Universität St.Gallen

The Impact of House Prices on Small Business Creation in Switzerland

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Abstract

We are not able to find a significant correlation between an increase in housing net worth and an increase in small business creation for Switzerland attributable to the collateral lending channel. Firm size in areas with greater increase in real estate prices did not constitute a casual relation to stronger growth in employment in the same areas and industries, nor did starting capital and sole proprietorships. Aggregate changes in demand are rejected through the analysis of tradable and non-tradable industries separately what suggests that in Switzerland both, the collateral lending channel and local demand are not driven by house price appreciations.

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List of Abbreviations

e.g.	exempli gratia
et al.	Et altri
etc.	Et cetera
FHFA	Federal Housing Finance Agency
FHLMC	Federal Home Loan Mortgage Corporation
FSO	Federal Statistical Office
HPI	House Price Index
i.e.	id est
MPC	Marginal Propensity To Consume
MSA	Metropolitan Statistical Area
NOGA	General Classification of Economic Activities
SNB	Swiss National Bank
US(A)	United States of America

1. Introduction

During the most recent boom-and-bust cycle of American real estate prices, different studies discovered a significant correlation between housing values and employment or small business creation (e.g. Adelino, Schoar, & Severino, 2015). Despite the common agreeance on the existence of the effect of housing values on employment and the like, different studies attribute different transfer mechanisms to the effect. Mian and Sufi (2014) argue that homeowners made use of their increased housing collateral to fund an increase in personal consumption, which consequently resulted in an increase in employment. Kocherlakota (2010) and Charles, Hurst and Notowidigdo (2012) analysed the rise in labor demand in the construction industry which masked structural mismatches in the workforce caused by job losses in the manufacturing sector in their research. Besides these two mechanisms, Adelino et al. (2015) took into account that residential housing has already featured prominently in explanations of corporate investment (Chaney et al., 2012) and employment (Giroud and Mueller, 2017, Schmalz et al., 2017) and discovered a causal effect of rising house prices in the creation of small firms. Their result provides proof that the boom-and-bust cycle of house prices over the past decade exerts substantial influence over the employment creation in small businesses through the *collateral lending channel*. The goal of this paper is to analyze whether this causal effect of rising house prices and small business creations is also evident in Switzerland, a land less affected by the most recent real estate crisis and with a different business and credit culture.

As suggested by multiple papers (Bernanke & Gertler, 1989, Kiyotaki & Moore, 1997) and more recent research (e.g. Adelino et al., 2015), improvements in collateral values may facilitate borrower credit restrictions and can have multiplier effects on economic growth. Information asymmetries between banks and firms, which can be mitigated more easily when collateral values are high and firms can have higher leverage (Rampini and Viswanathan, 2010), constitute the main idea of the collateral lending channel. Kashyap, Stein, and Wilcox, (1993) and Gertler and Gilchrist (1994) suggest that these are difficulties faced particularly by small, more opaque firms.

This paper is the first to look directly at shocks to home values in Switzerland and to consider the impact these shocks have on employment in small firms relative to large firms. The definition of small businesses is predetermined by the availability of corresponding data sets obtained through the Federal Statistical Office (FSO) and is defined as firms between one and nine employees. Proving the direction of causality of the collateral effect can be difficult as higher collateral values not only ease lending but can also be the result of improved economic conditions (e.g. Iacoviello, 2005). We follow the methodology of Adelino et al. (2015) and instrument for the growth in house prices between 2011 and 2016 using a methodology to estimate housing supply elasticity also used by Gyourko, Mayer & Sanai (2013). As we are constrained to using rental prices due to the availability of the data, we further rely on the correlation between rental housing supply elasticities and price housing supply elasticities

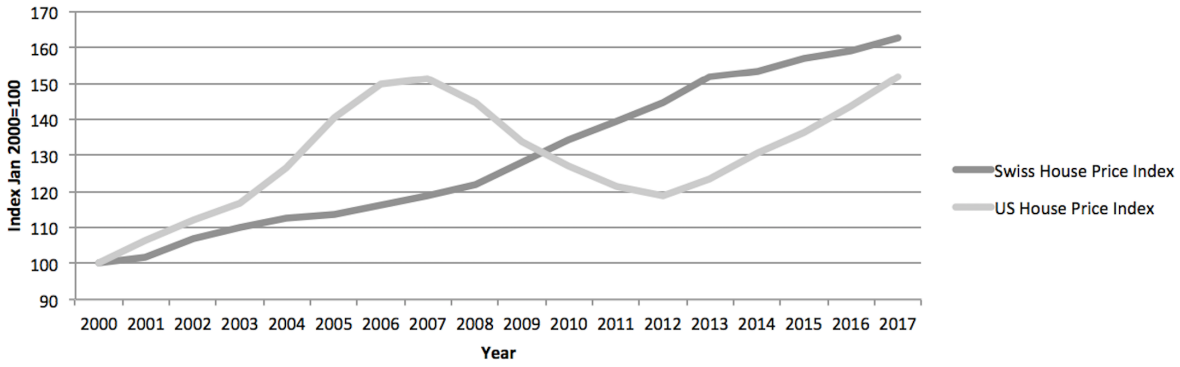
proven by Büchler, v. Ehrlich, & Schöni (2019) for Switzerland, who followed the much cited methodology of Saiz (2010) to estimate housing supply elasticities. Using Saiz's (2010) methodology, the elasticity measure is constructed through exogenous geographic and regulatory constraints to housing supply in order to separate regions in which an increase in housing demand translates into higher real estate prices and more collateral value (low elasticity of the housing supply occurs in regions where it is hard to build) or into higher volume of houses built (areas with high elasticity). These exogenous restrictions on the expansion of housing volumes allow us to identify the effect of high collateral values on employment in small businesses. Chaney, Sraer, and Thesmar (2012) and Mian and Sufi (2011) follow similar methodologies to look at corporate investment decisions and to examine increases in consumption from household leverage respectively.

Results of this paper might have a significant impact on the interest rate policy of the Swiss National Bank (SNB). A study by Stel et al. (2005) finds that small businesses, particularly entrepreneurial activity by nascent entrepreneurs and managers of young businesses, does indeed affect economic growth. This effect is dependent upon the level of per capita income and therefore again linked to the collateral lending channel, resulting in a new angle of interest which needs to be aligned within the interest rate policy. As the collateral lending channel represents another business area of banks, they might be interested in the results of this paper and draw possible conclusions to their product portfolio. Moreover will this paper offer insights whether research results can be replicated within a different geographical, economical and cultural environment. Especially, as real estate markets are local markets, an environment change can have significant impact on the research results achieved.

Contrary to the US house price index of the last two decades, Switzerland was not confronted with any significant downtrend in their real estate values (see Figure 1).

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*

This paper will therefore not be able to analyze the effect on business creation and employment in small firms through recent negative shocks to home values in Switzerland, but rather focus on the boom period. Adelino et al. (2015) revealed that during the US housing price boom of 2002 - 2007, areas with rising house prices experienced a significantly larger increase in small business creations as well as a rise in the number of people who were employed in establishments with less than ten employees compared to areas that did not experience such an increase in home values. We will not only analyze if the same effect also occured in Switzerland but also use newer data sets, collected between 2011 and 2016, to evaluate the consistency of these findings. Through the limited availability of Swiss data sets, the following hypothesis were structured slightly different which will be discussed in the limitation part in section 5 of this paper.

First, we use the housing supply elasticity measure described above to separate regions with low and high housing value growth. The Swiss Federal Statistical Office provides data on the number of businesses separated by number of employees which allows us to look at the net creation of businesses of different sizes by employment. This helps to differentiate the collateral channel from a pure expansionary demand increase as house price appreciations may suffice to secure financing against collateral (the increase value of the house) for small businesses, but is not enough for large businesses. This leads to the constitution of the following hypothesis:

Hypothesis 1 (H1):
„Availability of more collateral through increased house prices between 2011 and 2016 has an effect on the creation of small firms in Switzerland.”

By using a set of controls, obtained through the Swiss Federal Statistical Office, which catch certain cross-sectional differences across regions, we are able to extract the effect of real estate prices on small business creation and employment. To exclude the possibility that house price growth increases local demand for goods (Campbell and Cocco, 2007) and thereby employment at small non-tradable industries (Mian and Sufi, 2014) which are more sensitive to changes in local demand (Kashyap and Stein, 1994), we compare employment growth within industries. Hypothesis 2 makes the assumption that industries in Switzerland which are more reliant on national and global trade will be more geographically concentrated, while those reliant on local demand will be more geographically dispersed, based on the idea that the production of tradable goods requires specialization and scale (Mian & Sufi, 2014, p. 2201). Hypothesis 2 is therefore defined as follows:

Hypothesis 2 (H2):
"Small business creation in Switzerland between 2011 and 2016 was not driven by an increase of local demand"

To further support the findings of hypothesis 1, we analyze differences in employment and business creation based on the start up capital needed for new business in the respective sectors. This enables us to determine the importance of collateral for business financing as only limited financial capital can be gained through increase in house prices. This leads to the following third hypothesis:

Hypothesis 3 (H3):
"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."

We base the last hypothesis on the assumption that sole proprietorships are the type of businesses most likely to be financed by the collateral channel based on the same arguments as described above. Accordingly, the fourth hypothesis is constructed as following:

Hypothesis 4 (H4):
"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."

If we manage to proof all four hypotheses, we are confident to draw a connection of the collateral lending channel and the small business creation and the respective employment in these establishments. The remaining differences to the study of Adelino et al. (2015) will be discussed in the limitations part in section 5.

After testing all hypothesis of this paper, we can not distinguish the effect of house price appreciation on small business creation and employment. We reject hypothesis 1, 3 and 4 which examined the effect of increasing house prices on establishment size, starting capital needed and sole proprietorships. These results suggest that the collateral lending channel did not influence the creation of small firms or employment in such establishments in Switzerland between 2011 and 2016 significantly. We approve hypothesis 2, meaning we cannot determine any difference in business creation and employment in tradable versus non-tradable industries and thereby also reject a potential relationship of house prices and local demand. Our results suggest that either loans collateralized by real estate are not widely used in Switzerland and therefore are not able to significantly influence small business creation and employment at such establishments or, as the total volume of loans remained constant, the increase of collateralized loans was compensated by the decrease of unsecured loans resulting in no significant changes in small business creation and employment.

This paper contributes to the literature on the influence of credit constraints at the household level on the creation of new businesses (Evans and Jovanovic, 1989; Holtz- Eakin, Joulfaian, and Rosen, 1994; Gentry and Hubbard, 2005; Cagetti and De Nardi, 2006). Adelino, Schoar and Severino (2015) is the closest to our paper as we follow their research practice. This allows us to extend their findings to another geographical location and time period in order to dissect possible differences. As we analyse the effect of the collateral lending channel on small business creations and employment in Switzerland, this paper contributes to Fan and White (2003), Fairlie and Krashinsky (2012), Fort, Haltiwanger, Jarmin, and Miranda (2013), Corradin and Popov (2013), Schmalz, Sraer, and Thesmar (2013), Black, De Meza, and Jeffreys (1996) and Kleiner (2013) who show that housing wealth is an important factor in the funding of small businesses. We build and add on findings of Petersen and Rajan (1994), Fracassi, Garmaise, Kogan and Natividad (2013) and Robb and Robinson (2014) who disclosed an important relationship between bank credit and financing of small businesses

and on the finding of Berger and Udell (1998) that entrepreneurs often need to provide personal guarantees to get a bank loan. Lastly, through closely analyzing the collateral lending chanel, this paper contributes to the literature on the connection of collateral value and economic activity (Bernanke and Gertler (1986), Kiyotaki and Moore (1997), Black, De Meza, and Jeffreys (1996), Holmstrom (2015)). Papers of Gan (2010) and Mian, Rao and Sufi (2013) offer insights into the relationship between real estate prices and household borrowing & consumption, meanwhile Gan (2007) and Chaney, Sraer and Thesmar (2012) document the link between house prices and corporate investment.

The remainder of this paper is structured as follows. Section 2 describes our data and the empirical methodology. Section 3 presents the results of the analysis. Section 4 extends the paper by discussing the conclusions. Section 5 documents all limitations of this paper and frames the results in a broader context.

2. Data and empirical methodology

2.1. Data description

All our data sets are published by the Swiss Federal Statistical Office and available to the general public. We use the *workplaces and employees by canton, economic field, and size class* data set as our main data set. From this we obtain the number of employees and number of companies per year segmented into cantons, industry classification as well as establishment size, i.e. number of employees. The establishment size bins are defined as one to nine employees, 10 - 49 employees, 50 to 250 employees and 250+ employees. We use this data set to construct our dependent variable, change in amount of companies between 2016 and 2011. This allows us to differentiate the collateral lending channel effect on the net creation of establishments of different sizes.

We use the *Inhabited apartments by type of resident, residential ownership and canton* data set to obtain the number of rented apartments for the years 2016 and 2011 as well as the percentage of owner-occupied homes for 2011. We use the the *Average rental price in francs by construction period and canton* data set to obtain the average rental price in the years 2016 and 2011. We use both the average rental price increase as well as the increase in rented apartments to construct our instrumental variable, housing supply elasticity, for the main independent variable, change in house net worth. The change in percentage of owner-occupied housing we use as one of four control variables.

We use the *Workplaces and employees by canton and industry classification* data set to obtain the number of companies and employees per canton segmented by General Classification of Economic Activities [NOGA]. We require this data to construct a Herfindahl Index with a geographic scope in order to distinguish between tradable and non-tradable industries.

We use the *Foundation, closure and number of active companies by canton and legal form* dat set to obtain the number of companies and employees by legal form of the company for the period 2011 to 2016. We use the *Personnel costs and other operating expenses by industry classification* data set to obtain the ratio between personnel costs and other operating expenses as a proxy for the starting capital required by industry, where all industries above the median ratio are classified as starting capital intensive industries. We use both the change in sole proprietorships over the analysed period as well as the starting capital intensity of industries in robustness checks.

Finally, we use the *Permanent resident population older than 15 in private households by canton, language region, urban / rural areas and household type* data set to obtain the size of the population by cantons for the year 2011. We take the natural logarithm of the population to reduce the absolute difference between this variable and our other explanatory and control variables. We use the *Permanent resident population older than 15 by highest level of*

education and canton data set to obtain the amount of residents with a bachelor's degree or higher in 2011, with which we then calculate the percentage of the population with a bachelor's degree or higher. We use the *Employment rate of the permanent resident population older than 15 by canton* data set to obtain the percentage of employment people by cantons. Together with the percentage of owner-occupied house, we use these three variables as control variables.

2.2. Empirical Methodology

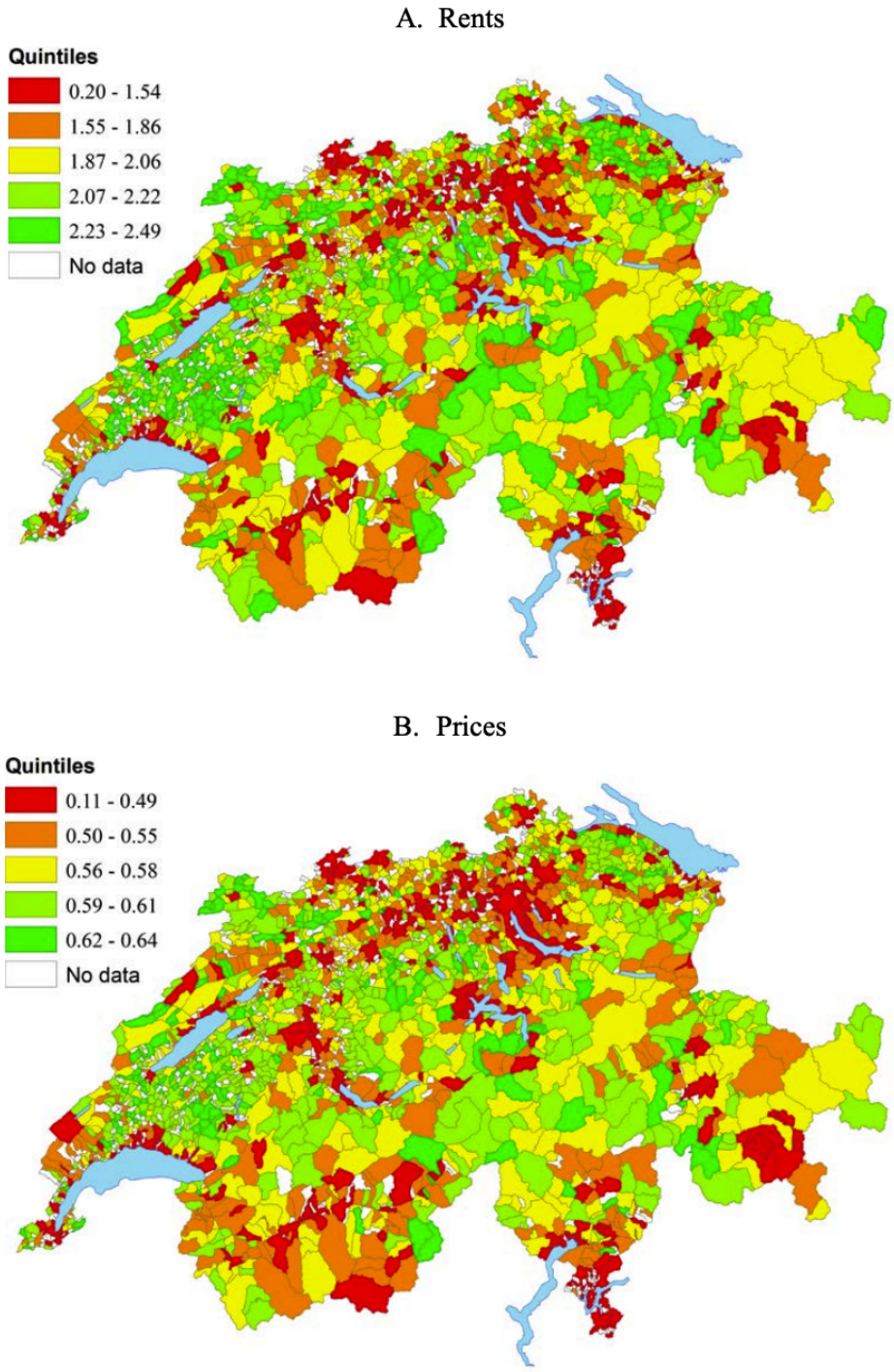
For our main independent variable, the change in housing net worth in the period of 2011 until 2016, we utilize an instrumental variable approach to determine the causal effect of housing net worth on small business creation. Having data on the change in rented housing units as well as the change in average rent price by cantons, we construct the housing supply elasticity as the negative exponentiated ratio between change in average rent prices and change in rental housing units. The theoretical concept behind this construction methodology is that in a supply inelastic region an increase in demand will result in a significantly higher increase in price levels than in a region where housing supply is more elastic. This approach is also utilized by Gyourko, Mayer & Sanai (2013) to determine the elasticity of cities in their quest to define superstar cities. The negative exponentiation allows us to guarantee that elasticities are not positive, as positive housing supply elasticities would erroneously suggest that an increase in housing supply would lead to higher rents.

Due to the lack of availability of data, we are constrained to using rental prices and correspondingly the change in rental housing units as our underlying data set. Therefore, the housing supply elasticities we calculate are rental housing supply elasticities. However, Büchler, v. Ehrlich, & Schöni (2019), in a yet unpublished paper, have calculated the housing supply elasticities for both rents as well as prices and received a very strong correlation between the two, as depicted in figure 2. They followed the frequently cited and well established methodology of Saiz (2010) using satellite-generated data to estimate the amount of developable land available in Switzerland.

In his empirical research on urban economics, Saiz (2010) found that physical land-scarcity is associated with stricter regulatory constraints to development (p. 1261), which in turn results in a more inelastic housing supply (p. 1264). Moreover, Saiz (2010) shows that geographic and regulatory constraints on land development are the most important determinants of housing supply inelasticity (p. 1286). Furthermore, Saiz (2010) proved that a simple linear combination of physical and regulatory constraints have a high explanatory power regarding the evolution of house prices, even without taking differential demand shocks into account (p. 1282). Furthermore, Mian & Sufi (2011) use the Saiz's (2010) housing supply elasticity as an instrument for the change in housing net worth, further suggesting its viability as good instrument.

Figure 2

Swiss Housing Supply Elasticities: Rents & 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)

Nevertheless, our identification relies on the assumption that the elasticity of the housing supply affects employment creation at establishments of different sizes only through its effect on house prices. The exclusion restriction is violated if housing supply elasticity is correlated

with employment or business creation for reasons other than house price growth. Indeed, we receive a covariance of zero between our instrumental variable, the housing supply elasticity, and the error term in the explanatory equation, conditional on the other covariates. Furthermore, housing supply is significantly correlated with our endogenous explanatory variable, change in rental prices. Hence, we conclude that the instrument has a strong first stage and the exclusion restriction is not violated.

Main, Rao, & Sufi (2013), in their research on the impact of housing net worth on consumption during the financial crisis of 2007 to 2009, estimate an elasticity of consumption with respect to housing net worth of 0.6 to 0.8 and an average marginal propensity to consume of 5 to 7 cents for every dollar loss in housing wealth (p. 1687). These findings highlight the impact of housing prices on consumption and therefore employment. Hence, we need to be able to confirm that the increase in small business creations is due to the increased available collateral and not due to increase local demand. In order to do so, we hypotheses that house price development does not have a stronger correlation with non-tradable industries than with tradable industries. As tradable industries are less affected by local demand, we would not be able to attribute the increase in small business creation to the collateral lending channel should non-tradable industries exhibit a stronger correlation between increased housing value and an increased number of small businesses.

In our attempt to classify industries as either tradable or non-tradable we utilize a Herfindahl Index with geographic scope. We follow the methodology outlined in Mian & Sufi (2011) and categorize industries segmented by NOGA classifications as either tradable or non-tradable depending on their geographic concentration. Hence, we make the assumption that industries that are more reliant on national and global trade are more geographically concentrated, as they require specialization and scale, while those reliant on local demand are more geographically dispersed, as they require proximity to their customers (Mian & Sufi, 2011, p. 2201). Consequently, we construct the geographical Herfindahl index for each industry classification based on the squared share of an industry's employment within a canton.

Applying the above mentioned approach, we receive a median index value of 0.098, a mean of 0.121 with a standard deviation of 0.082 (see table 1). The industry with the highest geographical concentration is *09 Provision of services for mining and for the extraction of stone and earth*, followed by *51 Aviation* and *12 Manufacturing of tobacco products*. The most geographically dispersed industries were *02 Forestry and logging* and *42 civil engineering*. No data was available for the industries *05 Coal mining, 06 Extraction of oil and natural gas,* and *07 Ore mining* and hence exhibit an index of 0.

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

2.3. Summary statistics

Table 2 reports summary statistics for the change in rental prices for the period of analyse, the constructed elasticities, all control variables as well as the number of households. For each variable we show the average, the standard deviation, the minimum and maximum as well as the 25th and 75th percentile. The change in rental prices refers to the percentage growth from 2011 to 2016. The elasticities refer to our constructed elasticities. The percentage of graduates refers to the number of Bachelor degree holders in proportion to the cantons population. The percentage employed refers to the percentage of 15 to 64 year olds employed per canton, while the percentage of homeowners refers to the percentage of homes that are owner-occupied.

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

2.3. Empirical model

We set out to measure the effect of regional price appreciation in the real estate market on small business creation on the basis of the collateral lending channel. Following the methodology set forth by Adelino et al. (2015) in their quest to prove the impact of the collateral channel on small business creation in the United States for the period 2002 until

2007, we differentiate the collateral channel from a pure expansionary demand increase by looking at the net creation of businesses of different sizes, measured by the total number of employees. This approach rests of the notion that house price appreciations may suffice to secure financing against collateral (the increased value of the house) for small businesses, but does not suffice for large businesses or those that require large amounts of starting capital. In order to establish which industries require large amounts of starting capital, we rely on the ratio of average personnel expenses to other expenses per industry categorized according the general classification of economic activities (NOGA 2008).

Saiz (2010) developed a measure for the elasticity of housing supply by metropolitan statistical areas (MSA) and shows that said supply elasticities in the United States show a very strong correlation with housing prices. Using the two-stage least squares instrumental variable approach, we seek to overcome the issue of endogeneity in the change in house price variable. The endogeneity of said variable is caused by the fact that the creation of new business correspondingly the increased economic activity in a region shifts the housing demand curve in the DiPasquale Wheaton Four Quadrant model to the right, leading to an increase in house prices in the long-term equilibrium. Hence, without instrumentalization, we cannot confirm the directional causality that an increase in house prices leads to an increase in small business creations.

We follow Adelino et al. (2015) and construct our two-stage least squares regression as follows:

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

where i indicates the establishment size category and j indicates the canton. $\Delta^{11-16}Employment_{ij}$ represents that change in employment per establishment size between 2011 and 2016 while ΔHP_j^{11-16} represents the estimated house price appreciation using our housing supply elasticity estimated in the first stage regression. 1_i represents a vector of dummy variables for each establishment size category. X_j, our set of controls, consists of the natural logarithm of the population of the canton, the percentage of people with a Bachelor's degree or higher, the percentage of people employed, and the percentage of owner-occupied houses. This set of controls is identical to those used by Adelino et al. (2015), differing only in regard to the canton's share of imports from China. Our coefficient of interest is β_3, which we hypotheses is larger for small establishments compared to large establishments.

Next, we employ a two-stage least squares regression incorporating the geographical Herfindahl Index to distinguish between tradable and non-tradable industries and disaggregating observations to the industry level. We assign all industries with an index above the median index level a one and all other industries a zero. Incorporating these industry fixed effects allows us to control further for common nationwide demand shocks. The regression equation is now as follows:

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

where$1_z$is a vector of industry indicator variables. With this specification, we intend to be able to differentiate the effect of house prices on new business creation between the collateral lending channel and expansionary local demand. The latter can be rationalised by the fact that homeowners feel richer due to their increased net worth and access thereto in form of home equity, and thus tend to consume more, increasing the demand for local products and services. Should the increase in creation of small businesses be due to the collateral lending channel, we hypothesis that the coefficients of interest are not significant.

Next, we repeat our two-stage least squares regression, however using a vector of dummy variables indicating the amount of starting capital required per industry. The specification is as above, where 1_znow represents, as just mentioned, the starting capital required. This specification rests on the notion that industries which require low levels of starting capital benefit disproportionately from increased house prices.

Our last regression specification incorporates the change of business with regard to their legal form rather than with regard to the establishment size. This specification is intended as a robustness check and rests on the idea that sole proprietorships are more likely to be finance through an increase in collateral provided by house price appreciations.

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

In this specification *i* indicates the legal form of the company. Finally, all second stage regressions are weighted by the number of households in 2011, a procedure used to minimizes the sum of weighted squared residuals to produce residuals with a constant variance, i.e. homoscedasticity.

3. Empirical results

The results of the first stage regression of the instrumental variable and the control covariates on the change in rental prices from 2011 to 2016 as well as the three second stage regressions conducted with our main data set, which includes the change in number of businesses segmented by cantons, establishment size as well as industry classifications, are reported in table 3. From the results of our first stage regression (1) we can confirm that the choice of our instrumental variable, as well as its construction methodology serves as a good instrument. With the standard deviation of house prices change being 0.026 and the standard deviation of elasticities being 0.8, an increase of the elasticity by one standard deviation would result in a 1% decrease in house prices. That intuitively makes sense, as in more inelastic regions an increase in demand results in a stronger prices increase than in more elastic regions.

Furthermore, we have a high R^2 of 0.653 as well as an adjusted R^2 of 0.567. We can also see that our control variables are not significant.

Table 3

Two Stage Least Squares Regressions

	Change in Housing Rents	Change in Number of 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 : 1-9 Employees		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)
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.			

Models (2), (3), and (4) represent the outputs of our second stage regression using different model specifications and correspond to the regression functions listed in the empirical methodology section. For all models, the establishment size category of 1 - 9 employees serves as the reference group, while it is also our main coefficient of interest. The output has

been restricted to the main variables of interest, and as such the intercepts for the dummy variables have been omitted.

Contrary to the findings of Adelino et al. (2015), we do not observe significant coefficients of interest in any of our 3 second stage regressions presented in table 3. Therefore, we cannot say that an increase in house prices has a significant effect on the increase in small business creations. Although we do observe that the coefficient for small businesses, 1-9 employees, is the largest amongst all four establishment size categories, the t-value is 0.20 and thus only significant at an unacceptable confidence level. Thus, we reject our first hypothesis and conclude that the availability of more collateral through increased house prices between 2011 and 2016 did not have an effect on the creation of small firms in Switzerland.

Similar, our findings for our third regression also contradict the findings of Adelino et al. (2015). Again, our coefficient of interest is not significant, albeit being sizably greater than the coefficients for the two largests establishment size categories. In addition to the size dummy variable we also included a dummy variable for tradable industries, defined as those with a geographic concentration greater than the median Herfindahl index level. The aim of this regression specification was to undermine the possibility of an increase in small business creations being caused by an increase in local demand instead of through the collateral lending channel. Albeit our coefficient being significant at the five percent level, it suggests that tradable industries are likely to exhibit a higher increase of companies than non-tradable industries. Thereby, we can say that the increase in companies is not driven by an increase in local demand, but rather the contrary, namely in the increase in national and international demand. Therefore, we can accept our second hypothesis and state that small business creation in Switzerland between 2011 and 2016 was not driven by an increase of local demand.

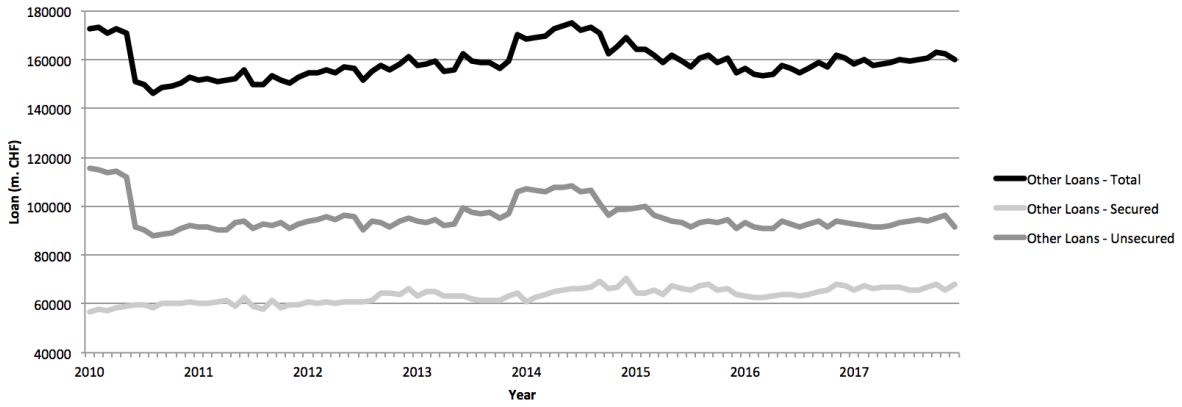
Our fourth regressions attempts to distinguish the impact of house price appreciation on business creation by analysing the differences in business creation based on the starting capital needed to create a new company in the respective industry. The collateral lending channel would suggest that job creation at small businesses in response to house prices changes is strongest in industries with low start-up capital requirements that can reasonably be financed through home equity loans (Adelino et al. 2015). Similarly as in the previous two regressions we observe that our coefficient of interest, house prices : 1-9 employees is insignificant, albeit being substantially larger than the coefficients for the other three establishment size categories. Furthermore, our dummy variable for starting capital required is insignificant in absolute as well as statistically terms. Therefore, we cannot conclude that an increase in house prices leads to an higher growth rate of the number of companies in industries which do not require great starting capital. Consequently, we reject our third hypothesis stating that 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.

Lastly, the specification of our fifth regression was meant as to ensure the robustness of our results. Instead of regressing the change in the number of companies based on establishment size on the change of instrumented house prices, we opted to analyses the change in companies differing in legal form, with our interest lying with the sole proprietorship. Albeit not being show in table 3, the coefficient of interest, *house prices : sole proprietorships,* is statistically insignificant. With this result, we are confident that an increase in house prices in Switzerland did not result in an increased number of businesses that could have been financed through the collateral lending channel. Hence, we also reject our fourth hypothesis and state that the effect of increased real estate prices on the creation of small businesses in Switzerland between 2011 and 2016 did not most prominently feature in sole proprietorships.

Taking a closer look at the Swiss loan structure we see that the volume of secured loans is actually the lowest (see Figure 3).

Figure 3

Secured vs. Unsecured Loans in Switzerland



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

Even though the volume of secured loans increased slightly over the time period of 2011 to 2016, it still remains significantly below the volume of unsecured loans. And even within the secured loan section, not all of them have to necessarily be backed by real estate. The total loan volume dropped in 2010 but since remained relatively constant on the CHF 160'000m level. This leads us to propose the following conclusion: either loans collateralized by real estate are not widely used and therefore are not able to significantly influence small business creation and employment at such establishments or, as the total volume of loans remained constant, the increase of collateralized loans was compensated by the decrease in unsecured loans resulting in no significant changes in small business creation and employment.

4. Conclusion

This paper builds on the findings of different studies which discovered a correlation between housing net worth and employment (Adelino et al., 2015, Mian & Sufi, 2014, Kocherlakota, 2010, Charles, Hurst & Notowidigdo, 2012). We follow the methodology of Adelino et al. (2015), instrumenting for the growth in house prices between 2011 and 2016 using the elasticity measure also utilized by Gyourko, Mayer & Sanai (2013) and try to identify the causal effect of higher house prices on small business creations and employment through the collateral lending channel in Switzerland.

We reject hypothesis 1, 3 and 4 which examined the effect of increasing house prices on establishment size, starting capital needed and sole proprietorships. These results suggest that the collateral lending channel did not influence the creation of small firms or employment in such establishments in Switzerland between 2011 and 2016. We approve hypothesis 2, meaning we cannot differentiate between business creation and employment in tradable versus non-tradable industries and thereby also reject a potential relationship of house prices and local demand. Our results suggest that either loans collateralized by real estate are not widely used in Switzerland and therefore are not able to significantly influence small business creation and employment at such establishments or, as the total volume of loans remained constant, the increase of collateralized loans was compensated by the decrease of unsecured loans resulting in no significant changes in small business creation and employment. The former argument is also underpinned by the substantially lower home ownership rates in Switzerland compared to the United States.

Well documented and one important driver of this paper is that entrepreneurial activity by nascent entrepreneurs and managers of young businesses does indeed affect economic growth (Stel et al., 2005). If the Swiss government is interested in economic growth through entrepreneurial activity, they are better advised to invest their resources in subsidizing bank loans for small businesses rather than through the collateral lending channel. Furthermore, our results may suggest that there is unexploited potential for Swiss banks to include more home equity collateralized consumer loans in their product portfolio, especially to nascent entrepreneurs and managers of young businesses, as this area seems not to be prevalent in Switzerland. However, this product strategy may only become more viable once the home ownership rates in Switzerland increase to levels similar to those seen in the United States. In turn, homeownership can directly be promoted by the Swiss government, just like the American government does through policies and institutions such as the Federal Home Loan Mortgage Corporation (FHLMC). Therefore, the Swiss government and banks together could reduce credit constraints for young and small firms (Kirschenmann, 2016) and increase economic activity and small business creation in the long-run by incentivizing homeownership and making home equity loans more prevalent in Switzerland.

"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

As we cannot replicate the results of Adelino et al. (2015) with Swiss data sets, we encourage further research on the correlation between housing values and employment and business creation in Switzerland. According to Rosenthal and Rosnow (1984, cited in Das, 2014, p. 132) there must have written at least 15 studies on a certain topic in order to give their statistical results general acceptance. Thus, the mentioned results and implications must be further tested, with the limitations of section 5 in mind, to get the necessary significance.

5. Limitations

Other authors relate house price growth to increased demand in the construction sector which can mask structural mismatches in the workforce caused by job losses in the manufacturing sector (see Kocherlakota, 2010; Charles, Hurst, and Notowidigdo, 2012). We do not specifically exclude the construction sector in our analysis and can therefore not completely rule out the influence of structural mismatches. Furthermore, Adelino et al. (2015) checked whether loosening credit standards of banks may be the reason for the increase in small business creation and employment in such establishments. As this paper could not find any indication for the collateral lending channel, we did not verify if this effect occured in Switzerland.

Due to the limited availability of Swiss data sets, we run the regressions based on the instrumented change in rent prices on the cantonal level between 2011 and 2016. This implies the assumption that house prices and rent prices heavily correlate and moved in the same direction over the past decade. Also, we found unrealistic observations in the data which are most likely are caused by errors in the data collection. For example, there was one worker for every canton in the coal mining industry. For the purpose of our analysis, we removed such data anomalies from our data set as a precaution. Moreover, not every canton is home to a company with more than 250 employees which could distort also our findings.

We differ from Adelino et al. (2015) in the construction of the housing supply elasticity instrument. While Adelino et al. (2015) employ the methodology proposed by Saiz (2010), we are constrained to using a combination of two approaches. For the estimation of the elasticities themselves we rely on the simple approach of setting the expansion of housing units in relation to the increase in housing prices for each region, an approach also used by Gyourko et al. (2013). In addition, we rely on the positive correlation between rental housing supply elasticities and owner housing supply elasticities to estimate the change in house

prices in the first stage regression. This required positive correlation was proven by Büchler, v. Ehrlich and Schöni in their extensive development of housing supply elasticities for Switzerland using the methodology set forth by Saiz (2010).

Furthermore, it should be noted that, as described by Adelino et al. (2015, p. 290), "even though the elasticity measure has a natural interpretation for positive housing demand shocks, we lack a good instrument for the house price drop. In fact, an increase in housing demand can translate into either higher house prices (inelastic areas) or an expansion of housing volume (elastic areas). However, on the downside, a drop in housing demand does not lead to the destruction of housing stock, and thus prices simply drop in both inelastic and elastic areas." However, due to the steady increasing housing price index in Switzerland over the analysed period, this limitation is more specific to Adelino et al (2015) and less of a limitation in our analysis.

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