# Profits, 'Superstar' Firms and External Imbalances

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# Motivation

- Since the 1990s, large **external imbalances** open up in **Europe**
  - **Persistent current account surpluses** (deficits) →
  - ... **large net foreign asset holdings** (debt)
- Why? **'Pull factor'** in the net borrower economies:
  - Low initial capital stocks, housing bubbles
- **This paper:**
  - **Novel stylized fact:** European lender economies featured (i) higher aggregate profit shares, (ii) more 'superstar' firms
  - **'Push factor' theory of European imbalances**: imperfect competition → het. profits → external imbalances

# Mechanism

- External imbalances arise due to economies' het. capacity to
  - Generate stores of value (asset supply)
  - Use these for saving (asset demand)
- Profits **affects both**:
  - **Asset supply:** firms that earn rents 'restrict' their production → demand for inputs, incl capital ↓ → capital as a store of value ↓
  - **Asset demand**: profits constitute a source of income → if profits are disproportionally saved → profits ↑ → asset demand ↑
- Low supply and high demand suppress the autarkic interest rate
- Economies with high profit shares emerge as international lenders

# This paper

1. **Minimal two-country model**
   - Aggregate profit shares & external imbalances are endogenous
2. **Empirical evidence in the European context**
   - Thickness of tails of firm size distributions predicts profit shares
   - Both predict higher net foreign asset positions
3. **Quantitative application**
   - Calibrated to Germany and RoE aggregate
   - Matches 24% of NFA held by Germany in 2019

# Literature

- **Oligopolistic trade:** Bernard et al. (2003), Atkeson and Burstein (2008), Edmond, Midrigan, and Xu (2018), Gaubert and Itskhoki (2018), Burstein, Carvalho, and Grassi (2020), and Gaubert, Itskhoki, and Vogler (2021)

  **Here:** effects on external imbalances

- **Global imbalances/Secular stagnation:** Caballero, Farhi, and Gourinchas (2008), Mendoza, Quadrini, and Rios-Rull (2009), Ferrero (2010), Liu, Mian, and Sufi (2019), De Loecker, Eeckhout, and Unger (2020), Benigno, Fornaro, and Wolf (2020), Mian, Straub, and Sufi (2020), and Ferra, Mitman, Romei, et al. (2021)

  **Here:** new mechanism due to profits

- **Imbalances in Europe:** Reis (2013), Benigno and Fornaro (2014), Gopinath et al. (2017), and Ferra (2021)

  **Here:** origins of $r_N < r_S$

# Two-country Stylized Model

# Firms

- 2 countries $(H, F^*)$, N firms in each, **no trade costs**
- Firms produce differentiated goods, are **heterogeneous**:

$$q_i = z_i k_i^{\alpha} l_i^{1-\alpha}$$

- Demand is CES with elasticity of substitution $\sigma > 1$:

$$Q^{\frac{\sigma-1}{\sigma}} = \sum_N q_n^{\frac{\sigma-1}{\sigma}} + \sum_{N^*} q_{n^*}^{\frac{\sigma-1}{\sigma}}$$

- Firm's **share in the common market** is:

$$s_i = \frac{y_i}{\sum_N y_i + \sum_{N^*} y_i^*} = \frac{P_i^{1-\sigma}}{\sum_N P_n^{1-\sigma} + \sum_{N^*} P_{n^*}^{1-\sigma}}$$

# Firms

- Suppose firms compete on quantity à la Cournot
- Atkeson and Burstein (2008):

$$\pi_i = \frac{Y_i - wl_i - rk_i}{Y_i} = \frac{1}{\sigma} + \frac{\sigma - 1}{\sigma} s_i$$

- More productive firms ...
  - ... feature **lower unit costs pf production**
  - ... charge **lower prices**
  - ... command **larger shares in the common market** $s_i$
  - ... enjoy **higher profit shares** $\pi_i$

# Aggregating up

- The **aggregate profit share** and **average market share**:

$$\pi = \sum_{n \in N} d_i \pi_i, \quad s = \sum_{n \in N} d_i s_i, \quad \text{where } d_i = \frac{y_i}{\sum_N y_i}$$

- As before,

$$\pi = \frac{1}{\sigma} + \frac{\sigma - 1}{\sigma} s$$

- A country that generates **larger firms ('superstars')** ...
  - ... enjoys a **high aggregate profit** share $\pi$

# What makes for a profitable economy?

- $\pi$ and $s$ are **endogenous**
- $\{z_i\}_n, \{z_i^*\}_{n^*}$ are **exogenous**
- Can show that

$$\frac{d\pi}{dz_i} \propto \frac{dy/y}{dz_i/z_i} - \frac{dw/w}{dz_i/z_i}$$

  where $y = Y/L$ is output per worker

- Moreover,

$$\frac{dy/y}{dz_i/z_i} \geq 0, \quad \frac{dw/w}{dz_i/z_i} \geq 0, \quad \rightarrow \quad \frac{d\pi}{dz_i} \lesseqgtr 0$$

- **Takeaway:** **aggregate profitability** $\neq$ being **more productive**

# What makes for a profitable economy?

- Rank the firm productivities such that $z_1 \geq z_2 \geq ... \geq z_N$. Then,

$$\frac{dw/w}{dz_1/z_1} \leq \frac{dy/y}{dz_1/z_1}, \quad \text{and thus} \quad \frac{d\pi}{dz_1} \geq 0.$$

- If there is enough dispersion, specifically, if $2s_z \leq s$, then

$$\frac{dw/w}{dz_N/z_N} \geq \frac{dy/y}{dz_N/z_N}, \quad \text{and thus} \quad \frac{d\pi}{dz_N} \leq 0.$$

- $\pi \gg 0 \leftrightarrow$ **more extreme draws** for the **most productive firms**
- Why?

$$\frac{y_1}{Y} \geq \frac{l_1}{L}, \quad \frac{y_N}{Y} \leq \frac{l_N}{L}$$

- Most productive firms restrict their supply the most

# Asset Demand

- Two types: **workers** $(1-\mu)L$ and **capitalists** $\mu L$
- Workers earn $\boldsymbol{w}$, capitalists earn $\boldsymbol{w + \frac{\Pi}{\mu L}}$
- **Non-homothetic** asset demand: $a_i \propto$ non-financial income

$$a_w = \zeta_w w, \quad a_c = \zeta_c(w + \frac{\Pi}{\mu L}), \quad \boldsymbol{\zeta_c > \zeta_w}$$

- **Asset demand:**

$$A = (1-\mu)La_w + \mu La_c = \boldsymbol{\zeta_w}(1-\mu)Lw + \boldsymbol{\zeta_c}\mu L(w + \frac{\Pi}{\mu L}) \rightarrow$$

$$\frac{A}{Y} = \zeta_w(1-\mu)(1-\alpha)(1-\pi) + \zeta_c(\mu(1-\alpha)(1-\pi)+\pi), \quad \boldsymbol{\frac{\partial A/Y}{\partial \pi} > 0}$$

# Asset Supply

- **Asset supply:** capital used in production

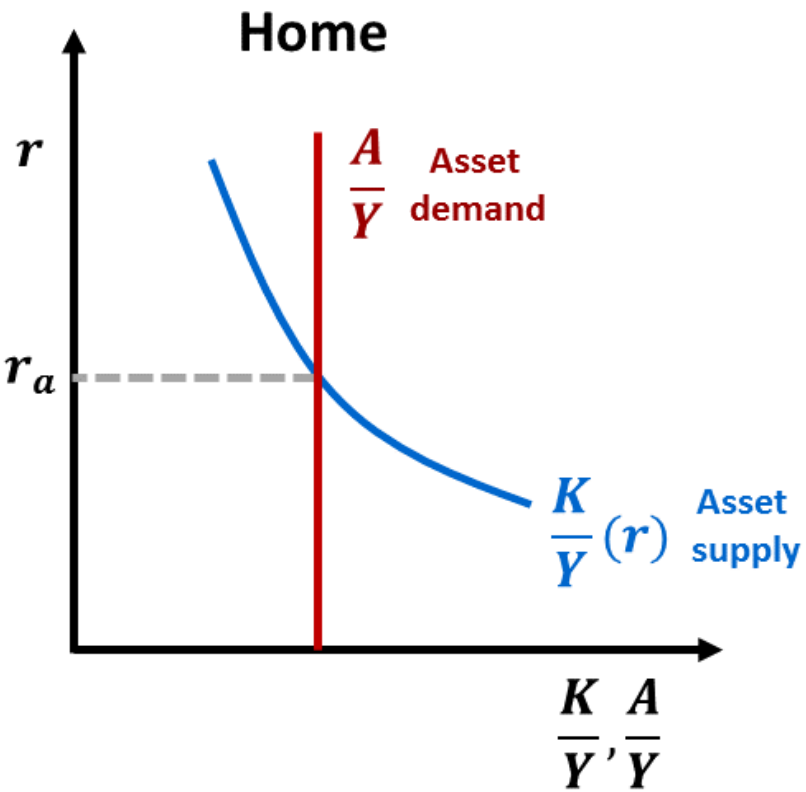
$$K = \sum_i k_i = \sum_i \frac{\alpha}{r}(1-\pi_i)y_i = \frac{\alpha}{r}(1-\pi)Y \rightarrow$$

$$\frac{K}{Y} = \frac{\alpha}{r}(1-\pi), \quad \boldsymbol{\frac{\partial K/Y}{\partial \pi} < 0}. \quad \text{Why?}$$

- Firms hire capital until $\dfrac{\partial PQ}{\partial K} = r$
- Under imperfect competition, firms internalize $P(Q) \rightarrow$ hire less $k$
- Less capital available as a store of value

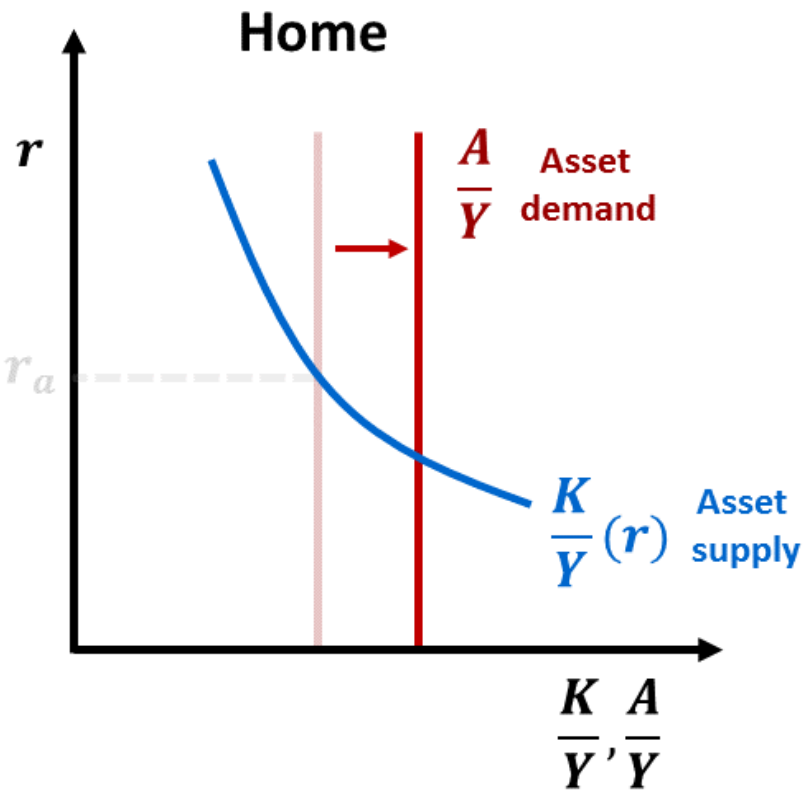
# Steady State under Autarky

- $r_a$ clears the market: $K(r_a) = A$



# Steady State under Autarky

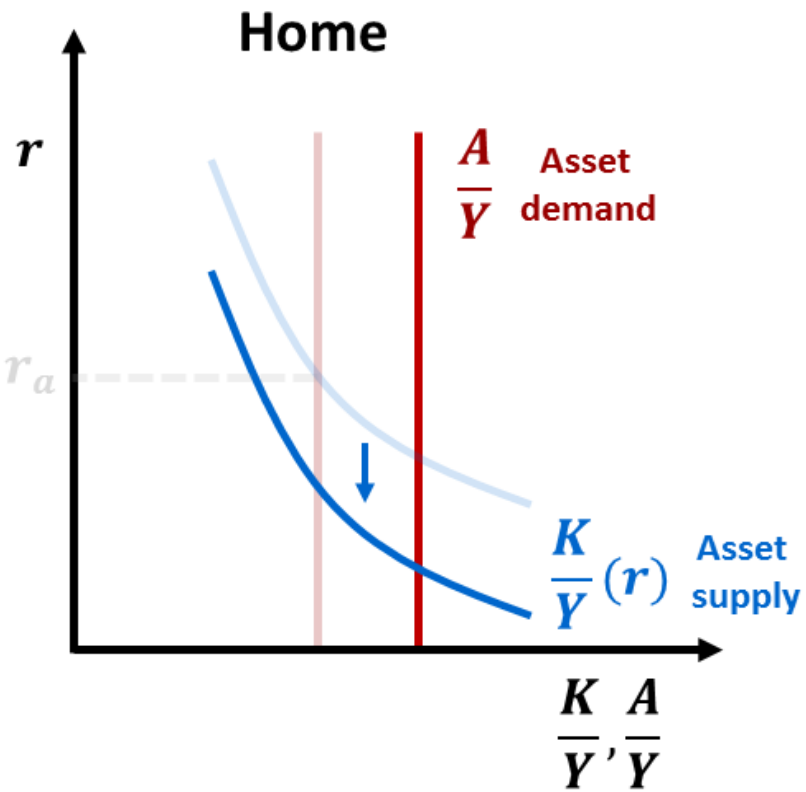
- $\uparrow \pi$ **increases the asset demand** relative to output $A/Y$




- Weighted average asset holdings in the economy
- Redistributes income to capitalists – 'saver' demographic

# Steady State under Autarky

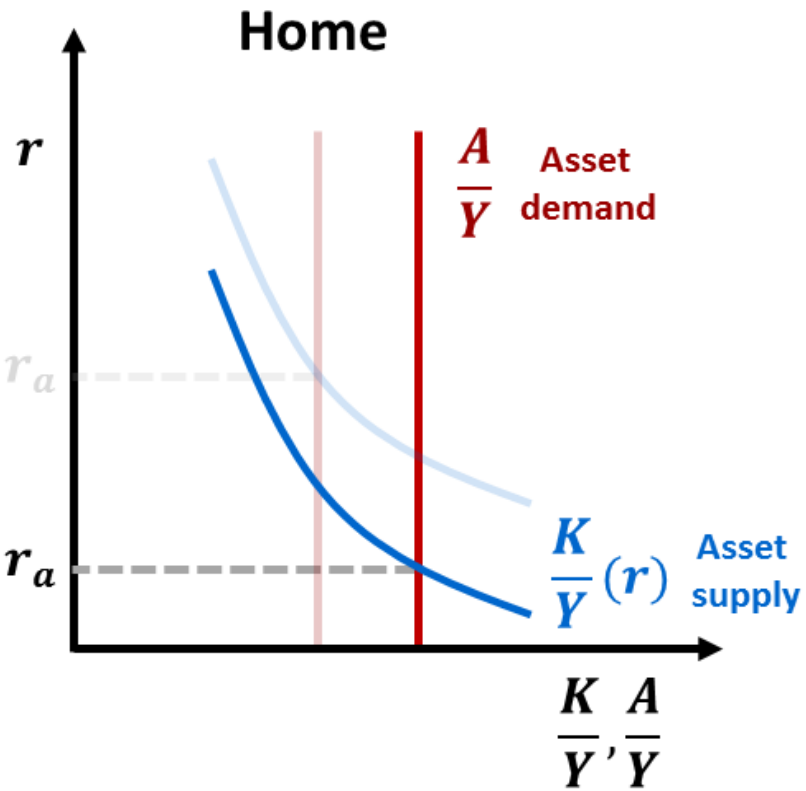
- $\uparrow \pi$ **reduces the asset supply** relative to output $K/Y$




- Firms that charge large markups produce inefficiently little
- Less capital used in production

# Steady State under Autarky

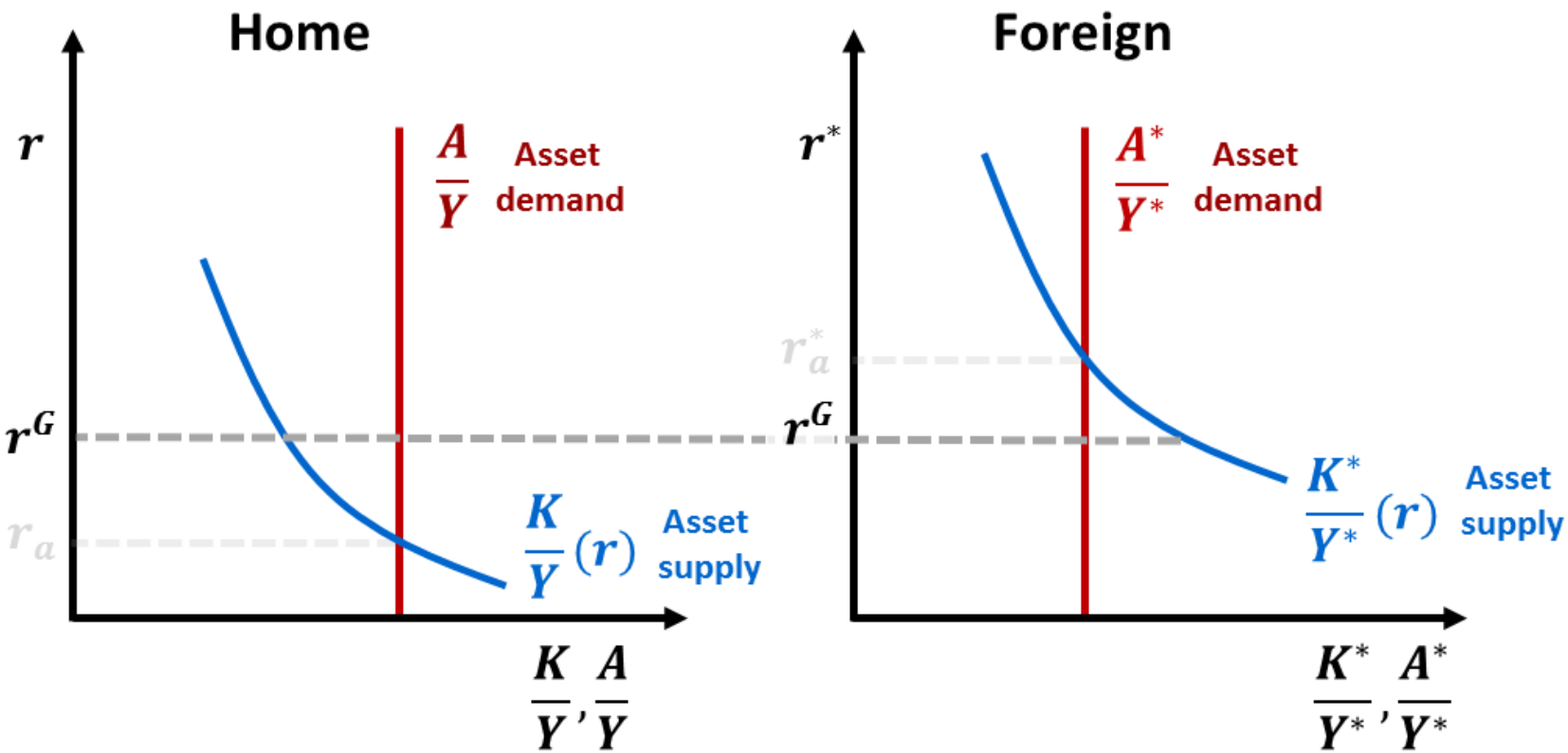
- Combining the two,




- **$\uparrow \pi$ reduces the autarkic interest rate**

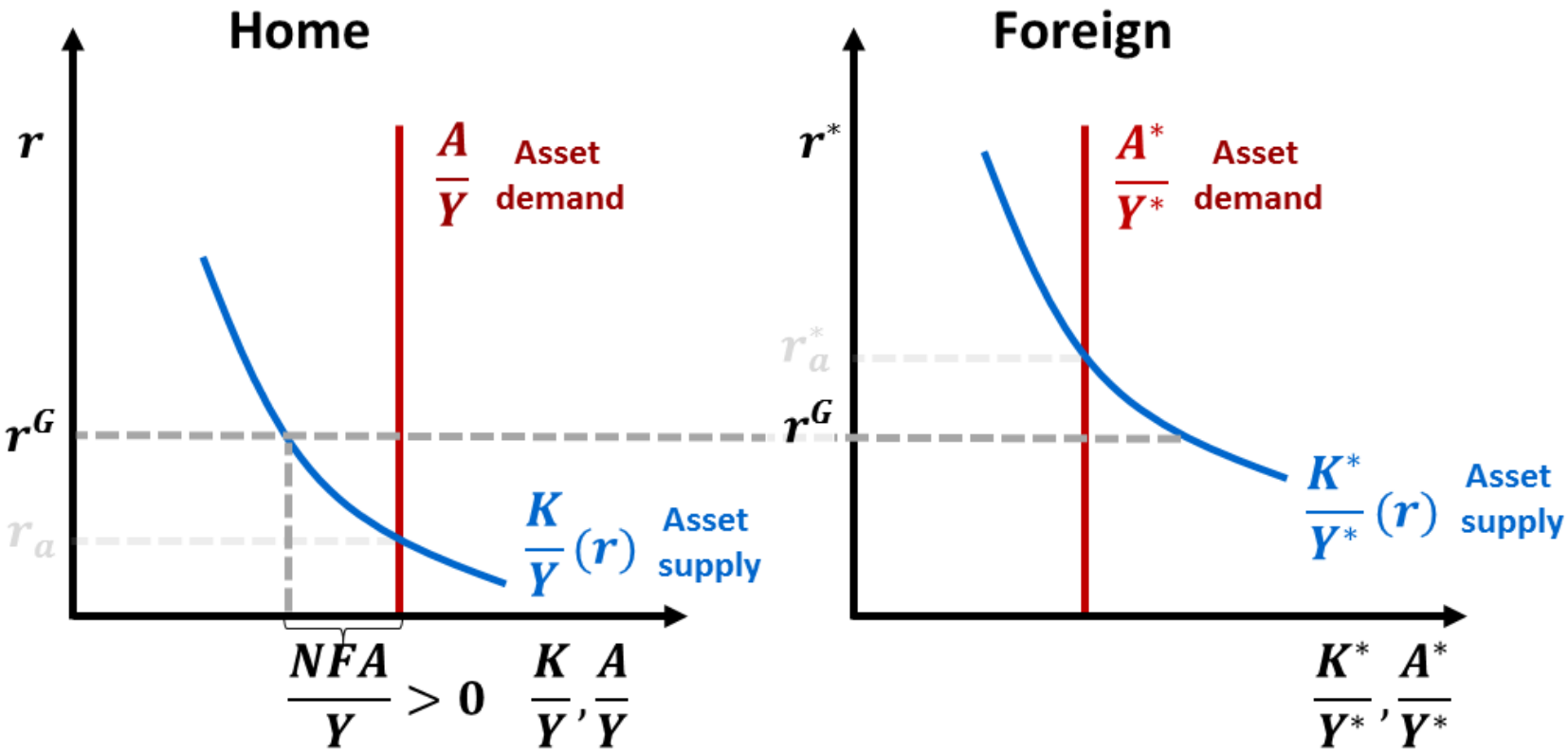
# Financial Liberalization

- Now consider complete financial liberalization, $r = r^* = r^G$



# Financial Liberalization

- Can solve for $NFA = A - K \propto \pi - \pi^*$



# Empirical Evidence

# Data

- Tail Index from employment by firm size bins (OECD SBS)
  - Define $tail = \log \frac{\tilde{F}(T_L)}{\tilde{F}(T_S)} / \log \frac{T_L}{T_S}$
  - $\tilde{F}(T_L)$ counts employment in firms above size $T_L = 250$
  - $\tilde{F}(T_S)$ counts employment in firms above size $T_S = 10$
  - $\overline{tail}_{it} = \sum_s tail_{ist}$: avg across ISIC Rev. 4 industries
- Aggregate profits: $\Pi = GOS - rK$, $\pi = \Pi / Y$
  - Method 1 (Barkai 2020): impute capital costs using the bank interest rate on corporate loans and nominal capital stock
  - Method 2: entrepreneurial income from national accounts
- Net foreign assets from the External Wealth of Nations database

# Results

| | Agg. Profit (% GDP) | | Net Foreign Assets (% GDP) | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\overline{tail}$ | 0.415*** | 7.932*** | 5.946*** | | |
| | (0.057) | (1.328) | (1.428) | | |
| *pr* | | | | 10.653*** | 8.989** |
| | | | | (3.116) | (3.222) |
| FE | Y | Y | Y | Y | Y |
| Clustering | C | C | C | C | C |
| Controls | | | ✓ | | ✓ |
| Observations | 84 | 98 | 98 | 168 | 168 |
| $R^2$ | 0.511 | 0.548 | 0.734 | 0.376 | 0.574 |

*Note:* *p<0.1; **p<0.05; ***p<0.01.

Estimation | Alternative Definitions | Non-EU | Drop crisis years | Results with Orbis

# Quantitative Application: German Imbalances

# Why Germany?

- European imbalances are, to a large extent, German imbalances:
  - Responsible for 60% of the foreign assets accumulated by lenders
- German non-corporate sector stands out among European peers:
  - 2nd highest aggregate profit share in my sample
  - Highest tail index in my sample
- German firms are 'closely held':
  - Over 70% of firms in Germany are in private ownership
  - Publicly traded firms are dominated by insiders ($CR_3 = 45\%$)
  - Home bias: 88% of German equity is held by German investors

# Extending the stylized model

- $K$ sectors (CES in CD), costly trade
- HH side as in Straub (2019) See details
  - Overlapping dynasties of workers and capitalists
  - Non-homothetic saving behaviour due to bequests and a preference for late-life spending that increases in income
- Future profits constitute financial assets See details
- Firm productivities drawn from Pareto distribution:

$$G_{ik}(z) = 1 - \left(\frac{\underline{z}_{ik}}{z}\right)^{\theta_{ik}}$$

  - $\underline{z}_{ik}, \theta_{ik}, \tau_{jik}$ target trade flows and sectoral concentration See details

# Results: What role of profit share gap?

- **Exercise:**
  - Model Germany vs RoE under full financial liberalization
  - Focus on the 'push factor': how much of $\text{NFA}^{DE}$ can we explain?

| | Profit Share | | Net Foreign Assets | |
|---|---|---|---|---|
| | Model | Data | Model | Data |
| DE | 0.16 | 0.17 | 0.14 | 0.59 |
| RoE | 0.14 | 0.14 | -0.06 | -0.22 |

*Note:* All variables as a share of GDP.

# Results: What role of profit share gap?

- **Exercise:**
  - Model Germany vs RoE under full financial liberalization
  - Focus on the 'push factor': how much of $\text{NFA}^{DE}$ can we explain?

| | Profit Share | | Net Foreign Assets | | Asset Demand | Asset Supply | Physical Capital | Fin. Assets |
|---|---|---|---|---|---|---|---|---|
| | Model | Data | Model | Data | | Model | | |
| DE | 0.16 | 0.17 | 0.14 | 0.59 | 3.59 | 3.45 | 2.96 | 0.49 |
| RoE | 0.14 | 0.14 | -0.06 | -0.22 | 3.40 | 3.46 | 3.04 | 0.42 |

*Note:* All variables as a share of GDP.

# Bonus Slide

# United States vs RoW

- What about the superstar firms in the US?
- Toy exercise
  - Let RoW have the same firm size distribution as Europe
  - Let US have higher industrial concentration than RoW
  - Set $\lambda$ to match market capitalization in the US, RoW

| | Net Foreign Assets | | |
|---|---|---|---|
| | Cal.(1) | Cal.(2) | Cal.(3) |
| US | −0.34 | −0.30 | −0.24 |
| RoW | 0.06 | 0.05 | 0.04 |

*Note:* All variables as shares of GDP. Columns 1-3 present the net foreign assets in calibrations where the United States has HHI of 125%, 150% and 175% of that in RoW.

# United States vs RoW

- What about the superstar firms in the US?
- Toy exercise
  - Let RoW have the same firm size distribution as Europe
  - Let US have higher industrial concentration than RoW
  - Set $\lambda$ to match market capitalization in the US, RoW

| | Net Foreign Assets | | | Asset | Asset | Physical | Fin. |
|---|---|---|---|---|---|---|---|
| | Cal.(1) | Cal.(2) | Cal.(3) | Demand | Supply | Capital | Assets |
| US | −0.34 | −0.30 | −0.24 | 3.74 | 4.04 | 2.82 | 1.22 |
| RoW | 0.06 | 0.05 | 0.04 | 3.71 | 3.65 | 2.84 | 0.82 |

*Note:* All variables as shares of GDP. Columns 1-3 present the net foreign assets in calibrations where the United States has HHI of 125%, 150% and 175% of that in RoW.

# To sum up

- Novel theory linking profit shares and external imbalances
- Cross-country evidence in support of the theory
- Matches 24% of German NFA in 2019

# Estimation

- Model describes the long run → pooled panel reg
  - Control for short-run, global shocks via year FE
  - Standard errors clustered at a country-level
- Control for other determinants of external imbalances:
  - Initial capital stock: % of GDP in 2000
  - Development of financial system: 'Rule of law' Index
  - Demographics: old-age to working-age ratio, pop. growth

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# European Economies: Alternative Variable Definitions

| | Agg. Profit (EI) (% GDP) | | Net Foreign Assets (% GDP) | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\overline{tail}_{50}$ | 0.399** | 5.992*** | 4.066*** | | |
| | (0.152) | (1.097) | (1.080) | | |
| $pr_{EI}$ | | | | 5.549* | 4.772* |
| | | | | (2.217) | (2.304) |
| FE | Y | Y | Y | Y | Y |
| Clustering | C | C | C | C | C |
| Controls | | | ✓ | | ✓ |
| Observations | 94 | 96 | 96 | 265 | 265 |
| $R^2$ | 0.329 | 0.496 | 0.715 | 0.342 | 0.398 |

*Note:* Here, I use 50 employees as the small firm cutoff for computing the *tail*, and entrepreneurial income as a measure of aggregate profit (EI). *p<0.1; **p<0.05; ***p<0.01.

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# Results Using All Countries

| | Agg. Profit (EI) (% GDP) | | Net Foreign Assets (% GDP) | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\overline{tail}$ | 0.137 | 3.843* | 3.266** | | |
| | (0.264) | (1.633) | (1.026) | | |
| $pr_{EI}$ | | | | 4.026* | 3.133+ |
| | | | | (1.823) | (1.739) |
| FE | Y | Y | Y | Y | Y |
| Clustering | C | C | C | C | C |
| Controls | | | ✓ | | ✓ |
| Observations | 187 | 245 | 218 | 462 | 446 |
| $R^2$ | 0.047 | 0.120 | 0.676 | 0.211 | 0.464 |

*Note:* Here, I retain all economies in my sample. I use entrepreneurial income as a measure of aggregate profit (EI). *p<0.1; **p<0.05; ***p<0.01.

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# European Economies: Excluding 2007-2013

| | Agg. Profit (% GDP) | | Net Foreign Assets (% GDP) | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\overline{tail}$ | 0.415*** | 7.679*** | 5.709** | | |
| | (0.092) | (1.591) | (2.141) | | |
| *pr* | | | | 10.595** | 9.100** |
| | | | | (3.440) | (3.446) |
| FE | Y | Y | Y | Y | Y |
| Clustering | C | C | C | C | C |
| Controls | | | ✓ | | ✓ |
| Observations | 41 | 47 | 47 | 109 | 109 |
| $R^2$ | 0.510 | 0.506 | 0.778 | 0.383 | 0.551 |

*Note:* Here, I exclude years 2007-2013 from analysis. *p<0.1; **p<0.05; ***p<0.01.

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# Results from Orbis

Table: Regression Results: Orbis

| | Profit (% Sales) | Net Foreign Assets (% GDP) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| *HHI* | 0.029$^{+}$ | 5.219$^{*}$ | |
| | (0.017) | (2.594) | |
| *pr* | | | 15.137$^{*}$ |
| | | | (7.650) |
| FE | S, Y | Y | Y |
| Clustering | CxS | C | C |
| Observations | 2,296 | 56 | 56 |
| $R^2$ | 0.336 | 0.247 | 0.164 |

*Note:* $^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01.

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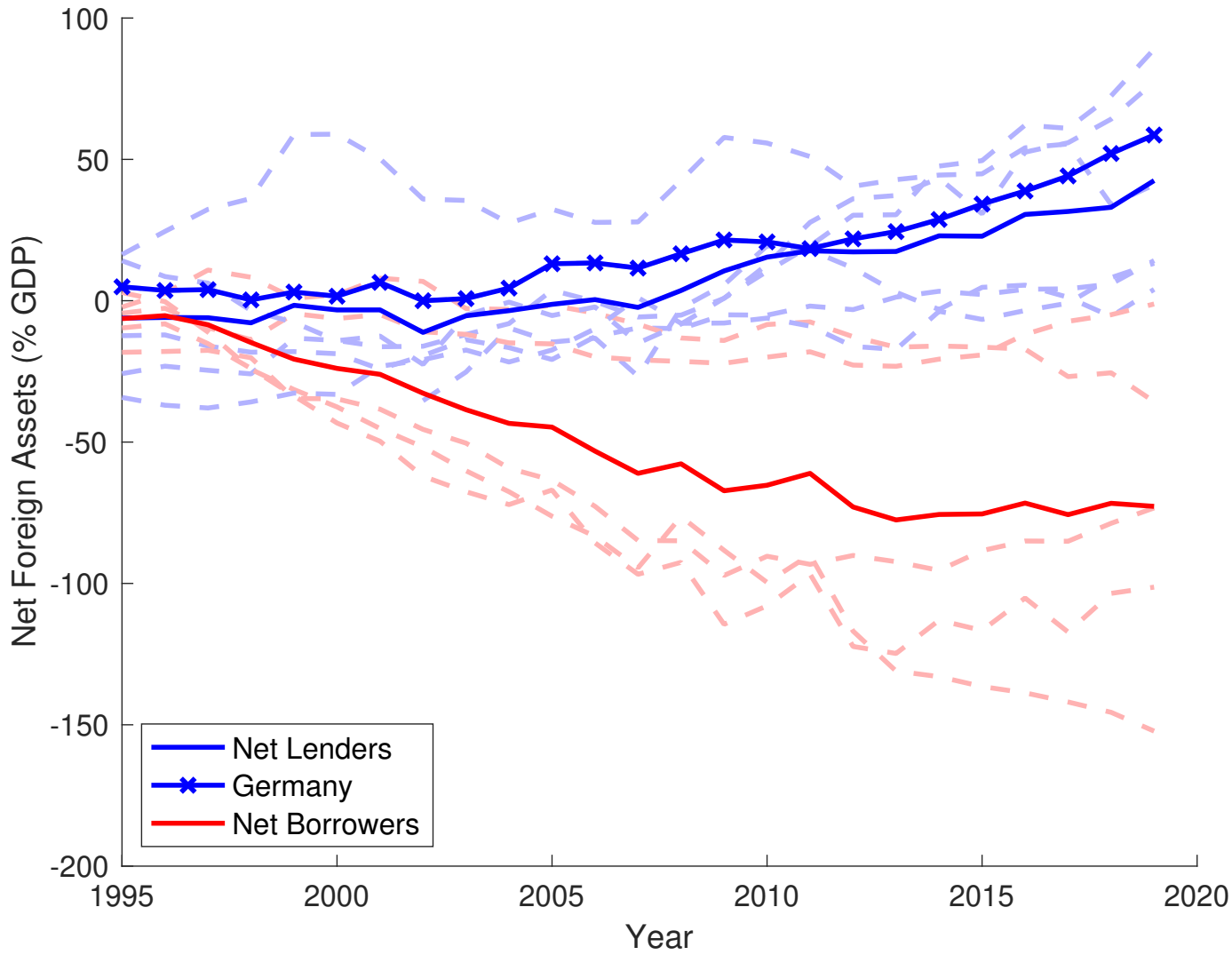
# External Imbalances in Europe




*Note:* Net lenders: Netherlands, Denmark, Germany, Belgium, Austria, Sweden, Finland. Net borrowers: Spain, France, Greece, Italy, Portugal. Sources: EWN.

# Data and Calibration

- **Germany** and **RoE** aggregate (BE, FI, FR, SE, IT, ES, PT)
- **Data sources:**
  - WIOD for sector-level moments
  - Orbis to calibrate firm distribution
  - OECD to calibrate household side
- **Method:**
  - SMM

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# Calibration overview

- **Production side:** Details
  - Estimate trade costs, productivity distribution parameters
  - Target: trade flows, output, employment, avg profit share, HHI

- **Household side:** Details
  - Estimate parameters of the household utility function
  - Target $a_{95}/a_{50} = 7.1$, $r = 3\%$, $B/Y = 6.75\%$, $\phi = 0.7$

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# HH à la Straub

- Setup from Straub (2019), stripping away the individual income- and date-of-death uncertainty
- Households are born and live for $T$ periods in an overlapping generations manner. The birth rate is $1/T$
- Workers and capitalists are dynasties with no mobility: workers give birth to workers and capitalists to capitalists
- Household non-financial income is as follows:

$$y_s^w = \begin{cases} w(1-^{lab}) & \text{if } 0 < s \leq t_3, \\ T^{soc} & \text{if } s > t_3, \end{cases} \qquad y_s^c = \begin{cases} w(1-^{lab}) + \dfrac{\Pi(1-\lambda)}{\mu L(T-t_1)} & \text{if } t_1 \geq s \leq t_2, \\ T^{soc} + \dfrac{\Pi(1-\lambda)}{\mu L(T-t_1)} & \text{if } t_2 < s \leq T, \end{cases}$$

- $(T-t_3)T^{soc} = (t_3-t_0)^{lab}w.$

# HH à la Straub

- The budget constraint is standard:

$$c_t^i + a_t^i = y_t^i + (1 + r_t)a_{t-1}^i, \quad \text{where} \quad i \in \{w, c\}.$$

- Asset holdings at the start of life = assets held at the date of death by their grandparent, $a_T$
- Preferences are non-homothetic:

$$U = \sum_{s=0}^{T} \beta^s u_s(c_s) + U_a(a_T), \quad u_s(c) = \frac{(c/o)^{1-\nu_s}}{1-\nu_s}, \quad \text{where} \quad \nu_s > 0, o > 0,$$

$$U_a(a) = k\frac{((a+\underline{a})/o)^{1-\nu_T}}{1-\nu_T}, \quad \text{where} \quad \nu > 0,\ k > 0,\ \underline{a} > 0.$$

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# Calibration of the Production Block

- **External Calibration:**
  - $\alpha = 0.34$, $\sigma = 10.5$ following Edmond et al. (2015)
  - $\gamma_{ik}$ directly as a ratio of sectoral absorption to total absorption
  - $N$, the number of firms in each country and sector to 500
- **Internal Calibration:**
  - Estimate $\tau_{jik}$, $\underline{a}_{ik}$, $\theta_{ik}$ from $G_{ik}(a) = 1 - (\underline{a}_{ik}/a)^{\theta_{ik}}$
  - Target sectoral bilateral trade flows $X_{jik}$ and $HHI_{ik}$
  - Restrict: $\theta_{ik} = \theta_i \theta_k$
- **Fit:**
  - $X_{jik}$ one-to-one, $HHI_{ik}$ least-squares

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# Calibration of the Household Block

- **External Calibration:**
  - $t_1 = 27$, $t_2 = 37$, $t_3 = 63$, $T = 80$ (OECD)
  - $\mu = 0.1$ following Cagetti and De Nardi (2006)
  - $\beta = 0.97$ following De Nardi (2004)
  - $\nu_{med} = 2.5$ following Straub (2019)
- **Internal Calibration:**
  - Set $o$ targeting $r = 3\%$
  - Set $\kappa$ targeting bequests to GDP of 5% (Straub 2019)
  - Set $\underline{a}$ targeting $a_{95th}/a_{50th}$ of 7.1 (OECD)
  - Set $\nu_{slope}$ to match $\phi = 0.699$ (Straub 2019)
- **Fit:**
  - Matches: $r = 3\%$ and bequest % of GDP
  - Untargeted: $y_c/y_w = 3.6$ cf $y_{95}/y_{50} = 3.3$ (OECD)

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# Tradable firms

- Suppose a share $\lambda$ of future profit stream can be sold as an asset
- Value of this asset $F$ satisfies

$$rF = \lambda \Pi$$

- $(1-\lambda)\Pi$ accrues to capitalists and is non-tradable
- **Asset demand:** $A^D = \boldsymbol{\zeta_w}(1-\mu)Lw + \boldsymbol{\zeta_c}\mu L(w + \frac{(1-\lambda)\Pi}{\mu L})$
- **Asset supply:** $A^S = K + F = \frac{\alpha}{r}(1-\pi)Y + \frac{\lambda \pi Y}{r}$
- Under plausible calibration, direction of effects unchanged

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# Tradable firms

- Suppose a share $\lambda$ of future profit stream can be sold as an asset
- Value of this asset $F$ satisfies

$$rF = \lambda \Pi$$

- $(1-\lambda)\Pi$ accrues to capitalists and is non-tradable
- **Asset demand:**

$$A = (1-\mu)La_w + \mu La_c = \boldsymbol{\zeta_w}(1-\mu)Lw + \boldsymbol{\zeta_c}\mu L(w + \frac{(1-\lambda)\Pi}{\mu L})$$

- **Asset supply:**

$$K + F = \frac{\alpha}{r}(1-\pi)Y + \frac{\lambda \pi Y}{r}$$

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