CESifo WORKING PAPERS

10236
2023

January 2023

# Labor Supply Shocks and Capital Accumulation: The Short and Long Run Effects of the Refugee Crisis in Europe

*Lorenzo Caliendo, Luca David Opromolla, Fernando Parro, Alessandro Sforza*

CESifo

## Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: https://www.cesifo.org/en/wp

CESifo *Working Paper No. 10236*

# Labor Supply Shocks and Capital Accumulation: The Short and Long Run Effects of the Refugee Crisis in Europe

## Abstract

European countries experienced a large increase in labor supply due to the influx of Ukrainian refugees after the 2022 Russia invasion. We study its dynamic effects in a spatial model with forward-looking households of different skills, trade, and endogenous capital accumulation. We find that real GDP increases in Europe in the long term, with large distributional effects across countries and skill groups. In the short run, an increase in the supply of labor strains the use of capital structures that takes time to build. Over time, countries that build capital structures increase output, resulting in potential long run benefits.

*Lorenzo Caliendo*
*Yale University / New Haven / CT / USA*
*lorenzo.caliendo@yale.edu*

*Luca David Opromolla*
*North Carolina State University*
*Raleigh / NC / USA*
*luca.opromolla@nyu.edu*

*Fernando Parro*
*The Pennsylvania State University*
*University Park / PA / USA*
*fxp5102@psu.edu*

*Alessandro Sforza*
*University of Bologna / Italy*
*alessandro.sforza3@unibo.it*

January 13, 2023
We thank Sharon Traiberman for the insightful discussion of the paper.

# 1 Introduction

European countries experienced an exogenous an once an for all increase in labor supply as a consequence of the influx of Ukrainian refugees due to the 2022 Russia invasion. More than 7 million refugees from Ukraine, with more than 4 million being working-age refugees of different skills, located geographically dispersed in Europe, with the Ukraine neighboring European countries experiencing the largest inflow of refugees. We study the economic effects of this unexpected increase in labor supply that varies across skill groups.

To quantify the general equilibrium effects, we extend the dynamic trade and migration model developed in Caliendo et al. (2021) and consider an endogenous process of capital accumulation as in Kleinman et al. (2022). The model comprises 23 European countries and a constructed rest of the world. Production of goods requires high-skilled and low-skilled labor, and capital structures, and countries trade goods subject to bilateral trade costs. Households, who might be employed or non-employed, make forward-looking migration decisions, and decide optimally where to locate each period subject to mobility frictions and idiosyncratic taste shocks. Immobile landowners (who we also refer as capitalists) have an investment technology to build capital structures (who they rent to local firms) in each country and decide the optimal stock of capital each period to maximize their present discounted value of their consumption. In the short run, an increase in the supply of labor strains the use of capital structures that takes time to build and impact the return to capital and price index, which affects the real return to accumulate capital across countries. Over time, countries that build capital structures can take advantage of the increase in labor supply and are able to increase output, resulting in potential long-run benefits.

We take the model to the data using gross migration flows by skills and employment status from the European Labor Force Survey (EU-LFS), and production and trade data from the World Input-Output Database (WIOD). We collect information on the Ukrainian refugees by skill, age, employment status, and country of destination from the United Nations High Commissioner for Refugees (UNHCR). By applying dynamic-hat algebra techniques developed in Caliendo et al. (2019), we compute the model without assuming that the economy is in the steady state at the

time of the influx of Ukrainian refugees. We first compute a baseline economy that delivers the transitional dynamics under the pre-refugee crisis fundamentals. We then compute a counterfactual economy that describes the transitional dynamics after the influx of Ukrainian refugees in the European countries. In particular, we feed into the model the refugees in each initial destination country as a unanticipated labor supply shock by skill group and employment status. With this shock, we aim to understand the effects of aggregate labor supply shocks on trade, migration and capital accumulation.

The labor supply shock as a consequence of the inflow of Ukrainian refugees increases aggregate real GDP in Europe in the long term. However, we find large distributional effects across countries, skill groups, and between households and capitalists. High-skilled households are worse off with the increased competition from a labor supply shock that is relatively high-skilled intensive. Low-skilled households tend to benefit from the relatively larger increase in high-skilled labor and from the accumulation of capital structures over time, and household income inequality declines across European countries as a result. As expected, the labor supply shock benefits the owners of capital, which has implications on the design of redistributive policies to absorb the shock. Our findings suggest that the ability to build capital structures importantly shapes the aggregate and distributional effects of the labor supply shock. Capital accumulation across European countries in the response to the labor supply shock allows to increase output, which tends to reduce the welfare losses of high-skilled households and benefit low-skilled households, although it is not enough to turn them into gains for everyone.

# 2 Dynamic Model of Trade, Capital and Migration

We consider a dynamic general equilibrium model that extends Caliendo et al. (2021) by endogenizing the process of capital accumulation. There are $N$ countries, indexed by $i$ (origin) and $j$ (destination). In each country there are a continuum of firms producing goods with heterogeneous productivity. Goods are traded across countries, and trade is subject to bilateral trade costs. Production of goods in a given country require the use of high-skilled and low-skilled labor, which are imperfect substitutes, and local capital structures.

Time is discrete and households have perfect foresight. Households with different skills make forward-looking labor relocation decisions subject to migration costs and idiosyncratic preferences as in Artuc et al. (2010) and Caliendo et al. (2019). At each moment in time, households decide whether to stay in the same country or to move to a different country, a decision that is influenced by migration costs, real wages and expected continuation values.

In each country we assume that capital structures are owned by local landowners (capitalists) that obtain income from renting capital structures to firms. These agents are forward looking as in Kleinman et al. (2022) and Cai et al. (2022), and decide intertemporally how much to consume and invest in order to increase the stock of local capital in the future and maximize the present discounted value of their utility. We now turn to describe the problem of each agent in the economy.

## 2.1 Production and Trade Structure

The production function of a given good with productivity $z^i$ in country $i$ is given by

$$q_t^i(z^i) = z^i A_t^i \left( \sum_{s=h,l} a_{s,t}^{i\,\frac{1}{\rho}} \left( L_{s,t}^{ie}(z^i) \right)^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}(1-\gamma^i)} \left( K_t^i(z^i) \right)^{\gamma^i},$$

where $L_{h,t}^{ie}(z^i)$ and $L_{l,t}^{ie}(z^i)$ are the demands for high- and low-skilled labor used to produce good $z^i$ in country $i$, $\rho$ is the elasticity of substitution between high- and low-skilled labor, $(1-\gamma^i)$ is the share of labor payments in output, $a_{s,t}^i$ is the $s$-skilled intensity in production, and $A_t^i$ is fundamental productivity in country $i$. The demand for capital structures is denoted by $K_t^i(z^i)$.

Goods can be traded across countries subject to iceberg-type bilateral trade costs. In particular, the cost of shipping goods from country $j$ to country $i$ is given by $\kappa_t^{i,j} \geq 1$. Good-specific productivity component $(z^i)$ is a stochastic realization from a Fréchet distribution with dispersion parameter $\theta$ as in Eaton and Kortum (2002), which gives rise to the bilateral trade shares $\lambda_t^{i,j} = \frac{A_t^j \left( \kappa_t^{i,j} x_t^j \right)^{-\theta}}{\sum_{k=1}^N A_t^k \left( \kappa_t^{i,k} x_t^k \right)^{-\theta}}$ and the local price index $P_t^i$, given by

$$P_t^i = \left( \sum_{j=1}^N A_t^j \left( \kappa_t^{i,j} x_t^j \right)^{-\theta} \right)^{-\frac{1}{\theta}},$$

where $x_t^i \equiv \zeta^i \left( \sum_{s=h,l} a_{s,t}^i \left( w_{s,t}^i \right)^{1-\rho} \right)^{\frac{1-\gamma^i}{1-\rho}} \left( r_t^i \right)^{\gamma^i}$ is the cost of an input bundle, and $\zeta^i$ is a constant. Notice that the cost of production depends on the unit price of skilled $s$ labor $w_{s,t}^i$, and the rental

rate of capital structures $r_t^i$, which are shaped by the dynamic decisions of households and capitalists that we describe next.

## 2.2 Capital Accumulation Across Countries

There are immobile landowners (capitalists) in each country who consume local goods and whose source of income is from renting capital structures that they own. Landowners have access to an investment technology in local capital structures that once installed are geographically immobile. The problem of a landowner in location $i$ is given by

$$\max_{\left\{C_t^i, K_{t+1}^i\right\}_{t=0}^{\infty}} U = \sum_{t=0}^{\infty} \beta^t \log(C_t^i),$$
$$\text{s.t. } r_t^i K_t^i = P_t^i \left[C_t^i + K_{t+1}^i - (1-\delta) K_t^i\right] \text{ for all } t,$$

where $\delta$ is the depreciation rate and $K_0^i$ is taken as given. The solution to this dynamic programming problem is characterized by the following policy functions,

$$C_t^i = (1-\beta)\left[r_t^i/P_t^i + (1-\delta)\right] K_t^i,$$
$$K_{t+1}^i = \beta\left[r_t^i/P_t^i + (1-\delta)\right] K_t^i,$$

where the last condition describes the law of motion of capital accumulation across countries.

## 2.3 Households - Labor Supply

Households in country $i$ can be either employed or non-employed. We denote the labor force status by $\ell$ (today) and by $o$ (tomorrow), with $(\ell, o)\ \varepsilon\ \{e, ne\}$, and where $e$ and $ne$ refer to employment and non-employment, respectively. An employed household works, earns the market wage for the unit of labor she supplies, and consumes local goods. Non-employed households enjoy the consumption of home production, a non-market good. Households in a given country are of different skills indexed by $s$, and of different nationalities indexed by $n$.

The value of a worker with nationality $n$, skill $s$ in country $i$ at time $t$, and with labor force status $\ell$, is denoted by $v_{n,s,t}^{i\ell}$, and it is given by

$$v_{n,s,t}^{i\ell} = log(C_{s,t}^{i\ell}) + \max_{\{j,o\}_{j=1,o=e,ne}^{N}} \{\beta E[v_{n,s,t+1}^{jo}] - m_{n,s,t}^{i\ell,jo} + \nu\varepsilon_{n,s,t}^{jo}\},$$

where $C_{s,t}^{i\ell}$ is the consumption aggregator, $m_{n,s,t}^{i\ell,jo}$ is the migration cost from country $i$ to country $j$ at time $t$. Idiosyncratic preference shocks $\varepsilon_{n,s,t}^{jo}$ are stochastic i.i.d. Type-I extreme value distributed with zero mean, and dispersion parameter $\nu$, and $\beta$ is the discount factor.

We denote the expected (expectation over $\varepsilon$) lifetime utility of a worker of nationality $n$, skill $s$, labor force status $\ell$, in country $i$, by $V_{n,s,t}^{i\ell} \equiv E[v_{n,s,t}^{i\ell}]$. It turns out that,

$$V_{n,s,t}^{i\ell} = log(C_{s,t}^{i\ell}) + \nu log\left(\sum_{j=1}^{N}\sum_{o=e,ne} exp(\beta V_{n,s,t+1}^{jo} - m_{n,s,t}^{i\ell,jo})^{1/\nu}\right),$$

where the first term in the equation represents the current utility of that households in country $i$ and the second term captures the option value of migrating to a different country or staying in the same location, which depends on employment status, skill and nationality.

The consumption aggregator $C_{s,t}^{i\ell}$ varies by employment status $\ell$. Non-employed households obtain consumption from home production and we denote this by $b^i > 0$. The indirect utility of a household with skill $s$ in country $i$ is given by $C_{s,t}^{i\ell} = w_{s,t}^i / P_t^i$ if $\ell = e$, and $C_{s,t}^{i\ell} = b^i$ if $\ell = ne$, where $P_t^i$ is the local price index.

The fraction of households of nationality $n$, and skill $s$ that migrates from country $i$ to country $j$ at time $t$ conditional on labor force status $\ell$, $o$, which we denote by $\mu_{n,s,t}^{i\ell,jo}$, is given by

$$\mu_{n,s,t}^{i\ell,jo} = \frac{exp(\beta V_{n,s,t+1}^{jo} - m_{n,s,t}^{i\ell,jo})^{1/\nu}}{\sum_{k=1}^{N}\sum_{a=e,ne} exp(\beta V_{n,s,t+1}^{ka} - m_{n,s,t}^{i\ell,ka})^{1/\nu}}.$$

This equilibrium condition represents the gross flows of migrants by nationality and skill across countries. The term $1/\nu$ represents the migration cost elasticity.

Denote by $L_{s,t+1}^{ie}$ the stock of employed households with skill $s$ in country $i$, which is given by

$$L_{s,t+1}^{ie} = \sum_{n=1}^{N}\sum_{j=1}^{N}\sum_{\ell=e,ne} \mu_{n,s,t}^{j\ell,ie} L_{n,s,t}^{j\ell}, \text{ for all } s.$$

Likewise, $L_{s,t+1}^{ine}$ denotes the stock of non-employed households ($ne$) with skill $s$ in country $i$. Finally, the total stock of households in each country is then given by $L_t^i = \sum_{s=h,l}\sum_{\ell=e,ne} L_{s,t}^{i\ell}$.

## 2.4 Market Clearing and Equilibrium

National income is determined by labor income and capital income; in particular, $I_t^i = \sum_{s=h,l} w_{s,t}^i L_{s,t}^{i,e} + r_t^i K_t^i$.[1] The labor market clearing condition can be expressed as

$$w_{s,t}^i L_{s,t}^{ie} = \xi_{s,t}^i (1-\gamma^i) \sum_{j=1}^N \lambda_t^{j,i} I_t^j, \text{ for all } i,s,$$

where $\xi_{s,t}^i$ is the share of skill $s$ in the labor payments given by $\xi_{s,t}^i = \frac{a_{s,t}^i \left(w_{s,t}^i\right)^{1-\rho}}{a_{h,t}^i \left(w_{h,t}^i\right)^{1-\rho} + a_{l,t}^i \left(w_{l,t}^i\right)^{1-\rho}}$, which follows from the CES production structure.

We now define the equilibrium of the model given a set of fundamentals.

**Equilibrium.** *Given an initial allocation of labor* $\{L_0^i\}_{i=1}^N$, *and capital structures* $\{K_0^i\}_{i=1}^N$, *a sequence of fundamentals* $\left\{\{\kappa_t^{i,j}, m_{n,s,t}^{i\ell,jo}, a_{h,t}^i, a_{l,t}^i, A_t^i, b^i\}_{n=1;i=1;j=1;\ell,o=e,ne}^{N,N,N}\right\}_{t=0}^{\infty}$ *the* **sequential competitive equilibrium** *of the model is a sequence of values, factor prices, good prices, households allocations, and capital stocks* $\left\{\{V_{n,s,t}^{i\ell}, w_{s,t}^i, r_t^i, P_t^i, L_{n,s,t}^{i\ell}, K_t^i\}_{n=1;i=1;j=1;\ell,o=e,ne;s=h,l}^{N,N,N}\right\}_{t=0}^{\infty}$, *that solves the households' and landowners dynamic problem, the firms' problem, and markets clear.*

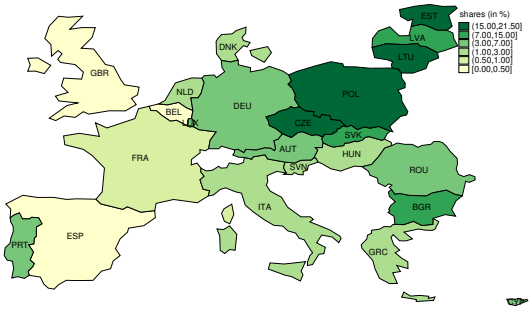
## 2.5 Computing Counterfactuals

We compute the model by applying dynamic-hat algebra techniques developed in Caliendo et al. (2019). In particular, by expressing the equilibrium conditions in time differences, we are able to compute the model without needing to estimate the levels of exogenous fundamentals or assuming that the economy is in the steady state at the initial period. We condition the model on observable allocations, which contain all the information about the fundamentals, and match the cross-section of the actual economy at the initial period that does not need to be in a steady state. We take the model to the data in the most recent year as described in the next section, and compute a baseline economy that delivers the transitional dynamics under the initial fundamentals, pre-refugee crisis. We then compute a counterfactual economy that describes the transitional dynamics after the influx of Ukrainian refugees in the European countries. In particular, we feed into the model the refugees in each initial destination country as a unanticipated labor supply shock by skill group and employment status at time $t = 1$. Since Ukrainian refugees covered by the Temporary Protection Directive

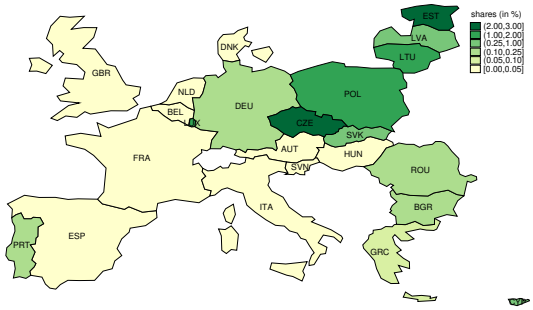
[1] In the quantitative analysis we consider exogenous constant trade imbalances as part of national income.

Figure 1: Labor supply shock due to Ukrainian refugees

(a) High-skilled refugees shock




(b) Low-skilled refugees shock




Notes: The figures present the number of refugees as a share of the host country working age population, by skill.

are able to move freely within the European Union and enjoy reduced costs for the issuance of a visa, after the first period we allow refugees to move as European Union nationals do.

# 3 Taking the Model to the Data

We collect data on the stock of Ukrainian refugees across each European country by education level, age, and employment status. We track the number of refugees from Ukraine in 23 European countries and the rest of the world using the second round of the survey of intentions and perspectives of refugees from Ukraine UNHCR (2022), carried out by the UNHCR. We focus on working age refugees that are between 18 and 59 years, which accounts for about 4.2 millions of refugees.[2] Most of the countries that are neighbors with Ukraine—like Poland, Romania, Slovakia and Bulgaria—plus the Baltic countries and some central European countries—like Czech Republic and Germany—host a higher number of refugees. Figure 1 describes the size of the labor supply shock by showing the number of refugees as a share of the host country working age population, by education level. The distribution of refugees is highly heterogeneous across host countries, refugees are generally high-skilled, and on average, around two-third of them are initially not employed in the host country.

To apply the dynamic-hat algebra techniques, we construct yearly bilateral gross migration flows, $\mu_{n,s,t}^{i\ell,jo}$, from 2018 to 2019, and the distribution of households, $L_{n,s,t}^{i\ell}$, for European countries by nationality (EU nationals or other nationals), by skill, and by employment status (employed

[2]We are grateful to Giorgia Tornieri, Ivan Cardona, and Aung Thu Win of the UNHCR for helping us with the access to data on Ukrainian refugees.

or not employed), using information from the EU-LFS that provides confidential information on country of residence in the previous year and labor force participation of people aged 15 and over.

Data on bilateral trade shares $\lambda_t^{ij}$, value added by country $I_t^i$, the share of labor payments in output $(1-\gamma^i)$ and the share of labor by skill $\xi_{s,t}^i$ are computed from the WIOD (Timmer et al. (2015)) for the last available year 2014. We obtain the initial capital stock, $K_0^i$ for our sample of countries using data from the IMF Investment and Capital Stock Dataset. We use the estimates of the migration cost elasticity $1/\nu = 0.5$, and of the elasticity of substitution between low-and high-skilled workers $\rho = 4$, from Caliendo et al. (2021) and the value for the trade elasticity $\theta = 4.5$ from Caliendo and Parro (2015), and we impose a yearly discount factor of $\beta = 0.97$ and an annual depreciation rate $\delta = 0.05$.

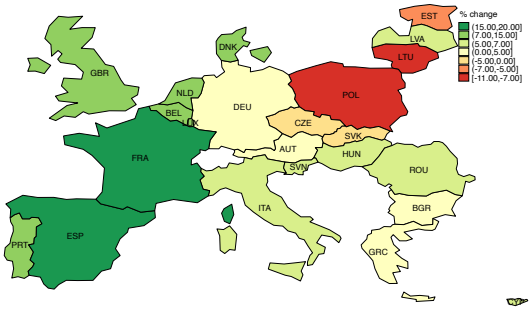
# 4 General Equilibrium Effects of the Refugees Crisis

We start by describing the aggregate effects across countries in Figure 2, which displays the long term effects on real GDP (Panel (a)), on the stock of capital structures (Panel (b)), and on employment (Panel (c)). We find that the inflow of Ukrainian refugees increases aggregate real GDP in Europe by 3.6 percent in the long run. We find that real GDP increases in most of the European countries, specially in Western European countries that build more capital structures. Some Eastern European countries experience a decline in output as they are not able to accumulate capital fast enough to respond to the increase in labor supply. As a result, the inflow of refugees substantially strain capital structures in the short-run in these countries so that households move to countries where capital is growing faster, which has a negative impact on employment and the incentives to build capital structures over time.

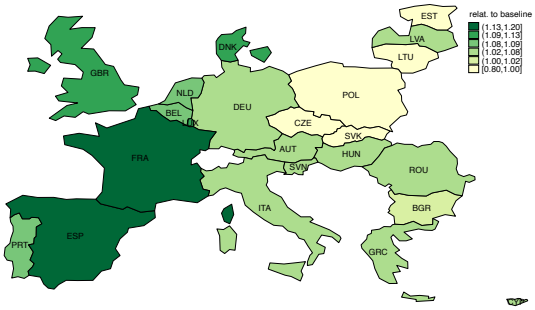
We find that these aggregate effects mask substantial distributional welfare effects across countries, across skill groups, and between households and the owners of capital. Figure 3 shows the distributional welfare consequences across skill groups (Panels (a) and Panel (b)), and the welfare effects for the capitalists (Panel (c)), all them measured as the change in consumption equivalent relative to the baseline economy. High-skilled households are worse off in all countries as they face increased competition in the labor market from an increase in labor supply that is relatively

Figure 2: Aggregate effects (relative to baseline)

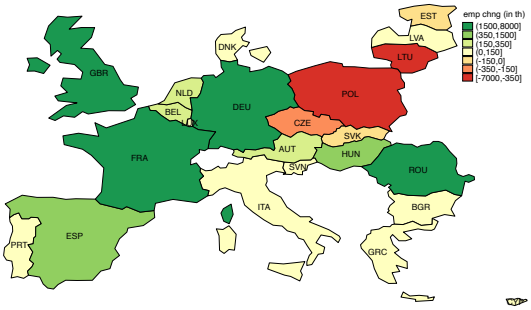
(a) Real GDP (percent)




(b) Stock of capital structures




(c) Employment effects (thousands)



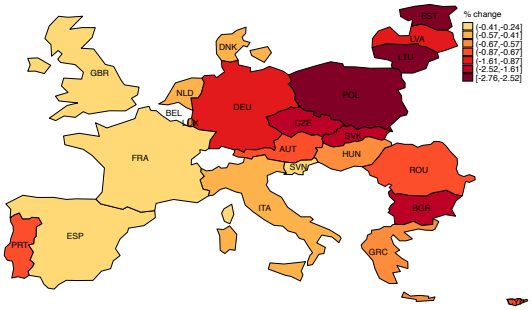

Note: The figures show the long-term (steady state) aggregate effects of the labor supply shock across European countries relative to the baseline economy. Panel (a) presents the effects on real GDP, Panel (b) shows the stock in capital structures in steady state relative to the baseline economy, and Panel (c) presents the long-term effects on employment.

high-skilled intensive, and the welfare losses are more pronounced in the countries that experienced a larger labor supply shock. On the other hand, low-skilled households are better off in three-fourth of the countries. Low-skilled workers benefit from a relatively larger inflow of high-skilled refugees that increases the supply of high-skilled workers, reduces their labor costs, and as a result, increases the demand for low-skilled workers. Importantly, since production also requires capital structures, the welfare gains for low-skilled households only materializes in countries that are able to build capital structures. We also find distributional welfare effects between households and the owners of capital across countries. In particular, the inflow of Ukrainian refugees increases the supply of labor, and create incentives to increase the demand for capital structures to scale up production across countries, which benefits capitalists.

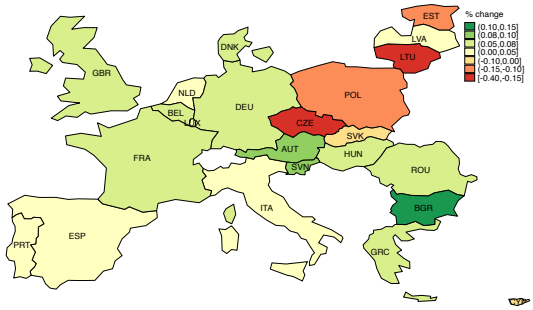
The welfare effects for households is highly correlated in the short run with the magnitude of the labor supply shock. The intuition comes from the fact that in the short run, capital structures is mostly a fixed factor; hence, the inflow of Ukrainian refugees congests capital structures, and

Figure 3: Distributional welfare effects

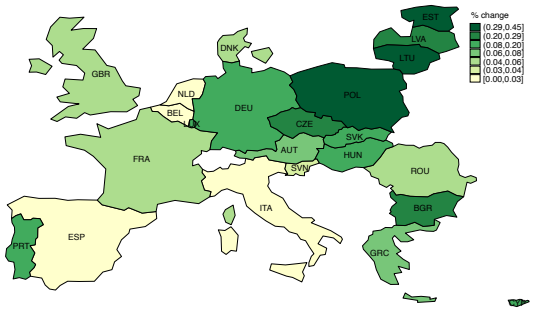
(a) High-skilled households (percent)




(b) Low-skilled households (percent)




(c) Capitalists (percent)



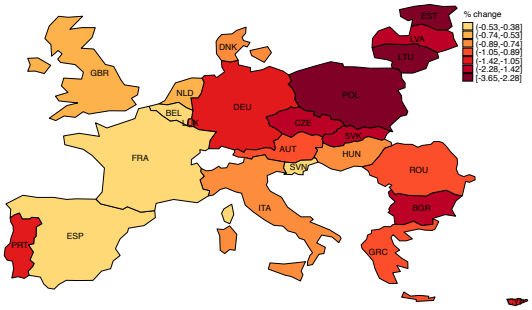

Note: The figures show the welfare effects, measured as the change in consumption equivalent relative to the baseline economy, of the labor supply shock across European countries. Panel (a) presents the welfare effects for high-skilled households, Panel (b) shows the the welfare effects for low-skilled households, and Panel (c) presents the welfare effects for capitalists.

increases the price index. Over time, the ability of a country to accumulate capital structures contributes to accommodate the labor supply shock. Accordingly, we find that the welfare effects for households is positively correlated with the change in the stock of capital structures across countries. Importantly, the accumulation of capital structures allows countries to reduce the welfare losses of high-skilled households and, as mentioned earlier, allows the low-skilled households to benefit from the high-skilled intensive labor supply shock. In fact, Figure 4 shows that in the absence of capital accumulation, the labor supply shock strains capital structures and raises the price index across countries so that both high-skilled and low-skilled households are worse off, and the welfare losses for high-skilled households would have been even larger.

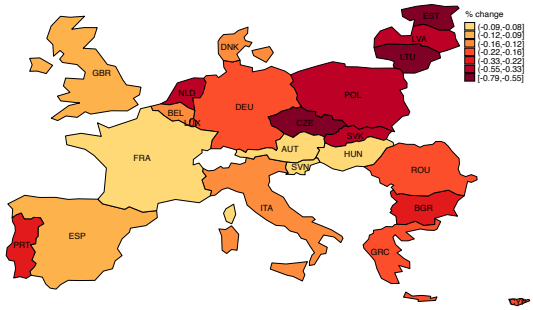
We also study two additional policy counterfactuals. The first one assumes that the inflow of Ukrainian refugees occurs in a counterfactual world where there is no labor market integration in Europe, namely households (including refugees) cannot move across countries. We find that with geographically segmented labor markets, the increase in real GDP and in the stock of capital struc-

Figure 4: Household's welfare without capital accumulation

(a) High-skilled households (percent)



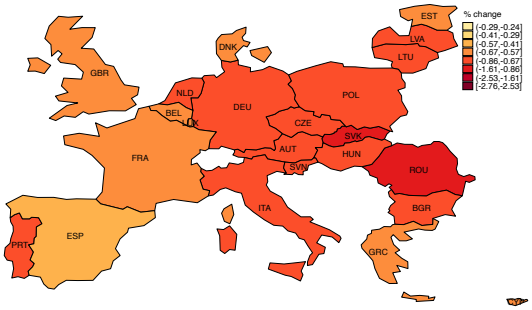

(b) Low-skilled households (percent)



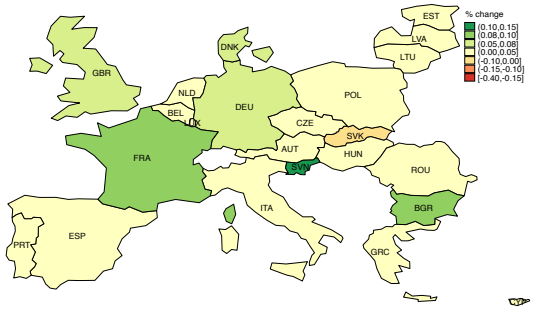

Note: The figures show the welfare effects without accumulation of capital structures for high-skilled households in Panel (a), and for low-skilled households in Panel (b).

Figure 5: Household's welfare with proportional distribution of refugees

(a) High-skilled households (percent)




(b) Low-skilled households (percent)




Note: The figures show the welfare effects of a proportional initial distribution of refugees across countries. Panel (a) and Panel (b) display the welfare effects for high-skilled households and for low-skilled households, respectively.

tures would be more modest, on average, as labor market integration allows households to migrate where capital grows faster, resulting in a larger increase in output in those countries. Finally, Figure 5 displays the welfare effects of a policy counterfactual that distributes refugees proportional to the population across countries so that the magnitude of the labor supply shock is the same across countries. Welfare losses for high-skilled are more equitable, and welfare for low-skilled households increases in all countries except for Slovakia. A proportional increase in labor supply avoids too much congestion of capital structures and price increases in some countries, leading to more uniform incentives to build capital structures, and as result, more generalized welfare gains for low-skilled households across countries.

# 5 Conclusion

A main lesson that emerges from the labor supply shock from the Ukrainian crisis is that the ability to accumulate capital structures importantly shapes the aggregate and distributional effects of the

labor supply shock. An increase in labor supply is an opportunity to increase production. However, the capacity to scale up production remains limited in countries that do not build more capital structures. In the case of the Ukrainian crisis, our quantitative analysis shows that capital accumulation benefits low-skilled households and dampens the welfare losses of high-skilled households who face most of the increase in labor market competition. With further increases in the stock of capital structures, European countries would create better opportunities to increase output and increase welfare for all group of individuals across countries.

# References


ARTUC, E., S. CHAUDHURI, AND J. MCLAREN (2010): "Trade Shocks and Labor Adjustment: A Structural Empirical Approach," *The American Economic Review*, 100, 1008–1045.

CAI, S., L. CALIENDO, F. PARRO, AND W. XIANG (2022): "Mechanics of Spatial Growth," Working Paper 30579, National Bureau of Economic Research.

CALIENDO, L., M. DVORKIN, AND F. PARRO (2019): "Trade and Labor Market Dynamics: General Equilibrium Analysis of the China Trade Shock," *Econometrica*, 87, 741–835.

CALIENDO, L., L. D. OPROMOLLA, F. PARRO, AND A. SFORZA (2021): "Goods and Factor Market Integration: A Quantitative Assessment of the EU Enlargement," *Journal of Political Economy*, 129, 3491–3545.

CALIENDO, L. AND F. PARRO (2015): "Estimates of the Trade and Welfare Effects of NAFTA," *The Review of Economic Studies*, 82, 1–44.

EATON, J. AND S. KORTUM (2002): "Technology, Geography, and Trade," *Econometrica*, 70, 1741–79.

KLEINMAN, B., E. LIU, AND S. J. REDDING (2022): "Dynamic Spatial General Equilibrium," *Econometrica*, forthcoming.

TIMMER, M. P., E. DIETZENBACHER, B. LOS, R. STEHRER, AND G. J. VRIES (2015): "An Illustrated User Guide to the World Input–Output database: The Case of Global Automotive Production," *Review of International Economics*, 23, 575–605.

UNHCR (2022): "Belgium, Bulgaria, Czech Republic, Germany, France, Italy, Lithuania, Moldova, Poland, Romania, Slovak Republic, Spain, Turkey: Survey of intentions and perspectives of refugees from Ukraine version 2 Sept 2022," United Nation High Commissioner for Refugees.