# The Impact of House Prices on Small Business Creation in Switzerland

Research Seminar - Financial Economics

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# Introduction

## What is our paper about?

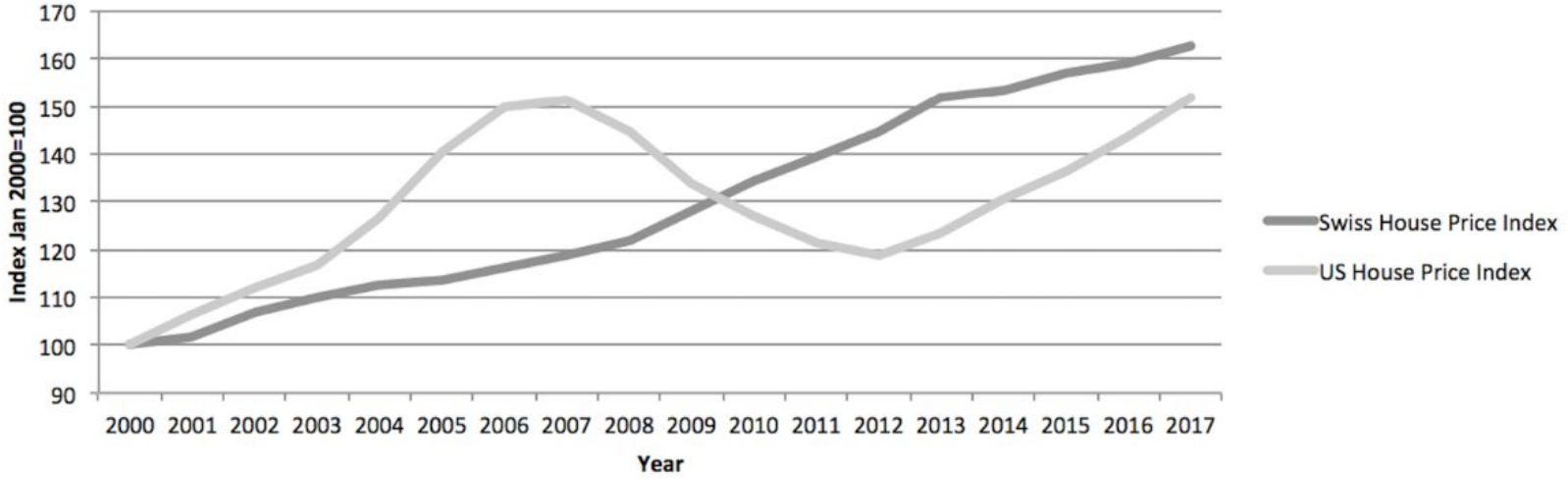
→ Correlation of housing values and employment & small business creation

→ Mian & Sufi (2014): increase personal consumption

→ Adelino, Schoar and Severino (2015): collateral lending channel

## *Figure 1*

*US vs. CH: Annual House Price Index*




Source: Federal Housing Finance Agency (FHFA) *House Price Index (HPI)* & SNB dataportal *Real estate price indices – by market area*

# Hypothesis 1

*Availability of more collateral through increased house prices between 2011 and 2016 has an effect on the creation of small firms in Switzerland.*

# Hypothesis 2

*Small business creation in Switzerland between 2011 and 2016 was not driven by an increase of local demand.*

# Hypothesis 3

*The effect of increased real estate prices on the creation of small businesses in Switzerland between 2011 and 2016 featured more prominently in industries with lower capital requirements to start a new firm.*

# Hypothesis 4

*The effect of increased real estate prices on the creation of small businesses in Switzerland between 2011 and 2016 featured most prominently in sole proprietorships.*

# Empirical Results

## What are the main findings of the paper?

| | Change in Housing Rents | | Companies | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Elasticities | −0.032*** | | | |
| | (0.006) | | | |
| Population | 0.000 | | | |
| | (0.000) | | | |
| Graduates | −0.000 | | | |
| | (0.000) | | | |
| Employment | −0.249 | | | |
| | (0.146) | | | |
| Owners | 0.013 | | | |
| | (0.045) | | | |
| House Prices | | 0.651 | 0.669 | 0.857 |
| | | (0.518) | (0.518) | (0.557) |
| Tradable Industries | | | 0.032** | |
| | | | (0.012) | |
| Low Capital Requirements | | | | −0.004 |
| | | | | (0.013) |

# Comparison

## Results of Adelino et al., 2015

| | First stage | All industries (IV) | | |
|---|---|---|---|---|
| | (1) | (3) | (4) | (5) |
| Housing Supply Elasticity | −0.09*** | | | |
| | (0.02) | | | |
| Growth in House Prices | | 0.05 | −0.06 | 0.02 |
| | | (0.06) | (0.10) | (0.03) |
| Growth in House Prices∗1−4 Employees | | 0.20*** | 0.26** | 0.16*** |
| | | (0.05) | (0.09) | (0.05) |
| Growth in House Prices∗5−9 Employees | | 0.08** | 0.17 | 0.00 |
| | | (0.04) | (0.10) | (0.04) |
| Growth in House Prices∗10−19 Employees | | 0.01 | 0.06 | −0.05 |
| | | (0.04) | (0.09) | (0.04) |
| Growth in house prices∗20−49 Employees | | 0.00 | 0.07 | −0.07** |
| | | (0.04) | (0.07) | (0.03) |

# Possible Explanations

## Differences to the United States

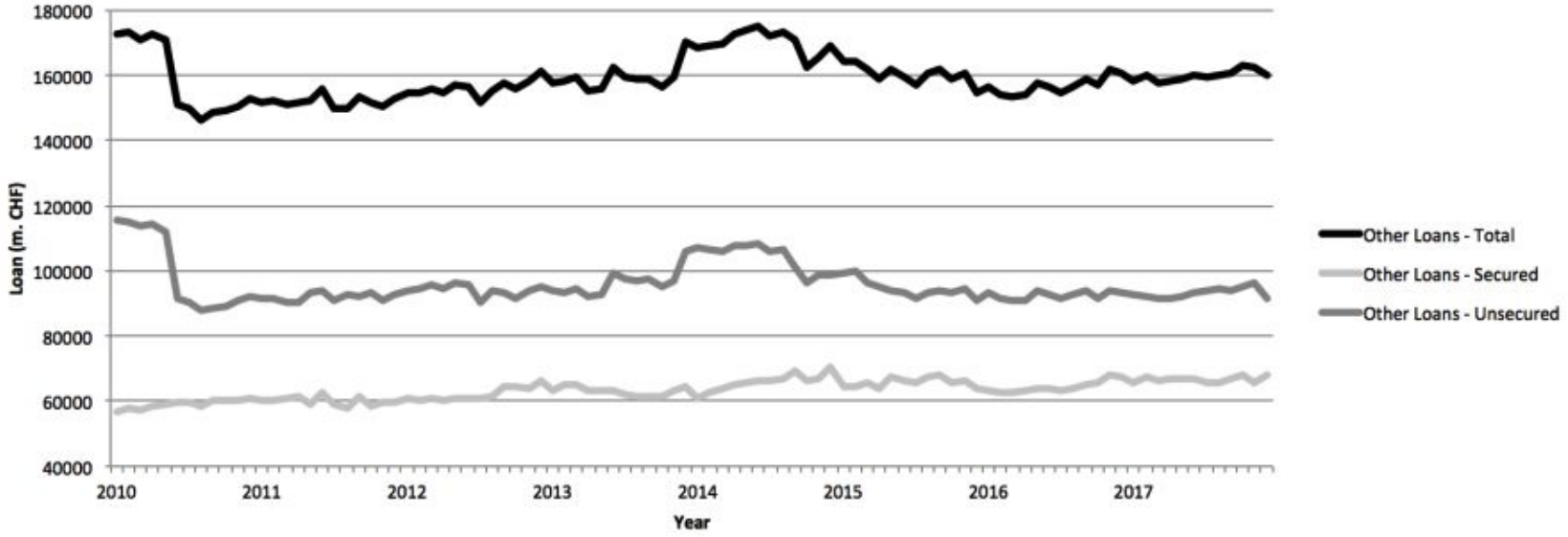
→ Lower homeownership rate in Switzerland

→ Tax incentives to not pay down mortgages

→ Low amount of unsecured loans (of which only a percentage will be real estate collateralized)

## *Figure 3*

*Secured vs. Unsecured Loans in Switzerland*




Source: SNB dataportal *Mortgage loans and other domestic and foreign loans*

# Empirical Model

## How did we specify our model?

→ Analyse net creation of businesses of different sizes

→ Housing supply elasticities show strong correlation with housing prices (Saiz, 2010)

→ Two-stage least square approach to overcome endogeneity

# Empirical Model

## How did we specify our model?

$$(2)\ \Delta^{11-16}Businesses_{ij} = \alpha + \beta_1 \Delta HP_j^{11-16} + \beta_2 1_i + \beta_3 1_i \Delta HP_j^{11-16} + \gamma X_j + \varepsilon_{ij}$$

$$(3,4)\ \Delta^{11-16}Businesses_{ijz} = \alpha + \beta_1 \Delta HP_j^{11-16} + \beta_2 1_i + \beta_3 1_i \Delta HP_j^{11-16} + 1_z + \gamma X_j + \varepsilon_{ij}$$

$$(5)\ \Delta^{11-16}Businesses_{ij} = \alpha + \beta_1 \Delta HP_j^{11-16} + \beta_2 1_i + \beta_3 1_i \Delta HP_j^{11-16} + \gamma X_j + \varepsilon_{ij}$$

# Summary Statistics

## What does our underlying data look like?

***Table 2***

*Summary Statistics*

| Statistic | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|
| Change in Rental Prices (2011-2016) | 0.202 | 0.026 | 0.169 | 0.184 | 0.207 | 0.288 |
| Elasticities | −1.158 | 0.817 | −3.821 | −1.319 | −0.574 | −0.116 |
| Log of Population | 12.084 | 1.131 | 9.664 | 11.164 | 12.853 | 14.147 |
| Percentage of Graduates | 0.098 | 0.040 | 0.052 | 0.072 | 0.109 | 0.197 |
| Percentage Employed | 0.810 | 0.027 | 0.730 | 0.793 | 0.825 | 0.844 |
| Percentage of Home Owners | 0.407 | 0.103 | 0.149 | 0.352 | 0.481 | 0.568 |
| Households | 135943 | 146706 | 6337 | 28976 | 162301 | 651857 |

# Empirical Methodology

## Which methodology did we use to get to our results?

→ Instrumentalization using housing supply elasticities

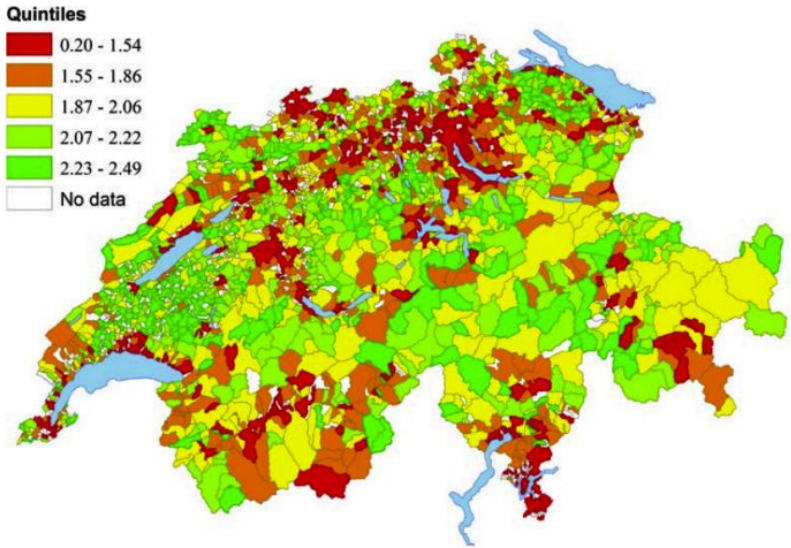
→ Negative exponentiated ratio between change in average rent prices and change in rental housing units per canton

→ Similar to Gyourko, Mayer & Sanai (2013)

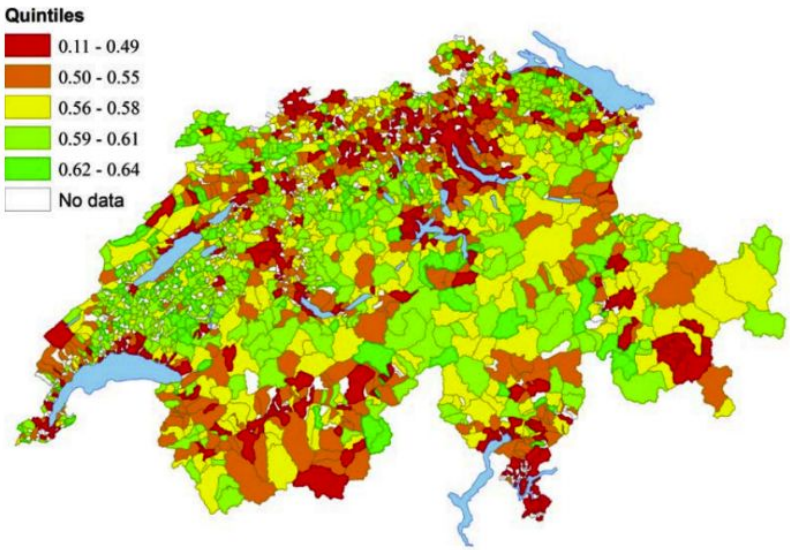
***Figure 2***

*Swiss Housing Supply Elasticities: Rents & Prices*

A. Rents




B. Prices




Source: Büchler, S., v. Ehrlich, M. & Schöni, O. (2019). Housing supply reactions to rent vs. price changes: The role of capitalization rates and regulation (p. 23)

# Empirical Methodology

## Which methodology did we use to get to our results?

→ Correlation between housing prices and consumption (Mian & Sufi, 2013)

→ Disentangling collateral channel from increase local demand

→ Differentiating between tradable and non-tradable industries

→ Non-tradable industries are geographically dispersed

# Geographic Herfindahl Index

Describes the concentration of companies of an industry among the different cantons.

***Table 1***

*Geographical Herfindahl Index by Industries*

| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| Herfindahl Index | 85 | 0.121 | 0.082 | 0.000 | 0.084 | 0.119 | 0.552 |

# Conclusion

## What can we take away from this paper?

Hypothesis 1: 

Availability of more collateral has an effect on the creation of small firms in Switzerland.

Hypothesis 2: 

Small business was not driven by an increase of local demand

# Conclusion

## What can we take away from this paper?

Hypothesis 3: ❌

Effect of increased real estate prices on the creation of small businesses featured more prominently in industries with lower capital requirements to start a new firm.

Hypothesis 4: ❌

The effect of increased real estate prices on the creation of small businesses featured most prominently in sole proprietorships.

*"The struggle small firms owners face to access finance to grow their operations is a global issue, affecting fast-growing emerging nations as much as developed countries."*

Financial Times, June 1, 2012

# Limitations

## What do we have to keep in mind?

→ Adelino, Schoar and Severino (2015): loosening credit standards

→ Correlation of house prices and rent prices

→ Different housing supply elasticity measure

# Appendix

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# Empirical Results

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| | (0.006) | | | |
| Population | 0.000 | | | |
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| Graduates | −0.000 | | | |
| | (0.000) | | | |
| Employment | −0.249 | | | |
| | (0.146) | | | |
| Owners | 0.013 | | | |
| | (0.045) | | | |
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| | | (0.518) | (0.518) | (0.557) |
| Tradable Industries | | | 0.032** | |
| | | | (0.012) | |
| Low Capital Requirements | | | | −0.004 |
| | | | | (0.013) |

| | | | | |
|---|---|---|---|---|
| Low Capital Requirements | | | | −0.004 |
| | | | | (0.013) |
| Population | | 0.007 | 0.005 | 0.018 |
| | | (0.019) | (0.019) | (0.021) |
| Graduates | | −0.000 | −0.000 | −0.000 |
| | | (0.000) | (0.000) | (0.000) |
| Employment | | −0.771*** | −0.776*** | −0.772*** |
| | | (0.274) | (0.274) | (0.296) |
| Owners | | 0.008 | 0.017 | −0.016 |
| | | (0.096) | (0.096) | (0.104) |
| House Prices : 10-49 Employees | | 0.610 | 0.598 | 0.598 |
| | | (0.386) | (0.386) | (0.413) |
| House Prices : 250+ Employees | | 0.400 | 0.329 | 0.626 |
| | | (0.764) | (0.764) | (0.888) |
| House Prices : 50-249 Employees | | 0.523 | 0.460 | 0.515 |
| | | (0.448) | (0.449) | (0.480) |
| Constant | 0.165 | 0.539** | 0.538** | 0.406 |
| | (0.114) | (0.261) | (0.261) | (0.281) |
| Observations | 26 | 3,217 | 3,217 | 2,741 |
| $R^2$ | 0.653 | 0.006 | 0.008 | 0.007 |
| Adjusted $R^2$ | 0.567 | 0.002 | 0.004 | 0.003 |
| Residual Std. Error | 0.018 (df = 20) | 147.127 (df = 3205) | 146.998 (df = 3204) | 145.904 (df = 2728) |
| F Statistic | 7.539*** (df = 5; 20) | 1.720* (df = 11; 3205) | 2.132** (df = 12; 3204) | 1.607* (df = 12; 2728) |

*Notes:* ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

# The Transmission of the Federal Interest Rate to Mortgage Rates in Switzerland

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# Summary

## What are the main findings of the paper?

| | **pre-period** | **post-period** |
|---|---|---|
| **Interest rate** | increase | increase |
| **GDP** | decrease | increase* |
| **Fixed mortgage rate** | decrease | decrease* |
| **Variable mortgage rate** | increase | increase |

* not significant

# Literature

## How does the paper fit into recent literature on the topic?

Empirical assessment of NIRP

→ Effects of negative interest rates on fixed and variable mortgage rates

→ Impact on GDP in a negative interest rate environment

→ Pass-through of monetary policy shocks to mortgage rates

# Simplification of Technical Methodology

## Explanation of Vector Autoregressive Models

→ VAR as an extension of AR models

→ Macroeconomic variables are often endogenous

→ No causal interpretation of the coefficients

→ Allows interpretation about the dynamic relationship

→ Ordering of variables significantly impact results

# Simplification of Technical Methodology

## Explanation of Vector Autoregressive Models

→ Stationary time series

→ Uncorrelated error terms between variables

$$Y_{1,t} = \alpha_{11} Y_{1,t-1} + \alpha_{12} Y_{2,t-1} + \varepsilon_{1,t}$$

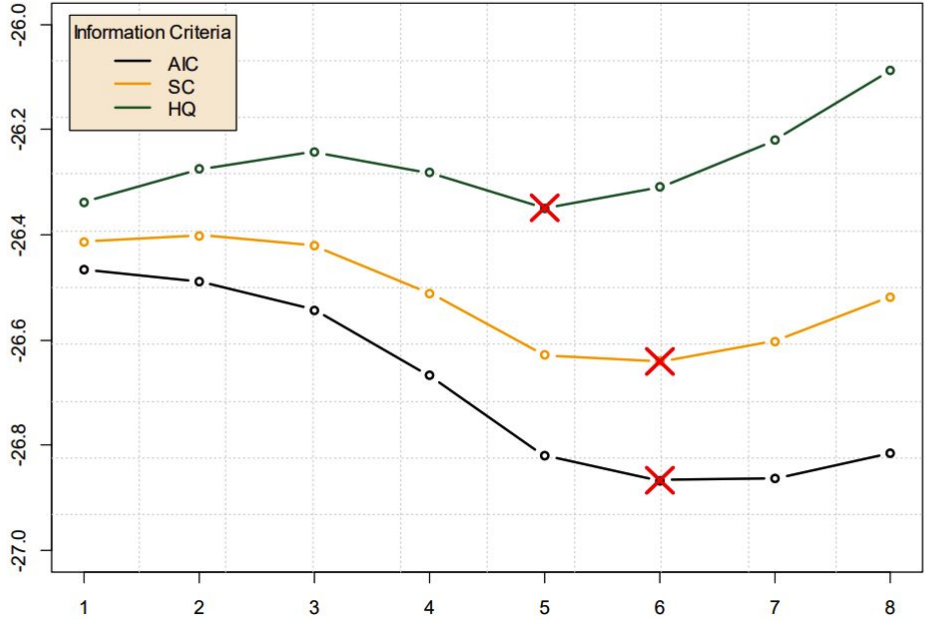
$$Y_{2,t} = \alpha_{21} Y_{1,t-1} + \alpha_{22} Y_{2,t-1} + \varepsilon_{2,t}$$

# Simplification of Technical Methodology

## Explanation of Vector Autoregressive Models

**Example: Cap Rates of Industrial and Office Properties**

R command: `VARselect(data, lag.max = 8, type = "const")`



# Simplification of Technical Methodology

## Explanation of Vector Autoregressive Models

- **Example: Cap Rates of Industrial and Office Properties**
- R command: `VAR(data, p = 5, type = "const")`

$$Office_t = -0.00 + 1.22^{***} Office_{t-1} - 0.22^{*} Office_{t-2} - 0.54^{***} Office_{t-3} + 0.76^{***} Office_{t-4}$$
$$-0.34^{***} Office_{t-5} + 0.14^{*} Indus_{t-1} - 0.11 Indus_{t-2} + 0.17^{*} Indus_{t-3} + 0.05 Indus_{t-4}$$
$$-0.14^{*} Indus_{t-5}$$

# Simplification of Technical Methodology

## Explanation of Impulse Response Function

**Example** (from above): $\varepsilon_{1t}$ increases by 1 standard deviation in period $t$

$$Y_{1,t} = 0.3 + 0.8Y_{1,t-1} - 0.3Y_{2,t-1} + \varepsilon_{1,t}$$

$$Y_{2,t} = -0.1 + 0.4Y_{1,t-1} + 0.9Y_{2,t-1} + \varepsilon_{2,t}$$

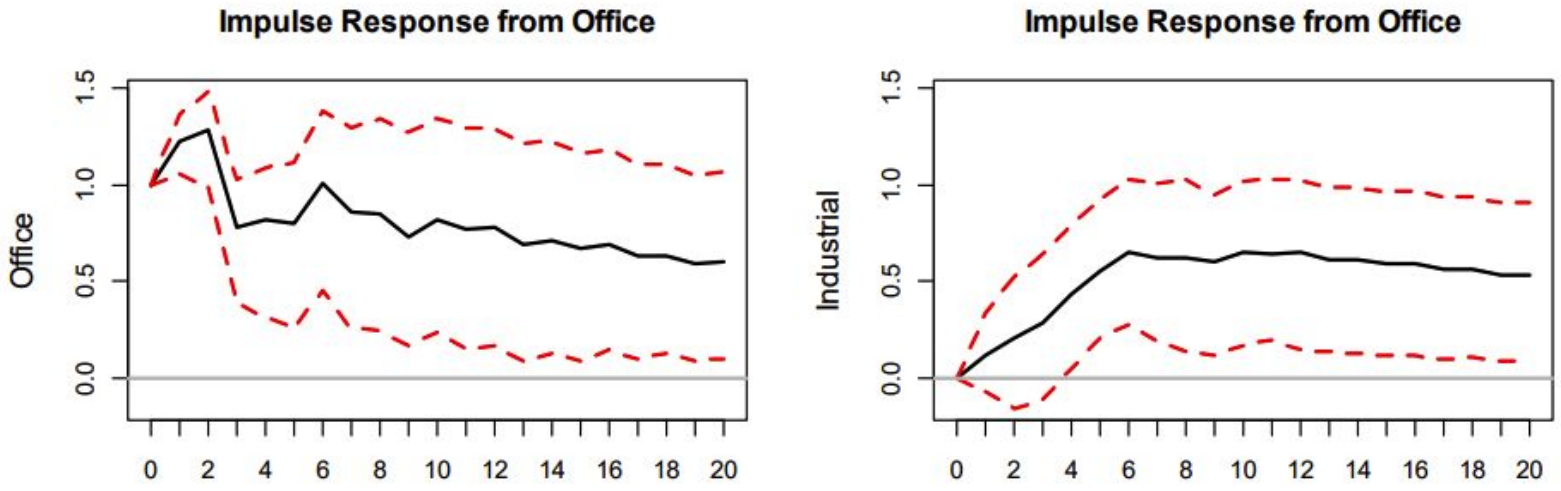
| | Equation 1 increases by | Equation 2 increases by |
|---|---|---|
| Period $t$ | $\varepsilon_{1t}$ | No increase in this period<br>under assumption uncorrelated between epsilon Y1 and epsilon Y2 |
| Period $t$+1 | $0.8\varepsilon_{1t}$ | $0.4\varepsilon_{1t}$ |
| Period $t$+2 | $0.8 \cdot 0.8\varepsilon_{1t} - 0.3 \cdot 0.4\varepsilon_{1t} = 0.37\varepsilon_{1t}$ | $0.9 \cdot 0.4\varepsilon_{1t} + 0.4 \cdot 0.8\varepsilon_{1t} = 0.68\varepsilon_{1t}$ |

# Simplification of Technical Methodology

## Explanation of Impulse Response Function

**Example: Cap Rates of Industrial and Office Properties**

R command: `irf(model, ortho = FALSE, n.ahead = 20)`



# Constructive Critique

## Suggestions on improving the paper

→ Transmission of federal interest rates to mortgages rates

→ Fixed rate mortgage rate rigidity

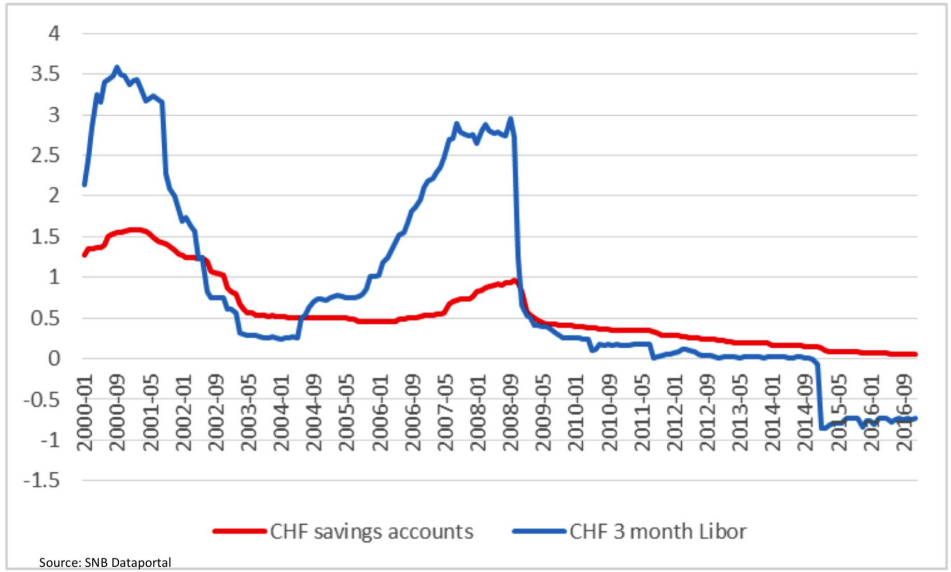
→ Differentiation between mortgage contracts and mortgage rate index

# Transmission

## Incomplete pass-through of interest rate

Interest rates: Non-maturing deposits

Swiss interest rates in %, 2000 - 2016




Source: SNB Dataportal

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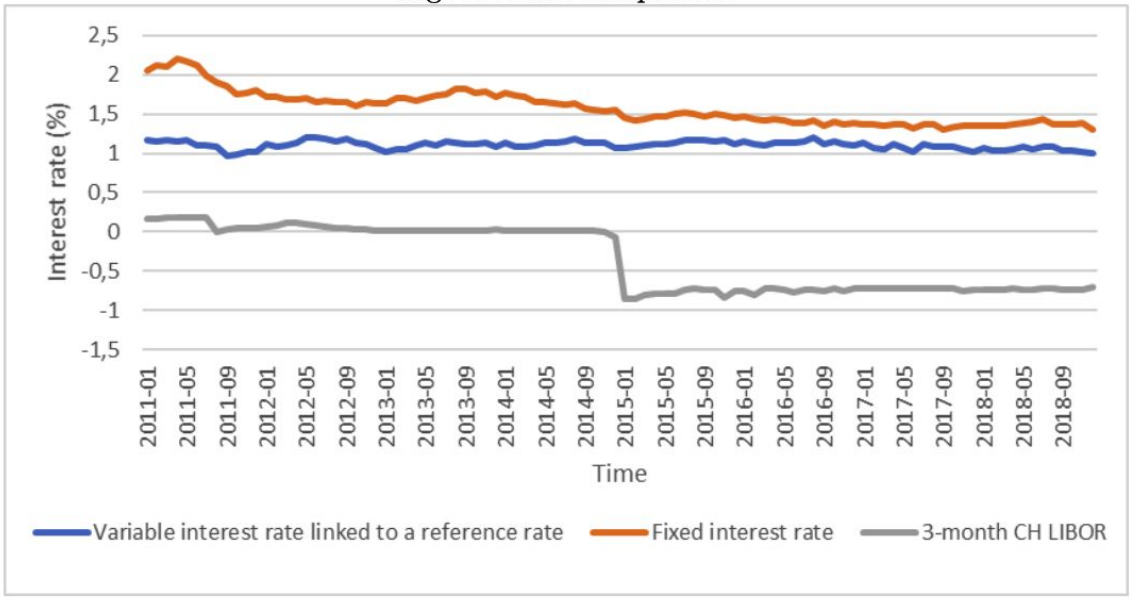
# Transmission

## Fixed vs. variable mortgage rate

Fig. 5. Rates comparison



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→ Ordering of endogenous variables

→ Endogeneity of federal interest rate

→ Cointegration analysis & error correction model as alternative

→ Use the log of GDP

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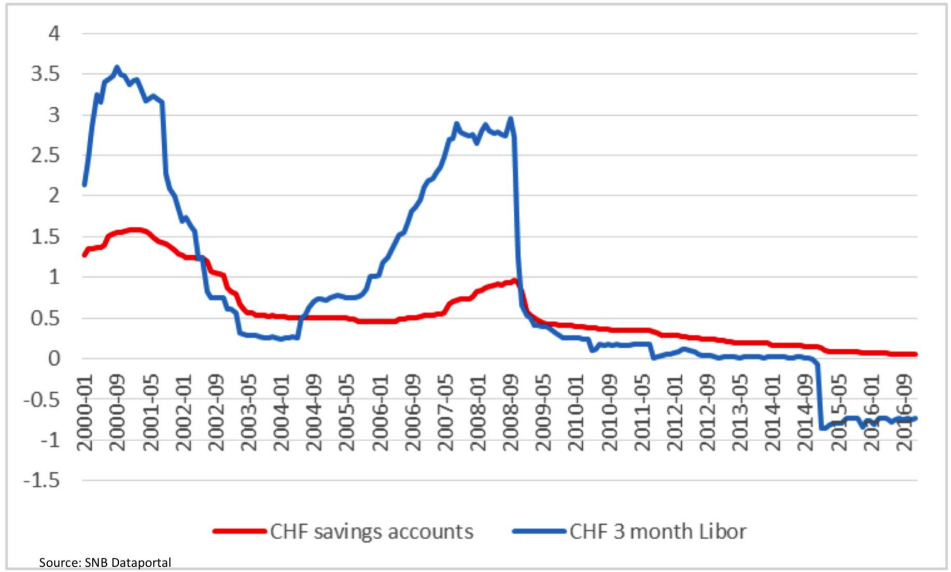
Interest rates: Non-maturing deposits

Swiss interest rates in %, 2000 - 2016




Source: SNB Dataportal

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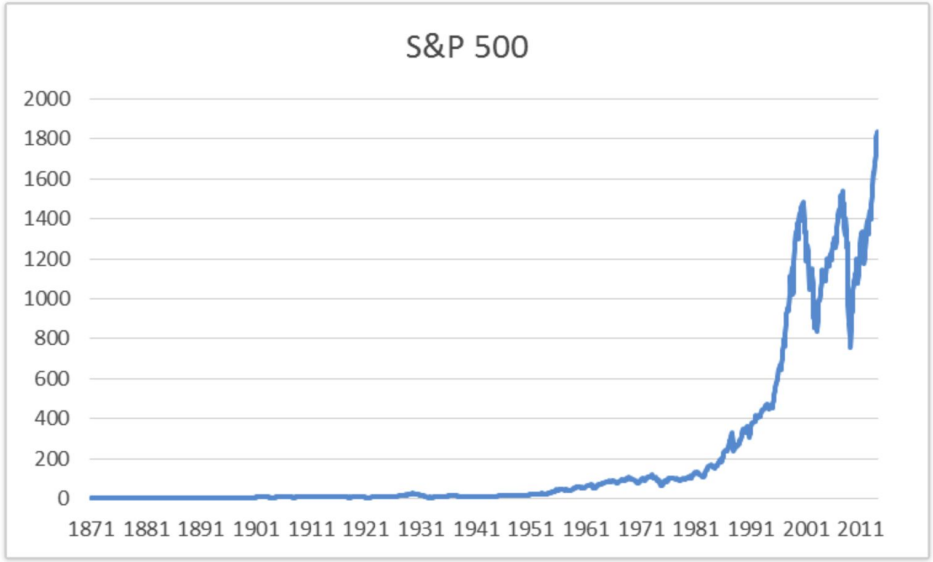
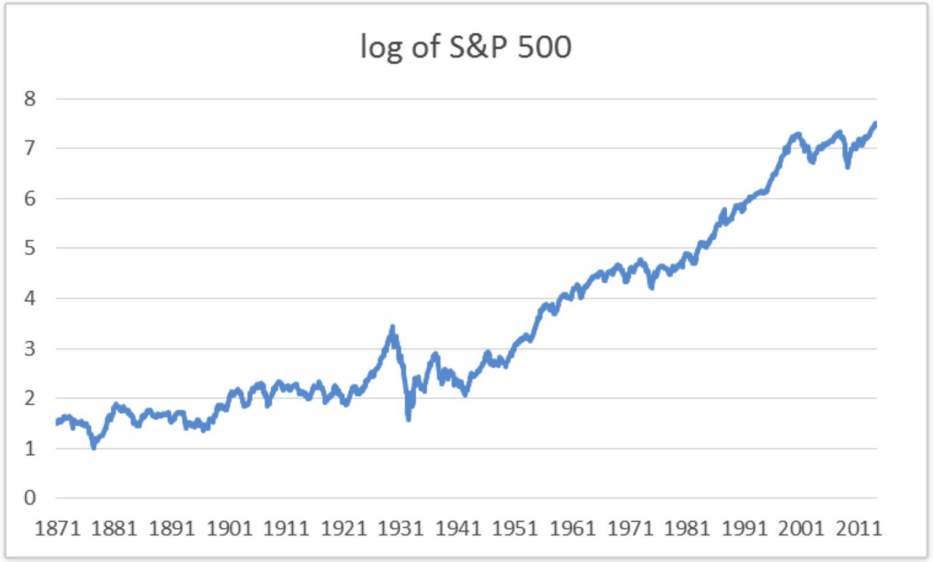



*S&P 500 stock price index, 1871:M1 – 2014:M2. Data source: Robert Shiller.*




*Natural log of U.S. stock prices.*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