On the Interaction between Bank Credit and Labor: the Role of Capital-Labor Substitution[1]

M. Mariathasan[a] K. Mulier[b] N. G. Okatan[c]

[a]KU Leuven & NBB

[b]Ghent University

[c]University of Milano-Bicocca

10th IWH-FIN-FIRE, 2024

[1]The views expressed are our own and should not be taken as representing the views of the National Bank of Belgium or the Eurosystem.

Introduction

- Effects of credit supply on investment: **clear and widely documented**
  (Duchin et al., 2010; Campello et al., 2010; Amiti and Weinstein, 2018; ...)
- Effects of credit supply on employment: **vary across firms and settings**
  (Giannetti & Simonov, 2013; Chodorow-Reich, 2014; Doerr et al., 2018; ...)

Introduction

- Effects of credit supply on investment: **clear and widely documented**
  (Duchin et al., 2010; Campello et al., 2010; Amiti and Weinstein, 2018; ...)
- Effects of credit supply on employment: **vary across firms and settings**
  (Giannetti & Simonov, 2013; Chodorow-Reich, 2014; Doerr et al., 2018; ...)
- **Role of production technology is under-explored** in the credit supply literature
  (Laeven et al., 2023)

Introduction

- Effects of credit supply on investment: **clear and widely documented**
  (Duchin et al., 2010; Campello et al., 2010; Amiti and Weinstein, 2018; ...)
- Effects of credit supply on employment: **vary across firms and settings**
  (Giannetti & Simonov, 2013; Chodorow-Reich, 2014; Doerr et al., 2018; ...)
- **Role of production technology is under-explored** in the credit supply literature
  (Laeven et al., 2023)

Clarifying the joint role of capital-labor substitution & credit supply to understand employment outcomes may help to reconcile existing evidence

Introduction

- Effects of credit supply on investment: **clear and widely documented**
  (Duchin et al., 2010; Campello et al., 2010; Amiti and Weinstein, 2018; ...)
- Effects of credit supply on employment: **vary across firms and settings**
  (Giannetti & Simonov, 2013; Chodorow-Reich, 2014; Doerr et al., 2018; ...)
- **Role of production technology is under-explored** in the credit supply literature
  (Laeven et al., 2023)

Clarifying the joint role of capital-labor substitution & credit supply to understand employment outcomes may help to reconcile existing evidence

$\Rightarrow$ We study a local labor supply shock and granular credit data to understand ...

- ... how credit and capital-labor substitution shape the absorption of labor supply
- ... the implications for absorbing firms

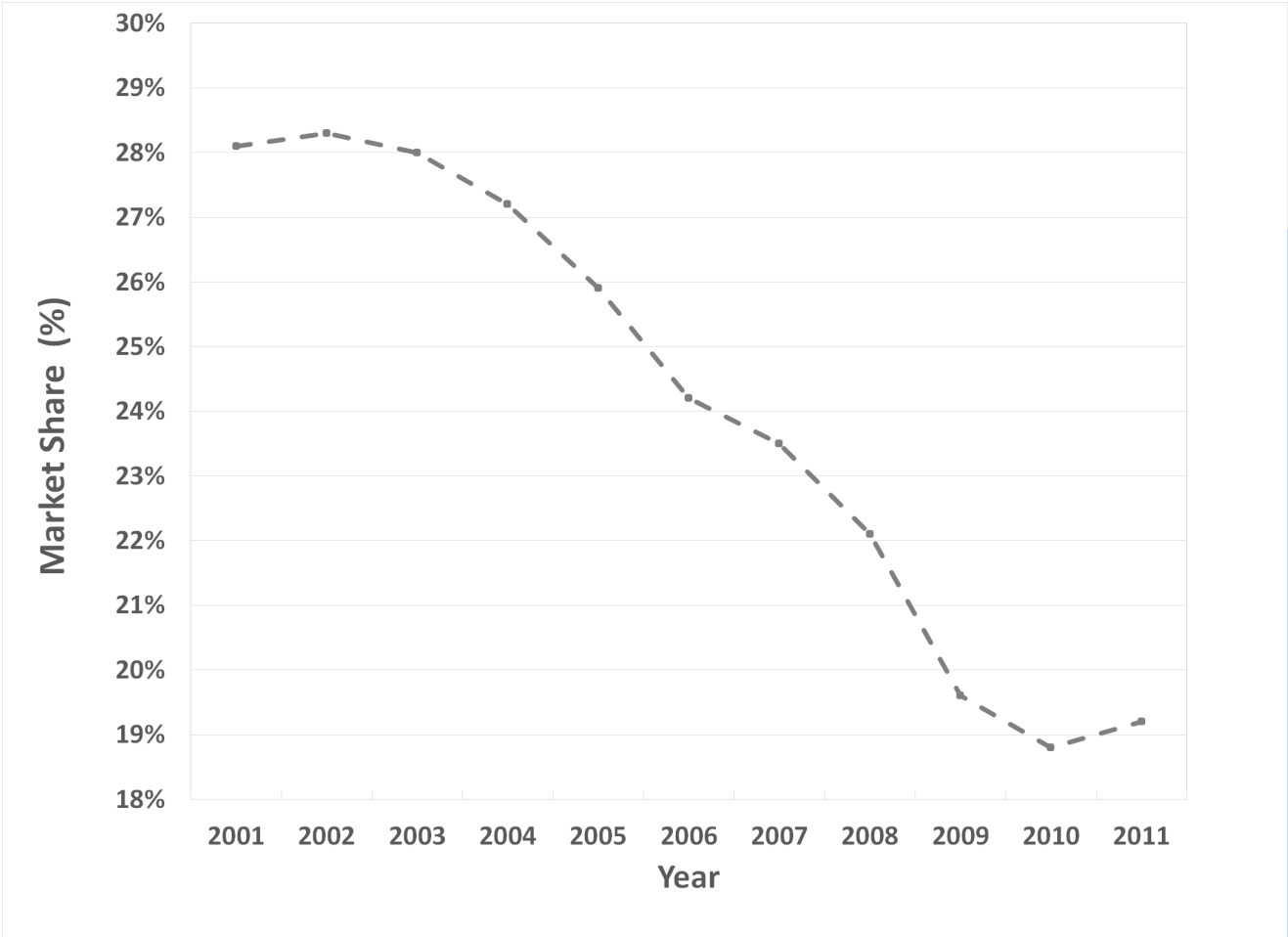
Data

- **Firm-level**, Bel-first
  - Financial statements & granular workforce information
- **Loan-level**, Belgian credit register
  - Enables bank-firm matching
  - Enables estimating banks' credit supply (Degryse et al., 2019)
- **Worker-level**, VDAB
  - Residence zipcodes for laid off employees
- **Industry-level**
  - capital-labor substitution elasticities
  - US KLEMs, 1940-2007, estimated by Laeven et al. (2023)
  - Robustness: Chirinko & Mallick (2017), Oberfield & Raval (2021)
- **Base sample:** 63,739 firm-year observations, 2003-2011 Sum Stats

Setting: The closure of GM Antwerp

Setting: The closure of GM Antwerp

- General Motors U.S. faced declining market share in home market (caused by drastic energy price increase after 2001)



Setting: The closure of GM Antwerp

- Onset of the global financial crisis $\rightarrow$ financial troubles of GM U.S.

Setting: The closure of GM Antwerp

- Onset of the global financial crisis $\rightarrow$ financial troubles of GM U.S.
- U.S. Government bailout to save GM, but strings attached

Setting: The closure of GM Antwerp

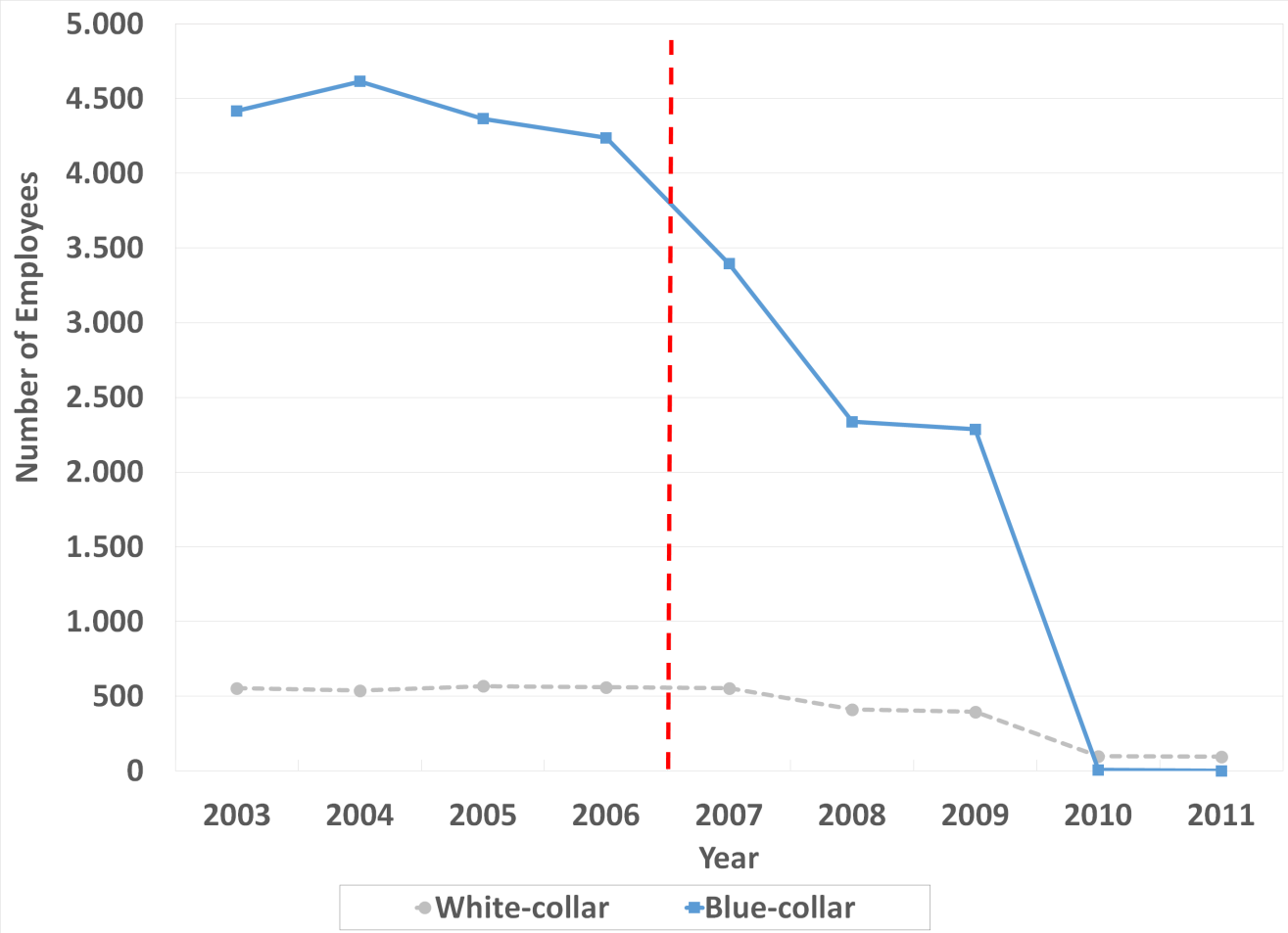
- Onset of the global financial crisis $\rightarrow$ financial troubles of GM U.S.
- U.S. Government bailout to save GM, but strings attached
  - Forced downsizing and wage bill cuts (BUT outside the U.S.)
  - All plants in Europe under consideration, but Belgian EPL didn't allow for wage bill cuts

Setting: The closure of GM Antwerp

- Onset of the global financial crisis $\rightarrow$ financial troubles of GM U.S.
- U.S. Government bailout to save GM, but strings attached
  - Forced downsizing and wage bill cuts (BUT outside the U.S.)
  - All plants in Europe under consideration, but Belgian EPL didn't allow for wage bill cuts
  - Decision fell on GM Antwerp

Setting: The closure of GM Antwerp

Figure: The gradual closure of General Motors Antwerp



Methodology: labor supply

We estimate a Diff-in-diff model with firm (α_i) and year (α_t) fixed effects

$$Y_{it} = \boldsymbol{\beta_1} Post_t \times Affected_i + \boldsymbol{\Phi}' \boldsymbol{X_{it-1}} + \alpha_i + \alpha_t + \varepsilon_{it}$$

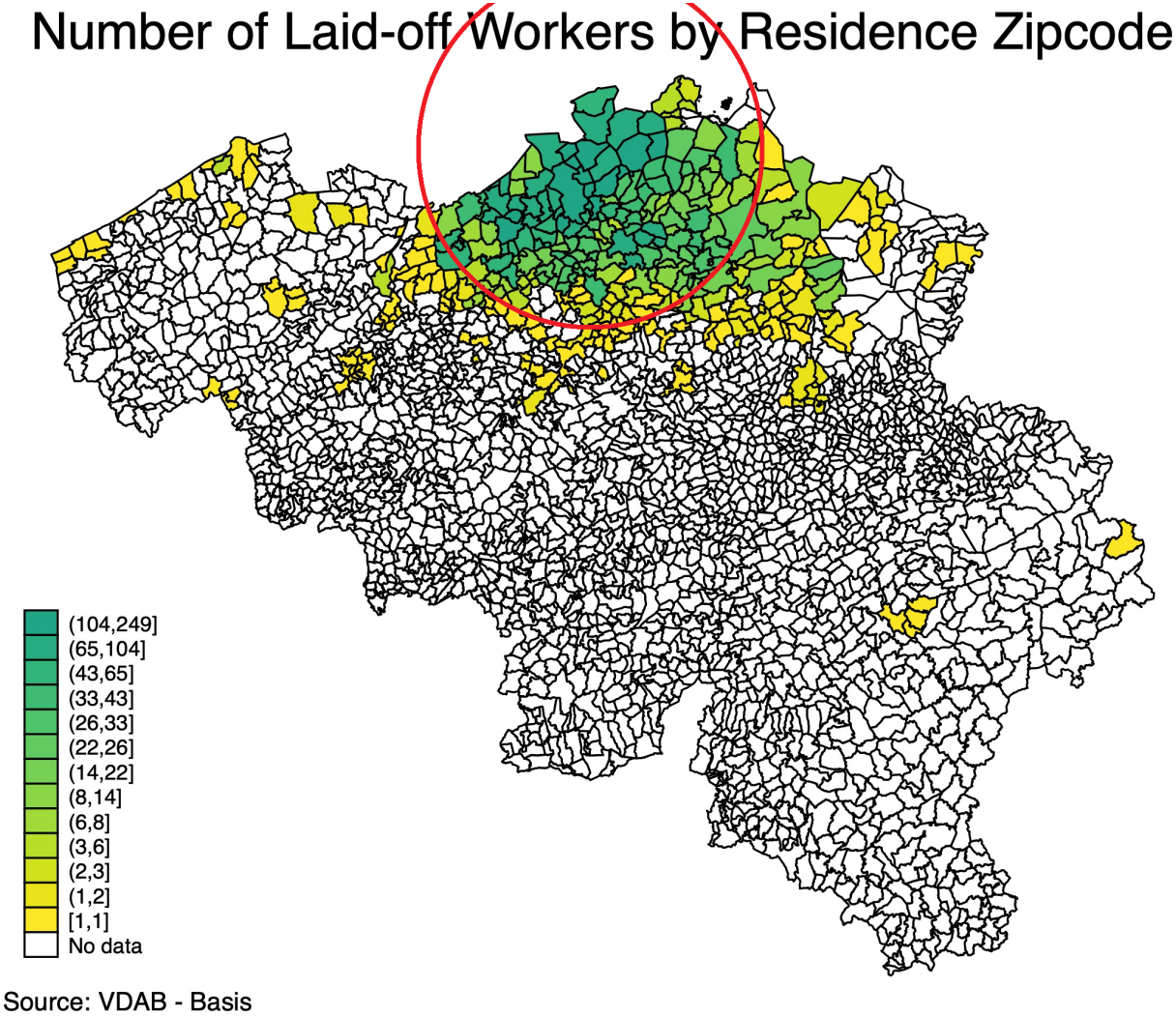
Methodology: labor supply

We estimate a Diff-in-diff model with firm (α_i) and year (α_t) fixed effects

$$Y_{it} = \boldsymbol{\beta_1} Post_t \times Affected_i + \boldsymbol{\Phi}' \boldsymbol{X_{it-1}} + \alpha_i + \alpha_t + \varepsilon_{it}$$

- Y_{it} : outcome variable for firm i at time t
- $Post_t = 1$ if $t \in [2007, 2011]$, and 0 if $t \in [2003, 2005]$
- $Affected_i = 1$ if firm i is within 50km of GM Antwerp, 0 otherwise
  - Matching to Flemish firms outside of 50km based on key observables
  - Robustness: 40km, 60km, worker zipcodes
- $\boldsymbol{X_{it-1}}$: controls (credit demand, assets, age, leverage, cash, ROA)

Methodology: labor supply

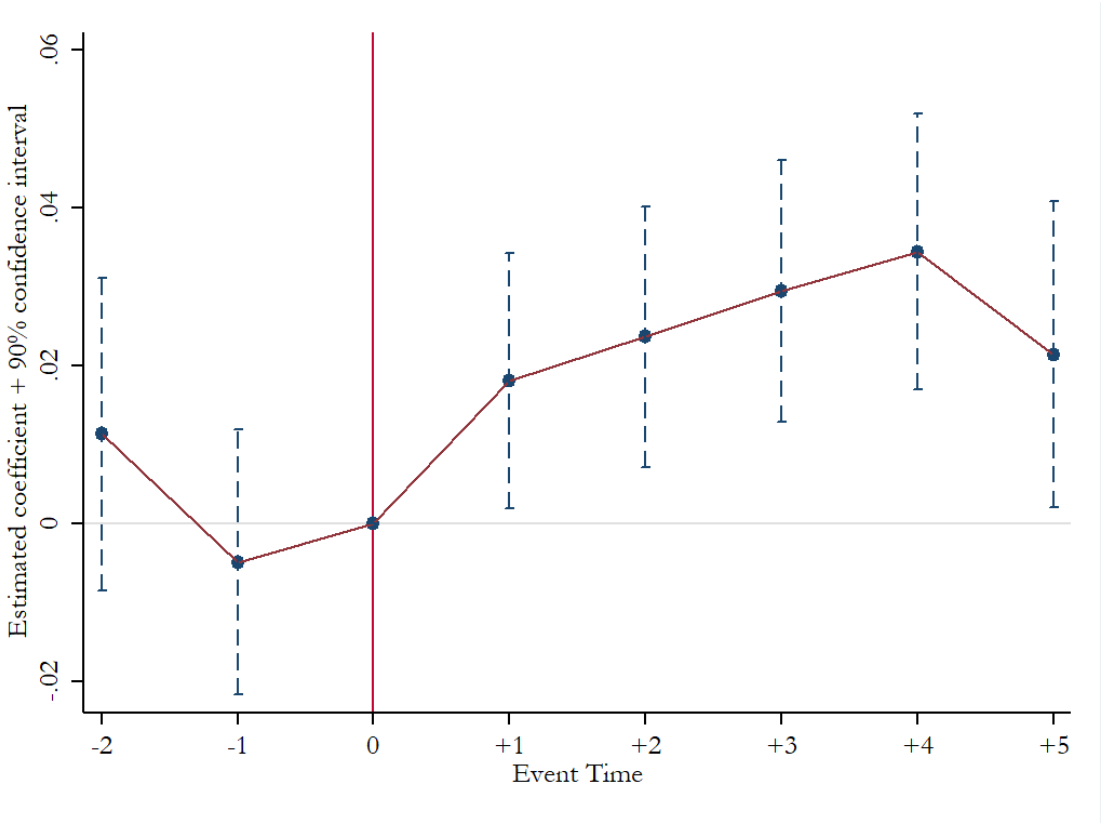


Results: baseline

	Ln(Blue-collar employment)			
	(1)	(2)	(3)	(4)
Post	0.083***	-0.041***		
	(0.009)	(0.008)		
Affected	-0.043***	-0.023**	-0.023**	
	(0.013)	(0.012)	(0.012)	
Post x Affected	**0.030***	**0.033****	**0.033****	**0.024*****
	(0.016)	(0.015)	(0.015)	(0.006)
Control variables		✓	✓	✓
Year Fixed Effects			✓	✓
Firm Fixed Effects				✓
Observations	63,739	63,739	63,739	63,739
R-squared	0.003	0.183	0.183	0.908

Results: baseline (sanity checks)

- Effect much stronger in tight (/weaker in slack) labor markets Tight Markets
- Parallel trends:



Methodology: credit supply

- Decompose credit growth into **firm demand** and **bank supply**:

$$\Delta C_{bit} = \boldsymbol{\alpha_{ILSt}} + \boldsymbol{\beta_{bt}} + \varepsilon_{bit}$$

  - ΔC_{bit}: observed credit growth from bank b to firm i at time t
  - α_{ILSt} : Industry-Location-Size-Time fixed effects (Degryse et al., 2019)
  - β_{bt} : Bank-time fixed effects

Methodology: credit supply

- Decompose credit growth into **firm demand** and **bank supply**:

$$\Delta C_{bit} = \boldsymbol{\alpha_{ILSt}} + \boldsymbol{\beta_{bt}} + \varepsilon_{bit}$$

  - ΔC_{bit}: observed credit growth from bank b to firm i at time t
  - α_{ILSt} : Industry-Location-Size-Time fixed effects (Degryse et al., 2019)
  - β_{bt} : Bank-time fixed effects

1. **Take estimated credit supply shocks:** $\hat{\boldsymbol{\beta}}_{\boldsymbol{bt}}$

Methodology: credit supply

- Decompose credit growth into **firm demand** and **bank supply**:

$$\Delta C_{bit} = \boldsymbol{\alpha_{ILSt}} + \boldsymbol{\beta_{bt}} + \varepsilon_{bit}$$

  - ΔC_{bit}: observed credit growth from bank b to firm i at time t
  - α_{ILSt} : Industry-Location-Size-Time fixed effects (Degryse et al., 2019)
  - β_{bt} : Bank-time fixed effects

1. **Take estimated credit supply shocks:** $\hat{\boldsymbol{\beta}}_{\boldsymbol{bt}}$
2. **From bank- to firm-level** using banks' shares in firms' borrowing $\rightarrow \bar{\boldsymbol{\beta}}_{\boldsymbol{it}}$

Methodology: credit supply

- Decompose credit growth into **firm demand** and **bank supply**:

$$\Delta C_{bit} = \boldsymbol{\alpha_{ILSt}} + \boldsymbol{\beta_{bt}} + \varepsilon_{bit}$$

  - ΔC_{bit}: observed credit growth from bank b to firm i at time t
  - α_{ILSt} : Industry-Location-Size-Time fixed effects (Degryse et al., 2019)
  - β_{bt} : Bank-time fixed effects

1. **Take estimated credit supply shocks:** $\hat{\boldsymbol{\beta}}_{\boldsymbol{bt}}$
2. **From bank- to firm-level** using banks' shares in firms' borrowing $\rightarrow \bar{\boldsymbol{\beta}}_{\boldsymbol{it}}$
3. **High Credit Supply = 1** if $\bar{\boldsymbol{\beta}}_{\boldsymbol{it}}$ above median in industry during post period

Results: credit supply channel

Results: credit supply channel

	Ln(Blue-collar employment)	
	Credit supply	
	Low	High
	(1)	(2)
Post x Affected	**0.022*** **	**0.027*** **
	(0.008)	(0.009)
Equality test	$p = 0.632$	
Controls	✓	✓
Year FE	✓	✓
Firm FE	✓	✓
Observations	32,174	31,565
R-squared	0.903	0.913

Results: credit supply channel

	Ln(Blue-collar employment)	
	Credit supply	
	Low	High
	(1)	(2)
Post x Affected	**0.022*** **	**0.027*** **
	(0.008)	(0.009)
Equality test	$p = 0.632$	
Controls	✓	✓
Year FE	✓	✓
Firm FE	✓	✓
Observations	32,174	31,565
R-squared	0.903	0.913

$\Rightarrow$ On first sight, credit supply does not seem to shape hiring.

Capital-Labor Substitution by Industries

Capital-Labor Substitution by Industries

Industry	2-digit NACE codes	σ
Food, beverages, and tobacco	10–12	1.59
Textiles, textile, leather, and footwear	13–15	0.92
Wood and products of wood and cork	16, 31	0.69
Pulp, paper, printing, and publishing	17–18	1.8
Coke, refined petroleum, and nuclear fuel	19	0.36
Chemicals and chemical products	20–21	0.9
Rubber and plastic	22	0.57
Other non-metallic mineral products	23	0.41
Basic metals and fabricated metal products	24–25	0.42
Electrical, electronic, and optical equipment	26–27	0.79
Machinery, not else specified	28	0.54
Transportation equipment	29–30	0.64
Manufacturing, not else specified	32–33	0.66
Electricity, gas, and water supply	35–39	1.26
Construction	41–43	1.96
Sale, maintenance, and repair of motor vehicles and motorcycles	45	0.72
Wholesale trade, except of motor vehicles and motorcycles	46	0.86
Retail trade, except of motor vehicles and motorcycles	47	0.75
Transportation and storage	49–53	0.92
Hotels and restaurants	55–56	0.57
IT and other information services	62–63	0.66
Real estate, renting and business activities	68–82	0.78

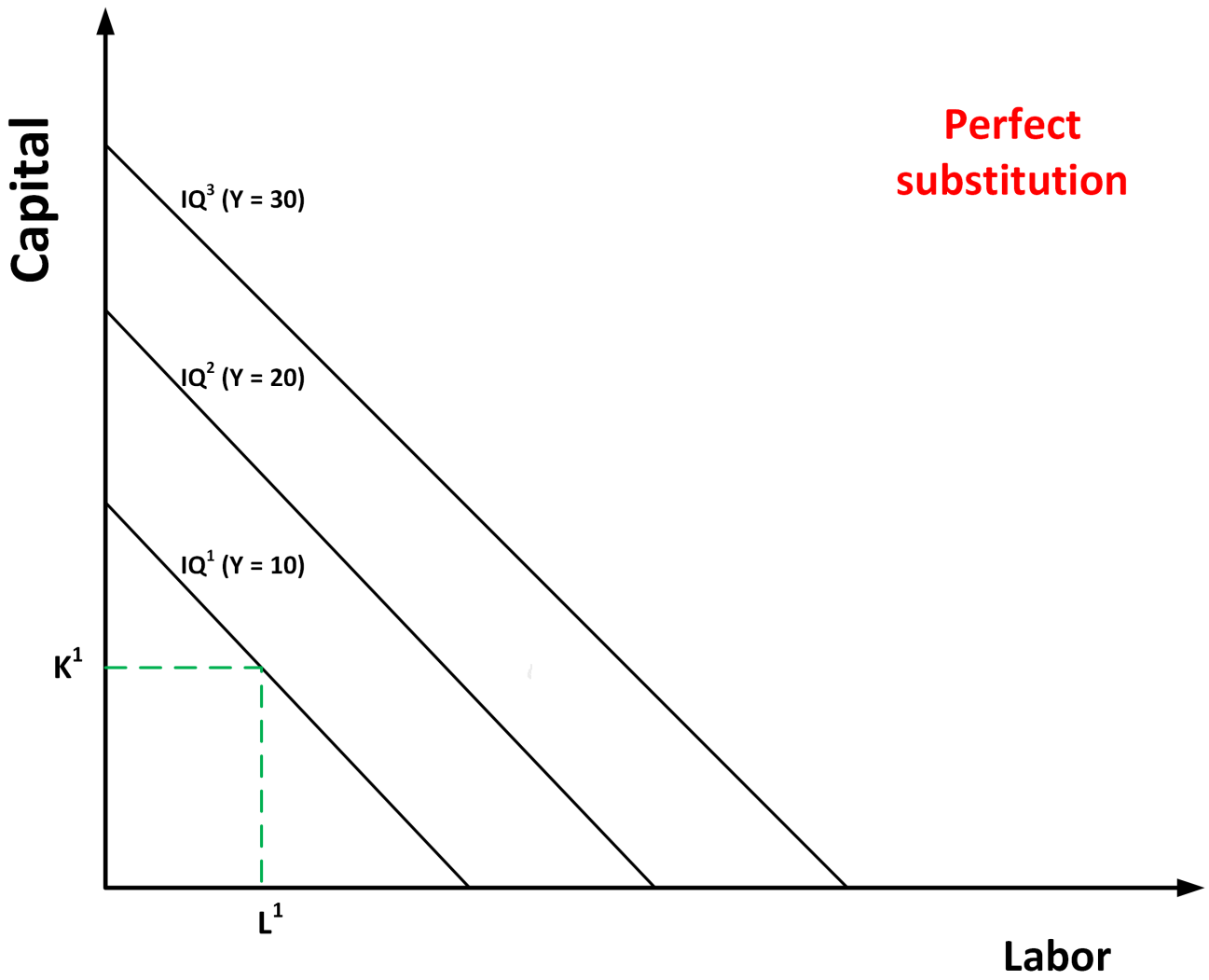
1. Take estimates of σ by Laeven et al. (2023) **or** Chirinko & Mallick (2017) **or** Oberfield & Raval (2021)

2. **High Substitution = 1** if industry's σ is above median in sample

Theoretical Motivation

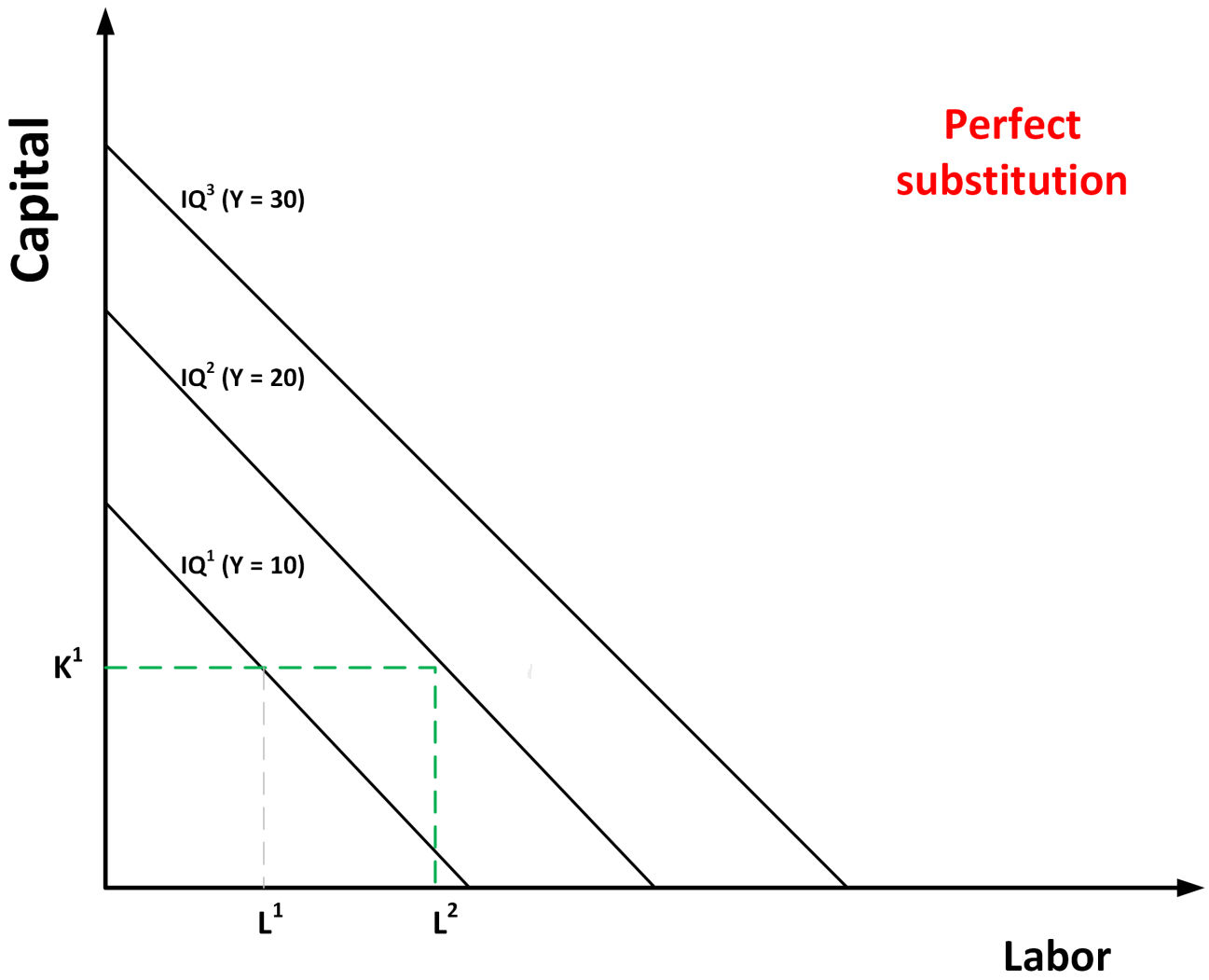
Theoretical Motivation

Figure: Capital-Labor substitution and production output



Theoretical Motivation

Figure: Capital-Labor substitution and production output

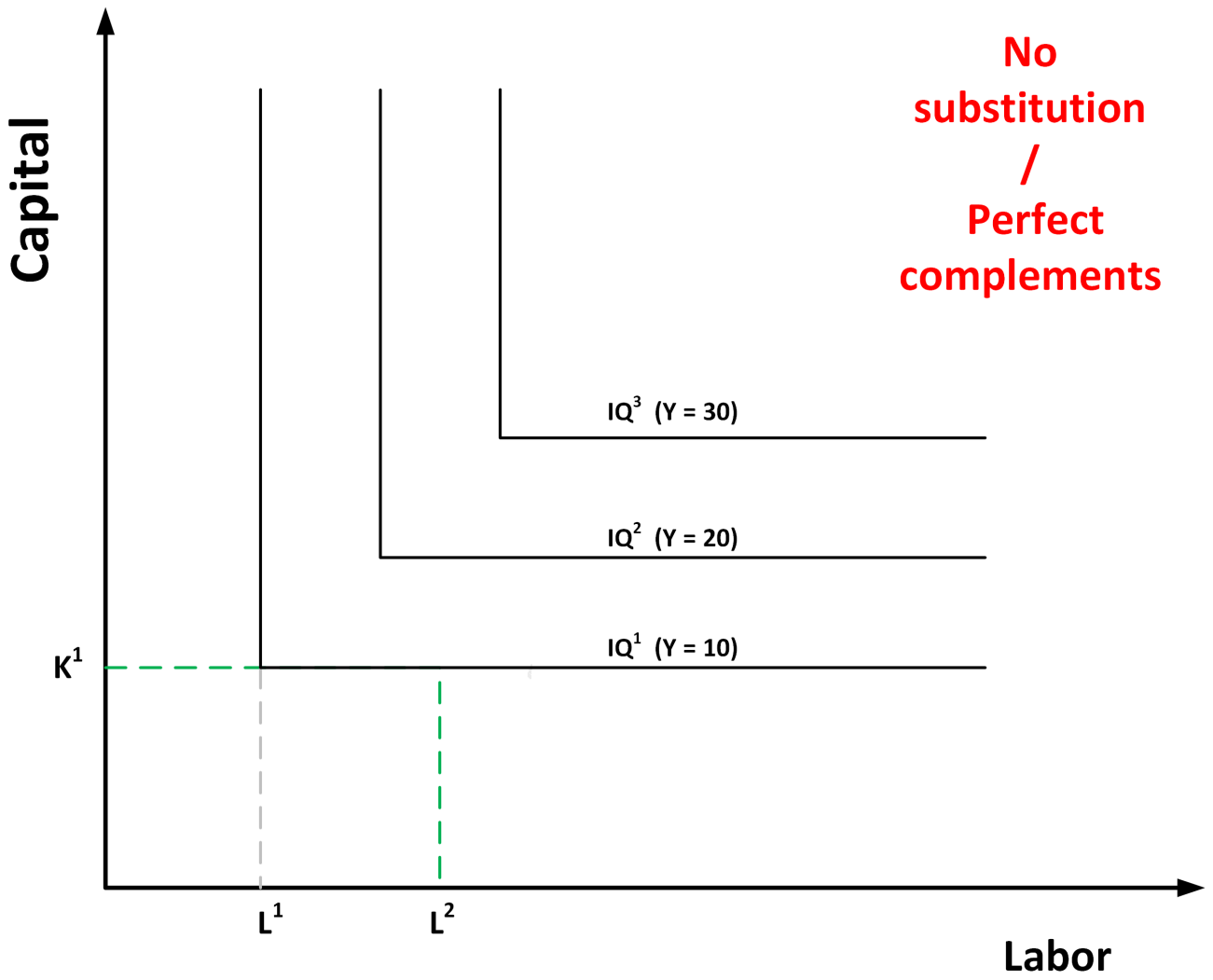


Theoretical Motivation

Figure: Capital-Labor substitution and production output

Theoretical Motivation

Figure: Capital-Labor substitution and production output



Results: capital-labor substitution

	Ln(Blue-collar employment)	
	Capital-Labor Substitution	
	Low	High
	(1)	(2)
Post x Affected	**0.017***	**0.034****
	(0.009)	(0.008)
Equality test	$p = 0.052$	
Controls	✓	✓
Year FE	✓	✓
Firm FE	✓	✓
Observations	31,914	31,825
R-squared	0.90	0.91

Results: capital-labor substitution

	Ln(Blue-collar employment)	
	Capital-Labor Substitution	
	Low	High
	(1)	(2)
Post x Affected	**0.017***	**0.034****
	(0.009)	(0.008)
Equality test	$p = 0.052$	
Controls	✓	✓
Year FE	✓	✓
Firm FE	✓	✓
Observations	31,914	31,825
R-squared	0.90	0.91

⇒ Firms that can substitute capital for labor seem to increase hiring more

Alternative elasticities

Results: Interaction of credit and elasticity of substitution

	Ln(Blue-collar employment)			
	Low substitution		High substitution	
	High credit	Low credit	High credit	Low credit
	(1)	(2)	(3)	(4)
Post x Affected				
Controls				
Year FE				
Firm FE				
Observations				
R-squared				

Results: Interaction of credit and elasticity of substitution

	Ln(Blue-collar employment)			
	Low substitution		High substitution	
	High credit	Low credit	High credit	Low credit
	(1)	(2)	(3)	(4)
Post x Affected	**0.028****	0.008	**0.031*****	**0.038*****
	(0.013)	(0.012)	(0.012)	(0.011)
Equality test	$p = 0.095$		$p = 0.356$	
Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	15,701	16,213	15,864	15,961
R-squared	0.905	0.897	0.913	0.904

Results: Interaction of credit and elasticity of substitution

	Ln(Blue-collar employment)			
	Low substitution		High substitution	
	High credit	Low credit	High credit	Low credit
	(1)	(2)	(3)	(4)
Post x Affected	**0.028****	0.008	**0.031*****	**0.038*****
	(0.013)	(0.012)	(0.012)	(0.011)
Equality test	$p = 0.095$		$p = 0.356$	
Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	15,701	16,213	15,864	15,961
R-squared	0.905	0.897	0.913	0.904

- Firms that cannot easily substitute, need credit to hire
- Firms that can easily substitute, hire independent of credit

Results: Investments

- Firms with **low capital-labor substitution** and **high access to credit** hire more labor after the labor supply shock **because**...

Results: Investments

- Firms with **low capital-labor substitution** and **high access to credit** hire more labor after the labor supply shock **because**...

	Low capital-labor substitutability		
	High Credit		
	Land & Buildings	Plant & Machinery	Furniture & Vehicles
	(1)	(2)	(3)
Post x Affected	0.125	0.022	**0.176*** **
	(0.086)	(0.054)	(0.060)
Controls	✓	✓	✓
Firm FE and Year FE	✓	✓	✓
Observations	15,701	15,701	15,701
R-squared	0.895	0.778	0.664

- ...they can then make **complementary investments**.

Results: Investments

- Firms with **high capital-labor substitution** and **high access to credit** hire more labor after the labor supply shock **and**...

Results: Investments

- Firms with **high capital-labor substitution** and **high access to credit** hire more labor after the labor supply shock **and**...

	High capital-labor substitutability		
	High Credit		
	Land & Buildings	Plant & Machinery	Furniture & Vehicles
	(1)	(2)	(3)
Post x Affected	-0.002	-0.050	-0.006
	(0.070)	(0.041)	(0.046)
Controls	✓	✓	✓
Firm FE and Year FE	✓	✓	✓
Observations	15,864	15,864	15,864
R-squared	0.881	0.782	0.656

- ...**keep their investments on par** with unaffected firms.

Results: Investments

- Firms with **high capital-labor substitution** and **low access to credit** hire more labor after the labor supply shock **but**...

Results: Investments

- Firms with **high capital-labor substitution** and **low access to credit** hire more labor after the labor supply shock **but**...

	High capital-labor substitutability		
	Low Credit		
	Land & Buildings	Plant & Machinery	Furniture & Vehicles
	(1)	(2)	(3)
Post x Affected	**-0.151****	**-0.062***	**-0.204*****
	(0.064)	(0.037)	(0.044)
Controls	✓	✓	✓
Firm FE and Year FE	✓	✓	✓
Observations	15,961	15,961	15,961
R-squared	0.878	0.792	0.680

- ...**invest less/divest** compared to similar unaffected firms.

Robustness

- Alternative I: capital-labor substitution measure
  - Oberfield & Raval (2021) Link
- Alternative II: capital-labor substitution measure
  - Chirinko & Mallick (2017) Link
- Alternative "high credit supply" benchmark
  - Sample vs industry median Link
- Alternative treatment definitions
  - 40 km to 60 km + based on residence of fired workers Link
- Labor Market Tightness Link

Conclusion

Finance. Employment response to credit shocks depends on production function.

Conclusion

Finance. Employment response to credit shocks depends on production function.

Stimulating credit supply may ...

- only lead to hiring if complementary investments are accessible
- not impact hiring at high substitution firms *but may prevent investment cuts*

Conclusion

Finance. Employment response to credit shocks depends on production function.

Stimulating credit supply may ...

- only lead to hiring if complementary investments are accessible
- not impact hiring at high substitution firms *but may prevent investment cuts*

Labor. Credit is key for understanding effects of plant closures & mass layoffs

- may shape multiplier & agglomeration effects
- may shape differential career trajectories for blue/white-collar workers

Thank you for your attention!

Labor Market Tightness

	Ln(blue-collar employment)			
	Labor Cost Growth for BE		Labor Cost Growth for NL	
	Tight	Slack	Tight	Slack
	(1)	(2)	(3)	(4)
Post x Affected	**0.056*** **	**0.008**	**0.040*** **	**0.010**
	(0.010)	(0.009)	(0.010)	(0.007)
Equality test	$p = 0.000$		$p = 0.000$	
Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	20,372	26,538	28,742	34,997
R-squared	0.911	0.898	0.894	0.915

- In tight markets, equilibrium employment can only increase if labor supply shifts

Back - Dynamic

Labor Market Tightness - Tight Industries

Industry Code	Industry Name	Tightness	Share of Blue	Median Share of Blue
10	Manufacture of food products	Tight	0.72	0.76
11	Manufacture of beverages	Tight	0.93	0.76
12	Manufacture of tobacco products	Tight	0.98	0.76
13	Manufacture of textiles	Tight	0.86	0.76
14	Manufacture of wearing apparel	Tight	0.82	0.76
15	Manufacture of leather and related products	Tight	0.89	0.76
16	Manufacture of wood and of products of wood and cork	Tight	0.87	0.76
17	Manufacture of paper and paper products	Tight	0.69	0.76
18	Printing and reproduction of recorded media	Tight	0.76	0.76
20	Manufacture of chemicals and chemical products	Tight	0.56	0.76
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	Tight	0.60	0.76
22	Manufacture of rubber and plastic products	Tight	0.81	0.76
23	Manufacture of other non-metallic mineral products	Tight	0.83	0.76
24	Manufacture of basic metals	Tight	0.85	0.76
25	Manufacture of fabricated metal products, except machinery and equipment	Tight	0.84	0.76
26	Manufacture of computer, electronic and optical products	Tight	0.55	0.76
27	Manufacture of electrical equipment	Tight	0.76	0.76
28	Manufacture of machinery and equipment	Tight	0.75	0.76
29	Manufacture of motor vehicles, trailers and semi-trailers	Tight	0.88	0.76
30	Manufacture of other transport equipment	Tight	0.72	0.76
31	Manufacture of furniture	Tight	0.85	0.76
32	Other manufacturing	Tight	0.77	0.76
33	Repair and installation of machinery and equipment	Tight	0.80	0.76
49	Land transport and transport via pipelines	Tight	0.92	0.76
50	Water transport	Tight	0.95	0.76
51	Air transport	Tight	0.95	0.76
52	Warehousing and support activities for transportation	Tight	0.74	0.76
53	Postal and courier activities	Tight	0.94	0.76
58	Publishing activities	Tight	0.59	0.76
59	Motion picture, video and television programme production	Tight	0.51	0.76
61	Telecommunications	Tight	0.07	0.76
62	Computer programming, consultancy and related activities	Tight	0.46	0.76
63	Information service activities	Tight	0.46	0.76
86	Human health activities	Tight	0.70	0.76
87	Residential care activities	Tight	0.39	0.76
90	Creative, arts and entertainment activities	Tight	0.69	0.76
91	Libraries, archives, museums and other cultural activities	Tight	0.43	0.76
92	Gambling and betting activities	Tight	0.68	0.76
93	Sports activities and amusement and recreation activities	Tight	0.79	0.76
95	Repair of computers and personal and household goods	Tight	0.76	0.76
96	Other personal service activities	Tight	0.88	0.76

Labor Market Tightness - Slack Industries

Industry Code	Industry Name	Tightness	Share of Blue	Median Share of Blue
36	Water collection, treatment and supply	Slack	0.58	0.69
37	Sewerage	Slack	0.70	0.69
38	Waste collection, treatment and disposal activities; materials recovery	Slack	0.82	0.69
39	Remediation activities and other waste management services	Slack	0.82	0.69
41	Construction of buildings	Slack	0.90	0.69
42	Civil engineering	Slack	0.90	0.69
43	Specialised construction activities	Slack	0.88	0.69
55	Accommodation	Slack	0.80	0.69
56	Food and beverage service activities	Slack	0.94	0.67
68	Real estate activities	Slack	0.75	0.69
69	Legal and accounting activities	Slack	0.62	0.69
70	Activities of head offices; management consultancy activities	Slack	0.72	0.69
71	Architectural and engineering activities; technical testing and analysis	Slack	0.58	0.69
72	Scientific research and development	Slack	0.14	0.69
73	Advertising and market research	Slack	0.68	0.69
74	Other professional, scientific and technical activities	Slack	0.57	0.69
75	Veterinary activities	Slack	0.31	0.69
78	Employment activities	Slack	0.65	0.69
79	Travel agency, tour operator reservation service and related activities	Slack	0.67	0.69
80	Security and investigation activities	Slack	0.67	0.69
81	Services to buildings and landscape activities	Slack	0.90	0.69
82	Office administrative, office support and other business support	Slack	0.69	0.69

Back - Credit Supply

Alternative "high credit supply" benchmark

	Ln(Blue-collar employment)	
	Sorting by	
	Bank Credit Supply	
	Low	High
	(1)	(2)
Post x Affected	**0.019****	**0.029*****
	(0.008)	(0.009)
Equality test	$p = 0.356$	
Controls	✓	✓
Year FE	✓	✓
Firm FE	✓	✓
Observations	32,376	31,363
R-squared	0.905	0.911

- Sorting based on **sample** median

Back - Benchmark Back - Robustness

Results: Capital-labor substitution

	ln(Blue-collar Employment)			
	Capital-labor substitution			
	Chirinko & Mallick (2017)		Oberfield & Raval (2021)	
	Low	High	Low	High
	(1)	(2)	(3)	(4)
Post x Affected	**0.024****	**0.050*****	**0.008**	**0.030***
	(0.009)	(0.012)	(0.018)	(0.018)
Equality test	$p = 0.095$		$p = 0.386$	
Controls	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Firm Fixed Effects	✓	✓	✓	✓
Observations	26,008	17,784	6,154	5,849
R-squared	0.905	0.879	0.925	0.922

Back - Benchmark

Alternative Elasticities - Oberfield & Raval (2021)

	Ln(Blue-collar employment)			
	Low substitution		High substitution	
	High Credit	Low Credit	High Credit	Low Credit
	(1)	(2)	(3)	(4)
Post x Affected	**0.050***	-0.034	-0.016	**0.073*****
	(0.026)	(0.025)	(0.027)	(0.024)
Equality test	$p = 0.000$		$p = 0.000$	
Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	3,038	3,152	2,929	2,952
R-squared	0.92	0.92	0.92	0.92

Back - Robustness Back - Benchmark

Alternative Elasticities - Chirinko & Mallick (2017)

	Ln(Blue-collar employment)			
	Low substitution		High substitution	
	High Credit	Low Credit	High Credit	Low Credit
	(1)	(2)	(3)	(4)
Post x Affected	**0.041*****	0.007	**0.042****	**0.058*****
	(0.014)	(0.013)	(0.017)	(0.017)
Equality test	$p = 0.000$		$p = 0.613$	
Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	12,898	13,110	8,708	9,076
R-squared	0.906	0.904	0.888	0.872

Back - Robustness Back - Benchmark

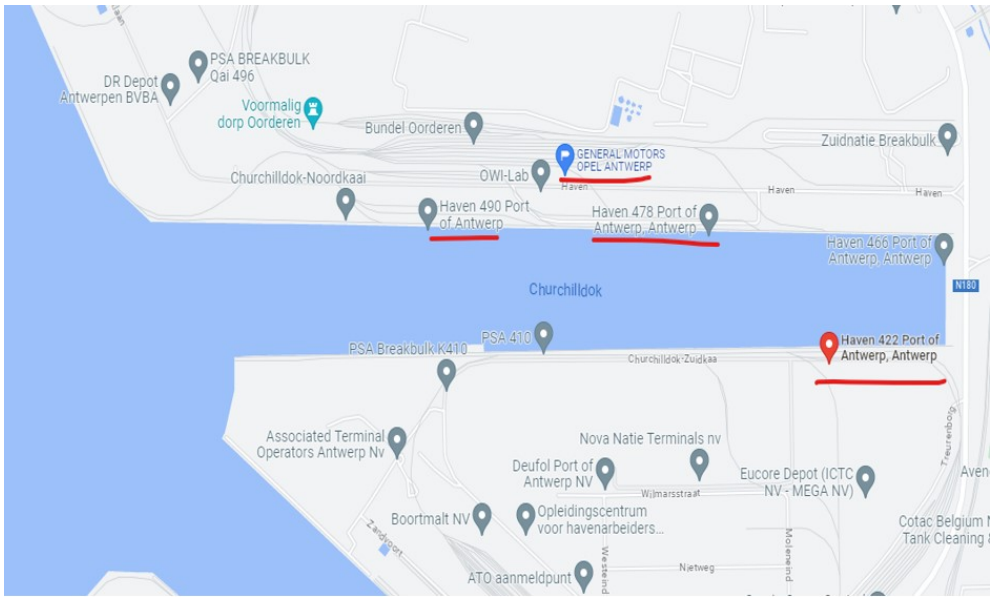
Alternative Treatment Definitions

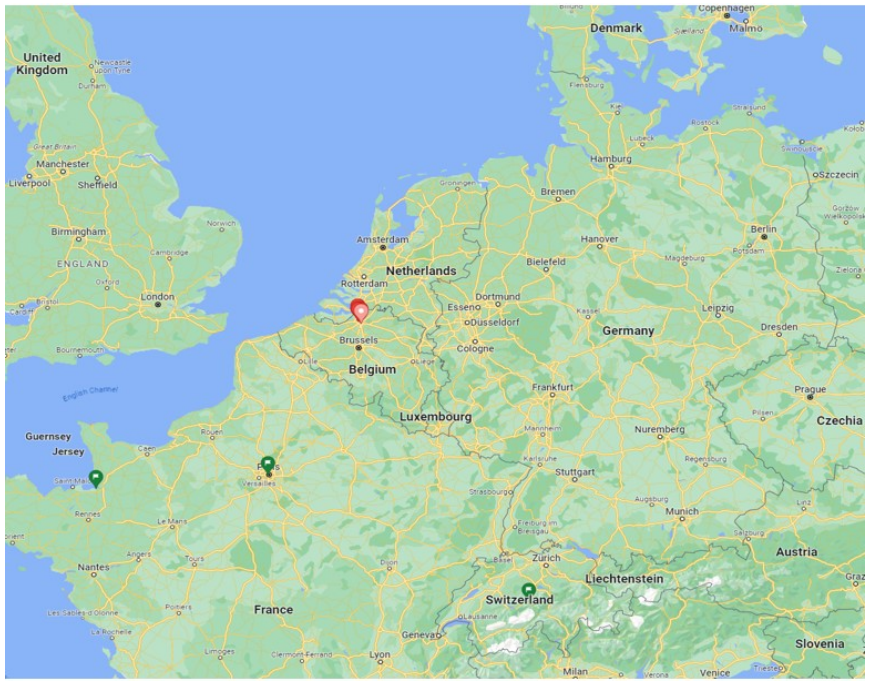
	Ln(blue-collar employment)			
	40 km	50 km	60 km	Worker Zipcode
	(1)	(2)	(3)	(4)
Post x Affected	**0.023*** **	**0.024*** **	**0.023*** **	**0.017*** **
	(0.007)	(0.006)	(0.006)	(0.006)
Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	63,739	63,739	63,739	63,739
R-squared	0.91	0.91	0.91	0.91

Back - Robustness

About GM Antwerp

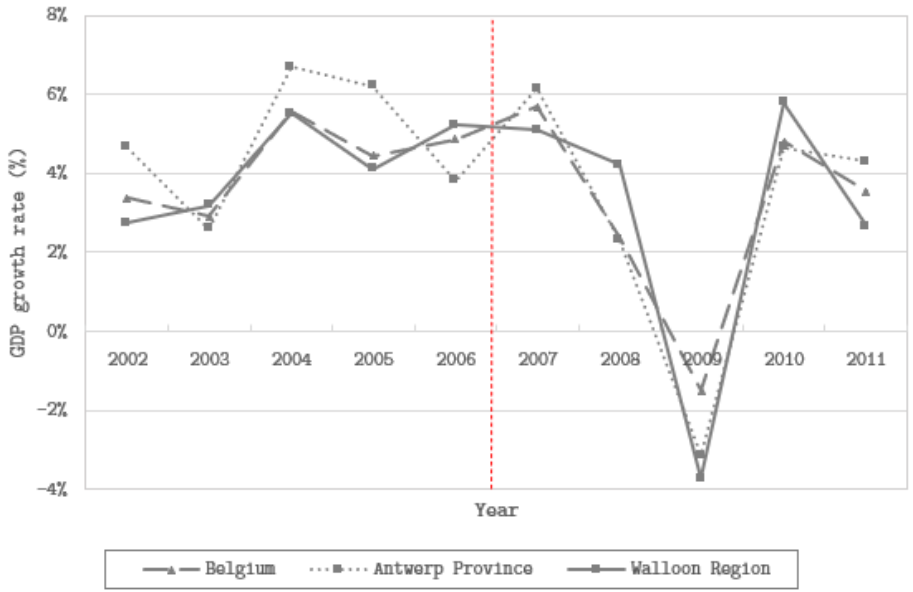
- After the closure, the port bought GM Antwerp's land
- Antwerp, Belgium: a central location for easy exports

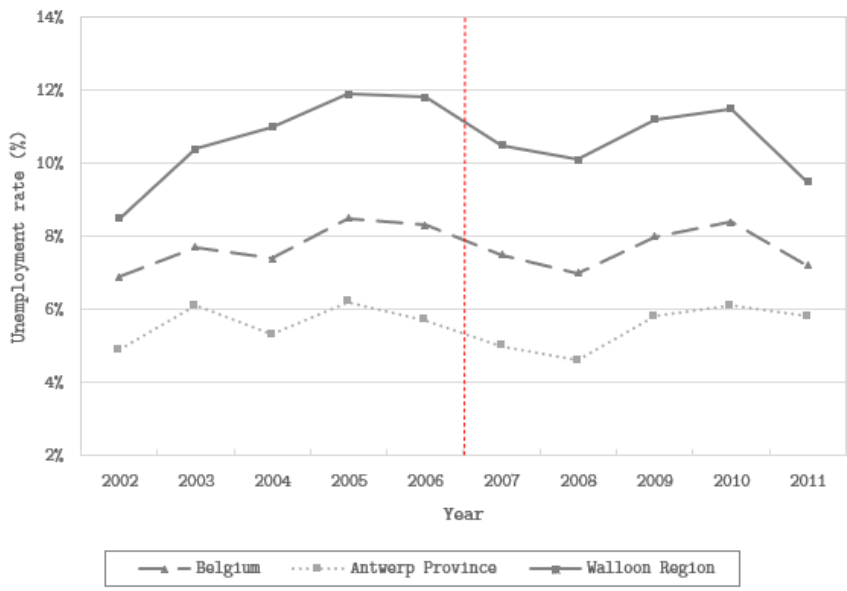




Regional Similarities/Disparities

- Similar trends in unemployment rates
- Roughly similar trends in GDP growth rates
- No other major shocks that affected Antwerp but not others, or vice versa





Why did GM Antwerp close down?

- \$70 billion loss from 2006 to 2007 by **GM US** due to
  - $\uparrow$ energy prices
  - Global financial crisis
- $\downarrow$ market share ($\approx$ 10 pp) but still "too big to fail"
- Bailout program (\$50 billion) to save GM US (to $\downarrow$ job losses in the US)
- Save GM US at the expense of subsidiaries, including GM Antwerp
- Reduced cost-efficiency of GM Antwerp compared to other plants due to strict employment protection in Belgium
- Closure is arguably exogenous to local economic conditions

The Labor Supply Shock

- $\approx$ 14% early retired, $\approx$ 650 workers out of 4,800
- Some suppliers closed down, but not a major effect
- At least $\approx$ 3,800 male blue-collar workers added to $\approx$ 8,400 unemployed male blue-collar workers in the Antwerp Region, $\approx$ 45%

- Sizeable local labor supply shocks
- Job search concentrated in the Antwerp Region

Characteristics of the Displaced Workers

Bel-first, survey data, interviews

- 4,800 laid-off workers
- 88% blue-collar workers, $\approx$ 4,200 workers
- $\approx$ 90% male
- Relatively skilled: versatile, precise, well-trained
- Middle-aged ($\approx$ 40 years old)
- Lengthy tenure (> 10 years, for most)
- Complaints about the workload (vast majority)
- Highly satisfied with their jobs (> 7 out of 10, for almost all)
- Bought houses near the plant
- Dutch-speaking
- Started working young
- Mostly knew each other

References

Acharya, V. V., Eisert, T., Eufinger, C., & Hirsch, C. (2019). Whatever it takes: The real effects of unconventional monetary policy. The Review of Financial Studies, 32(9), 3366-3411.

Baghai, R. P., Silva, R. C., Thell, V., & Vig, V. (2021). Talent in distressed firms: Investigating the labor costs of financial distress. *Journal of Finance*, 76(6), 2907-2961.

Benmelech, E., Bergman, N., & Seru, A. (2021). Financing labor. *Review of Finance*, 25(5), 1365-1393.

Bernstein, S., Townsend, R. R., & Xu, T. (2024). Flight to safety: How economic downturns affect talent flows to startups. The Review of Financial Studies, 37(3), 837-881.

Brown, J., & Matsa, D. A. (2016). Boarding a sinking ship? An investigation of job applications to distressed firms. *The Journal of Finance*, 71(2), 507-550.

Chirinko, R. S., & Mallick, D. (2017). The substitution elasticity, factor shares, and the low-frequency panel model. *American Economic Journal: Macroeconomics*, 9(4), 225-253.

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. The Quarterly Journal of Economics, 129(1), 1-59.

Classen, T. J., & Dunn, R. A. (2012). The effect of job loss and unemployment duration on suicide risk in the United States: A new look using mass-layoffs and unemployment duration. *Health Economics*, 21(3), 338-350.

Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K., & Schepens, G. (2019). Identifying credit supply shocks with bank-firm data: Methods and applications. *Journal of Financial Intermediation*, 40, 100813.

Dehaan, E., Li, N., & Zhou, F. S. (2023). Financial reporting and employee job search. *Journal of Accounting Research*, 61(2), 571-617.

Dörr, S., Raissi, M., & Weber, A. (2018). Credit-supply shocks and firm productivity in Italy. Journal of International Money and Finance, 87, 155-171.

References - Part 2

Giannetti, M., & Simonov, A. (2013). On the real effects of bank bailouts: Micro evidence from Japan. *American Economic Journal: Macroeconomics*, 5(1), 135-167.

Gopinath, G., Kalemli-Özcan, Ş., Karabarbounis, L., & Villegas-Sanchez, C. (2017). Capital allocation and productivity in South Europe. Quarterly Journal of Economics, 132(4), 1915-1967.

Laeven, L., McAdam, P., & Popov, A. (2023). Credit shocks, employment protection, and growth: firm-level evidence from spain. *Journal of Banking & Finance*, 152, 106850.

McKee-Ryan, F., Song, Z., Wanberg, C. R., & Kinicki, A. J. (2005). Psychological and physical well-being during unemployment: a meta-analytic study. *Journal of Applied Psychology*, 90(1), 53.

Oberfield, E., & Raval, D. (2021). Micro data and macro technology. *Econometrica*, 89(2), 703-732.

Paul, K. I., & Moser, K. (2009). Unemployment impairs mental health: Meta-analyses. *Journal of Vocational Behavior*, 74(3), 264-282.

Pezone, V. (2023). The real effects of judicial enforcement. Review of Finance, 27(3), 889-933.

Summary statistics - full sample

Panel A: Entire Sample

	Obs	Mean	Std Dev	p25	Median	p75
Employment	63,739	11.28	11.30	4	7	14
Blue-collar Employment	63,739	8.40	8.37	3	5	11
Share of Blue-collar	63,739	0.78	0.24	0.67	0.86	1
Total Assets (M €)	63,739	1.41	1.81	0.46	0.90	1.73
Return on Assets	63,739	3.48	10.20	-0.11	2.76	7.74
Age	63,739	20.20	11.19	12	18	26
Leverage	63,739	0.68	0.26	0.52	0.69	0.83
Cash	63,739	0.12	0.13	0.02	0.07	0.17
Bank Credit Supply	63,739	0.5	0.5	0	0.5	1

Summary statistics - full sample

Panel B: Affected Firms

	Obs	Mean	Std Dev	p25	Median	p75
Employment	19,925	11.17	11.57	4	7	14
Blue-collar Employment	19,925	8.38	8.52	3	5	11
Share of Blue-collar	19,925	0.78	0.25	0.67	0.86	1
Total Assets (M €)	19,925	1.40	1.64	0.42	0.86	1.68
Return on Assets	19,925	3.55	10.58	-0.15	2.85	8.06
Age	19,925	20.63	11.81	12	18	26
Leverage	19,925	0.70	0.26	0.53	0.70	0.85
Cash	19,925	0.12	0.14	0.02	0.07	0.17
Bank Credit Supply	19,925	0.5	0.5	0	0.5	1

Panel C: Unaffected Firms

	Obs	Mean	Std Dev	p25	Median	p75
Employment	43,484	11.33	11.18	4	7	14
Blue-collar Employment	43,484	8.41	8.30	3	5	11
Share of Blue-collar	43,484	0.78	0.24	0.66	0.86	1
Total Assets (M €)	43,484	1.44	1.88	0.48	0.91	1.76
Return on Assets	43,484	3.44	10.01	-0.09	2.73	7.57
Age	43,484	20.00	10.90	12	18	25
Leverage	43,484	0.68	0.25	0.52	0.69	0.82
Cash	43,484	0.12	0.13	0.02	0.07	0.17
Bank Credit Supply	43,484	0.5	0.5	0	0.5	1

Back - Data