FDI, Primary Income Flows and Economic Growth

Balazs Zelity*

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Very preliminary version. Do not circulate.

Abstract

Foreign direct investment (FDI) generally has a positive effect on economic growth. However, it is also often accompanied by primary income deficits as foreign-owned firms repatriate their profits. A particularly illustrative example of this phenomenon are the Visegrad 4 (V4) countries (Czech Republic, Hungary, Poland, Slovakia). This paper asks whether FDI can still be beneficial in the presence of profit repatriation with a particular focus on the V4 economies. To answer this question, I build a general equilibrium model that explicitly considers both the costs and the benefits of FDI. I then proceed by calibrating the model to the V4 economies. Counterfactual simulations suggest that the benefits of FDI outweigh the costs for the V4 economies. However, incentivising foreign firms to reinvest more of their profits domestically is, *ceteris paribus*, welfare-improving.

Keywords: FDI, primary income flows, profit repatriation, transition economies.
JEL classification: F21, F36, F40, E60.

*Department of Economics, Wesleyan University, 238 Church St, Middletown, CT 06459, United States. Email: bzelity@wesleyan.edu.

1 Introduction

Foreign direct investment (FDI) is broadly considered a positive contributor to economic growth in the literature (Alfaro et al., 2004; Yao and Wei, 2007). However, an almost mechanical counterpart of FDI is profit outflows. As foreign companies invest in an economy, they often tend to repatriate their profits (Graham et al., 2011; Seabra and Flach, 2005; Akkermans, 2017). The aim of this paper is to analyse the economic effect of FDI in a model that allows for profit repatriation by foreign-owned firms.

The empirical motivation for this paper is based on the case of Visegrd 4 (V4) countries (Czech Republic, Hungary, Poland, Slovakia). These countries have sizable primary income balance (PIB) deficits. The PIB measures a countrys net inflow of earnings from factors of production (compensation of employees and investment income). Large PIB deficits in the V4 countries primarily correspond to investment income outflows. As FIgure 1 shows, the PIB deficit is comparable in size to the trade balance (TB) in these economies. This means its size is large enough to significantly affect the current account balance (CAB) as CAB = TB + PIB + SIB, where SIB is secondary income balance (e.g. transfer payments, grants, foreign aid).

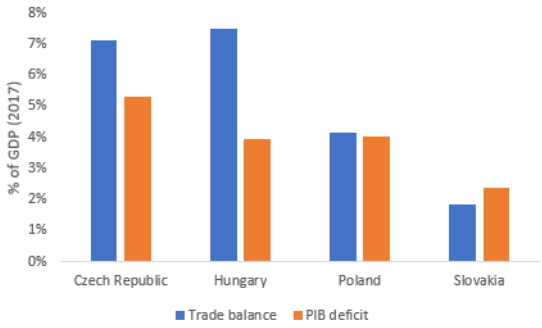


Figure 1: Trade balance and primary income balance in V4 countries

In addition to large PIB deficits, the V4 countries also have a substantial presence of foreign-owned firms, which is the source of the PIB deficits. Figure 2 shows that the share of foreign-controlled firms in total revenue generated by the private sector was hovering around 40-50% in the V4 countries as opposed to 25-30% in other EU economies.

Motivated by these facts, the key research question of this paper is how the positive effects of FDI (as measured by the share of foreign-controlled firms in revenue) interact with the negative effects of profit repatriation (as measured by PIB deficits). To study this question, I build a general equilibrium model with heterogeneous firms in which, on the one hand, foreign-owned firms are more productive and thus have positive macroeconomic effects by decreasing prices, increasing wages, and profits. On the other hand, foreign-owned firms repatriate a share of their profits, which shifts households budget constraint inward creating an adverse macroeconomic effect.

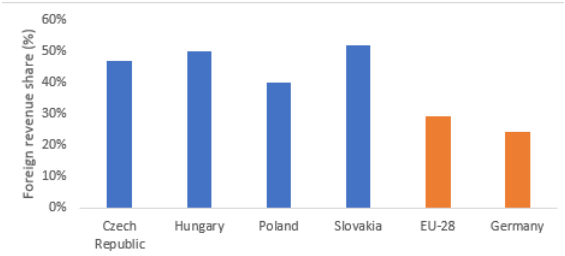


Figure 2: Share of foreign-controlled companies in private sector revenue

The coexistence of a cost and a benefit to having foreign-owned firms in the economy implies that this model can generate a positive, a negative, or a non-linear relationship between the share of foreign-owned firms and aggregate welfare. To discipline the model and to connect it to the data, I calibrate it to the case of the V4 economies to match important variables such as the size of profit outflows or the relative productivity of foreign vs. domestically owned firms.

The goal is to calibrate to model to V4 economies, and then see how exogenously varying the number of foreign-owned firms in the economy affects macroeconomic variables, primarily output and welfare. There are two key findings. First, reducing the number of foreign-owned firms in the V4 economies would on net be detrimental to welfare. Second, the model also suggests that increasing the share of profits that are reinvested in these economies by foreign-owned firms would improve welfare. The combination of these two results gives rise to a policy trade-off: incentivising the domestic re-investment of profits can improve welfare, but could potentially reduce the number of foreign-owned firms present offsetting some of the welfare gains.

2 Model

2.1 Consumers

A representative household maximizes utility by choosing its consumption of each final good variety. There is a continuum of varieties indexed by $i \in [0,1]$. Household income consists of labour income and the profits of domestic firms. Since there is no disutility of labour, $L > 0$ units of labour is inelastically supplied to firms. The household's problem is

$$\max_{c_i \geq 0} \left[\int_0^1 (1-x) c_i^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}} \quad \text{s.t.}$$
$$\int_0^1 w_i \delta_i di L + \Pi_d + \rho \Pi_f \geq (1-x) \int_0^1 p_i c_i di,$$

where c_i is consumption of variety i, $\sigma > 1$ is the elasticity of substitution between varieties, δ is the fraction of workers employed by domestic firms, w_i is the wage rate of firm i, $L > 0$ is the size of the labour force, Π_d and Π_f are the aggregate profits of domestic and foreign firms, ρ is the fraction of profits foreign firms do not repatriate, p_i is the price of variety i, and x is the share of output that's exported.

Each good i is thus produced by a single firm, and the goods are substitutable for consumption (monopolistic competition). Each firm can either be domestic or foreign. Domestic firms keep all their profits in the country, while foreign firms repatriate a share $1-\rho$. Households can be employed by either a domestic or a foreign firm, δ fraction are employed by domestic firms. The spending of households, $(1-x)\int_0^1 p_i c_i di$, is the sum of total production by firms with a fraction x being exported, and it is thus not consumed locally. The assumption of there being exports is primarily a technical one, because if $\rho < 1$, then households wouldn't have enough income to afford to buy all domestic production, hence some production needs to be exported.

Let $w \equiv \int_0^1 w_i \delta_i di$ and $\Pi \equiv \Pi_d + \rho \Pi_f$. Then this household problem gives rise to an inverse demand function of the form

$$p_i = \frac{(wL+\Pi)^{1/\sigma}}{P^{\frac{1-\sigma}{\sigma}}} c_i^{-1/\sigma} (1-x)^{-1/\sigma}, \tag{1}$$

where $P \equiv \left[\int_0^1 p_i^{1-\sigma} di\right]^{\frac{1}{1-\sigma}}$ is an aggregate price index.

2.2 Firms

Each variety's market is a monopoly, and therefore the firms are monopolistically competitive. Firms can be either domestic or foreign, and they also vary by their productivity. Firm i solves the problem

$$\max_{p_i, c_i} p_i c_i - w c_i^{\gamma_i} \text{ s.t. } (1).$$

This cost structure implies a Cobb-Douglas production function as the labour required to produce Y units of output is $L = Y^{\gamma_i}$, hence $Y = L^{1/\gamma_i}$, which is why the assumption is that $\gamma_i > 1$ to make this a decreasing returns to scale production function. It follows from optimisation that the output

(c_i) and price (p_i) of firm i are

$$c_i = \left[\frac{\sigma-1}{\sigma}\frac{(wL+\Pi)^{1/\sigma}}{\gamma_i w_i P^{\frac{1-\sigma}{\sigma}}(1-x)^{1/\sigma}}\right]^{\frac{\sigma}{1+\sigma(\gamma_i-1)}}$$
$$p_i = \left(\frac{wL+\Pi}{1-x}\right)^{\frac{\gamma_i-1}{1+\sigma(\gamma_i-1)}} P^{\frac{(\sigma-1)(\gamma_i-1)}{1+\sigma(\gamma_i-1)}}\left[\frac{\sigma}{\sigma-1}\gamma_i w_i\right]^{\frac{1}{1+\sigma(\gamma_i-1)}}.$$

We take the average foreign firm's price to be the numeraire so that $p_f = 1$. The average foreign firm is the one whose γ_i is equal to the average of the foreign firms' γ_i distribution, denoted γ_f. This means that we can use the general expression for p_i, evaluate it for the average foreign firm ($i = f$), set it equal to 1 and solve for the aggregate price index as

$$P = \left(\frac{wL+\Pi}{1-x}\right)^{\frac{1}{1-\sigma}}\left(\frac{\sigma-1}{\sigma}\frac{1}{\gamma_f w_f}\right)^{\frac{1}{(\sigma-1)(\gamma_f-1)}}. \tag{2}$$

To get the aggregate profits Π_d and Π_f, individual firm profits need to be calculated first as,

$$\begin{aligned}\pi_i &= p_i c_i - w_i c_i^{\gamma_i} \\ &= \left[\frac{\sigma-1}{\sigma}\frac{1}{\gamma_f w_f}\right]^{\frac{\gamma_i}{[1+\sigma(\gamma_i-1)][\gamma_f-1]}}\left[\left(\frac{\sigma-1}{\sigma}\frac{1}{\gamma_i w_i}\right)^{\frac{\sigma-1}{1+\sigma(\gamma_i-1)}} - w_i\left(\frac{\sigma-1}{\sigma}\frac{1}{\gamma_i w_i}\right)^{\frac{\sigma\gamma_i}{1+\sigma(\gamma_i-1)}}\right].\end{aligned}$$

Aggregate profits are then given by merely integrating over these. In particular, a fraction $\mu \in (0,1)$ of firms are domestic and within the domestic category there is a distribution of γ_i with weights f_i^d such that $\int_0^1 f_i^d di = 1$. In other words, the domestic firms themselves are not identical, but there are more productive (lower γ_i) and less productive (higher γ_i) among them with the distribution being given by f_i^d. A similar situation holds for foreign firms that take up a fraction $1-\mu$ of all firms with γ_i distribution weights f_i^f such that $\int_0^1 f_i^f di = 1$. This means that

$$\Pi_d = \mu\int_{i\in D}\pi_i f_i^d di$$
$$\Pi_f = (1-\mu)\int_{i\in F}\pi_i f_i^f di,$$

where D and F are the set of domestic and foreign firms.

2.3 Equilibrium

First, note that the aggregate price index also has to satisfy $P = \left[\int_0^1 p_i^{1-\sigma} di\right]^{\frac{1}{1-\sigma}}$. This equation can be set equal to the other expression for P in (2), and can be solved for the fraction of output that is

exported in equilibrium, x. This will be

$$x = 1 - \frac{(wL+\Pi)\left[\frac{\sigma}{\sigma-1}\gamma_f w_f\right]^{\frac{1}{\gamma_f-1}}}{\mu\int_{i\in D} f_i^d\left[\frac{\sigma}{\sigma-1}\gamma_f w_f\right]^{\frac{(\sigma-1)(\gamma_i-1)}{(\gamma_f-1)[1+\sigma(\gamma_i-1)]}}\left[\frac{\sigma-1}{\sigma}\frac{1}{\gamma_i w_i}\right]^{\frac{\sigma-1}{1+\sigma(\gamma_i-1)}}di + (1-\mu)\int_{i\in F} f_i^f\left[\frac{\sigma}{\sigma-1}\gamma_f w_f\right]^{\frac{(\sigma-1)(\gamma_i-1)}{(\gamma_f-1)[1+\sigma(\gamma_i-1)]}}\left[\frac{\sigma-1}{\sigma}\frac{1}{\gamma_i w}\right.}$$

Finally, the labour markets need to clear. For domestic firms, this means $\mu f_i^d c_i^{\gamma_i} = \delta g_i^d L$ for all firms, and for foreign firms $(1-\mu) f_i^f c_i^{\gamma_i} = (1-\delta) g_i^f L$. Plugging in for c_i in these two equations, the equilibrium wage rates for domestic and foreign firms, respectively, can be derived as

$$w_i^d = \left(\frac{\mu f_i^d}{\delta g_i^d L}\right)^{\frac{1+\sigma(\gamma_i-1}{\sigma\gamma_i}}\left(\frac{(1-\delta)g_f^f L}{(1-\mu)f_f^f}\right)^{\frac{1}{\sigma\gamma_f}}\frac{\sigma-1}{\sigma}\frac{1}{\gamma_i}$$

$$w_i^f = \left(\frac{(1-\mu)f_i^f}{(1-\delta)g_i^f L}\right)^{\frac{1+\sigma(\gamma_i-1}{\sigma\gamma_i}}\left(\frac{(1-\delta)g_f^f L}{(1-\mu)f_f^f}\right)^{\frac{1}{\sigma\gamma_f}}\frac{\sigma-1}{\sigma}\frac{1}{\gamma_i},$$

where the variables with f subscripts (g_f^f, f_f^f, γ_f) refer to the foreign numeraire firm's attributes.

3 Calibration

While the model can be explicitly solved, its solution is quite complex and can exhibit a large number of qualitative behaviours. In order to proceed, I solve the model at specific parameter values matching the V4 economies, and then evaluate its policy implications numerically. This section explains how the numerical parameter values are obtained.

The model's parameters are split into three groups: calibrated parameters, observable parameters, and normalized parameters. Calibrated parameters are picked so that the model reproduces an empirically observable data point at those parameter values. Observable parameters can be directly inferred from data. Normalized parameters are exogenously picked.

3.1 Calibrated parameters

The parameters that are calibrated are f_i^d, f_i^f and σ. Their values are varied so that the model comes as close as possible to matching the aggregate revenue distribution of firms by size, the profit per employee of foreign firms relative to domestic firms, and the share of profits in GDP.

To implement the calibration, let us call the vector of parameters that need to be calibrated θ,

and the vector of data points to be matched $\vec{m}$. The estimate of θ is

$$\hat{\theta} = \arg\min_{\theta}(\vec{m} - f(\theta))'\vec{W}(\vec{m} - f(\theta)),$$

where $\vec{m}$ and $f(\theta)$ are $k \times 1$ vectors, and k is the number of data points to be matched. $\vec{W}$ is a $k \times k$ weighting matrix whose diagonal elements are set to $1/m_i$ in row i.

In order to estimate the weights of the domestic and foreign γ_i distributions (f_i^d, f_i^f), the distribution is discretised and split into five groups. This is because the data about revenue distribution also comes in five groups. These groups are defined as follows:

- Group 1 includes firms with $\gamma_i \in (1, 1.25]$ implying a Cobb-Douglas exponent in $[0.8, 1)$,
- Group 2 includes firms with $\gamma_i \in (1.25, 1.67]$ implying a Cobb-Douglas exponent in $[0.6, 0.8)$,
- Group 3 includes firms with $\gamma_i \in (1.67, 2.50]$ implying a Cobb-Douglas exponent in $[0.4, 0.6)$,
- Group 4 includes firms with $\gamma_i \in (2.50, 5.00]$ implying a Cobb-Douglas exponent in $[0.2, 0.4)$,
- Group 5 includes firms with $\gamma_i \in (5.00, 100]$ implying a Cobb-Douglas exponent in $[0.01, 0.2)$.

The shares of firms in each of these groups is calibrated to match the aggregate revenue distribution by firm size. The size of Groups 2-5 is identical for domestic and foreign firms, labelled s_2, s_3, s_4, s_5. The size of Group 1 is allowed to vary between domestic and foreign firms, labelled s_1^d, s_1^f.

Given this, the parameters to be estimated are

$$\theta' = \begin{bmatrix} s_1^d & s_1^f & s_2 & s_3 & s_4 & \sigma \end{bmatrix}.$$

The data points to be matched with each of these parameters are

- the share in revenue of firms employing 1-9 people (targeted with s_1^d),
- the profit per employee of foreign firms relative to domestic firms (targeted with s_1^f),
- the share in revenue of firms employing 10-19 people (targeted with s_2),
- the share in revenue of firms employing 20-49 people (targeted with s_3),
- the share in revenue of firms employing 50-249 people (targeted with s_4),
- total profits as a percent of GDP (σ).

The exact calibrated values of these parameters is presented in Table B.1. Further, Figures A.1-A.2 show that the model does quite well in matching the targeted data points for all four countries.

3.2 Observable parameters

Some parameters are readily observable in the data. These are:

- μ, which is the share of domestic firms in total revenue (from Eurostat);
- ρ, which is the fraction of foreign firms' profits that is reinvested (from the IMF);
- δ, which is the share of domestic firms in total employment (from Eurostat);
- g_i^d, g_i^f, which represent the employment distribution (from the OECD).

While the first three are straightforward, the employment distribution requires further explanation. The available data from the OECD gives the share of firms in total employment by firm size (e.g. the share of firms with 1-9 employees in total employment). The parameters g_i^d and g_i^f are picked so as to exactly reproduce this distribution. This is done by once again splitting the firms up into five groups, and therefore having only five g_i^d and g_i^f parameters. These are then set so as to replicate the data. The caveat is that there are no data on employment distribution by ownership. On the assumption that foreign firms are most likely bigger, for foreign firms I scale the share of the largest firms up and the share of the smallest firms down. The domestic firm shares are then adjusted to ensure that the aggregate employment distribution matches the data.

Let the aggregate shares of employment by firm size be g_1, g_2, g_3, g_4, g_5. That is, e.g. firms of size 1-9 employees employ g_1 percentage of the total employed population, firms of size 10-19 people employ g_2 percentage, etc. Then in order to make foreign firms relatively larger than domestic firms, I let $g_1^f = (1/a_2)g_1, g_2^f = (1/a_1)g_2, g_4^f = a_1 g_4, g_5^f = a_2 g_5$ for $a_1, a_2 > 1$, and g_3 will be the remaining share. To ensure that on aggregate, employment shares are still consistent with the observed data, I let $g_i^d = \frac{g_i - (1-\delta)g_i^f}{\delta}$, which implies $\delta g_i^d + (1-\delta)g_i^f = g_i$, as desired.

The list of observable parameters is shown in Table B.2. In addition, Figure A.3 verifies that the choices for g_i^d and g_i^f indeed perfectly reproduce the observed employment distributions.

3.3 Normalised parameters

The remaining parameters (L, a_1, a_2) are picked exogenously without guidance from the data. In addition to the three parameters listed, while the model technically has a continuum firms, the number of firms in the numerical solution needs to be discretised. This is the last normalised parameter. The values of these parameters are listed in Table B.3.

4 Results

The results are presented in three main sections. First, a comparative statics analysis is carried out by examining the macroeconomic impact of having a different number of foreign-owned firms (μ) and different amounts of reinvested profits (ρ). This section contains the core results of the paper. Second, I examine what variables exactly drive the core results. Finally, a sensitivity analysis is carried out that sheds more light on robustness and under what conditions the core results may break down.

4.1 Comparative statics

Of most interest to answer the key research question of this paper is the results of a comparative statics analysis with respect to μ and ρ. This analysis shows what would happen to output and welfare if each of the countries were to have more or fewer foreign-owned firms (by varying μ), or if the countries could incentivise firms to reinvest more or less of their profits (by varying ρ).

Figure A.4 shows the result for μ. It is apparent that in all four countries welfare (as measured by utility) and output are both decreasing in the share of domestically-owned firms. The implication of this result is that, while there is a cost and a benefit to having more foreign-owned firms (as will become clear in Section 4.2), on net the benefit outweighs the cost for the particular case of the V4 countries. In addition, as it is discussed in more detail in Section 4.3, one of the main reasons for this result is that foreign firms are significantly more productive than domestic ones in these countries. This is also illustrated in Figure A.2a.

Figure A.5 reproduces the same figure, but plotting the relative (percentage) impact of changing μ instead of its absolute impact. This allows for more convenient interpretation and comparison across countries. As it can be seen in this figure, the negative effect of having more domestically-owned firms is much higher for Hungary and Slovakia than for the Czech Republic and Poland.

Moving on to the comparative statics with respect to ρ, Figures A.6-A.7 show the results in absolute and relative terms, respectively. Changing ρ has no effect whatsoever on output. This is because if ρ is lower, more output has to be exported, and the model implicitly assumes that firms can sell exported output at the prevailing domestic prices. Therefore, there is no incentive to change production decisions just because ρ changes. Welfare, on the other hand, is significantly affected by changing ρ. The reason for this is that in equilibrium the fraction of output exported has to be equal to the fraction of profits repatriated ($x = (1-\rho)\Pi_f/Y$), because this is the "missing" income that cannot be used domestically to purchase output. Since utility is given by $U = (1-x)\left[\int_0^1 c_i^{\frac{\sigma-1}{\sigma}} di\right]^{\frac{\sigma}{\sigma-1}}$, it is apparent that increasing ρ will have a positive effect on welfare. Intuitively,

more profits are reinvested in the country, so domestic incomes are higher as the budget constraint shifts outward, and this allows domestic households to consume more.

The relative quantitative effects of changing ρ vary among the four countries. Countries where profit reinvestment rates are currently low (especially Slovakia but also the Czech Republic) would see greater relative benefits from increasing ρ than countries where current reinvestment rates are higher.

Comparing the relative magnitudes of the results for μ and ρ is also interesting. For instance, Poland could attain a roughly 4% welfare gain by increasing the share of reinvested profits from around 45% to around 65%. However, if this policy were to result in a drop in the share of foreign-owned firms from the current 38% to roughly 15%, then the gains would be eradicated. It is beyond the scope of this paper to investigate how policies incentivising profit reinvestment rates affect the willingness of foreign-owned firms to locate to and stay in a country. But given the trade-off identified here between these two policy parameters, this is an interesting avenue for future research.

4.2 Drivers behind main results

To illustrate what exactly drives the negative effect of μ on welfare and output, Figure A.8 illustrates how household income and its two components (labour income and profit income) vary as μ changes. This graph clearly shows the trade-off that arises from having more foreign-owned firms: labour income increases but profit income decreases. The quantitative net effect on total income is positive for all four countries. That is, labour income increases by more than profit income decreases by if there are more foreign-owned firms. Labour income is higher because foreign firms are more productive and can pay more to the same workers. Profit income is lower because foreign firms reinvest less of their profits domestically than do domestic firms.

In addition to the effect on household income, having more foreign-owned firms also affects the aggregate price level. This is shown in Figure A.9. Due to the higher productivity of foreign-owned firms, having more of these firms reduces the aggregate price index (P). This allows domestic households to purchase more goods and services, so this further improves welfare, in addition to the positive effect of rising labour income.

Figures A.10-A.11 show how income and prices vary when ρ is changed. The effect of ρ is much simpler than that of μ. Since welfare is only affected through the fact that more profits are reinvested domestically, and since production decisions are unchanged, the only thing that changes is the profit income of households. More reinvested profits increase domestic profit income without

affecting labour income or domestic prices. This is what drives the positive relationship between ρ and welfare.

4.3 Sensitivity analysis

Finally, I examine how sensitive the results are to parameter choices. Figures A.12-A.17 illustrate that perturbing the calibrated parameters by $\pm 25\%$ does not significantly affect the qualitative or quantitative conclusions of the comparative statics analysis with respect to μ. Recall that what is important in these graphs is the slopes of the lines, not their levels. Out of the five calibrated parameters, the model appears most sensitive to the value σ. A lower σ signifies higher firm profitability (for both domestic and foreign firms). Higher profitability raises the importance of profits in household income, thus making the cost of having more foreign-owned firms higher, and consequently flattening the μ/welfare curve. Nevertheless, the effect is still quantitatively small for the 25% perturbations.

Figure A.18 shows how the foreign firms' size distribution parameters (a_1, a_2) affect the comparative statics results with respect to μ. Perturbing these parameters by 25% is the only one that has a quantitatively large effect on the core results. In fact, even the qualitative results can change: for the Czech Republic and Poland, having smaller foreign firms than in the baseline actually makes welfare increasing in the share of domestic firms. This is because smaller firms in the model are less productive, so this parameter perturbation reduces the profit per employee of foreign firms relative to domestic ones. Unfortunately, to date I have found no data that would allow me to pin down the foreign firm size distribution more accurately, so this is the biggest weakness of the paper. However, at the same time, Figure A.18 illustrates that the model can produce a qualitatively different behaviour from the one observed in the baseline calibrations: it is indeed possible in this model for welfare to be decreasing in the share of foreign-owned firms.

Figure A.19 shows the effects of perturbing the share of profits reinvested, ρ. The quantitative effect of this perturbation is rather small for Hungary and Slovakia. For the Czech Republic and Poland, it is a bit more noticeable that if a lower amount of profits are reinvested, then adding more foreign-owned firms to the economy is less beneficial. This makes sense as a lower ρ strengthens the cost of having more foreign-owned firms, as each additional foreign-owned firm will reduce domestic households' aggregate profit income by more.

Moving to the same sensitivity analysis of the comparative statics with respect to ρ, Figures A.20-A.25 show that perturbing the five calibrated parameters has little quantitative and no qualitative effect on these results. FIgure A.26 shows that the ρ comparative statics are not too sensitive to the foreign size distribution either. There is a weak effect, however, indicating that if foreign

firms are larger (more productive), then the ρ/welfare curve becomes steeper. This is because with more productive foreign firms, there is more welfare gain from one additional foreign-owned firm if the fraction of reinvested profits are higher.

To conclude the sensitivity analysis, Figure A.27 shows what happens to the ρ/welfare curve if the share of domestic firms (μ) varies. More foreign firms steepen the curve indicating that there are more gains to be had from increasing the share of profits reinvested. The intuition is that in this case foreign-owned firms make up a larger fraction of the economy, so their profits are a more important component of household income. Hence, raising the fraction they reinvest domestically has a stronger positive effect on welfare.

5 Conclusion

This paper investigated whether a heavy reliance on foreign-owned firms in an economy can be detrimental to aggregate welfare and output if a large fraction of profits are repatriated. It focused on the case of the V4 countries, which offer a particularly egregious example of this situation. There are two key findings. First, a calibration of a model that explicitly allows for both the costs and the benefits of having foreign-owned firms in an economy implies that reducing the number of foreign-owned firms in the V4 economies would on net be detrimental to welfare. Second, the same model also suggests that increasing the share of profits that are reinvested in these economies by foreign-owned firms would improve welfare. The combination of these two results gives rise to a policy trade-off: incentivising the domestic re-investment of profits can improve welfare, but could potentially reduce the number of foreign-owned firms present offsetting some of the welfare gains.

References

Akkermans, D. (2017). Net profit flow per country from 1980 to 2009: The long-term effects of foreign direct investment. *PLoS One*, 12(6).

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., and Sayek, S. (2004). Fdi and economic growth: the role of local financial markets. *Journal of International Economics*, 64(1):89–112.

Graham, J., Hanlon, M., and Shevlin, T. (2011). Real effects of accounting rules: Evidence from multinational firms investment location and profit repatriation decisions. *Journal of Accounting Research*, 49(1):137–85.

Seabra, F. and Flach, L. (2005). Foreign direct investment and profit outflows: a causality analysis for the brazilian economy. *Economics Bulletin*, 6(1):1–15.

Yao, S. and Wei, K. (2007). Economic growth in the presence of FDI: The perspective of newly industrialising economies. *Journal of Comparative Economics*, 35(1):211–34.

A Figures

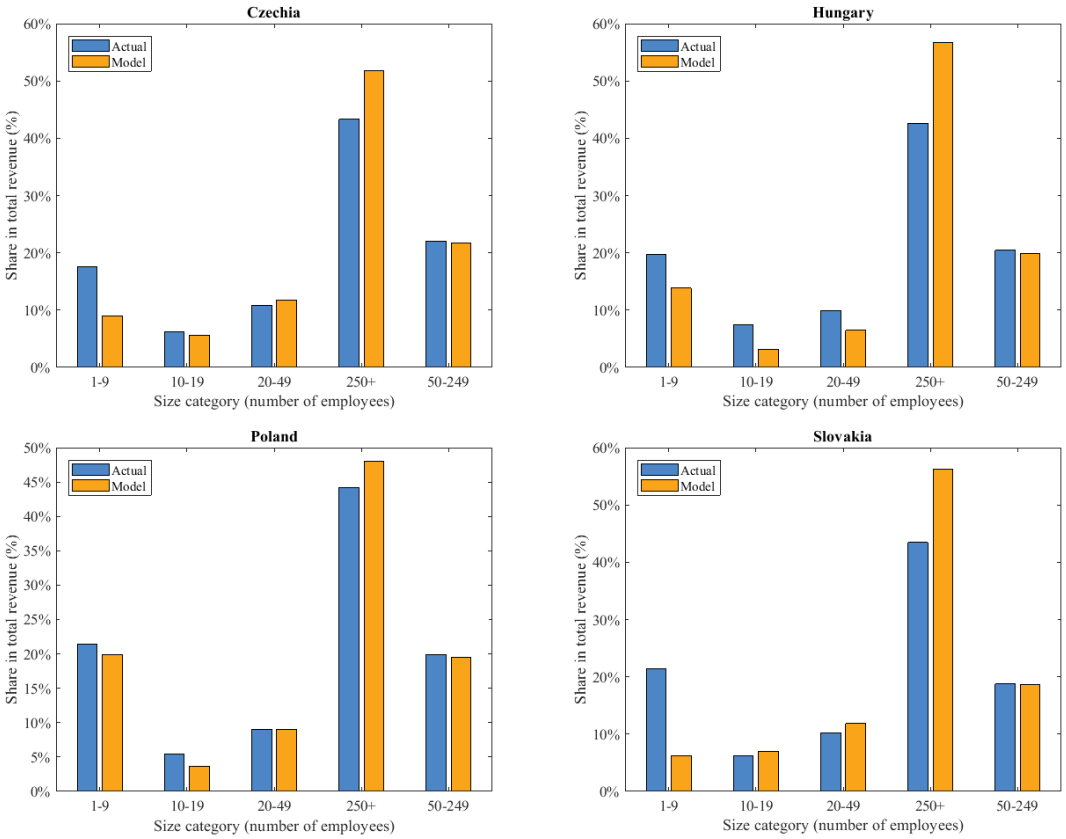
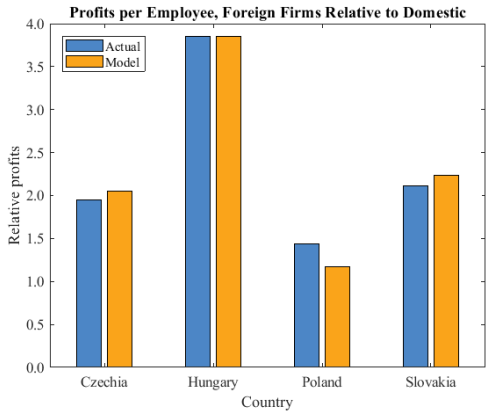
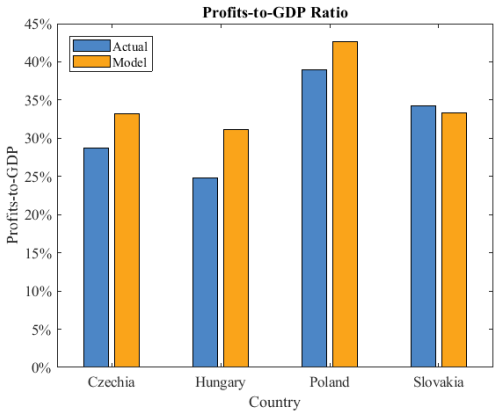


Figure A.1: Actual and modelled revenue distribution by firm size for each country



(a) Relative profit per employee



(b) Profit-to-GDP ratio

Figure A.2: Actual and modelled profitability indicators

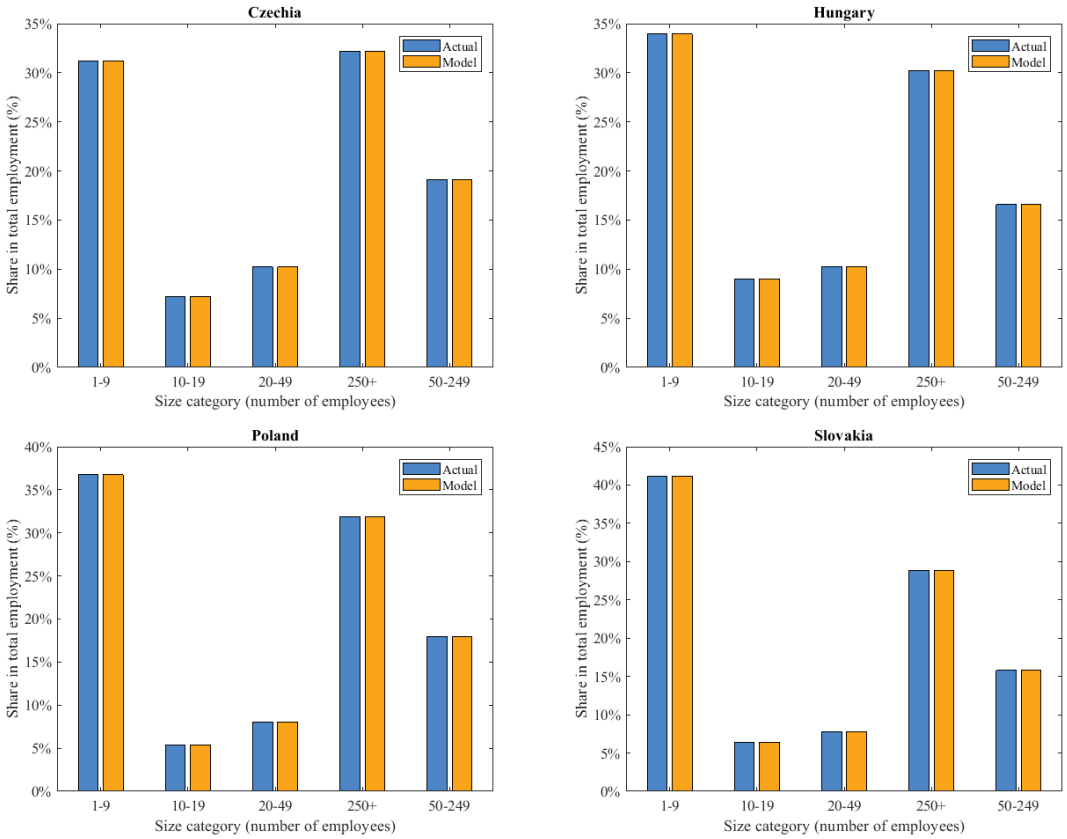


Figure A.3: Actual and modelled employment distribution by firm size for each country

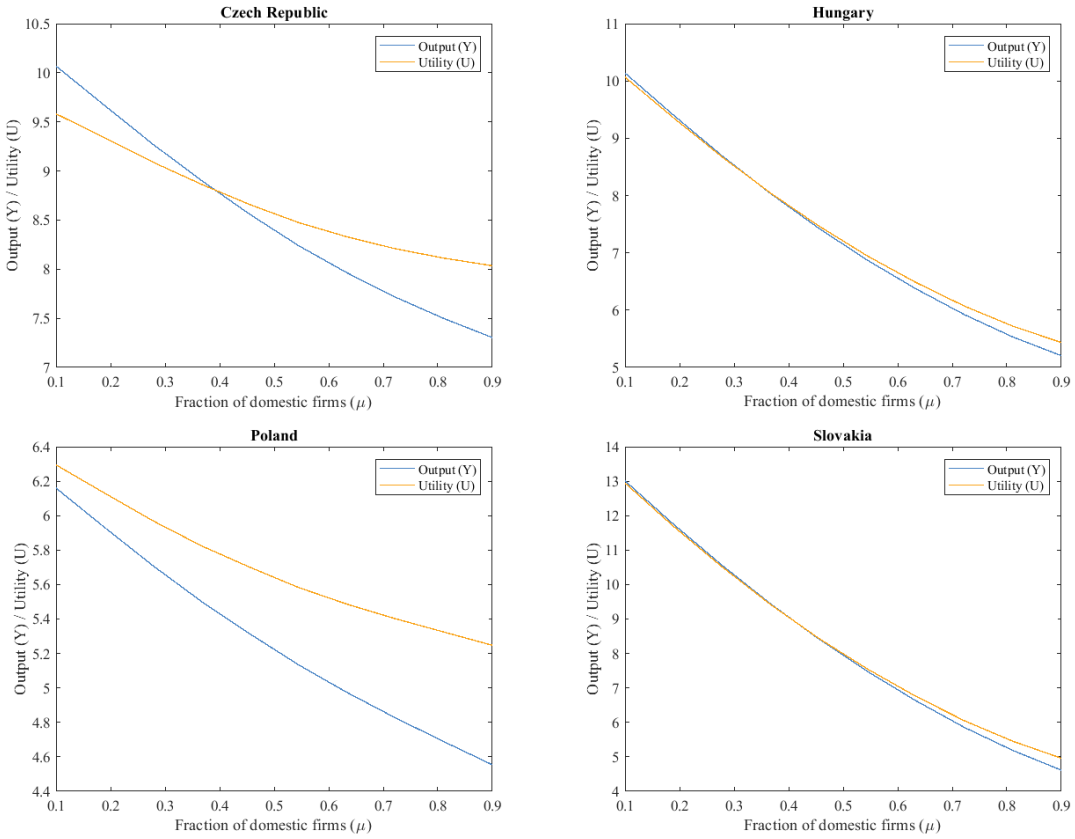


Figure A.4: The effect of changing the share of foreign-owned firms on output and welfare

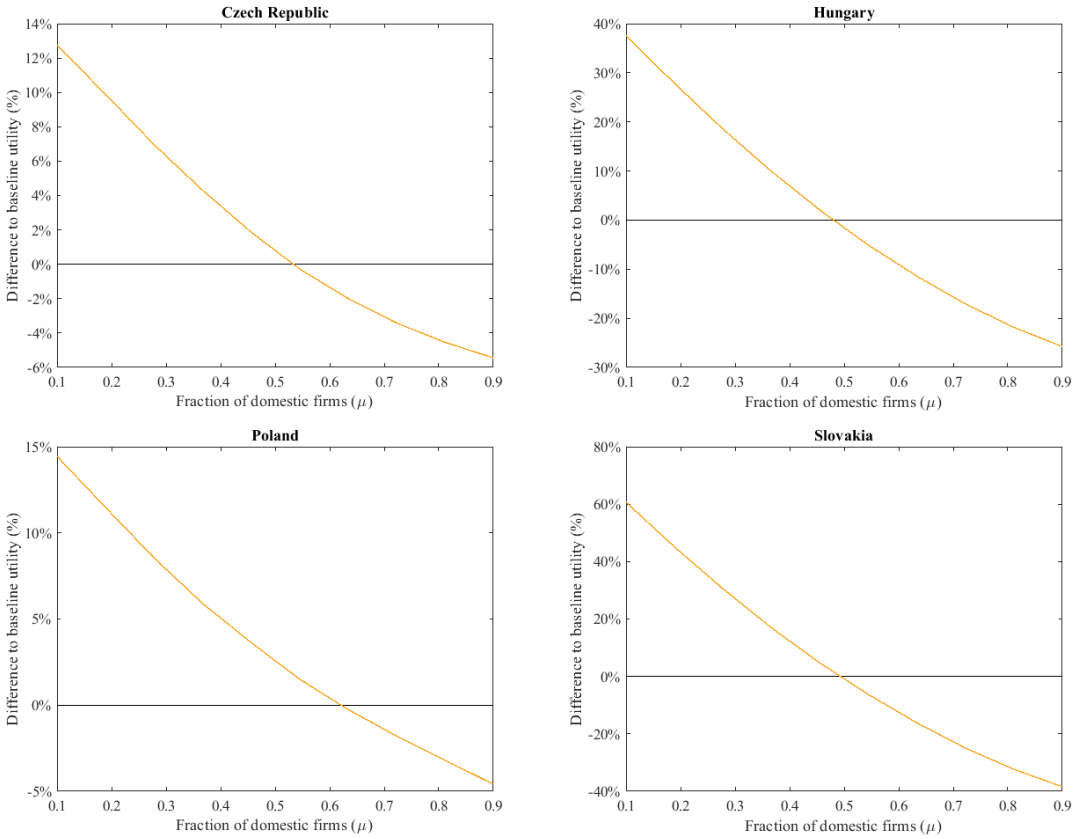


Figure A.5: The relative effect of changing the share of foreign-owned firms on output and welfare

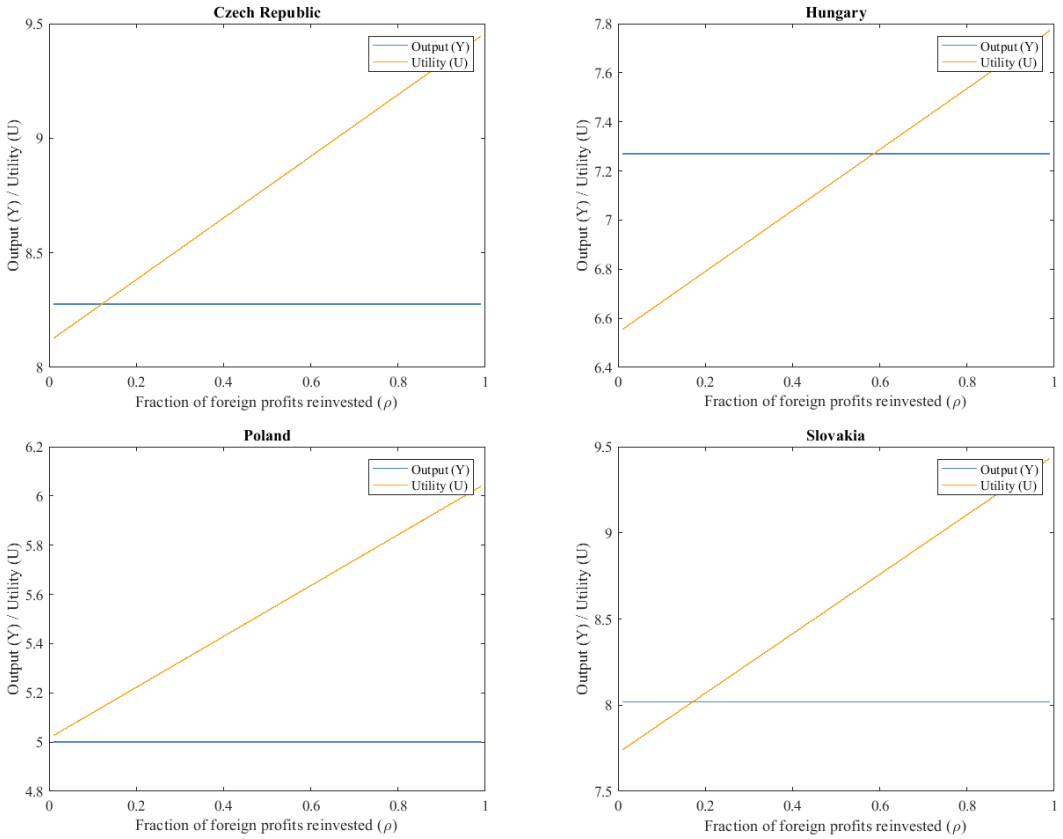


Figure A.6: The effect of changing the share of reinvested profits on output and welfare

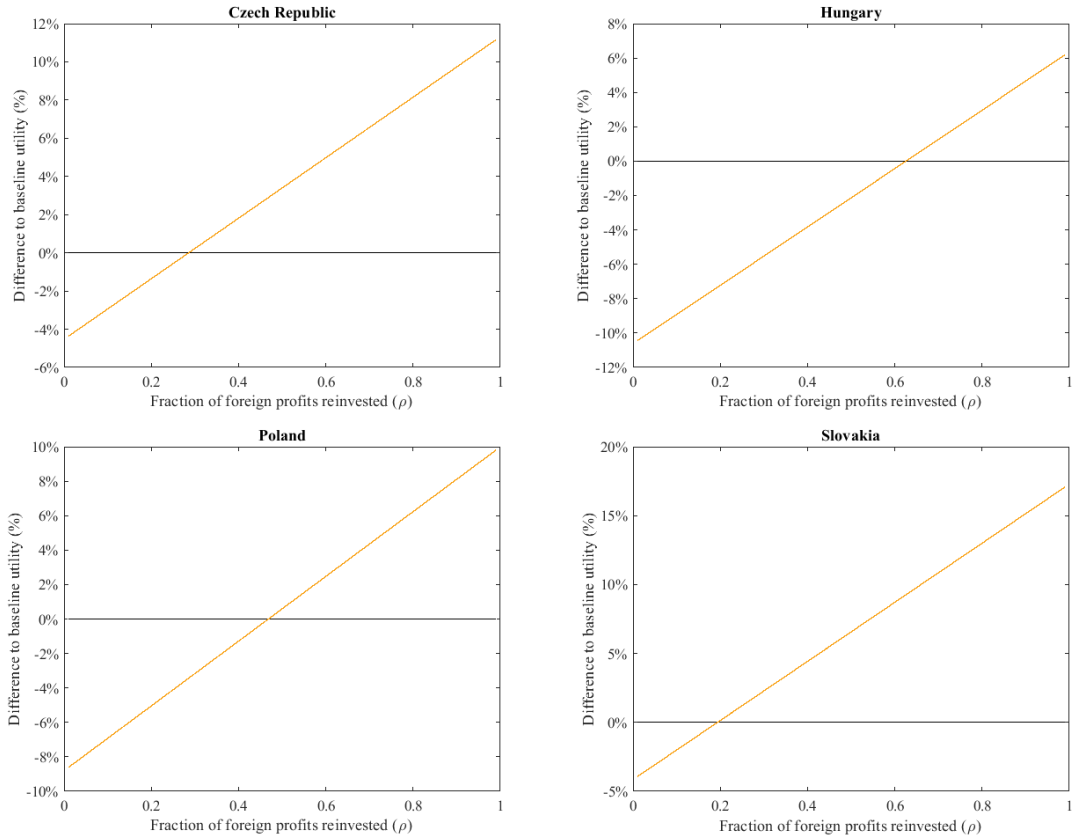


Figure A.7: The relative effect of changing the share of reinvested profits on output and welfare

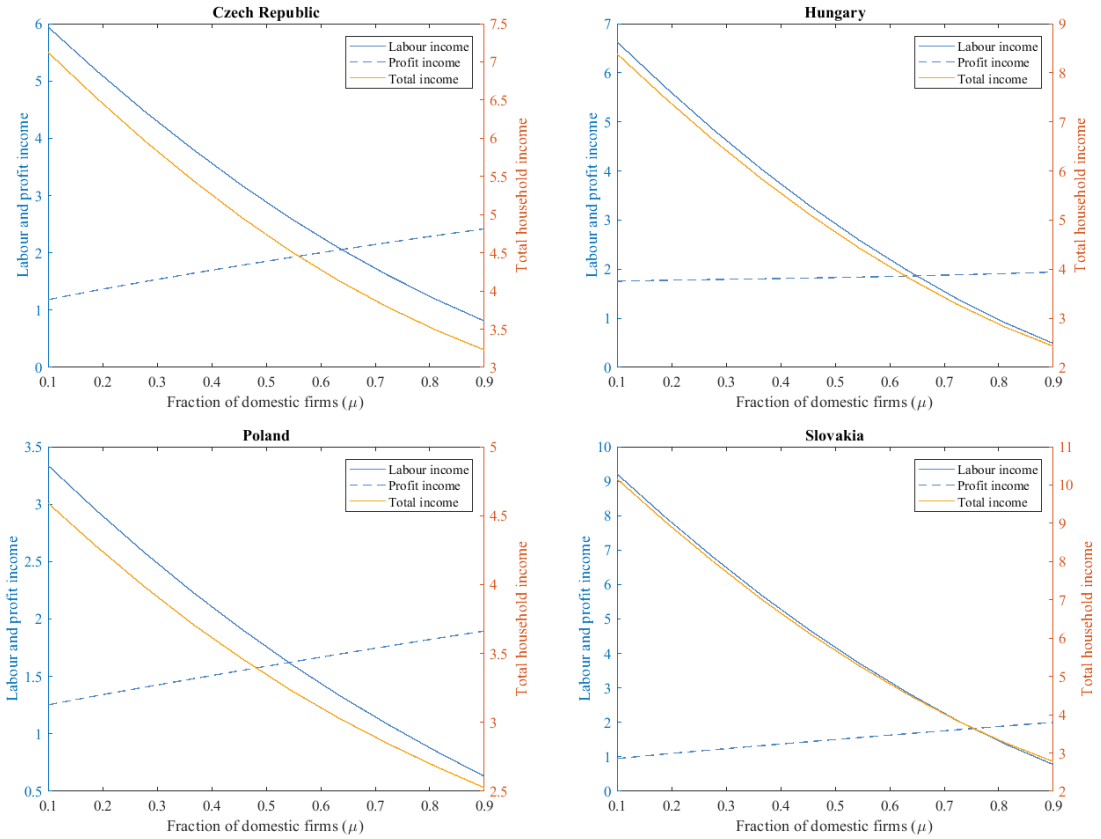


Figure A.8: The effect of changing the share of foreign-owned firms on household income

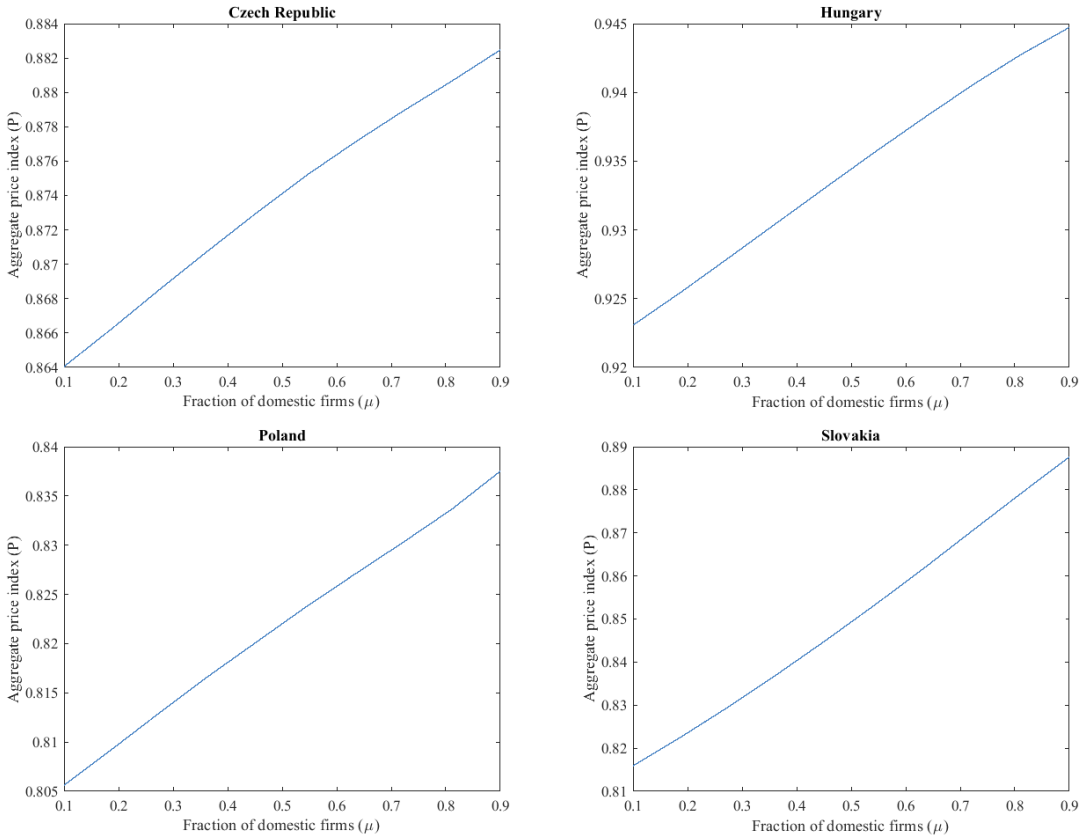


Figure A.9: The effect of changing the share of foreign-owned firms on prices

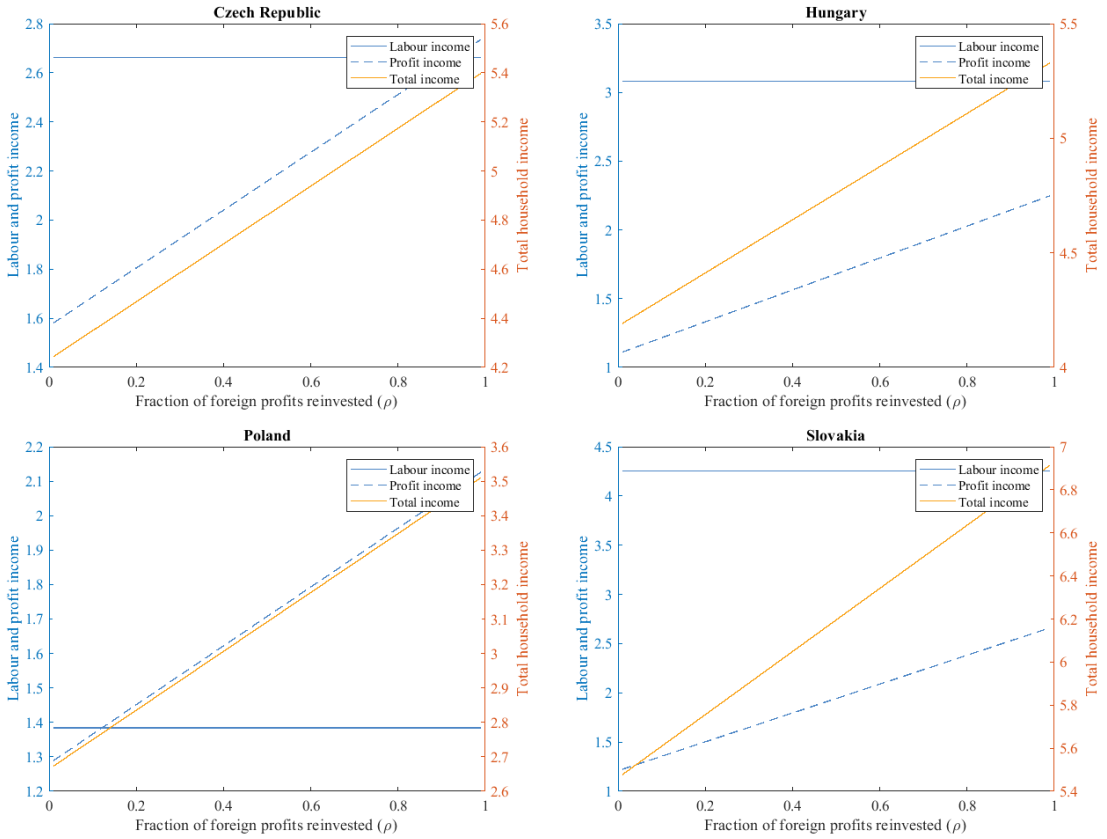


Figure A.10: The effect of changing the share of foreign-owned firms on household income

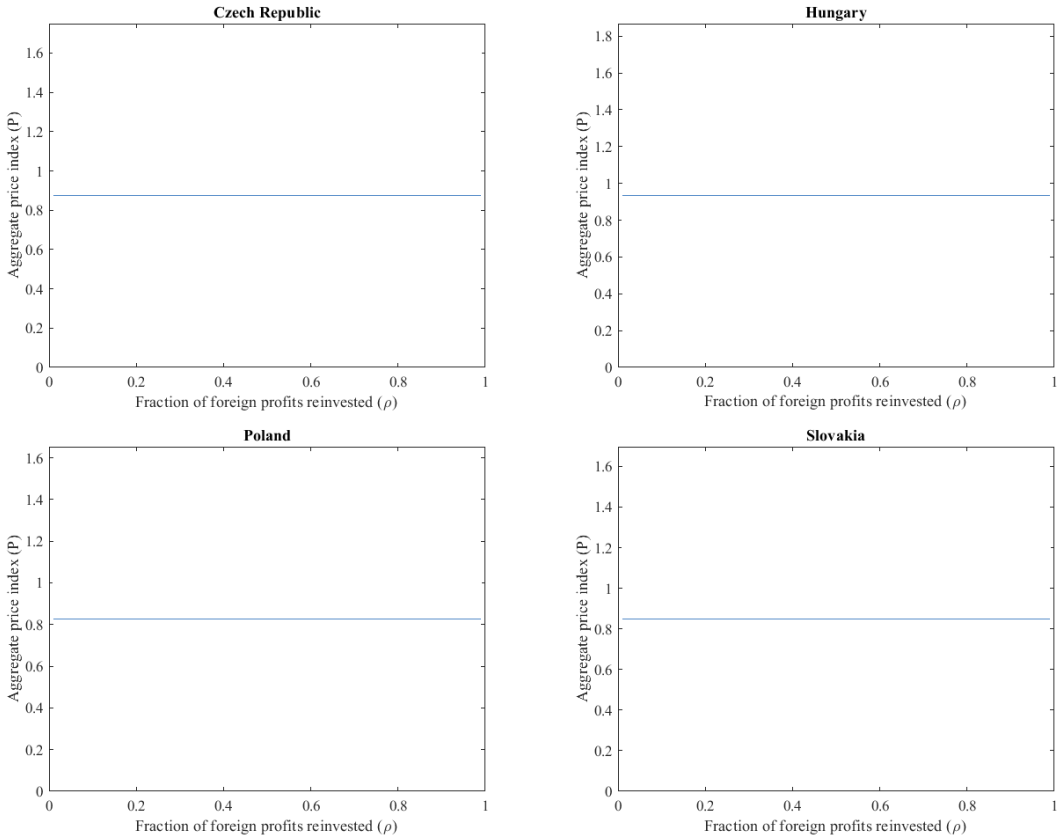


Figure A.11: The effect of changing the share of foreign-owned firms on prices

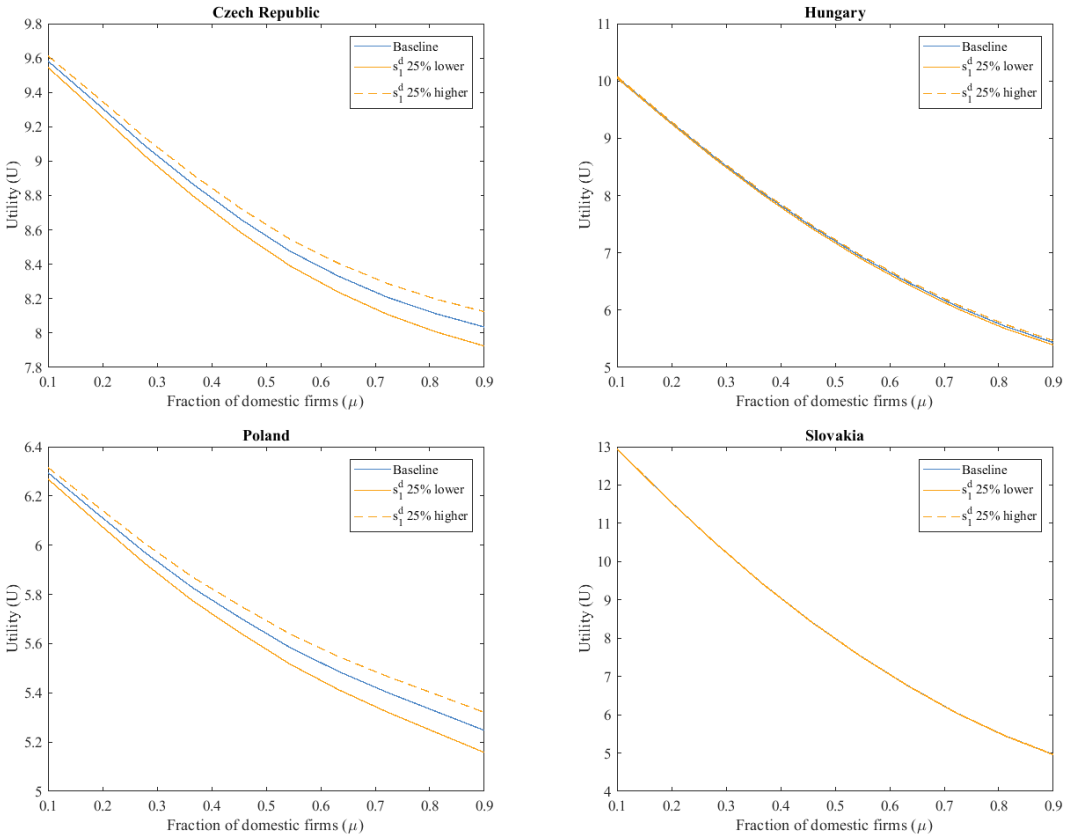


Figure A.12: Sensitivity of μ/welfare curve to s_1^d

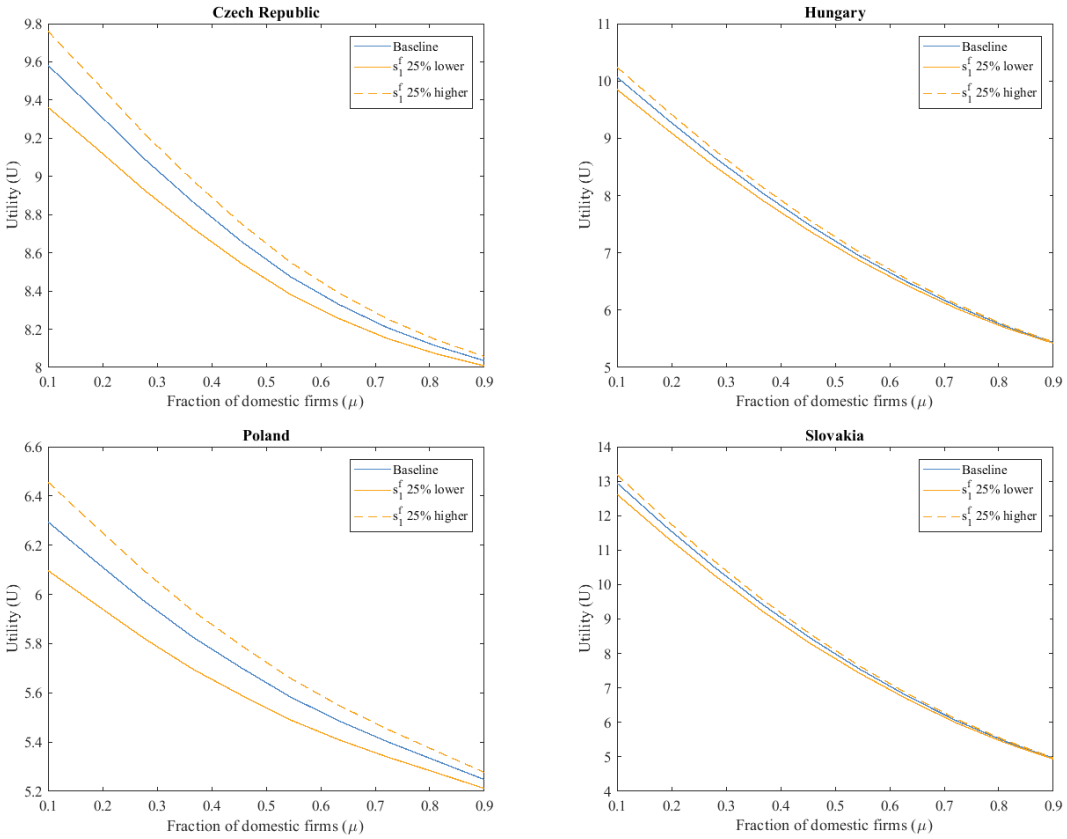


Figure A.13: Sensitivity of μ/welfare curve to s_1^f

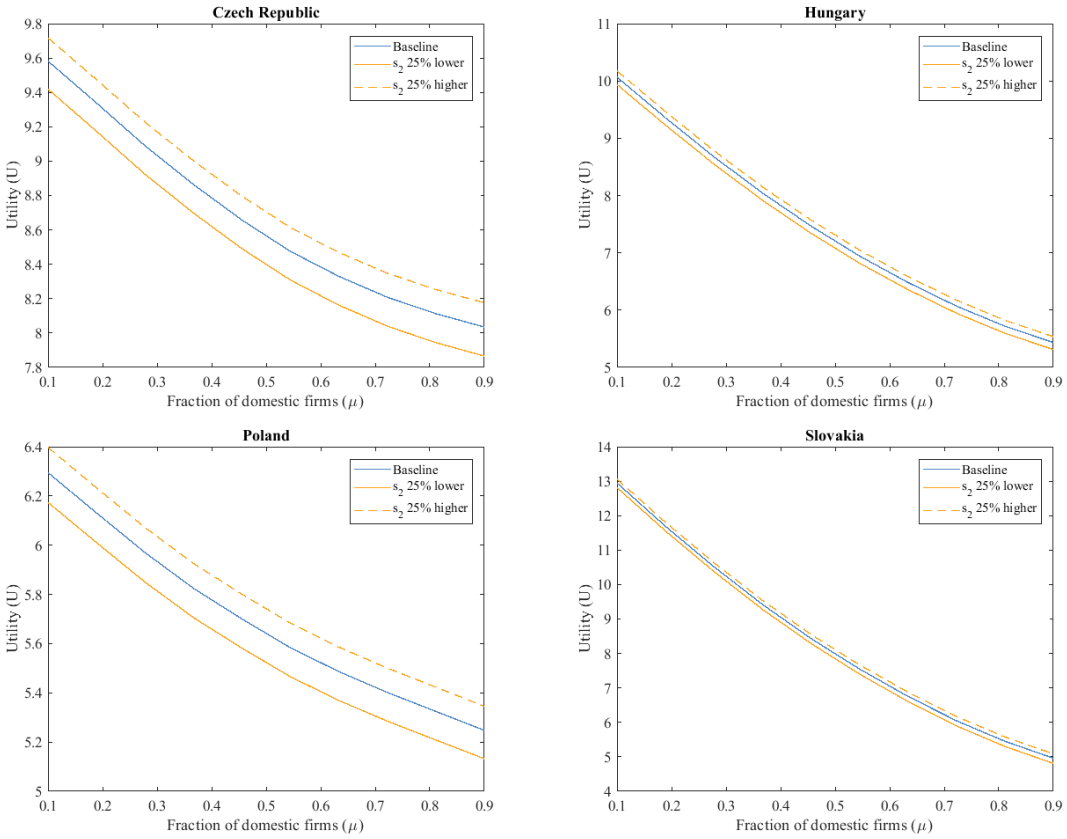


Figure A.14: Sensitivity of μ/welfare curve to s_2

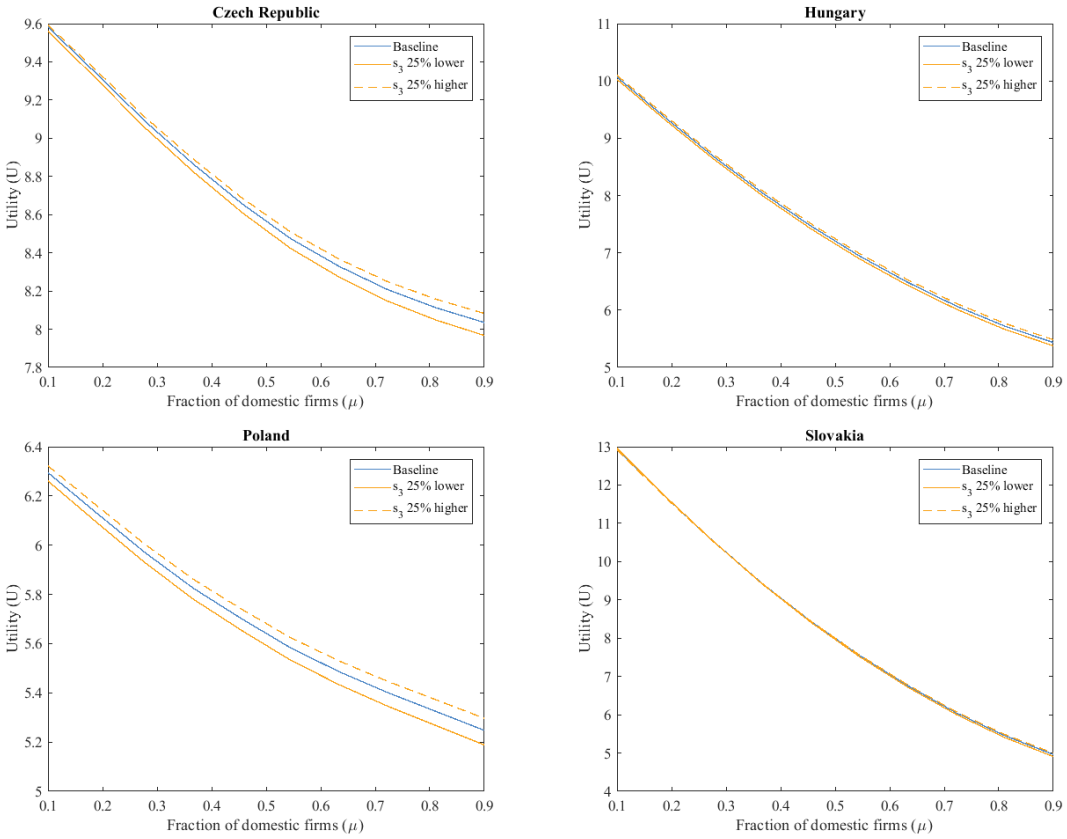


Figure A.15: Sensitivity of μ/welfare curve to s_3

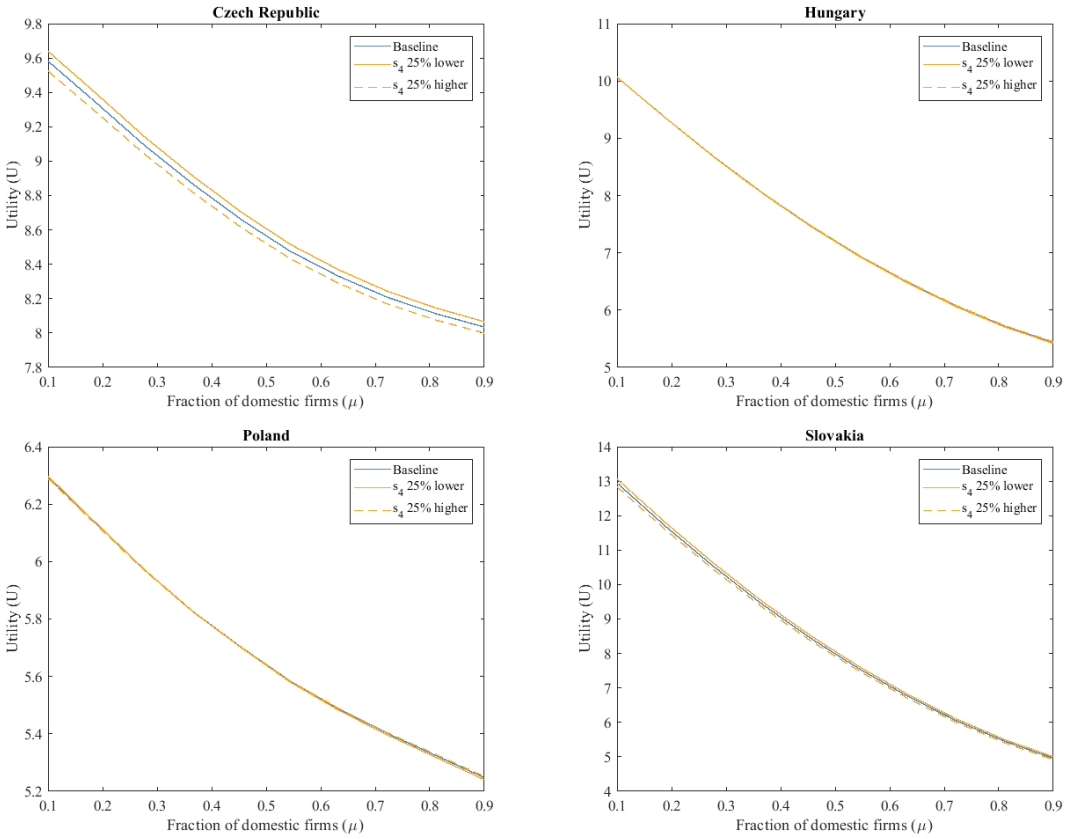


Figure A.16: Sensitivity of μ/welfare curve to s_4

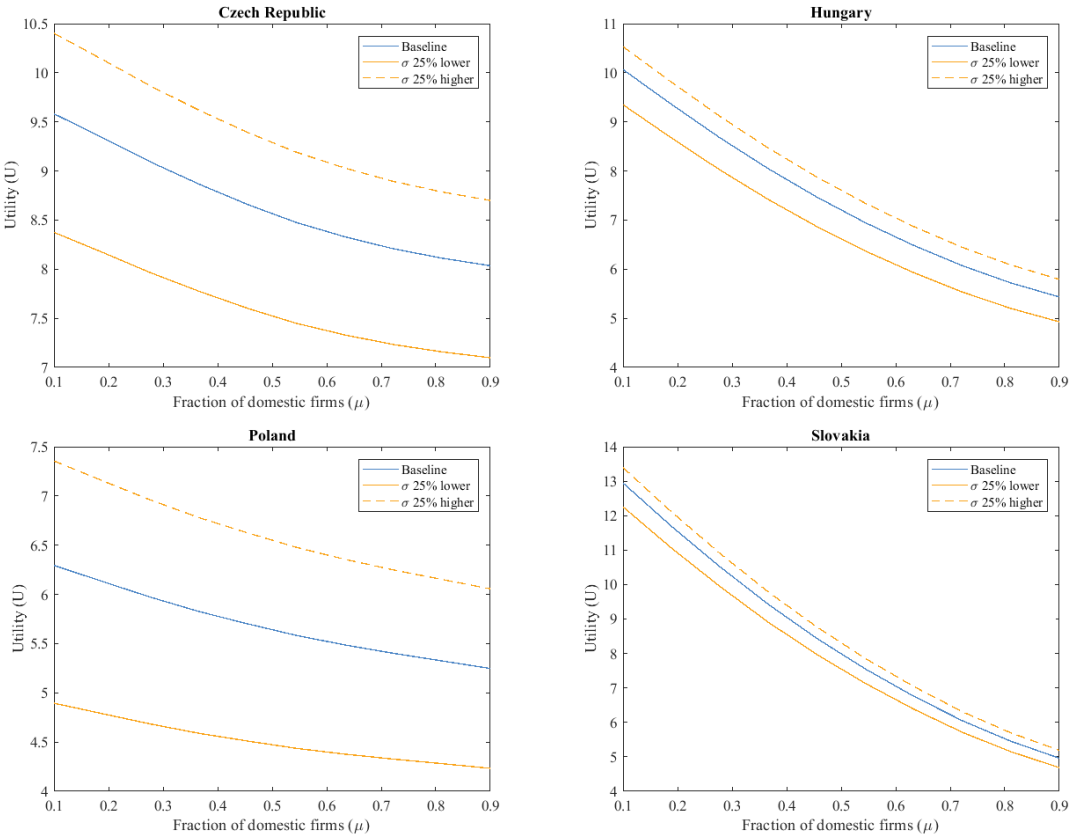


Figure A.17: Sensitivity of μ/welfare curve to σ

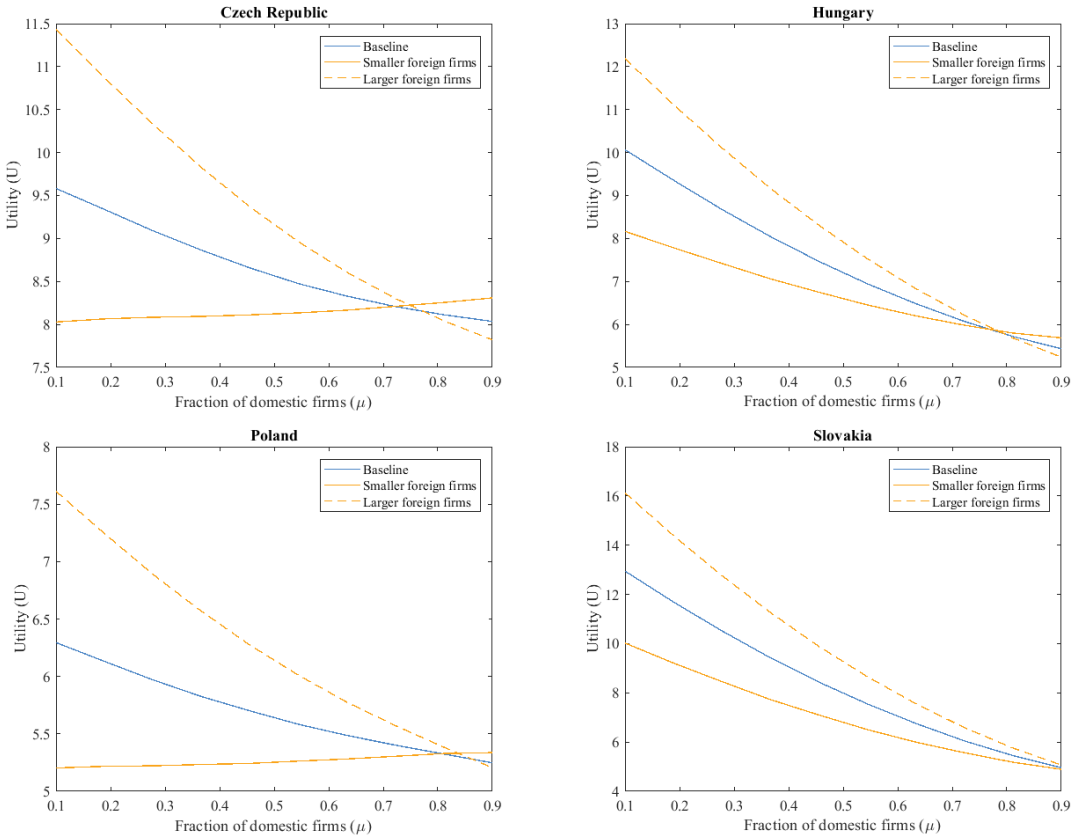


Figure A.18: Sensitivity of μ/welfare curve to a_1, a_2

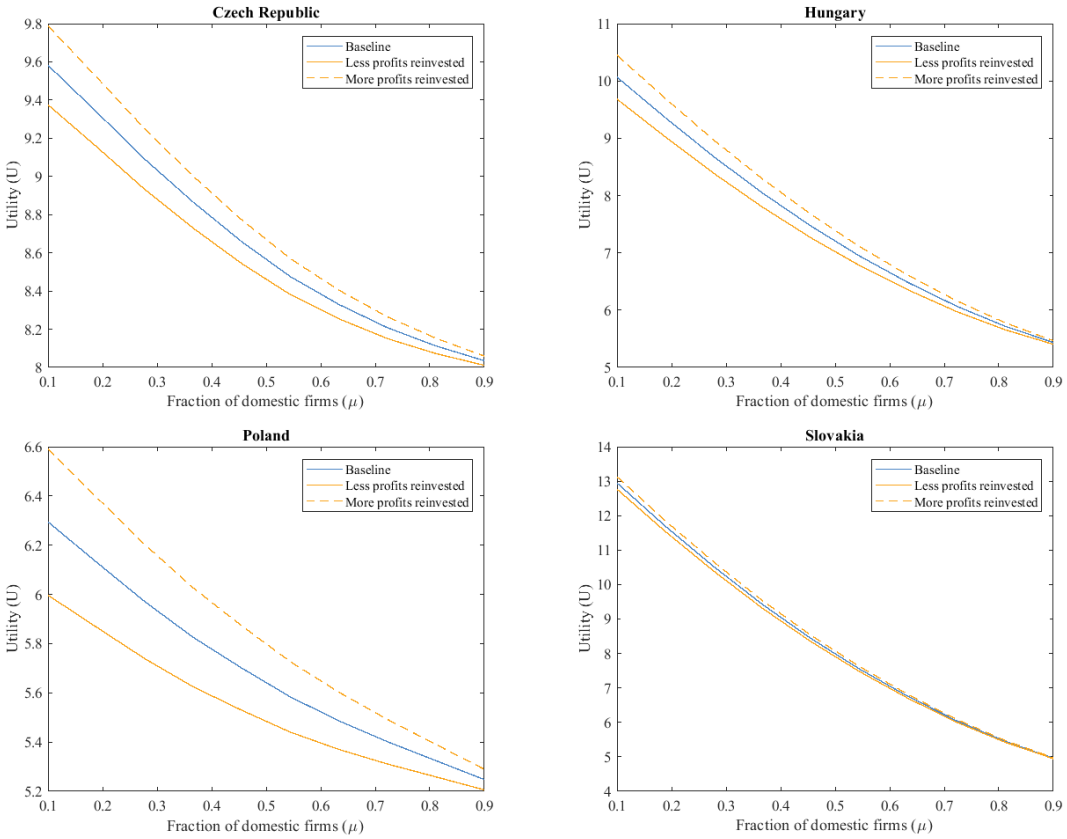


Figure A.19: Sensitivity of μ/welfare curve to ρ

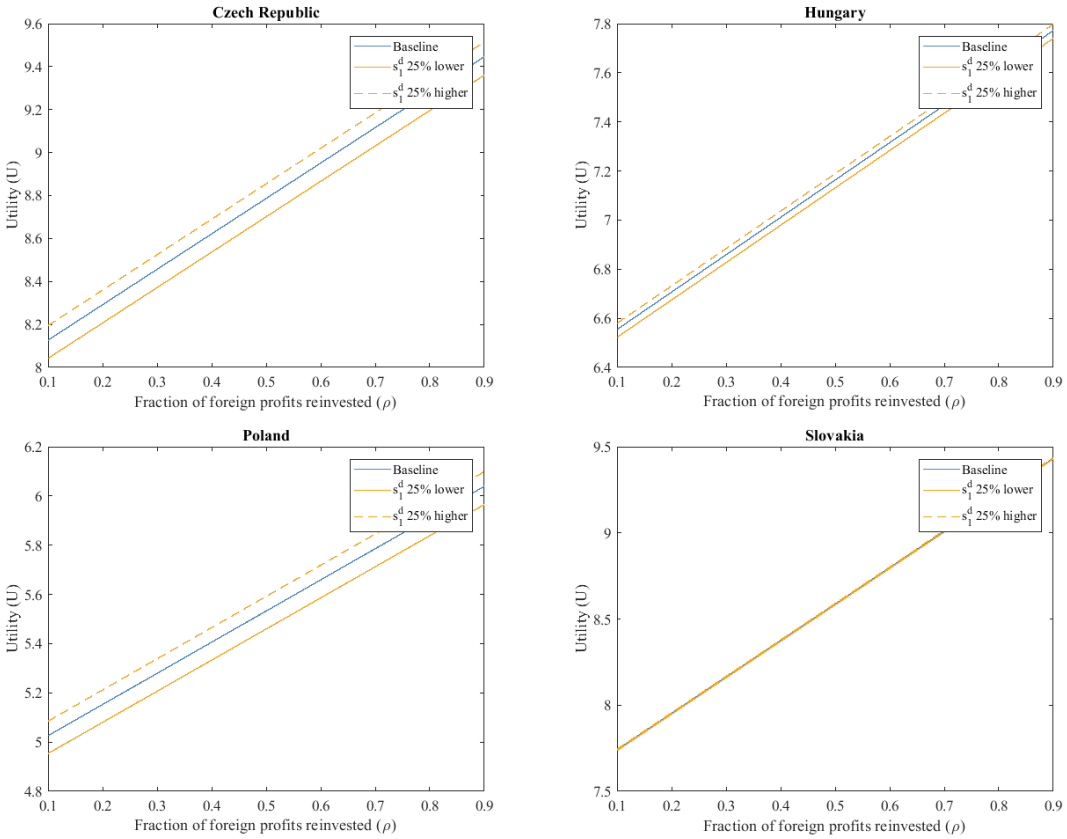


Figure A.20: Sensitivity of ρ/welfare curve to s_1^d

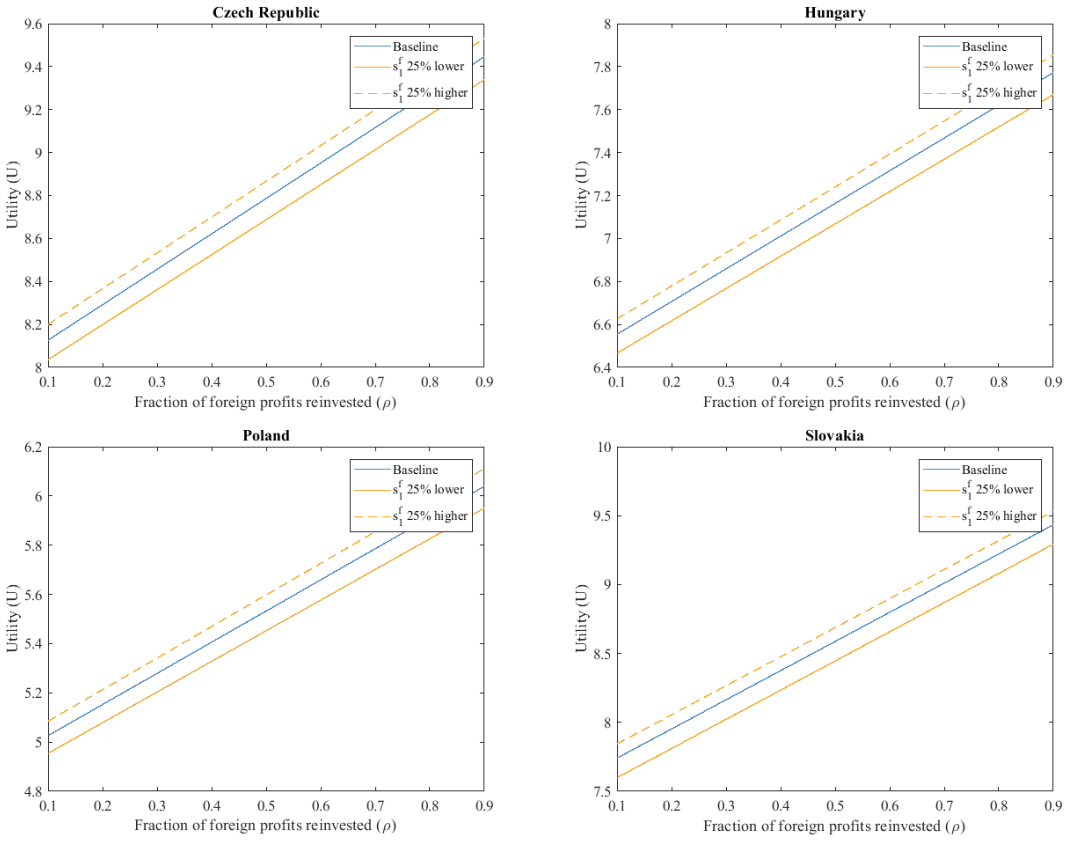


Figure A.21: Sensitivity of ρ/welfare curve to s_1^f

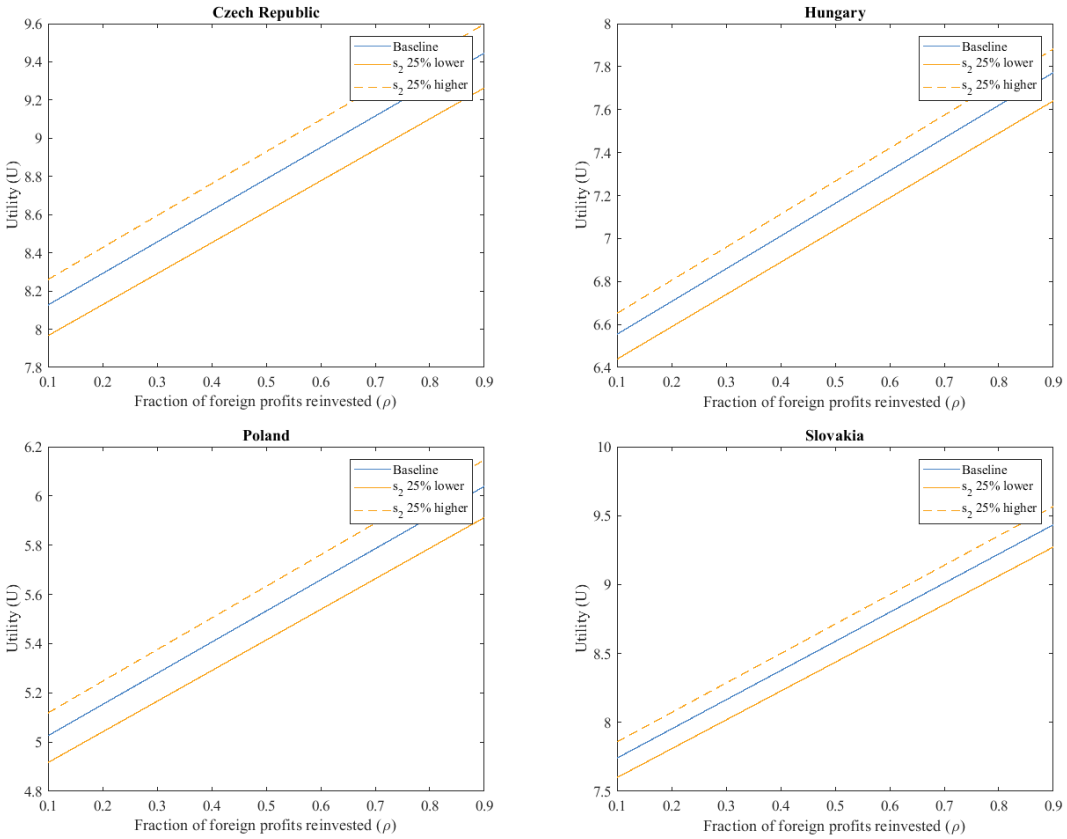


Figure A.22: Sensitivity of ρ/welfare curve to s_2

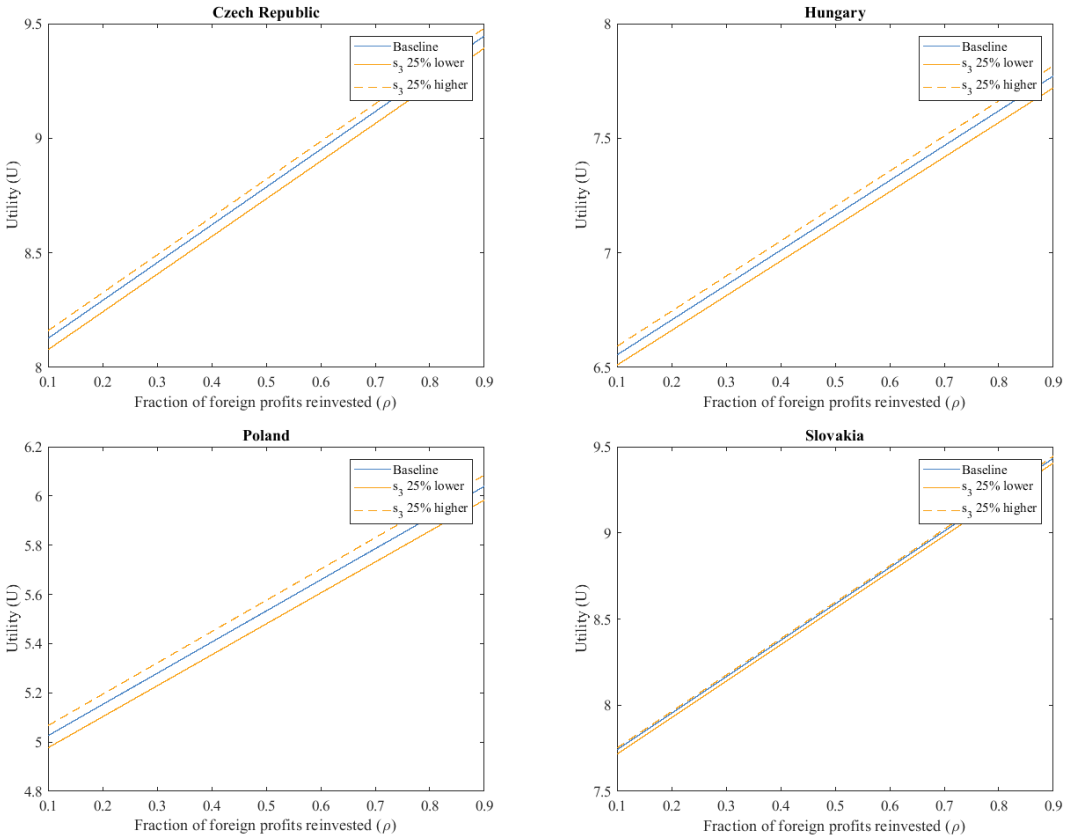


Figure A.23: Sensitivity of ρ/welfare curve to s_3

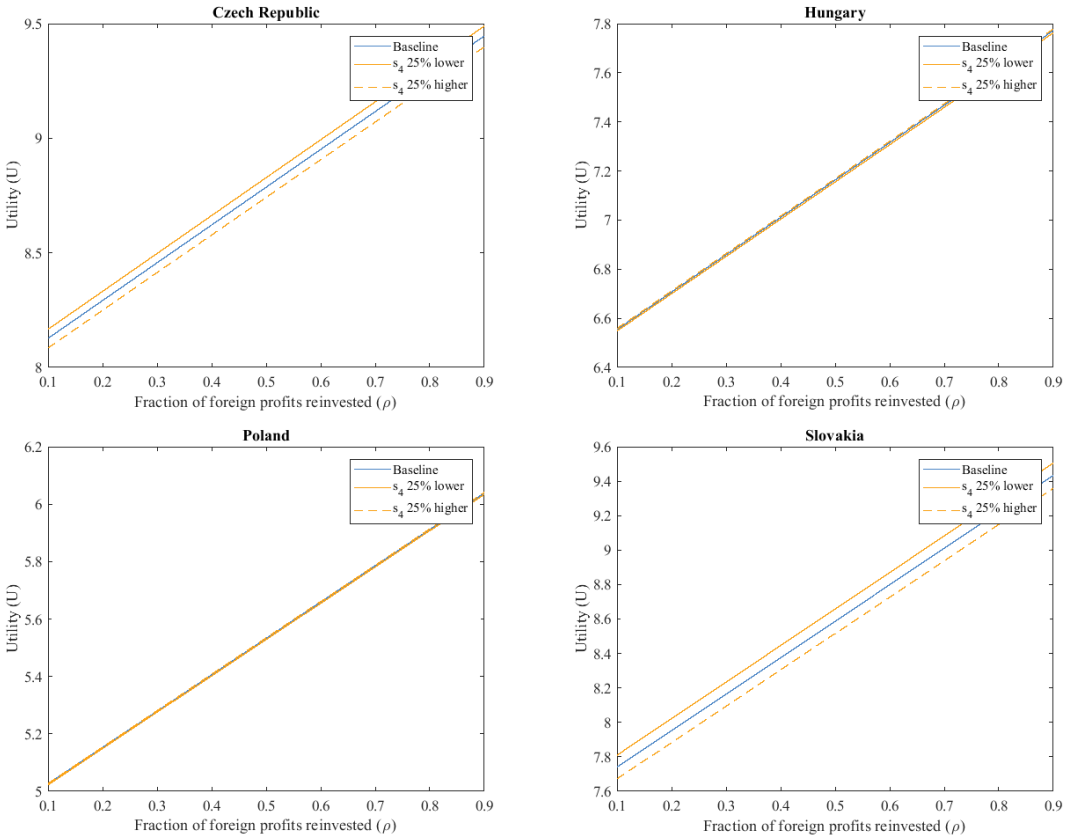


Figure A.24: Sensitivity of ρ/welfare curve to s_4

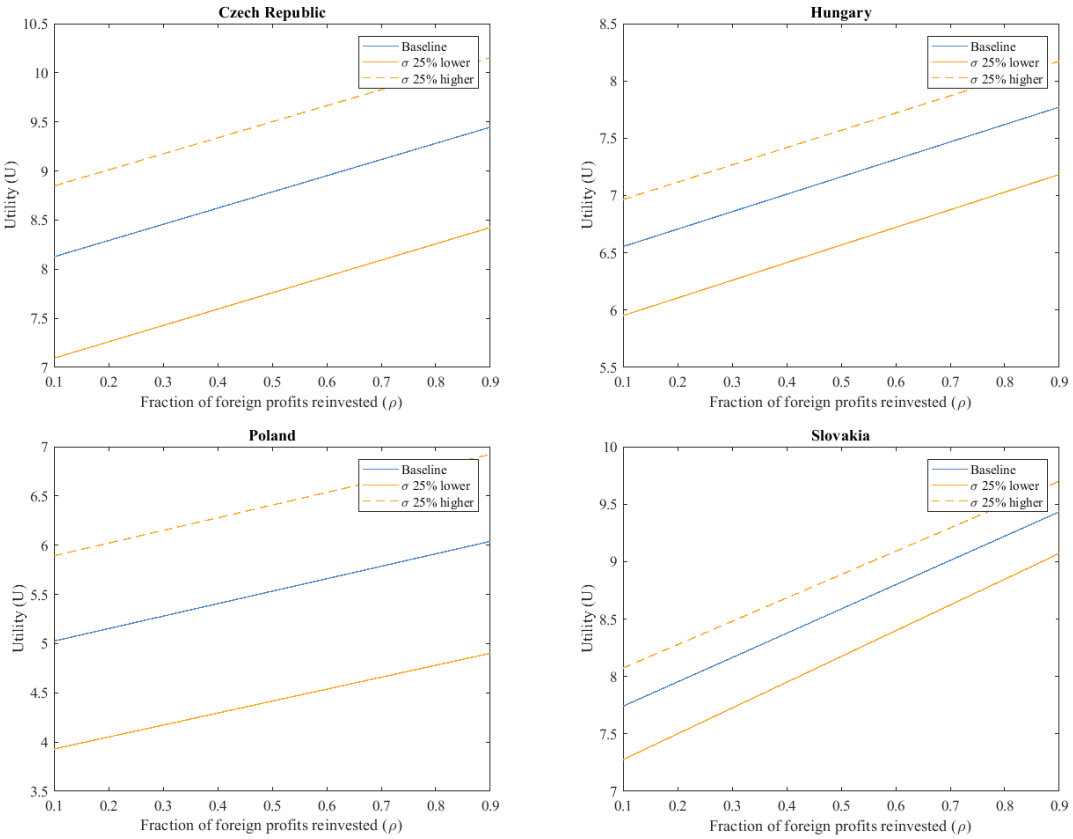


Figure A.25: Sensitivity of ρ/welfare curve to σ

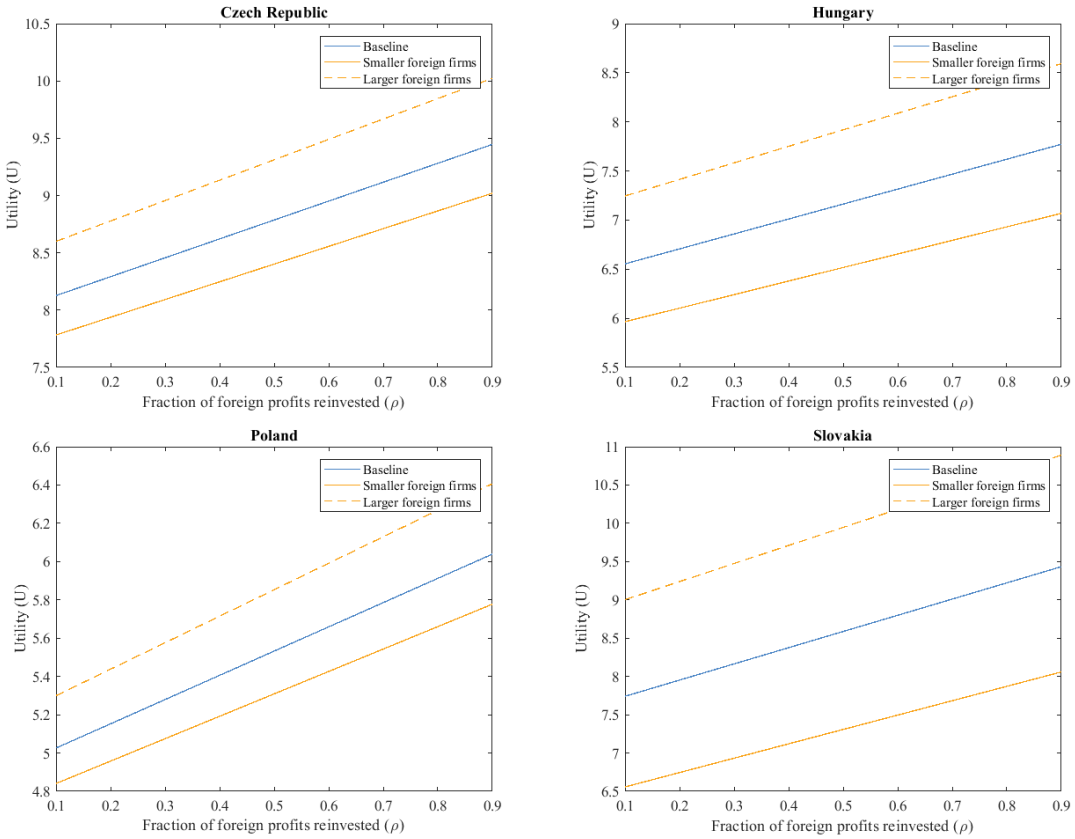


Figure A.26: Sensitivity of ρ/welfare curve to a_1, a_2

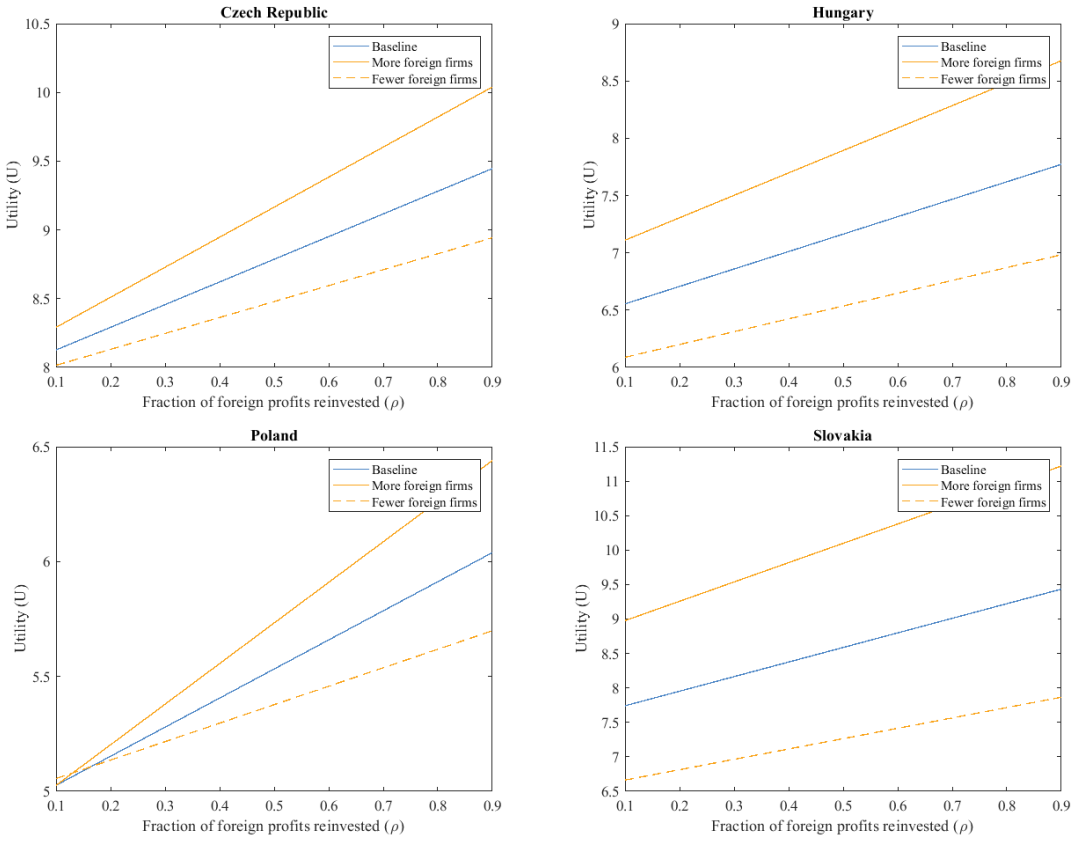


Figure A.27: Sensitivity of ρ/welfare curve to a_1, a_2

B Tables

Table B.1: Calibrated parameters

Parameter	HU	SK	CZ	PL
σ	29.166	13.209	16.352	9.106
s_1^d	0.00000	0	0.003	0.004
s_1^f	0.726	374.285	0.601	0.178
s_2	1.191	8.362	4.271	0.886
s_3	1.946	42.585	16.995	3.623
s_4	1.894	33.574	13.312	3.119

Table B.2: Data-based parameters

Parameter	HU	SK	CZ	PL
μ	0.480	0.492	0.535	0.617
ρ	0.626	0.194	0.286	0.468
δ	0.739	0.737	0.728	0.714

Table B.3: Normalized parameters

Parameter	HU	SK	CZ	PL
L	100	100	100	100
Grid size	50,000	50,000	50,000	50,000
a_1	0.150	0.150	0.150	0.150
a_2	0.200	0.200	0.200	0.200