w_{EE} + 2q(1-q)w_{EE} + (1-q)^2 b = 1$ or

$$w_{EE} = \frac{2-(1-q)^2 b}{q(2-q)}, \tag{11}$$

which is greater than one if $q \in [0,1)$. Note that w_{EE} is a Nash equilibrium in wage offers by the two firms that enter the foreign market. Moreover, a firm cannot increase its profit. The only situation in which the firm makes a strictly positive profit is when it is successful in market entry but the other is not. In this situation there is no labor shortage and the monopoly profit is realized. Any change in hiring or in the wage offered implies that either workers are no longer willing to accept the contract (because employment probability has decreased even when one firm is successful) or profits are reduced. To illustrate this point, assume that firms hired more workers than given in (10). There is no benefit to having more workers as profits of two successful firms are zero under Bertrand competition. The only effect of having more workers is that wages must rise because in the situation with only one successful firm workers face also an unemployment risk. Hiring fewer workers than (10) reduces profits as well, as now the firm faces a labor shortage when it is the only successful exporter.

Expected profits equal and expected industry unemployment are

$$\begin{aligned} \pi_{EE} &= q(1-q)\lambda \pi^M(c_{EE}) - F. \\ U_{EE} &= \frac{(1-q)^2 \lambda X_d(p^M(c_{EE}))}{a}, \end{aligned} \tag{12}$$

where $c_{EE} = w_{EE}/a$. Unemployment occurs only when both firms are unsuccessful.

- Table 2 about here -

I now turn to the analysis of equilibrium entry strategies given fixed cost and industry productivity. *Table 2* provides a summary of the profits at the entry stage. The entry game is not as clear cut as in the case with flexible labor markets because the wages are dependent on entry strategies. Note in particular that $w_{EE} < w_{\mathbf{E}N}$, that is, the wage in a situation with two potential exporters is lower than with one partly because the probability of export failure is smaller under the former than under the latter. The pair (E, E) is an equilibrium if sunk cost are sufficiently small, that is $\pi_{EE} > \pi_{E\mathbf{N}} = 0$ or

$$F < q(1-q)\lambda\pi^M(c_{EE}).$$

Foreign market entry of exactly one firm, (E, N) and (N, E), occurs if $\pi_{\mathbf{E}N} > \pi_{NN} = 0 = \pi_{E\mathbf{N}} > \pi_{EE}$ or

$$q(1-q)\lambda\pi^M(c_{EE}) < F < q\lambda\pi^M(c_{\mathbf{E}N}). \tag{13}$$

Condition (13) might not hold because marginal cost $c_{\mathbf{E}N} = w_{\mathbf{E}N}/a$ are typically higher than $c_{EE} = w_{EE}/a$, and hence the monopoly profit in the (E, N) case, $\pi^M(c_{\mathbf{E}N})$, may be smaller than in the (E, E) case, $\pi^M(c_{EE})$. Yet, the difference in critical profit levels, $\pi_{\mathbf{E}N} - \pi_{EE}$, is increasing in productivity a. To see this, consider

$$\begin{aligned} \frac{d(\pi_{\mathbf{E}N} - \pi_{EE})}{da} &= \frac{\lambda q[(1-q)\pi^M(c_{EE}) - \pi^M(c_{\mathbf{E}N})]}{da} \\ &= \frac{\lambda q}{a^2}\left(w_{\mathbf{E}N} - (\sqrt{1-q})w_{EE}\right) > 0, \end{aligned}$$

which is positive because - using (8) and (11) - the wage decreases when another firm enters the foreign market

$$w_{\mathbf{E}N} - w_{EE} = \frac{(1-b)(1-q)}{q(2-q)} > 0. \tag{14}$$

The monotonicity property of the profit difference $\pi_{\mathbf{E}N} - \pi_{EE}$ allows me to identify a critical productivity level a', which is independent of F and is implicitly defined via the value of a that solves

$$q(1-q)\lambda\pi^M(w_{EE}/a) = q\lambda\pi^M(w_{\mathbf{E}N}/a). \tag{15}$$

A necessary condition for a (E,N) or (N,E) equilibrium to exist therefore is $a > a'$ because (13) is then fulfilled for some F.

Recalling that a_1 depends positively on F and $a_2 < a_1$, we can now distinguish two different regimes, depending on the value of a_1 in relation to a'. Consider first $a_1 < a'$, which can be interpreted as a situation of high globalization because a_1 is low when F is small. Condition (13) cannot hold and hence for any industry only the (N,N) or the (E,E) equilibrium exists. By contrast, when $a_1 \geq a'$ condition (13) holds for some F and all types of entry strategy pairs $(N,N),(N,E),(E,N)$ and (E,E) are equilibrium candidates. When a_1 is larger than a' the degree of globalization is low as fixed costs are high and few industries have both firms entering the foreign market.

Proposition 5: In any pure-strategy equilibrium there exists a unique number of firms entering the foreign market given F and a. If for any given F

a) $a_1 < a'$, then (N,N) is the equilibrium whenever $a < a_1$ and (E,E) when $a \geq a_1$.

b) $a_1 \geq a'$, the equilibrium is of the type (N,N) when $a < a_2$, of type (E,N) or (N,E) when $a \in [a_2, a_1)$, and (E,E) when $a \geq a_1$.

The second part of Proposition 5 mirrors the structure of the equilibrium in section 3 (Prop. 1). One difference is that the critical values a_1 and a_2 differ from those in the case

with flexible labor markets because wages are not the same. Wages in the current section are higher, all else being the same, and hence the critical values must be higher in order to compensate the firms for the higher cost.

6.2 Globalization and unemployment

Comparative statics with respect to F can now be carried out. Specifically, I analyze unemployment and industry profit levels when within an industry the number of firms entering the foreign market increases.

Case 1: $a_1 < a'$ (low F, high level of globalization)

In this situation comparative statics are clear cut. In particular, unemployment unambiguously increases when F falls. Unemployment occurs only in those industries in which both firms enter the foreign market ($a \geq a_1$) and is defined by $U = m \cdot \left[\int_{a_1}^{\overline{a}} U_{EE}(a)da\right]$, as there are no industries with only one firm entering the foreign market. Differentiating

with respect to F gives

$$\frac{dU}{dF} = -mU_{EE}(a_1)\frac{da_1}{dF} < 0$$

(unemployment in any given industry is independent of F, see (12)).

Industry profits for those industries are $\Pi = m \cdot \left[\int_{a_1}^{\overline{a}} 2\pi_{EE}(a)da\right]$. The derivative with respect to F is negative, and thus total profits increase with globalization, since the indirect effect via the change of a_1 is zero ($\pi_{EE}(a_1) = 0$). The effect on inequality is straightforward when considering the expected income of workers as measure of workers income. Inequality unambiguously rises with globalization because each worker expects an income of one regardless of sectoral choice. This view focuses on gross incomes because part of workers income are government transfer payments which must be financed through

taxes on either firm owners or workers.

Case 2: $a_1 > a'$ (high F, low level of globalization)

In this situation the overall effects are less clear cut, although the sign of various partial effects can easily be identified. Note that a_2 can be larger or smaller than a'. The (N, N) regime extends for all industries with productivity $a < a_2$. Unemployment in an industry goes up when moving from (N, N), where unemployment is zero, to (E, N) or (N, E), where unemployment is given by (9). Less obvious is the effect when the second firm enters, i.e. a comparison of (9) and (12). On the one hand unemployment tends to be smaller because the probability of unsuccessful entry in an industry with two firms in the foreign market, $(1-q)^2$, is smaller than with one firm, $(1-q)$. On the other hand, the higher success probability of actually serving foreign consumers implies that the marginal cost in the case (E, E) is lower, and hence foreign sales are higher, which in turn draws more workers into the industry. The change in unemployment when the second firms enters is

$$U_{EE} - U_{EN} = \frac{(1-q)\lambda}{a}\left[(1-q)X_d(p^M(c_{EE})) - X_d(p^M(c_{\mathbf{E}N}))\right] < 0, \tag{16}$$

which is negative because $a_1 > a'$ implies $(1-q)\pi^M(w_{EE}/a) < \pi^M(w_{\mathbf{E}N}/a)$ or

$$(1-q)X_d(p^M(c_{EE})) < \left(\frac{p^M(c_{\mathbf{E}N}) - c_{\mathbf{E}N}}{p^M(c_{EE}) - c_{EE}}\right) X_d(p^M(c_{\mathbf{E}N})).$$

The term in brackets on the right hand side is less than one because $c_{EE} < c_{\mathbf{E}N}$ from (14), which proves the (16). The above results are summarized in

Proposition 6. When workers and wages are inflexible in the short run, a rise in the number of firms entering the foreign market due to globalization has the following effects:

a) When $a_1 < a'$ (low F, high level of globalization) unemployment and economy wide profits increase with globalization.

b) When $a_1 \geq a'$ (high F, low level of globalization) unemployment increases (decreases) in those industries in which globalization induces the first (second) firm to enter the foreign market.

Part b of Proposition 6 leaves the net effect of globalization on economy wide unemployment unclear. To gain further insight, unemployment can be written as

$$U = m \cdot \left[\int_{a_1}^{\overline{a}} U_{EE}(a)da + \int_{a_2}^{a_1} U_{EN}(a)da \right], \tag{17}$$

Unemployment depends on the marginal cost of exporting firms which in turn is a function of wages and productivity. Differentiating with respect to fixed cost and rearranging gives

$$\frac{dU}{dF} = m \left[\left[U_{EN}(a_1) - U_{EE}(a_1) \right] \frac{da_1}{dF} - U_{EN}(a_2) \frac{da_2}{dF} \right]. \tag{18}$$

The cutoff levels a_1 and a_2 are both increasing in F. From (16) we know that $U_{EN}(a_1) > U_{EE}(a_1)$, explaining the first term in (18). Numerical simulations are used to shed light on the net effect. Based on the parameter values $\alpha = 10, \beta = 1, \lambda = 1, q = 0.7, M = 1, \underline{a} = 0, \overline{a} = 1$, the critical value a' equals 0.136. In contrast to the simulation used in section 3, the only difference is in the success probability of entering the foreign market. The value $q = 0.7$ rather than 0.5 gives smaller unemployment rates and reasonable results. The cutoff value a_1 rises from 0.14 to 0.958 when F increases from 0.2 to 2.1. The value of a_2 is relatively flat and rises only from 0.138 to 0.229 over the same beachhead cost range, making the last term in (18) relatively small. For this reason the derivative (18) is positive, implying that globalization leads to less unemployment for these particular parameter values (unemployment falls from 21.4% to 7.5% when beachhead cost drop from 2.1 to 0.2).

Taken together with the first part of Prop. 6 unemployment as function of beachhead costs is possibly u-shaped. For low levels of globalization unemployment falls with globalization, while the opposite holds for the case of high globalization levels.

A further interesting result is found when considering a change in the unemployment replacement rate b for given F. An increase in b, that is a more generous welfare state, has an impact on the exporting behavior of firms because it lowers the wage premium and thus the wage paid by firms entering the foreign market, w_{EN} and w_{EE}, respectively (see (8) and (12)). This in turn raises unemployment for two reasons: First, firms in industries that previously entered the foreign market expect more sales when successful because of lower costs and thus hire more workers in the first place (see (7) and (10)), leading to $dU_{EE}/db > 0$ and $dU_{EN}/db > 0$. Second lower wages imply a lower value for the critical cutoff levels, i.e. $da_1/db < 0$ and $da_2/db < 0$. More industries change from not exporting to exporting and form one firm to both firms entering.

Proposition 7. An increase in the unemployment replacement rate b lowers the wage in firms entering the foreign market and raises industry labor supply. For given a_1 and a_2 a more generous welfare state (=higher b) increases unemployment and raises government expenditures more than proportionally.

Formally, this can be seen from differentiating government expenditures

$$G = bU = bm\left[\int_{a_1}^{\overline{a}} U_{EE}(a)da + \int_{a_2}^{a_1} U_{EN}(a)da\right],$$

which gives

$$\begin{aligned}\frac{dG}{db} &= U + bm\left[-(U_{EE}(a_1) - U_{EN}(a_1))\frac{da_1}{db} - U_{EN}(a_2)\frac{da_2}{db}\right. \\ &\quad \left. + \int_{a_1}^{\overline{a}} \frac{dU_{EE}(a)}{db}da + \int_{a_2}^{a_1} \frac{dU_{EN}(a)}{db}da\right] \qquad (19)\end{aligned}$$

An increase in unemployment benefits allows firms to pay workers a smaller risk premium, holding foreign entry cost and other parameters constant. Thus in some industries more firms enter the foreign market (change of a_1) and other industries become exporting industries (change of a_2). For the same reason unemployment is positively related to b. Lower wages mean a smaller monopoly price, more goods demand and an increase in industry labor demand. Thus overall government expenditures increase by more than the initial unemployment level for given cutoff levels, and the effect is reinforced when a_1 changes little relative to a_2.

It is interesting to note that in the presence of inflexible wages and immobile labor workers are no longer identical *ex post*. While all workers receive an expected income of one, the realized income is either higher or lower than one when a worker hires with a firm that enters the foreign market. In the present model workers are assumed to be risk-neutral and thus do not care about the increase in income volatility. Still, consistent with Rodrik (1998) globalization leads to an increase in external risk that makes incomes more volatile.

7 Discussion

This paper has developed a simple model of ex post hetergeneous firms which compete for foreign market rents. Stochastic productivity and foreign market entry cost determine the equilibrium number of firms entering the foreign market. The model is fairly tractable and could be used in applied contexts such as to study free entry of firms or the role of firm effort in relation to firm productivity. In the following I discuss two critical assumptions and some additional implications.

Firms produce a homogenous good and are assumed to compete in price. This leads to Bertrand competition whenever two firms are successful and thus face the same marginal cost. The advantage of this framework is that the analysis is fairly straightforward. A firm is either a monopolist or makes zero profits (except for the case with inflexible labor markets where limit pricing may occur). Assuming quantity competition in an otherwise identical model is likely to generate similar results. Competition between two successful firms is softened unter Cournot type competition, yet profits may not be large enough to justify foreign market entry of one or more than one firm.

The trade pattern was assumed to be simple in order to focus on the effects of foreign market entry risk on domestic labor markets. The foreign country exports to the domestic economy either the numeraire good, which is not subject to stochastic entry success, or another good (say y) that is not produced at home. Thereby globalization has no disruptive effect on the domestic economy via import competition. One way to incorporate the effects of import penetration is to assume that a domestic firm faces potential competition by a foreign firm which itself now faces sunk beachhead cost and uncertain market entry success. If beachhead cost are prohibitive there is no uncertainty for workers in the domestic firms, as the foreign firm never enters. When beachhead costs are sufficiently small, however, domestic workers face the risk of being laid off when the foreign firm enters the market and is successful. Several implications follow. First of all unemployment is to be expected now in those industries that face import competition. Moreover domestic workers will demand a wage premium to compensate them for the risk of unemployment. This makes the domestic firms less competitive and induces them to hire fewer workers in the first place, reducing the pool of workers that are affected by import competition. Future research should address these effects of import penetration when exporting is risky

and costly in more detail.

The model has further implications that go beyond the question raised in the present paper. For example, when workers are risk averse, they would tend to avoid export sectors. To the extent that workers can influence the degree of their own intersectoral mobility, they would try to reduce the risk of being stuck in any particular sector. How could they do this? Intersectoral mobility is often tied to the amount of general skills relative to sector-specific skills. The model therefore suggests that in economies with less flexible labor markets individuals have an incentive to invest more in general rather than specific skills all else equal. Moreover, given that specific skills are often more relevant for innovation we may expect that the risk of foreign market entry may spill over into the degree of innovation in an economy. Whether workers have indeed less sector-specific skills in inflexible labor markets depends also on the incentives of employers who can more easily capture the returns to training when workers cannot depart easily, thereby counteracting the workers' incentive (see Thelen, 2004, for a detailed account of skill formation from a comparative perspective).

The model carries also implications for empirical work. It is clear that the type of labor market institutions play a role for the effects of globalization on employment and inequality. This aspect has been acknowledged by the literature and is controlled for in applied empirical work. What has been less clear perhaps is that the effects can be non-monotonic in beachhead cost under both types of labor market institutions. Moreover, the analysis implies that the causality between openness and government size runs both ways. The replacement rate itself drives exports, which in turn affect unemployment and thus welfare expenditures. This is in contrast to the work (such as Rodrik, 1998) that sees openness or external risk as determinant of the size of government. Future work

should carefully deal with the potential endogeneity of openness and external risk. In addition, this paper emphasizes like some other recent theoretical work that the effects of globalization are not necessarily monotonic in the level of globalization. It would be useful to find out whether such non-monotonicity is also detected in the data, and quantify the turning point.

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Footnotes

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1. The result does not imply a strictly positive correlation between exports and welfare state expenditures because countries may differ in labor market flexibility. For the same reason the model does not contradict the empirical observation that wages of unskilled workers in continental Europe exceed those in the U.S.

2. One could introduce another sector Y, similar in structure to the X sector, which is located in the rest of the world. In that case the home country imports output from Y industries in addition to or instead of importing the numeraire good.

3. Jorgenson and Schröder (2006) analyze the welfare effects of trade policy in the presence of a model with heterogenous fixed cost of exporting.

4. Evidence for market power in foreign markets is provided by the literature on pricing to market. Example for the permanent market power in specific market is given by Goldberg and Knetter (1999) and Requena Silvente (2005).

5. The assumption on preferences of firm owners could be relaxed without much difficulty but at the cost of messy notation in order to account for the number firm owners.

6. When a pure-strategy equilibrium with one firm entering the foreign market exists, there also exists a mixed-strategy equilibrium in which both firms enter with positive probability. In this paper I focus on the pure-strategy equilibrium.

7. Proposition 2b applies to aggregate exports of an industry. Interestingly, the result does not necessarily hold for an individual firm, even if we condition on that firm being an exporter. For example, comparing the case of (E, N) and (E, E) the expected exports of a firm that is entering the foreign market in both situations is unchanged if one assumes that the firms split the market when both successful. Of course, this is the consequence of the linear demand structure which implies that the monopoly output is half of the competitive output.

8. I checked the plausibility of the model by varying parameters and found no abnormal results.

9. Consistent with differential mobility is the difference in variation of regional unemployment rates between U.S. states on the one hand and German Länder on the other hand. The coefficient of variation for the former is 0.24, but 0.36 for the latter (Jan. 2006 data). Also, the generous welfare benefits for unemployed workers in some continental European countries may reduce the incentive to find a new job.

10. An alternative assumption that gives the same outcome is that the exporting firm could set up a separate plant supplying only the dometic market at the same cost as the non-exporting firm. Again, profits in the domestic market are zero. In a previous version of the paper, Janeba (2007) I assumed that the domestic firm has no further competitor in the domestic market and sets a limit price. This assumption makes the analysis more complex without much gain.

11. Note that even if the wage did rise firms would still be Bertrand competitors and profits would be zero for both firms.

Firm 2 / Firm 1	Enter E	Not Enter N
Enter E	$q(1-q)\lambda\pi^M - F$ $q(1-q)\lambda\pi^M - F$	0 $q\lambda\pi^M - F$
Not Enter N	$q\lambda\pi^M - F$ 0	0 0

Table 1 – Firm profits at entry stage (flexible labor market)

Firm 2 / Firm 1	Enter E	Not Enter N
Enter E	$q(1-q)\lambda\pi^{M}(c_{EE}) - F$ $q(1-q)\lambda\pi^{M}(c_{EE}) - F$	0 $q\lambda\pi^{M}(c_{EN}) - F$
Not Enter N	$q\lambda\pi^{M}(c_{EN}) - F$ 0	0 0

Table 2 – Firm profits at entry stage (inflexible labor market)

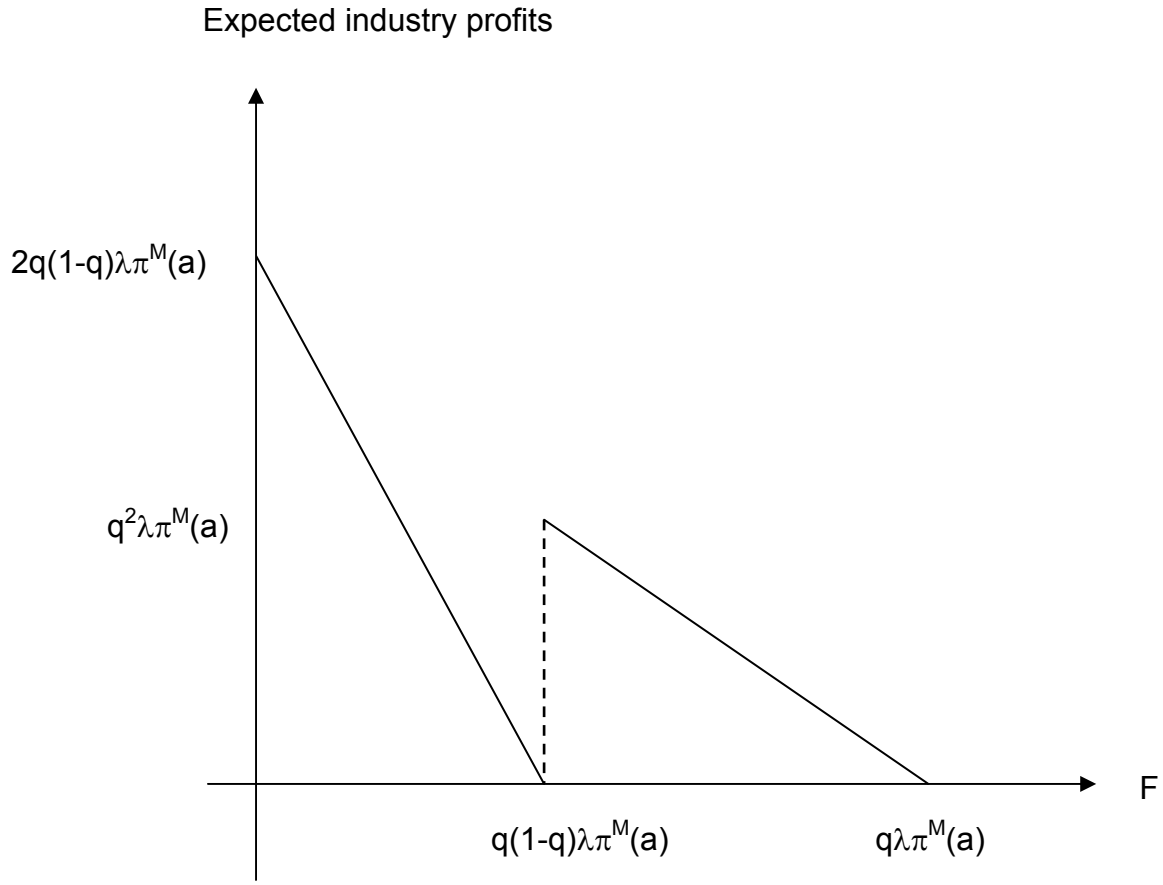

Figure 1 – Expected industry profits for given productivity

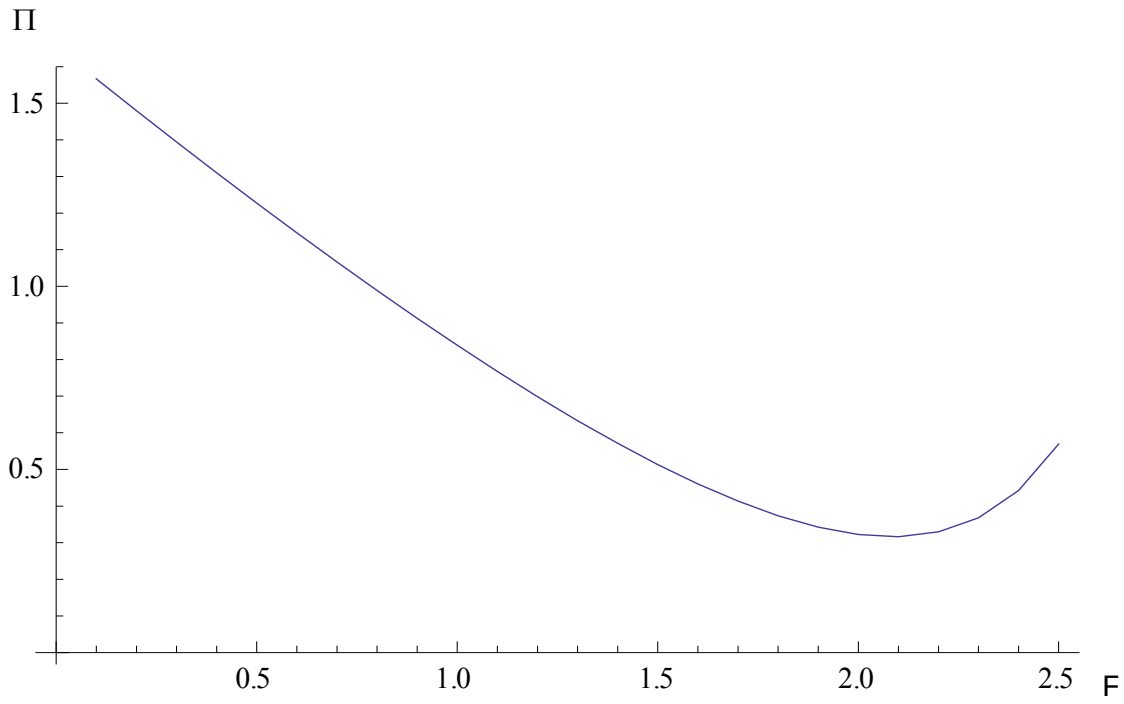

Figure 2 – Total profits as function of beachhead cost F