Brexit and trade competition
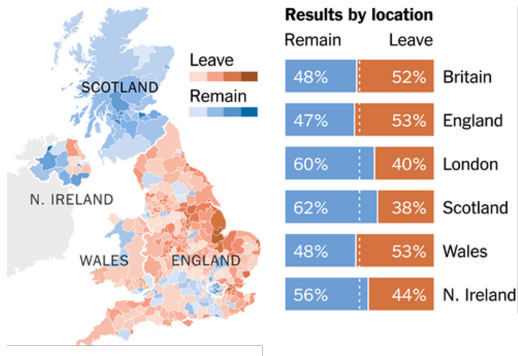## Did trade competition affect the leaving vote?

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Brexit referendum

Share of leave votes

Leave vote share is lower in London, Scotland, N. Ireland

Literature review

Brexit referendum

- education profile, historical dependence on manufacturing employment, low income, unemployment and share of older people are key drivers of the vote leave share (Becker et al., 2017, Arnorsson and Zoega, 2018).

- regions voting for leave have the greatest levels of dependency on European Union markets for their local economic development (Los et al., 2016).

- immigration stock has a negative effect on the leave share (Becker et al.,2017) while dislike of immigrants has a positive effect (Arnorsson and Zoega, 2018).

Literature review

Gains from trade

- labour market gains from trade are not distributed evenly (Akerman et al., 2013, Helpman, 2010)

- Import-competing sectors, regions, firms or workers tend to fare worse in relative terms than their export-oriented counterparts (Autor et al., 2013)

- At the worker level, this is particularly problematic for less educated workers in manufacturing, who face the largest obstacles to labour mobility and therefore bear a larger part of the relative adjustment costs (Dix-Carneiro, 2014)

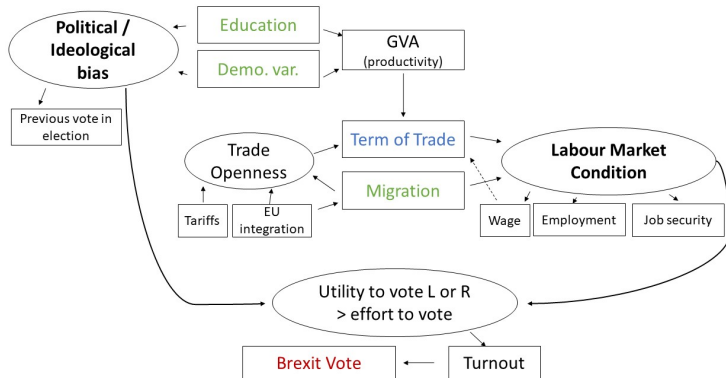**Trade openness, term of trade and share of leave votes**
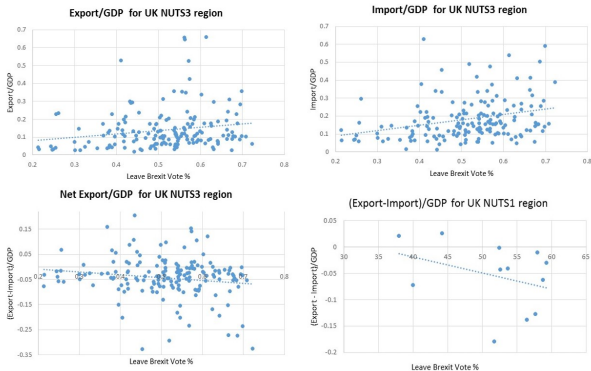
Negative correlation between trade openness and remain vote

System dynamics

The Brexit choiche model
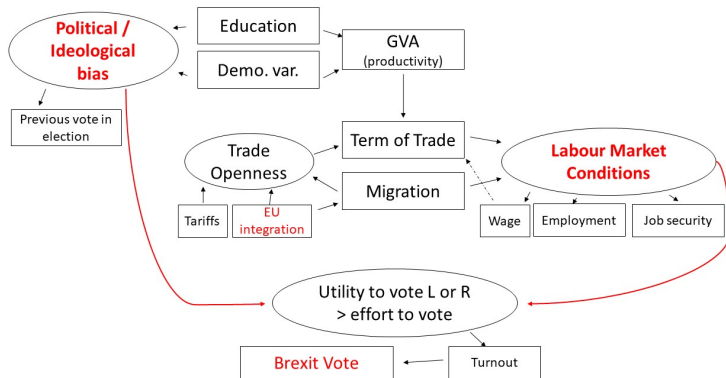
Latent (circled) and observed (squared) variables

System dynamics

Confounding factors

Independent (blue), confounding (green) and dependent (red) variables

Research questions and policy implication

Research questions

- Are the benefits from trade competition distributed unequally, leaving some geographic areas much worse off?
- Did trade openness influence the labour market, affecting the Brexit vote?
- Is the effect of trade competition greater than the impact of migration?

Policy implications

- Could an effective compensation of trade losers, or compensation schemes for geographical areas, prevent isolationism and the liberalism crisis?

A hypothetical utility curve

Preliminary results
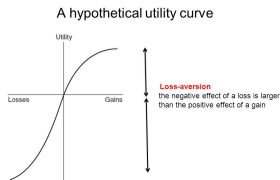
Trade competition in final and intermediate goods, at NUTS1 level

- From the Chaney (2008) model of trade we compute the average regional (NUTS1) residuals that are proxies for the exporting and importing attitude of regions.

$$X_{ijt}^h = \mu_h \frac{Y_{it} Y_{jt}}{Y_t} \left(\frac{w_{it} \tau_{ij}^h}{\theta_{jt}^h} \right)^{-\gamma_h} \left(f_{ijt}^h \right)^{1 - \frac{\gamma_h}{(\sigma_h - 1)}}$$

- For export, considering regions i,l $\in UK \rightarrow f_{ij}^h = f_{lj}^h = f_j^h = \theta_j^H$

$$lnX_{ij}^h = \theta_H + ln(Gdp_i) + ln(Gdp_j) - const - \gamma_{1H}ln\,(Gdp\,per\,capita_i) - \gamma_{2H}\log\,(dist_{ij}) + \theta_j^H + \varepsilon_{ij}^h$$

$$Eq.\ 1$$

- For import, considering regions j,l $\in UK \rightarrow f_{ij}^h = f_{il}^h = f_i^h = \theta_i^H, \theta_j^h = \theta_l^h = \theta_H$

$$lnX_{ij}^h = \theta_H + ln(Gdp_i) + ln(Gdp_j) - const - \gamma_{1H}ln\,(Gdp\,per\,capita_i) - \gamma_{2H}\log\,(dist_{ij}) + \theta_i^H + \varepsilon_{ij}^h$$
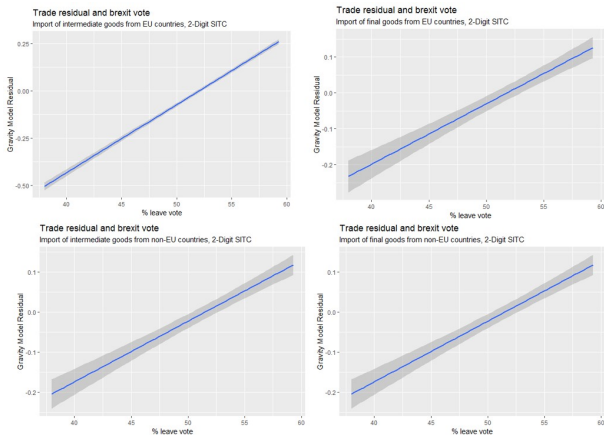
$$Eq.\ 2$$

Preliminary results

- Dataset includes regional (NUTS1) trade data from 2013 to 2016, for 160 exporting and importing countries at SITC 2-digit products (h)
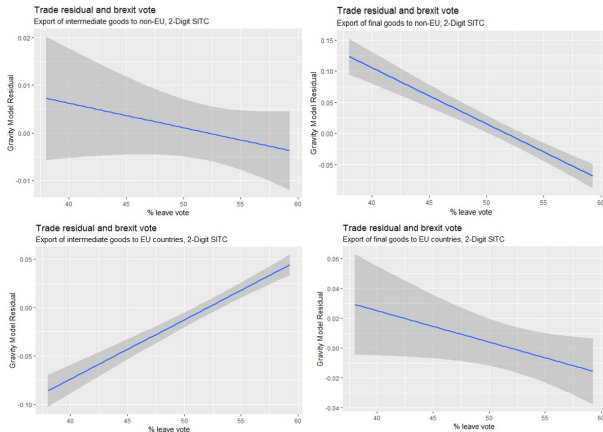
Export residuals for intermediate and final goods to EU, non-EU countries

Preliminary results

Import residuals for intermediate and final goods to EU, non-EU countries

Preliminary results

- Differently from the export/gdp openness index, regions with higher attitude to export are more likely to vote remain than leave, except for regions exporting intermediate goods to EU countries.
- Regions importing more intermediate goods from EU countries are the most likely to vote leave.

Theoretical model - Firm production

- As in Baldwin and Taglioni (2014) or Jang and Song (2017) we consider gravity model of trade with intermediate inputs, adding regional labour productivity parameter (φ) in the production function.

$$Y_i^h = \left[(\alpha_{iL}^h)^{\frac{1}{\epsilon_h}} (\varphi L)^{\frac{\epsilon_h - 1}{\epsilon_h}} + (\alpha_{iC}^h)^{\frac{1}{\epsilon_h}} (q_c)^{\frac{\epsilon_h - 1}{\epsilon_h}} \right]^{\frac{\epsilon_h}{\epsilon_h - 1}}$$

- where ϵ_h is the elasticity of substitution between labour (L) and the intermediate composite good (q_c)
- The price index of the good produced by the firm, (P_i^h) is equal to the unit (marginal) cost.

$$P_i^h = c_i(\varphi) = \left[\alpha_{iL}^h \left(\frac{w_i}{\varphi} \right)^{1-\epsilon_h} + \alpha_{iC}^h (P_i^{Ch})^{1-\epsilon_h} \right]^{\frac{1}{1-\epsilon_h}}$$

- P_i^{Ch} is the cost of the intermediate composite good and σ_h the elasticity of substitution among the produced goods.

$$P_i^{Ch} = \left[\sum_j (p_{ji}^h)^{1-\sigma_h} \right]^{\frac{1}{1-\sigma_h}}$$

Theoretical model - Household demand and export equation

- As in Song and Jang (2017), the representative consumer maximizes an utility function made of a composite good (G_{ih}^F) produced all over the world

$$U_i = \left[\sum_h (\alpha_{ih}^F)^{\frac{1}{\epsilon_f}} \left(G_{ih}^F \right)^{\frac{\epsilon_f - 1}{\epsilon_f}} \right]^{\frac{\epsilon_f}{\epsilon_f - 1}}, \qquad G_{ih}^F = \left[\int g_{ij}^{F \frac{\sigma_h - 1}{\sigma_h}} \right]^{\frac{\sigma_h}{\sigma_h - 1}}$$

- aggregating firm and household demand, maximizing the firm profit and aggregating firm production (with homogeneous productivity) we have

$$X_{ij}^h = n_i^h \left(\frac{\sigma_h}{\sigma_h - 1} \frac{c_i^h(\varphi) \tau_{ij}^h}{P_j^{Ch}} \right)^{1 - \sigma_h} GO_j^h (1 + \theta_j^h)$$

- GO_j^h is the gross output of sector h in country j and θ_j^h is the net import over the gross output

Theoretical model - The labour demand

- Rearranging the gravity equation

$$X_{ij}^h = \left(\frac{\tau_{ij}^h}{\Pi_i^h P_j^{Ch}}\right)^{1-\sigma_h} \frac{GO_i^h GO_j^h (1+\theta_j^h)}{GO_W^h}, \; \Pi_i^h = \Sigma_j \left(\left(\frac{\tau_{ij}^h}{P_j^{Ch}}\right)^{1-\sigma_h} \frac{GO_j^h (1+\theta_j^h)}{GO_W^h}\right)$$

- we derive the **labour demand for one unit of product**

$$w_i L_i^h = \alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} \left[\alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} + \alpha_{iC}^h (P_i^{Ch})^{1-\epsilon_h}\right]^{\frac{\epsilon_h}{1-\epsilon_h}}$$

- and the **total labour demand**

$$w_i L_i^h = \alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} \frac{n_i^h \left[\alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} + \alpha_{iC}^h (P_i^{Ch})^{1-\epsilon_h}\right]^{\frac{1-\sigma_h}{1-\epsilon_h}-1} \Pi_i^h}{\sum_i \left(n_i^h \left[\alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} + \alpha_{iC}^h (P_i^{Ch})^{1-\epsilon_h}\right]^{\frac{1-\sigma_h}{1-\epsilon_h}} \Pi_i^h\right)} GO_W^h$$

Theoretical model - The labour demand

- because of the exponent $(\frac{1-\sigma_h}{1-\epsilon_h} - 1)$, if the elasticity of substitution of the goods h (σ_h) is greater than the elasticity of substitution between labour and the intermediate good used in the production (ϵ_h), a decrease of the intermediate good price (P_i^{Ch}) increases the labour demand

	$\Delta P_i^{Ch} < 0$	$\Delta P_i^{Ch} > 0$
$\sigma_h > \epsilon_h$	$\Delta WL > 0$	$\Delta WL < 0$
$\sigma_h < \epsilon_h$	$\Delta WL < 0$	$\Delta WL > 0$

Theoretical model - EU inclusion

- from 2004 to 2007, 12 low income countries joined the EU (east Europe + Cyprus)
- we had a competitive effect on the EU market: with lower τ_{sj} the prices of final and intermediate goods decrease
- therefore, there is a negative effect on the labour demand due to the lower prices of the competing countries (larger Π_s^h in the denominator) and a positive effect (if $\sigma_h > \epsilon_h$) caused by the lower prices of the intermediate goods used in the production
- for labour intensive (high α_{iL}^h) tradable sectors, the negative (competitive) effect overcomes the positive supply chain effect (lower P_i^{Ch}).

- recalling:

$$w_i L_i^h = \alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} \frac{n_i^h \left[\alpha_{iL}^h \left(\frac{w_i}{\varphi}\right)^{1-\epsilon_h} + \alpha_{iC}^h (P_i^{Ch})^{1-\epsilon_h}\right]^{\frac{1-\sigma_h}{1-\epsilon_h}-1} \Pi_i^h}{\sum_s \left(n_s^h \left[\alpha_{sL}^h \left(\frac{w_s}{\varphi}\right)^{1-\epsilon_h} + \alpha_{sC}^h (P_s^{Ch})^{1-\epsilon_h}\right]^{\frac{1-\sigma_h}{1-\epsilon_h}} \Pi_s^h\right)} GO_W^h$$

$$\Pi_s^h = \sum_j \left(\left(\frac{\tau_{sj}^h}{P_j^{Ch}}\right)^{1-\sigma_h} \frac{GO_j^h(1+\theta_j^h)}{GO_W^h}\right), P_i^{Ch} = \left[\sum_s (\tau_{si}^h c_s^h)^{1-\sigma_h}\right]^{\frac{1}{1-\sigma_h}}$$

- we can explain the positive correlation between leave vote and the export residual for intermediate goods, whenever intermediate goods are labour intensive (high α_{iL}^h) or they have large elasticity of substitution among inputs (ϵ_h)

Labour market effect

- discovering sectors at national level where $\sigma_h < \epsilon_h$, we compute the total labour compensation growth at NUTS1 level, for these sectors and the whole economy.

All economic sectors

Sectors with high elasticity of substitution between intermediate goods and labour
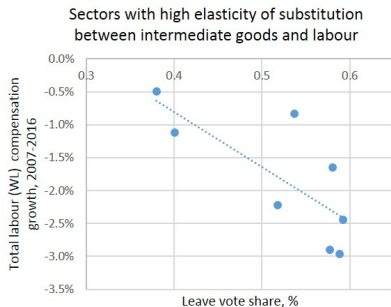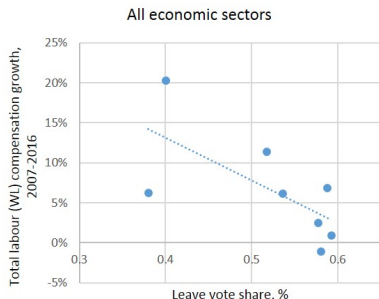
- leave vote shares are higher in NUTS1 regions where losses of labour compensation, in sectors that are negatively affected by trade liberalizations, are larger.

Following steps

- estimate the structural model (identification problem)

- analyse data at more disaggregated level (lack of sectors and products data at NUTS3 level)

THANKS FOR YOUR ATTENTION