

# Follow-thy-neighbor? Spillovers of asset purchases within the real sector

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## Motivation

- The economy consists of networks of participants. Firms are dependent on each other and influence each other.
- Unconventional monetary policy (UMP) can induce zombie lending behavior and is oftentimes followed by a sluggish economic recovery (Acharya et al., AER 2019).
- To gain an understanding of the aggregate impact of UMP it is crucial to understand how the shock disseminates among market participants.

## The ECB's first asset purchase programme

- The ECB introduced the **Securities Market Programme (SMP)** in May 2010.
- The ECB purchased government bonds from five crisis countries.
- It was the first time that the ECB intervened. The programme marked a **regime shift** and was largely unexpected.
- The aim of the programme was to lower government bond yields, not to stimulate credit growth.
- Still, Koetter (JME, 2020) shows that **the SMP stimulated regional banks' credit growth** to commercial borrowers.

## Setting

- Small and medium sized enterprises (squares in in Figure 1) operate in one region mainly within one sector.
- Some firms have a link to a bank which held SMP eligible assets (black) and other firms are connected to a bank which did not held SMP eligible assets (white).
- **In the following, I compare the investment behavior of black and white firms within one region-sector cluster and take spillover effects between the two groups into account.**

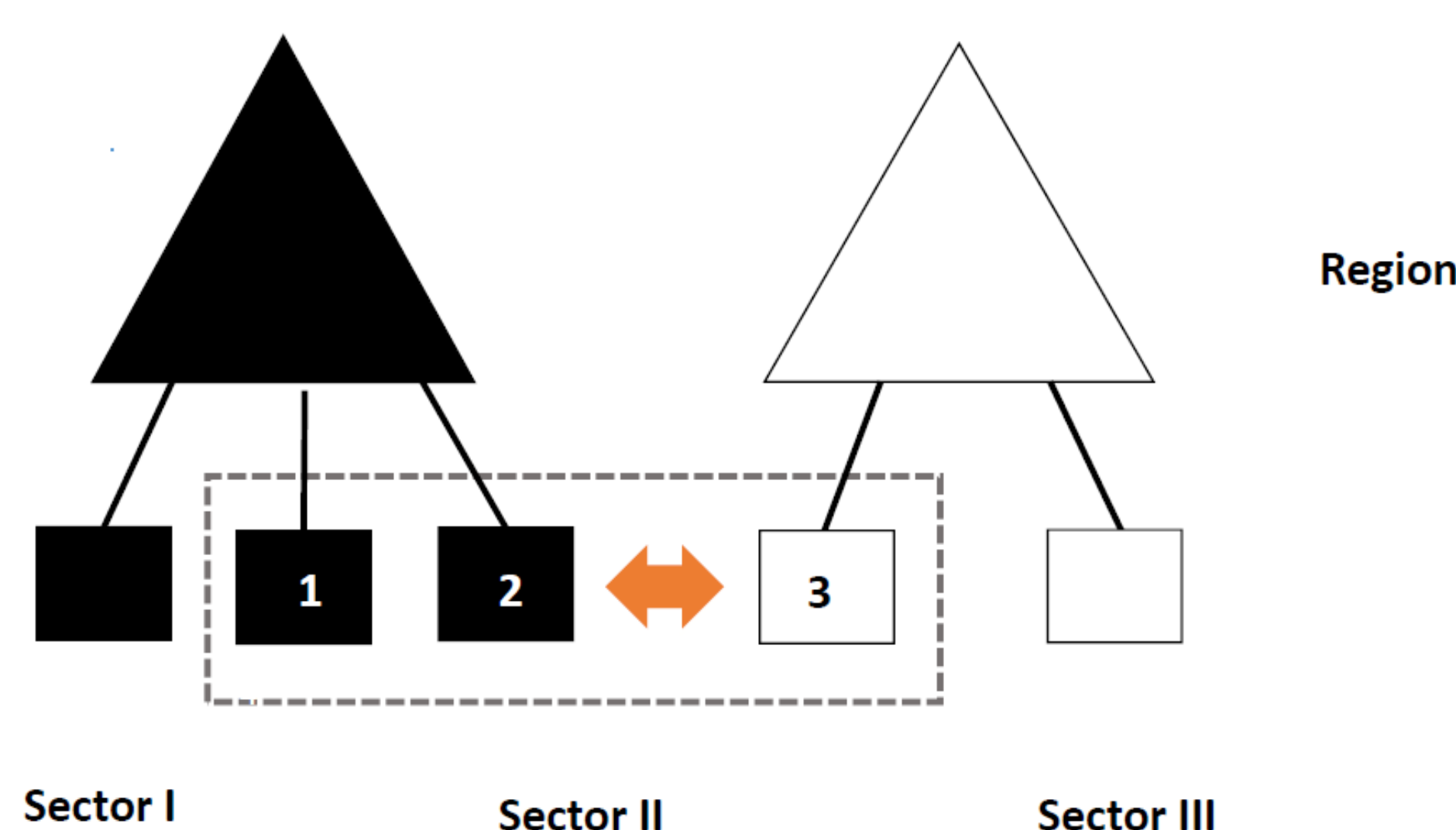


Figure 1: Setting

This figure sketches the setting of the analysis: triangles are regional banks which operate in confined regions. Squares are firms which operate within a region within a sector. The black bank holds SMP eligible assets, the white bank does not.

## Summary

**Research question:** Does unconventional monetary policy which sparks zombie lending induce spillover effects between firms?

**Setting:** Side-effects of the first asset purchase program of the ECB - the securities market programme (SMP) on German firms and their peers.

**Results:** Directly exposed firms invest less. There are negative spillover effects on firms operating in the surroundings.

**Contribution:** Zombie lending diametrically impacts economic growth also via spillovers between firms. The effect is not visible in a common differences-in-differences framework!

## Zombie lending

- I replicate findings by Koetter (JME, 2020) that regional banks increase lending to firms.
- Weakly capitalized banks increase lending to high leveraged firms similar to the finding of Acharya et al. (AER, 2019) on the later Outright Monetary Transaction programme.

## Hypotheses

Directly affected firms might change their investment behavior. Spillovers could occur due to local aggregate demand effects, agglomeration spillovers, or the use of peers as a source of information.

*H1: There are concurrent spillovers to investment behavior of peer firms.*

There can also be competition between firms. Firms receiving cheaper funding might drive peer firms out of the market.

*H0: There are diametrical spillovers on investment behavior on peer firms*

## Data

- Banks' exposure to the SMP provided by Koetter (JME, 2020)
- Bureau van Dijk's Amadeus firm level data and Dafne firm-bank links.

Sample:

- German SMEs linked to German regional banks with a single bank relationship which report investments.
- 11,809 firms over time period 2007-2013, or 38,663 firm-year observations.
- 395 NUTS-3 regions, 19 sectors according to NAICS.
- 25.5% of observations are directly treated and the average exposure within the cluster is 28.8%.

## On the aggregate ...

... high exposed regions do not show higher GDP growth similar to findings in Acharya et. al (AER, 2019). But they exhibit lower unemployment rates:

	(I)	(II)	(III)	(IV)
	GDP growth		Unemployment	
Post×SMPshare_region	-0.010 (0.010)		-2.059*** (0.317)	
Post×SMPshare_region_SMEs		-0.001 (0.008)		-0.691*** (0.260)
Observations	2,726	2,726	2,726	2,726
R-squared	0.438	0.438	0.972	0.971
Region FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 1: Aggregate results

In this table I show results from estimating the following regression on the region level:  $Y_{rt} = \gamma \times Post_t \times SMPshare_r + \alpha_r + \alpha_t + \epsilon_{rt}$ .  $SMPshare\_region$  is the share of treated firms within region  $r$  and  $SMPshare\_region\_SMEs$  includes only SMEs.  $Post$  equals 0 in 2007-2009 and 1 in 2010-2013. Dependent variables are GDP growth and unemployment rate of region  $r$ .

## Identifying spillovers

I follow Berg et. al (JFE 2021) to measure direct and spillover effects of the SMP on firms' investment behavior.

$$Y_{it} = \gamma_1 \times SMP_i \times Post_t + \gamma_2 \times Post_t \times SMPshare_i + \alpha_i + \alpha_{rt} + \alpha_{kt} + \epsilon_{it} \quad (1)$$

- $Y_{it}$ : investment of firm  $i$  in year  $t$ .
- $SMP_i$  equals 1 if firm  $i$  has a link to a bank which held SMP eligible assets in all three treatment years.  $Post$  equals 1 in post period 2010-2013 and 0 in pre period 2007-2009.
- $SMPshare_i$ : Share of treated firms within the same region-sector cluster excluding firm  $i$ .

→  $\gamma_1$  captures differences in investment behavior between treated and control firms similar to a standard DiD.

→  $\gamma_2$  captures average spillover effects.

## Results

	(I)	(II)	(III)
	Investments		
SMP×Post	-0.056* (0.033)	-0.054* (0.033)	-0.188*** (0.064)
Post×SMPshare		-0.333** (0.134)	
SMP×Post×SMPshare			-0.172 (0.139)
(1-SMP)×Post×SMPshare			-0.465*** (0.147)
Observations	38,661	38,661	38,661
R-squared	0.567	0.567	0.567
Firm FE	Yes	Yes	Yes
Industry-Time FE	Yes	Yes	Yes
Region-Time FE	Yes	Yes	Yes

Table 2: Spillover effects

In this Table I show results from estimating equation (1). I further augment the model and differentiate between spillovers on treated (SMP=1) and non-treated (SMP=0) by estimating the following regression model:  $Y_{it} = \gamma_1 \times SMP_i \times Post_t + \gamma_2 \times SMP_i \times Post_t \times SMPshare_i + \gamma_3 \times (1 - SMP_i) \times Post_t \times SMPshare_i + \alpha_i + \alpha_{rt} + \alpha_{kt} + \epsilon_{it}$ .

- Directly treated firms invest less; there are negative spillover effects on firms operating within the same cluster, see column II.
- Spillover effects are driven by negative spillover effects on non-treated firms, see column III.
- **Economic magnitudes** Directly treated firms reduce investments by 55%. Non-treated firms operating in averagely affect clusters reduce investments by 36% compared to firms operating in surroundings without treated peers.

## Further Results

- Treated firms increase employment which is reflected in lower aggregate unemployment.
- Competition increases: profits decrease for and market shares shrink for all firms in high-exposed clusters.

## Contact Information

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