

Goods and Factor Market Integration: A Quantitative Assessment of the EU Enlargement

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商品与要素市场一体化：对欧盟扩大的定量评估

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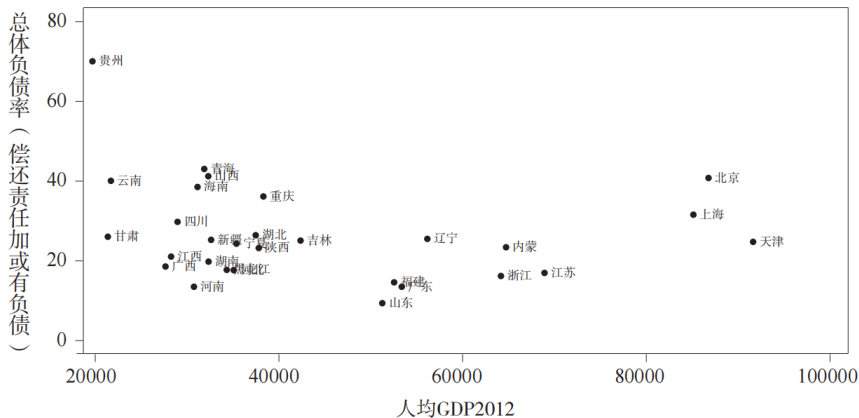
- 引言：从欧洲来看中国
- 事件背景：欧盟 2004 年的扩大
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- 数据与估计方法
- 欧盟扩大的经济影响
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中国经济的欧洲化

- 欧元区病：财政独立的货币联盟
 - 2011 年欧债危机：国际收支危机
 - 欧元区内部不同国家生产率存在差异，理论上生产率决定了汇率。然而，欧元区内部实施统一的货币政策。
 - 边缘国家主权债务增加的原因：欧元区内部劳动力不能完全自由流动，生产率差异导致的贸易逆差无法改变；然而不存在更高级政府的转移支付。
- 虽然中国中央政府存在转移支付，但是在经济发展水平较为落后的地区依然呈现出债务率更高的现象。中国经济也面临与欧元区相似的问题。
- 关键在于劳动力要素的流动。

中国经济的欧洲化

图 1 中国地方政府债务的地理分布



欧盟扩大对中国有所启示吗？

- 欧盟的扩大主要表现在允许自由移民和自由贸易，也就是减少了地区间劳动力流动和商品流动的约束。
- 欧盟扩大所接受的 10 个国家都是欧洲发展水平相对较低的国家，欧盟扩大导致商品流动和要素流动的变化与中国的一体化进行有可类比性。

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- **事件背景：欧盟 2004 年的扩大**
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欧盟 2004 年的扩大

- 2004 年 5 月 1 日，10 个国家加入欧盟，成员国由 15 个增加到 25 个。
 - EU-15：奥地利、比利时、丹麦、芬兰、德国、希腊、西班牙、法国、爱尔兰、意大利、卢森堡、荷兰、葡萄牙、瑞典和英国
 - New Member States (NMS)：捷克共和国、塞浦路斯、爱沙尼亚、拉脱维亚、立陶宛、匈牙利、马耳他、波兰、斯洛文尼亚和斯洛伐克
- 不同国家在人口规模、技术工人禀赋方面存在很强的异质性。
 - 人口规模：马耳他 40 万人，波兰 3800 万人
 - 技术工人（低技术/高技术）：EU-15 国家 3.8，NMS 国家 5.2

欧盟 2004 年的扩大

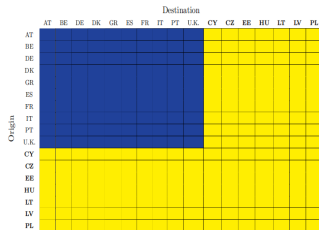


移民政策的变化

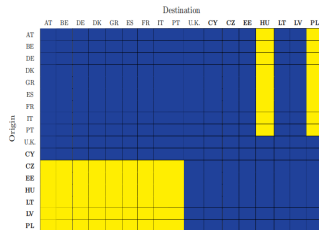
- 欧盟成员国之间居民和商品可以自由流动。
 - 成员国居民可以实现无障碍流动
 - 成员国工人在就业、薪酬以及其他条件方面不能存在基于国籍的任何歧视
 - 移民在税收优惠和社会待遇等方面与本地居民是平等的
- 2003 年《加盟条约 (Accession Treaty)》
 - 允许旧成员国的劳动力市场对新成员国 (除了马耳他和塞浦路斯) 仍然保持暂时性的限制, 移民受到本国的管理
 - 限制最多维持 7 年, 形成了 2-3-2 的阶段

移民政策的变化

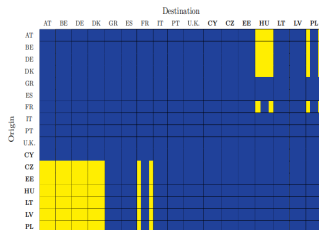
(a) Before the 2004 Enlargement



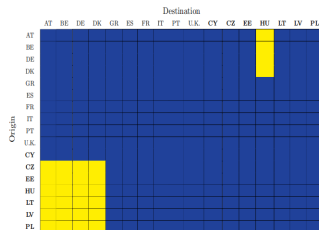
(b) Phase 1 - May 1st, 2004 to April 30th, 2006



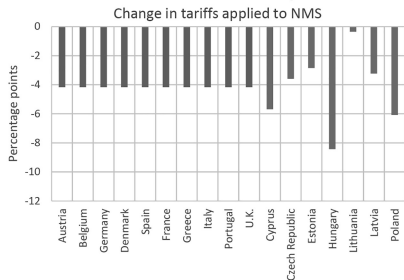
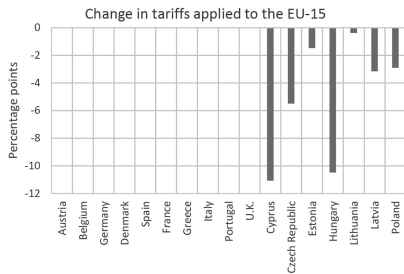
(c) Phase 2 - May 1st, 2006 to April 30th, 2009



(d) Phase 3 - May 1st, 2009 to April 30th, 2011



贸易政策的变化



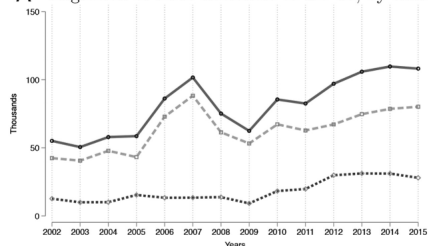
人口流动与就业

- 数据来源：European labor force survey (EU-LFS)
 - 包含欧盟成员国国家和部分其他国家
 - 数据包含了受访者的年龄、国籍、技能、劳动力状况 (就业、非就业)、12 个月前的居住国等信息
 - 共有 17 个欧盟国家有前后相一致的数据，其中 10 个属于 EU-15，7 个属于 NMS(2004 年涵盖了 91% 的欧盟人口)
- 技术工人的划分
 - 高技能群体：至少受过一些大学教育
 - 低技能群体：高中及以下学历
- 移民的定义
 - 对比上一年所在的国家 (origin) 与当前所在的国家 (destination)
 - 如果上一年是在 NMS，当前在 EU-15，则为从 NMS 到 EU-15 的移民

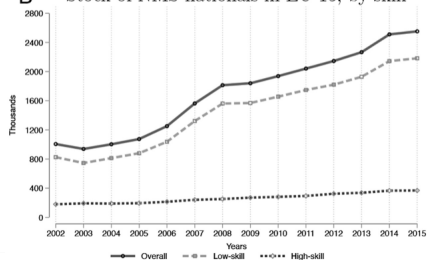
人口流动与就业

- 移民群体的主要是低技能群体，不同群体趋势不完全相同
- 存量呈现出上升的趋势，趋势在某些特定时点有所改变

A Migration of NMS nationals to EU-15, by skill



B Stock of NMS nationals in EU-15, by skill



人口流动与就业

- 就业状态是比较持久性的
- 移民群体更有可能从非就业状态转变为就业状态

Table C.1: Transition rates between empl. and non-empl. for NMS nationals (percent)

status at $t-1$ /status at t	Panel (a): All NMS households			
	Stayers		Migrants to EU-15 countries	
	Non-employment	Employment	Non-employment	Employment
Non-employment	89	11	51	49
Employment	6	94	19	81
	Panel (b): Low-skilled NMS households			
	Stayers		Migrants to EU-15 countries	
	Non-employment	Employment	Non-employment	Employment
Non-employment	90	10	51	49
Employment	7	93	18	82
	Panel (c): High-skilled NMS households			
	Stayers		Migrants to EU-15 countries	
	Non-employment	Employment	Non-employment	Employment
Non-employment	73	27	54	46
Employment	4	96	24	76

Note: This table shows the transition rates between employment and non-employment for NMS national stayers and migrants into EU-15 countries. Panel (a) presents the transition rates for all NMS nationals, Panel (b) shows the transition rates for low-skilled households, and Panel (c) presents the transition rates for high-skilled households.

一个简约式估计

- 考察 2004 年后 NMS 到英国移民的变化，回归方程：

$$\ln F_{n,t}^{i,UK} = \lambda_{i,t} + \alpha_{NMS} + \beta_{03}\mathbb{I}(n = NMS; t \geq 2003) + \beta_{04}\mathbb{I}(n = NMS; t \geq 2004) + \varepsilon_{n,t}^i$$

TABLE 1
REDUCED-FORM ESTIMATES OF CHANGE IN THE FLOW OF NMS
NATIONALS MIGRATING TO THE UNITED KINGDOM

	(1)	(2)
Year $\geq 2004 \times$ treatment (β_{04})	3.286* (1.872)	2.824** (1.375)
Year $\geq 2003 \times$ treatment (β_{03})	-.925 (2.202)	
Origin-time fixed effects	x	x
NMS fixed effects	x	x
Observations	126	126
R^2	.495	.490

NOTE.—Robust standard errors are shown in parentheses.

* $p < .10$.

** $p < .05$.

一个简约式估计

- 波兰移民者的目的地变化

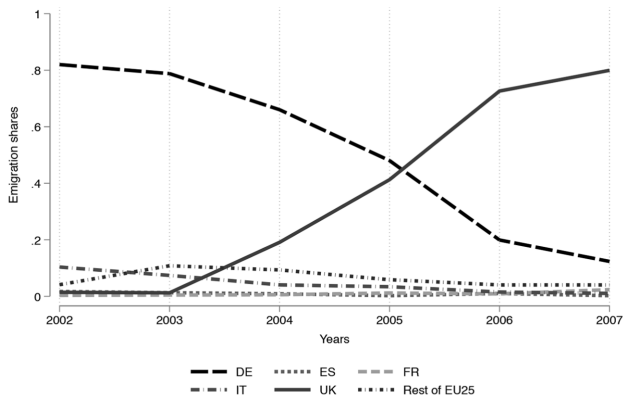


FIG. 3.—The United Kingdom leapfrogs Germany as the top destination for migrants from Poland. The graph charts, for each year, migrants from Poland to EU-25 nations by country of destination as a share of total Polish migrants.

一个简约式估计

- 进一步估计？
 - 不同技能的工人？不同劳动力供给状态？
 - 简约式估计到此为止！
- 目标：识别欧盟扩大的因果效应

- 经验研究中的两种思路：
简约式 (reduced-form) v.s. 结构模型 (structural model)

简约式 v.s. 结构模型

- reduced-form
 - Advantages: Easy to implement, accurate.
 - Disadvantages
 - Suffer from Lucas Critique, which argues that it is naive to try to predict the effects of a change in economics policy entirely on the basis of relationship observed in historical data, especially highly aggregated historical data.
 - Sometimes, the estimated parameters are variant to policy interventions. They are not the primitive parameters for the data generating process.
 - Unable to recover some interesting underlying parameters, such as cost.
 - Exogenous shocks are needed to identify parameters.
 - Hard to conduct some complicated counterfactual analysis.
- structural model
 - Advantages
 - Can survive Lucas Critique.
 - Conduct counterfactual analysis or policy prediction.
 - Disadvantages
 - Sometimes, we have to impose assumptions on unobservable, which are hard to verify.
 - The theoretical basis might be wrong.
 - It is usually time-consuming and hard to estimate a complex structural model.

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Dynamic General Equilibrium Model: Set-up

- N countries: i (origin), j (destination)
- Competitive labor market, high- and low- skilled labor
- Households have perfect foresight and make forward-looking labor relocation decision subject to migration costs and idiosyncratic preferences
- Heterogeneous productivity firms (Fréchet distribution, θ) – EK model (Eaton and Kortum, 2002)
- A fraction of goods are traded across countries
- The trade is subject to trade costs: an ad-valorem tariffs and iceberg costs
- Goods market and labor market clearing

A. Households

- The value $v_{n,s,t}^{il}$ is given by:

$$v_{n,s,t}^{il} = \ln C_{s,t}^{il} + \max_{\{j,o\}_{j=1,o=e,ne}^N} \left\{ \beta E \left[v_{n,s,t+1}^{jo} \right] - m_{n,s,t}^{il,jo} + \nu \epsilon_{n,s,t}^{jo} \right\}$$

- Consumption $C_{n,s,t}^{il}$

$$C_{n,s,t}^{il} = \begin{cases} \omega_{s,t}^i / P_t^i & \text{if } \ell = e, \\ b_i & \text{if } \ell = ne, \end{cases} \quad (2)$$

- Migration cost $m_{n,s,t}^{il,jo}$

$$m_{n,s,t}^{il,jo} = \tilde{m}_{n,s,t}^{il,jo} + mpol_{n,t}^{i,j}$$

- nonpolicy component: $\tilde{m}_{n,s,t}^{il,jo} = \bar{m}_{n,s,t}^{il} + \bar{m}_{n,s,t}^{jo} + \bar{m}_{n,s,t}^{il,jo}$
- policy component: $mpol_{n,t}^{i,j}$

A. Households

- Define $V_{n,s,t}^{il} \equiv E[v_{n,s,t}^{il}]$

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

- The fraction of households that migrates from i to j $\mu_{n,s,t}^{il,jo}$

$$\mu_{n,s,t}^{il,jo} = \frac{\exp \left(\beta V_{n,s,t+1}^{jo} - m_{n,s,t}^{il,jo} \right)^{1/\nu}}{\sum_{k=1}^N \sum_{a=e,ne} \exp \left(\beta V_{n,s,t+1}^{ka} - m_{n,s,t}^{il,ka} \right)^{1/\nu}} \quad (3)$$

A. Households

- The series of the stock of employment households:

$$L_{s,t+1}^{ie} = \sum_{n=1}^N \sum_{j=1}^N \sum_{\ell=e,ne} \mu_{n,s,t}^{j\ell,ie} L_{n,s,t}^{j\ell} \quad (4)$$

- Similarly, we can get the expression of $L_{s,t+1}^{ine}$
- Finally, the total stock of households in each country is then given by the sum of high- and low-skilled employed and nonemployed households of all nationalities

$$L_t^i = \sum_{s=h,l} \sum_{\ell=e,ne} L_{s,t}^{i\ell}$$

B. Production

- A continuum of goods is produced in each country with technology as described by Eaton and Kortum (2002).
- Production function:

$$q_t^i = z^i A_t^i \left(\sum_{s=h,l} \delta_{s,t}^{i, 1/\rho} (L_{s,t}^{ie}(z^i))^{\rho-1/\rho} \right)^{\rho(1-\gamma^i)/(\rho-1)} (H^i(z^i))^{\gamma^i} \quad (5)$$

$$\Rightarrow q_t^i = z^i A_t^i \left[\left((\delta_{h,t}^i)^{1/\rho} (L_{h,t}^{ie})^{\rho-1/\rho} + (\delta_{l,t}^i)^{1/\rho} (L_{l,t}^{ie})^{\rho-1/\rho} \right)^{\rho-1} \right]^{1-\gamma^i} (H^i(z^i))^{\gamma^i}$$

- Technology levels are endogenous and proportional to the size of the economy: $A_t^i = \Phi_t^i L_t^i$
- And a variety-specific component z^i , which is a stochastic realization from a Fréchet distribution.

B. Production

- The return of the fixed factor r_t^i
- Assuming that these rents are sent to a global portfolio and that rentiers obtain a share τ_i of the global portfolio revenues given by $\chi_t = \sum_{i=1}^N r_t^i H^i$, where r_t^i is the rental price of structures in country i
- Trade costs: $\kappa_t^{i,j} = (1 + \tau_t^{i,j}) d_t^{i,j}$
- Solve for the bilateral trade shares $\pi_t^{i,j}$ and the price index P_t^i as Eaton and Kortum (2002)

$$\pi_t^{i,j} = \frac{A_t^j (\kappa_t^{i,j} x_t^j)^{-\theta}}{\sum_{k=1}^N A_t^k (\kappa_t^{i,k} x_t^k)^{-\theta}} \quad (6)$$

$$P_t^i = \left(\sum_{j=1}^N A_t^j (\kappa_t^{i,j} x_t^j)^{-\theta} \right)^{-1/\theta} \quad (7)$$

where x_t^i is the unit price of an input bundle.

C. Market Clearing

- Goods market clearing

$$X_i = \sum_{n=1}^N \sum_{s=h,l} w_{s,t}^i L_{n,s,t}^{ie} + \iota^i \kappa_t + T_t^i, \text{ for all } i \quad (9)$$

- Labor market clearing

$$w_{s,t}^i L_{s,t}^{ie} = \xi_{s,t}^i (1 - \gamma^i) \sum_{j=1}^N \frac{\pi_t^{j,i}}{(1 + \tau_t^{j,i})} X_t^j, \text{ for all } i, s \quad (10)$$

D. Equilibrium

- The set of constant and time-varying fundamentals:

$$\Theta_t \equiv \left\{ d_t^{i,j}, \tilde{m}_{n,h,t}^{il,jo}, \tilde{m}_{n,l,t}^{il,jo}, \Phi_t^i, \delta_{h,t}^i, \delta_{l,t}^i, H^i, b^i \right\}_{n=1; i=1; j=1; \ell, o=e, ne}^{N, N, N}$$

- The different economic policies \rightarrow tariffs and migration policies:

$$\Upsilon_t \equiv \left\{ \tau_t^{i,j}, mpol_{n,t}^{i,j} \right\}_{n=1; i=1; j=1}^{N, N, N}$$

- The state of economy:

$$L_t \equiv \left\{ L_{n,h,t}^{i\ell}, L_{n,l,t}^{i\ell} \right\}_{n=1; i=1; \ell=e, ne}^{N, N}$$

- The force to reach equilibrium:

$$\left\{ w_{h,t}^i, w_{l,t}^i, r_t^i, P_t^i \right\}_{i=1}^N$$

D. Equilibrium

- Definition 1.

Given $(L_t, \Theta_t, \Upsilon_t)$, the temporary equilibrium is a set $\{w_{h,t}^i, w_{l,t}^i, r_t^i\}$ of factor prices that solves the equilibrium conditions.

- Definition 2.

Given an initial allocation of labor L_0 , a sequence of fundamentals $\{\Theta_t\}_{t=0}^{\infty}$, and a sequence of policies $\{\Upsilon_t\}_{t=0}^{\infty}$, a sequential competitive equilibrium of the model is a sequence

$\left\{ \left\{ L_{n,s,t}^{it}, \mu_{n,s,t}^{il,jo}, V_{n,s,t}^{il}, \omega_{s,t}^i(L_t, \Theta_t, \Upsilon_t) \right\}_{n=1; i=1; j=1; \ell, o=e, ne; s=h, l}^{N, N, N} \right\}_{t=0}^{\infty}$, that

solves the households' dynamic problem, equilibrium conditions and the temporary equilibrium at each t .

E. Solving for Policy Changes

- Traditional method needs to calibrate many fundamental parameters.
- An alternative method proposed by Caliendo, Dvorkin, and Parro (2019), Dynamic Hat Algebra (DHA), allows to conduct the quantitative analysis without estimating the fundamentals of the economy.
- What is Hat?
 - define $\dot{y}_{t+1} \equiv y_{t+1}/y_t$
 - consider a change of policies: $\{\Upsilon_t\}_{t=0}^{\infty} \rightarrow \{\Upsilon'_t\}_{t=0}^{\infty}$
 - define $\hat{y}_{t+1} \equiv \dot{y}'_{t+1}/\dot{y}_{t+1}$
 - the hat variable denotes the relative time difference of the variable under a sequence of policies $\{\Upsilon'_t\}_{t=0}^{\infty}$ relative to the sequence of policies $\{\Upsilon_t\}_{t=0}^{\infty}$.

E. Solving for Policy Changes

- Proposition 1. Given a baseline economy, $\{L_t, \mu_t, \pi_t, X_t\}_{t=0}^{\infty}$, elasticities $(\nu, \theta, \beta, \rho)$, and a sequence of counterfactual changes in policy $\{\hat{Y}\}_{t=0}^{\infty}$, solving the model does not require $\{\Theta\}_{t=0}^{\infty}$ and solves

$$\hat{u}_{n,s,t}^{il} = \hat{C}_{s,t}^{il} \left(\sum_{j=1}^N \sum_{o=e,ne} \mu_{n,s,t-1}^{il,jo} \hat{\mu}_{n,s,t}^{il,jo} (\widehat{mpol}_{n,t}^{i,j})^{-\frac{1}{\nu}} (\hat{u}_{n,s,t+1}^{jo})^{\frac{\beta}{\nu}} \right)^{\nu} \quad (12)$$

$$\hat{\mu}_{n,s,t}^{il,jo} = \frac{\hat{\mu}_{n,s,t-1}^{il,jo} \hat{\mu}_{n,s,t}^{il,jo} (\widehat{mpol}_{n,t}^{i,j})^{-\frac{1}{\nu}} (\hat{u}_{n,s,t+1}^{jo})^{\frac{\beta}{\nu}}}{\sum_{k=1}^N \sum_{a=e,ne} \hat{\mu}_{n,s,t-1}^{il,ka} \hat{\mu}_{n,s,t}^{il,ka} (\widehat{mpol}_{n,t}^{i,k})^{-\frac{1}{\nu}} (\hat{u}_{n,s,t+1}^{ka})^{\frac{\beta}{\nu}}} \quad (13)$$

$$L_{n,s,t+1}^{io} = \sum_{j=1}^N \sum_{\ell=e,ne} \mu_{n,s,t}^{j\ell,io} L_{n,s,t}^{j\ell} \quad (14)$$

for all ℓ, n , and s , where $\hat{\mu}_{n,s,t}^{il,jo}$ is the time evolution of migration flows in the baseline economy. (following from Caliendo, Dvorkin, and Parro (2019).)

E. Solving for Policy Changes

- Construct baseline economy
 - a sequence of observed data including the policy changes due to the EU enlargement
 - assuming that all fundamentals and policy variables remain permanently unchanged following the data period
- Construct counterfactual sequence of policies
 - the counterfactual sequence of policies is to leave tariffs and migration policy unchanged, that is, at the pre-enlargement level
- A belief summary of the algorithm

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结构模型需要的预估参数

- DHA 方法需要的现实数据

- 分类人口存量数据、移民数据、贸易份额数据、总支出数据

$$\left\{ L_{n,s,t}^{il}, \mu_{n,s,t}^{il,jo}, \pi_t^{i,j}, X_t^i \right\}_{t=0}^{\infty}$$

- 移民成本弹性、贸易成本弹性、贴现率、技能工人替代率、要素间分配、劳动要素内部分配

$$(\nu, \theta, \beta, \rho, \gamma, \xi)$$

- 关税相对变化、移民成本相对变化

$$\{\hat{\Upsilon}\}_{t=0}^{\infty} \equiv \left\{ \hat{\tau}_t^{i,j}, mpol_{n,t}^{i,j} \right\}_{t=0}^{\infty}$$

- 基本上直接可得的数据

- 分类人口存量数据、移民数据: EU-LFS
- 贸易份额数据、总支出数据、要素间分配、劳动要素内部分配: World Input-Output Database (WIOD)

- 部分参数值

- $\theta = 4.5$ (Caliendo and Parro, 2015)
- $\beta = 0.97$
- $\nu = 2$ (Artuç et al., 2010; Artuç and McLaren, 2015; Caliendo et al., 2019)

移民成本的变化

- 利用 reduced-form 为 structural model 估计参数
- 移民政策改变的两个阶段
 - 第一阶段：英国 (2004)；希腊、意大利、西班牙和葡萄牙 (2006)
 - 第二阶段：法国 (2008)；比利时、丹麦 (2009)；奥地利 (2011)；德国 (2011)

Estimation Strategy for the First Wave

- Assuming there are 3 countries: A, B and C, and there is a policy change between A and B
- The migration costs we discussed before:

$$m_{n,t}^{i,j} = \bar{m}_{n,t}^i + \bar{m}_{n,t}^j + \bar{m}_{n,t}^{i,j} + mpol_{n,t}^{i,j}$$

- The equilibrium flows of households in A that migrate to B is given by:

$$\mu_{n,t}^{A,B} = \frac{\exp\left(\beta V_{n,t+1}^B - m_{n,t}^{A,B}\right)^{1/\nu}}{\sum_{k=A,B,C} \exp\left(\beta V_{n,t+1}^k - m_{n,t}^{A,k}\right)^{1/\nu}}$$

$$\Rightarrow \frac{\mu_{n,t}^{A,B}}{\mu_{n,t}^{A,A}} = \frac{\exp\left(\beta V_{n,t+1}^B - m_{n,t}^{A,B}\right)^{1/\nu}}{\exp\left(\beta V_{n,t+1}^A - m_{n,t}^{A,A}\right)^{1/\nu}}$$

$$\Rightarrow y_{n,t}^{A,B} - y_{n,t}^{A,A} = -\frac{1}{\nu} \left(\bar{m}_{n,t}^A + \bar{m}_{n,t}^B + \bar{m}_{n,t}^{A,B} + mpol_{n,t}^{A,B} - m_{n,t}^{A,A} \right) + \frac{\beta}{\nu} V_{n,t+1}^B - \frac{\beta}{\nu} V_{n,t+1}^A$$

Estimation Strategy for the First Wave

$$\Rightarrow y_{n,t}^{A,B} - y_{n,t}^{A,A} = -\frac{1}{\nu} \left(\bar{m}_{n,t}^A + \bar{m}_{n,t}^B + \bar{m}_{n,t}^{A,B} + mpol_{n,t}^{A,B} - m_{n,t}^{A,A} \right) + \frac{\beta}{\nu} V_{n,t+1}^B - \frac{\beta}{\nu} V_{n,t+1}^A$$

$$y_{n,t}^{A,C} - y_{n,t}^{A,A} = -\frac{1}{\nu} \left(\bar{m}_{n,t}^A + \bar{m}_{n,t}^C + \bar{m}_{n,t}^{A,C} + mpol_{n,t}^{A,C} - m_{n,t}^{A,A} \right) + \frac{\beta}{\nu} V_{n,t+1}^C - \frac{\beta}{\nu} V_{n,t+1}^A$$

$$y_{n,t}^{C,B} - y_{n,t}^{C,C} = -\frac{1}{\nu} \left(\bar{m}_{n,t}^C + \bar{m}_{n,t}^B + \bar{m}_{n,t}^{C,B} + mpol_{n,t}^{C,B} - m_{n,t}^{C,C} \right) + \frac{\beta}{\nu} V_{n,t+1}^B - \frac{\beta}{\nu} V_{n,t+1}^C$$

• Identification restrictions

- there is no change in policy between A and C or in policy for migrants in C moving to B:

$$mpol_{n,post}^{A,C} - mpol_{n,pre}^{A,C} = 0$$

$$mpol_{n,post}^{B,C} - mpol_{n,pre}^{B,C} = 0$$

- the difference between the nonpolicy migration costs between countries that change and do not change policy remains constant over time:

$$\bar{m}_{n,post}^{A,B} - \left(\bar{m}_{n,post}^{A,C} + \bar{m}_{n,post}^{C,B} \right) = \bar{m}_{n,pre}^{A,B} - \left(\bar{m}_{n,pre}^{A,C} + \bar{m}_{n,pre}^{C,B} \right)$$

Estimation Strategy for the First Wave

$$\begin{aligned} \Rightarrow y_{n,t}^{A,B} - y_{n,t}^{A,A} &= -\frac{1}{\nu} \left(\bar{m}_{n,t}^A + \bar{m}_{n,t}^B + \bar{m}_{n,t}^{A,B} + mpol_{n,t}^{A,B} - m_{n,t}^{A,A} \right) + \frac{\beta}{\nu} V_{n,t+1}^B - \frac{\beta}{\nu} V_{n,t+1}^A \\ y_{n,t}^{A,C} - y_{n,t}^{A,A} &= -\frac{1}{\nu} \left(\bar{m}_{n,t}^A + \bar{m}_{n,t}^C + \bar{m}_{n,t}^{A,C} + mpol_{n,t}^{A,C} - m_{n,t}^{A,A} \right) + \frac{\beta}{\nu} V_{n,t+1}^C - \frac{\beta}{\nu} V_{n,t+1}^A \\ y_{n,t}^{C,B} - y_{n,t}^{C,C} &= -\frac{1}{\nu} \left(\bar{m}_{n,t}^C + \bar{m}_{n,t}^B + \bar{m}_{n,t}^{C,B} + mpol_{n,t}^{C,B} - m_{n,t}^{C,C} \right) + \frac{\beta}{\nu} V_{n,t+1}^B - \frac{\beta}{\nu} V_{n,t+1}^C \end{aligned}$$

- Notation

$$Y_{n,t}^{A,B,C} \equiv (y_{n,t}^{A,B} - y_{n,t}^{A,A}) - (y_{n,t}^{A,C} - y_{n,t}^{A,A}) - (y_{n,t}^{C,B} - y_{n,t}^{C,C})$$

- From the triple differencing, we obtain:

$$Y_{n,post}^{A,B,C} - Y_{n,pre}^{A,B,C} = -\frac{1}{\nu} \left(mpol_{n,post}^{A,B} - mpol_{n,pre}^{A,B} \right) \quad (17)$$

Estimation Strategy for the First Wave

- Empirical specification for UK (Analogy to DDD):

$$\begin{aligned}
 y_{s,t}^{i,j} - y_{s,t}^{i,i} = & \sum_{s,t} \lambda_{s,t}^{UK} \mathbb{I}(j = UK; s; t) + \sum_{s,t} \sum_{origin \in NMS} \alpha_{s,t}^{origin} \mathbb{I}(i = origin \in NMS; s; t) + \\
 & \sum_s \sum_{origin \in NMS} \beta_s^{origin, UK} \mathbb{I}(i = origin \in NMS; j = UK; s) + \\
 & \beta_{post}^{NMS, UK} \mathbb{I}(i = origin \in NMS | j = UK, t \in post) + \varepsilon_{s,t}^{ij}
 \end{aligned}$$

- Coefficient we are interested in

$$\beta_{post}^{NMS, UK} \equiv -\frac{1}{\nu} (mpol_{NMS, post-enlarg}^{NMS, UK} - mpol_{NMS, pre-enlarg}^{NMS, UK})$$

The Changes of Immigration Costs

- The first wave

TABLE 2
ESTIMATES OF CHANGES IN MIGRATION POLICY: NMS NATIONALS ($n = \text{NMS}$)

Destination $j \rightarrow$	United Kingdom (2004)	Greece (2006)	Italy (2006)	Spain (2006)	Portugal (2006)
$\beta_{\text{post}}^{\text{NMS},j}$	3.29*** (.67)	1.50*** (.52)	.76** (.30)	.21 (.34)	.83*** (.29)
R^2	.98	.99	.99	.99	.99
Observations	564	564	564	564	564

NOTE.—The table reports estimates, from separate regressions, of the change in migration cost from NMS countries to either the United Kingdom, Greece, Italy, Spain, or Portugal for NMS nationals. Recall, from eq. (19), that a positive estimate implies a reduction in migration costs. The post periods are 2004–7 for the United Kingdom and 2006–7 for the rest. Robust standard errors are in parentheses. Similar significance is obtained if instead we use two-way clustering at the origin-destination-country level.

- The second wave

TABLE 3
CHANGES IN MIGRATION POLICY: ADDITIONAL EU COUNTRIES

Destination $j \rightarrow$	France (2008)	Belgium (2009)	Denmark (2009)	Austria (2011)	Germany (2011)
$\beta_{\text{post}}^{\text{NMS},j}$.62 (.54)	2.36*** (.48)	1.27** (.51)	1.60*** (.40)	3.10*** (.41)
R^2	.98	.98	.98	.99	.98
Observations	140	140	140	140	140

NOTE.—The table reports the estimates, from separate regressions, of the change in migration cost from NMS countries to either France, Belgium, Denmark, Germany, or Austria for NMS nationals. Recall, from eq. (21), that a positive estimate implies a reduction in migration costs. The post period is 5 years after the policy change for each country. Robust standard errors are in parentheses.

Elasticity of Substitution between Low- and High-Skilled Workers

- From the model, we get the relationship of relative wage and relative stock of workers:

$$\ln \frac{w_{h,t}^i}{w_{l,t}^i} = -\frac{1}{\rho} \ln \frac{L_{h,t}^{ie}}{L_{l,t}^{ie}} + \frac{1}{\rho} \ln \frac{\delta_{h,t}^{ie}}{\delta_{l,t}^{ie}}$$

- Estimation specification

$$\ln \frac{w_{h,t}^i}{w_{l,t}^i} = -\frac{1}{\rho} \ln \frac{L_{h,t}^{ie}}{L_{l,t}^{ie}} + \alpha^i + \varphi_t^i + \varepsilon_t^i \quad (22)$$

- Result: $\rho = 4$

TABLE 4
ELASTICITY OF SUBSTITUTION BETWEEN HIGH- AND LOW-SKILLED WORKERS

	(1)	(2)	(3)	(4)
Specification with $-1/\rho$	$\alpha^i + \varphi_t^i$ -.246*** (.083)	$\alpha + \varphi_t^i$ -.250*** (.027)	$\alpha^i + \varphi_t$ -.038 (.032)	$\alpha + \varphi_t$ -.221*** (.031)
R^2	.95	.84	.95	.27
Observations	130	130	130	130

NOTE.—Specification in col. 1 includes a country-specific time-invariant component and a country-specific linear trend, specification in col. 2 includes a common constant and a country-specific linear trend, specification in col. 3 includes a country-specific time-invariant component and a common linear trend, and specification in col. 4 includes a constant and a common linear trend. Robust standard errors are in parentheses.

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移民效应

- 欧盟扩大对移民的影响是渐进的

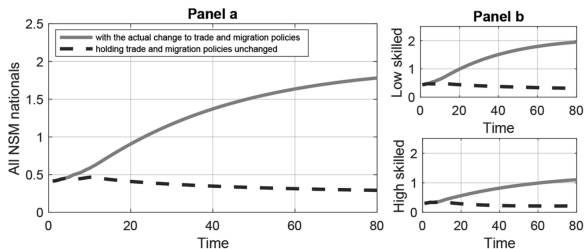


FIG. 4.—Evolution of the stock of NMS migrants in EU-15 countries by population share (percent). The solid lines show the evolution of this share with actual changes to trade and migration policies. The dashed lines show the evolution with trade and migration policies unchanged. *a*, Results for all migrants (employed and nonemployed). *b*, Results for high- and low-skilled households (as a share of high- and low-skilled populations, respectively). Time is expressed in years.

移民效应

- 在欧盟扩大的三年内，这一事件使得 EU-15 中来自 NMS 的移民存量增加了 5%；到 2015 年，增加的比例达到了 27.4%。
- 低技能劳动者的增加比例要大于高技能劳动者的增加比例。
- 如果贸易政策没有随之发生变化，欧盟扩大的移民效应还会更大。

TABLE 5
MIGRATION EFFECTS: CHANGE IN THE STOCK OF NMS NATIONALS IN EU-15

	ALL NMS		LOW SKILL		HIGH SKILL	
	EU Enlargement (1)	Trade Policy Unchanged (2)	EU Enlargement (3)	Trade Policy Unchanged (4)	EU Enlargement (5)	Trade Policy Unchanged (6)
2002	0	0	0	0	0	0
2007	.054	.055	.065	.065	.010	.013
2015	.274	.277	.307	.308	.142	.149
Steady state	1.654	1.671	1.797	1.810	1.074	1.106

NOTE.—Values in cols. 1, 3, and 5 show the percentage point change in the share of low-skilled and high-skilled NMS nationals in EU-15 countries due to the 2004 EU enlargement. Columns 2, 4, and 6 report the effects in the absence of trade policy changes.

移民效应

- 欧盟的扩大减少了不就业的比例，这一比例的减小在 NMS 中更加明显。
- 不就业比例的减少更多体现在低技能家庭，对高技能家庭的影响较小。

TABLE 6
EFFECTS OF THE EU ENLARGEMENT ON NONEMPLOYMENT SHARES

	ALL HOUSEHOLDS		LOW SKILL		HIGH SKILL	
	EU-15 (1)	NMS (2)	EU-15 (3)	NMS (4)	EU-15 (5)	NMS (6)
2002	0	0	0	0	0	0
2007	-.058	-.328	-.065	-.350	-.038	-.107
2015	-.096	-.730	-.114	-.801	-.046	-.147
Steady state	-.098	-1.881	-.143	-2.117	-.038	-.283

NOTES.—Values indicate the percentage point change in the share of nonemployed households due to the EU enlargement.

福利效应

- 欧盟的扩大使得欧洲整体的福利增加了，不论是 EU-15 还是 NMS 都从欧盟扩大中获得了好处。
- EU-15 获得的好处完全是来自于贸易的一体化，移民政策损害其福利。
- NMS 获得的好处更多来源与移民的开放 (解释了 68% 的福利变化)。
- 在各种情况下，高技能家庭增加的福利都更大。

TABLE 7
WELFARE EFFECTS OF TRADE AND MIGRATION POLICIES

	EU Enlargement (1)	Only Changes to Trade Policy (2)	Only Changes to Migration Policy (3)
EU-15:			
High skill	.136	.146	-.014
Low skill	.020	.094	-.076
Aggregate	.043	.105	-.064
NMS:			
High skill	1.701	.552	1.079
Low skill	1.099	.328	.755
Aggregate	1.170	.354	.793
Europe:			
Aggregate	.233	.147	.081

NOTES.—Values indicate the percentage change in welfare, measured as consumption equivalent, from changes to migration and trade policies. Column 1 presents the welfare effects due to changes in migration and trade policies, col. 2 presents the welfare effects from only changes to trade policies, and col. 3 shows the welfare effects due to only changes to migration policy. Aggregate effects are calculated as the population-weighted average of the high- and low-skilled households.

福利效应

- 自给自足的条件下，要素流动带来的要素价格变化导致的贸易条件变化影响较小。
- 而在自由贸易的条件下，对 NMS 的福利提升更加明显。

TABLE 8
TRADE OPENNESS AND WELFARE EFFECTS OF MIGRATION POLICY

	Only Changes to Migration Policy (1)	Changes to Migration Policy under Trade Autarky (2)	Changes to Migration Policy under Free Trade (3)
EU-15:			
High skill	-.014	.008	-.015
Low skill	-.076	-.063	-.077
Aggregate	-.064	-.049	-.065
NMS:			
High skill	1.079	1.009	1.086
Low skill	.755	.718	.758
Aggregate	.793	.752	.797
Europe:			
Aggregate	.081	.087	.081

NOTES.—Values show the percentage change in welfare, measured as consumption equivalent, due to the actual change to migration policy. Column 1 presents the welfare effects under the actual level of trade openness, col. 2 shows the welfare effects under trade autarky, and col. 3 shows the welfare effects under free trade.

额外的讨论：考虑公共服务

- 如果考虑到公共服务的拥挤效应 (将人均公共服务纳入居民的效用函数), 移民效应的发展趋势不会发生改变, 但是幅度会下降。
- 与之前的模型相比, 考虑公共服务的新模型中, NMS 的福利增大了 (疏导效应), EU-15 的福利减少了 (拥挤效应)。
- 除此之外, 文中还放松了对规模效应的设定、对固定要素收益分配的设定、对技能工人替代弹性的放松。

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总结

- 本文构建了一个考虑异质性家庭和企业的动态一般均衡模型，利用 DHA 方法实现了对欧盟扩大的反事实估计，进而估计欧盟扩大产生的因果效应。
- 欧盟的扩大主要促进了低技能家庭的移民，而贸易政策有助于缓和移民流动和减轻拥堵效应。
- 欧盟扩大增加了各国就业的比例，尤其是 NMS 低技能劳动力的就业 (呈现出一种类似于城乡二元经济的特征)。
- 人口的流动带来福利在欧盟各国的再分配。本文理论模型中的核心因素是劳动力价格，这种福利再分配的效应主要通过劳动力价格实现。
- 虽然整个欧洲都从欧盟的扩大中获益，但最大的赢家是 NMS，EU-15 虽然在扩大中也获得了好处，但主要是从贸易一体化中获得了好处，接纳移民对国内劳动力价格产生向下的压力，有损本国福利。
- 在整个一体化过程中，高技能劳动力在其中获得的福利提升是更大的 (或者下降是更小的)，体现出福利在不同技能工人之间的不平衡分配。
- 文章福利中还利用本文的理论和实证框架对英国脱欧的事件进行了福利分析 (external validity)。

讨论：欧盟扩大对中国研究的启示

- 模型的适用性：对贸易政策、移民政策的衡量

$$v_{n,s,t}^{il} = \ln C_{s,t}^{il} + \max_{\{j,o\}_{j=1,o=e,ne}}^N \left\{ \beta E \left[v_{n,s,t+1}^{jo} \right] - m_{n,s,t}^{il,jo} + \nu \epsilon_{n,s,t}^{jo} \right\}$$

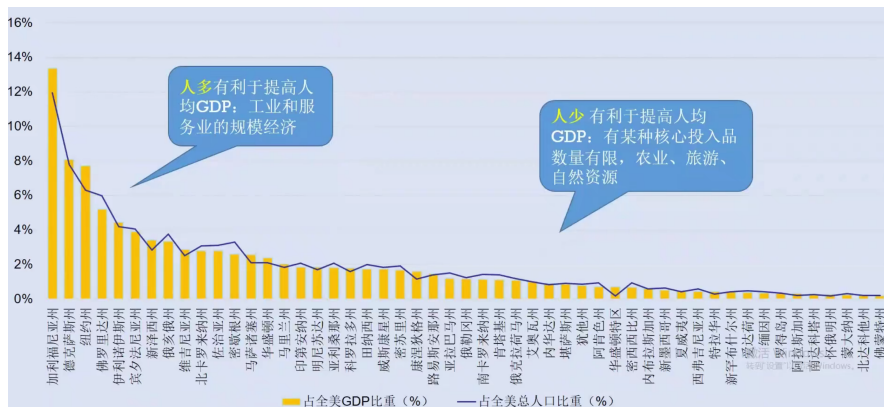
$$\kappa_t^{i,j} = (1 + \tau_t^{i,j}) d_t^{i,j}$$

- 在中国的一体化进程中，不同群体、不同地区得到的福利效应是不同的，谁从市场一体中得到了好处是重要的问题。
- 商品市场一体化 (对应本文贸易政策) 对于不同地区均有好处，与国际经济学主流理论的推论是相一致的。
- 要素市场一体化减少了劳动力流动的阻碍，更多地驱使低技能劳动力流入大城市，减少了人口流出地的劳动力市场拥挤，增加当地就业，提高当地工资水平，增加当地人均 GDP，增加当地居民福利。
- 人口流入地受到劳动力市场的冲击，使工资水平出现下行压力，而且产生公共品的拥挤效应，对当地人均 GDP 可能产生负向的因果效应。

讨论：欧盟扩大对中国研究的启示

- 人口流动是市场因素趋势的，是一种有利于提高整体效率的现象。
- 要素市场的一体化带来“在集聚中走向平衡”的趋势，带给我们对区域发展战略的再思考。
 - 人均收入的平衡还是发展程度的平衡？
 - 不同城市的比较优势：都要努力发展大工业吗？

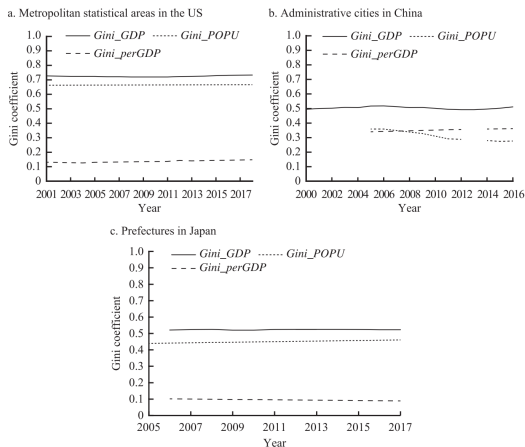
讨论：欧盟扩大对中国研究的启示



讨论：欧盟扩大对中国研究的启示

- 美国与日本的人口和地区生产总值都是高度集聚的，但是地区之间的人均GDP 差异却非常小 (Li and Lu, 2021)。

Figure 8. Comparison of economic activities and population concentration in the US, China, and Japan, 2000–2017



讨论：欧盟扩大对中国研究的启示

- 人口流动是市场因素趋势的，是一种有利于提高整体效率的现象。
- 要素市场的一体化带来“在集聚中走向平衡”的趋势，带给我们对区域发展战略的再思考。
 - 人均收入的平衡还是发展程度的平衡？
 - 不同城市的比较优势：都要努力发展大工业吗？
- 大城市本地居民是受到一体化的负面影响的，而且产生了对公共品的拥挤效应，即今天讨论很多的大城市病。大城市本地居民抵制外来人口流入的地方政府行为是可以理解的。
- 如果商品市场一体化相伴而来，那么带来的负面影响会较小，但今天中国商品市场一体化已经比较成熟了，要素一体化进程会受到更大的阻碍。

感谢倾听!