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Immigration and Swiss House Prices

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Abstract

This study examines the behavior of Swiss house prices to immigration flows for 85 districts from 2001 to 2006. The results show that the nexus between immigration and house prices holds even in an environment of low house price inflation, nationwide rent control, and modest immigration flows. An immigration inflow equal to 1% of an area's population is coincident with an increase in prices for single-family homes of about 2.7%: a result consistent with previous studies. The overall immigration effect for single-family houses captures almost two-thirds of the total price increase.

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1. Introduction

Recent evidence from country studies on house prices suggests that the impact of immigration on local house prices is a global phenomenon. Saiz (2007) estimates that an immigrant inflow equal to 1% of a city's population results in a 2% increase in house prices for U.S. cities. Gonzalez and Ortega (2009) show that the price effect through immigration is higher for the Spanish housing market. Akbari and Aydede (2009) instead find muted immigration effects for the Canadian housing market. Stillman and Mare (2008) uncover a separation result between migrant groups. They find that the inflows of returning New Zealanders are related to rising house prices but that inflows of new foreign immigrants are not.

A striking feature of these spatial correlations - the correlation between house prices and immigration across local markets - is that they coincide with episodes of high house price inflation and pronounced immigration flows at the national level. Gonzalez and Ortega (2009), for example, consider a boom episode where Spanish house prices grew annually by 17.5% and the foreign-born share in the working population increased from 2 to 16% between 1998 and 2008. Similarly, Saiz (2007) examines a 15-year episode where prices for new single-family homes grew annually by 6.3% and the 10 largest American

immigrant cities recorded levels of new legal immigration of 13% of the initial population.[1] Immigrations impact for periods of low house price inflation have not been previously examined.

The objective of this paper is to show that the nexus between house prices and immigration holds also for episodes of low house price inflation and modest immigration inflows. At the extreme we consider a country with low rates of home ownership and nationwide rent control. Both of these market features may suggest that the demand induced pressures from immigration are weaker in an environment of low house price inflation. More specifically, we examine the behavior of Swiss house prices to immigration flows for 85 districts between 2001 and 2006. During this period, the population-weighted average price change for single-family homes grew annually by 1.5% and the immigration inflow to Switzerland was consistent with the European average of around 3 immigrants per 1000 inhabitants.

To interpret our short-run estimates that attribute price increases to demand effects through immigration flows, we rely on country specific features of the Swiss housing market. We argue that the structure of the housing

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[1]The figure 6.3% is from 1983 to 1997 for new single-family homes using the index from the U.S. Department of Housing and Development.

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market is important for understanding the links between house prices and immigration. On the one hand, nationwide rent control and a low level of home ownership characterize the Swiss housing market. A prior shared by most researchers is that these two market features should lead to moderate house price movements. On the other hand, low vacancy rates and low turnover rates depict the Swiss housing market. These features mean that the tight Swiss housing market is susceptible to local shocks, say through unexpected immigration inflows. This latter channel suggests that the relation between immigration and house prices could be broader than is documented in previous country studies.

Our empirical analysis of the Swiss housing market that exploits the cross-regional variation at the annual frequency fits closest to studies by Saiz (2007) and Gonzalez and Ortega (2009). Conditioning on a set of local variables, our estimates find that an immigration inflow equal to 1% of a district's population is coincident with an increase in prices for single-family homes of about 2.7%. The average immigration impact for single-family houses explains almost two-thirds of the total price increase.

The paper is organized as follows. Section 2 outlines the main features of the Swiss housing market. Section 3 presents the empirical methodology.

Section 4 discusses the data and descriptive statistics. Section 5 documents the empirical results. Section 6 concludes.

2. Distinct Features of the Swiss Housing Market

To show that our results are primarily explained by demand shocks in tight local markets, we first outline the main distinguishing features of the Swiss housing market. House price inflation in Switzerland is low by international standards. Table 1 lists the average annual real increase in house prices for 18 OECD countries from 1970 to 2006. The historical record shows that the average real price increase for Swiss housing is 0.34%. This figure is the second lowest among the advanced countries and is seven times lower than the returns for U.S. homes examined in Saiz (2007).[2]

Low demand for owner occupancy and nationwide rent control are frequently mentioned as factors explaining the muted growth in Swiss house prices, see Werczberger (1997). The rates for home ownership in Canada (65.8%, national census 2001), New Zealand (67.8%, 2001), Spain (85.3%, 2000), and the United States (67.8%, 2000), countries examined in previ-

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[2]Wüest and Partner (2004b) calculate international investment returns for housing, yielding similar results as in Table 1.

ous house price-immigration studies, are twice that of Switzerland's (35.5%, 2000). Unlike in many other countries, the Swiss federal government does not actively promote home ownership.[3]

Nationwide rent control is a further reason for low house price inflation in Switzerland. Rent increases must be justified by the landlord's cost increases, see Stalder (2003). As such, rent increases do not fully reflect market pressures. Figure 1 shows the levels of the Wüest and Partner index for rents and single-family homes from 2000:1 to 2006:4. The quarterly index for rents moves in a trend like manner, reflecting legislative constraints for rent increases. Instead, home prices show greater fluctuations with moderate growth.[4]

A tight housing market is often the consequence of pro-tenant laws. Tightness of the housing market is observed in low vacancy and low turnover rates. For our period of investigation, the average vacancy rate, measured by the Bundesamt für Statistik, is 1.34% for Swiss rental units compared

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[3]In fact, taxes discourage owner-occupancy in Switzerland. Property is treated as an asset subject to wealth and income taxes for imputed rental income. Further, unlike other financial investments in Switzerland, housing is subject to capital gains taxes. Capital gains are taxed at the cantonal level with rates differing by duration of ownership.

[4]A corresponding rent index at the regional level is unavailable for Switzerland.

to 9.7% for U.S. rental units. The tightness of the Swiss housing market is also reflected in low occupancy turnover rates. Wüest and Partner estimate the average stay to be 5 to 6 years for rental units, 12 to 14 years for condominiums, and 20 years for single family homes.[5]

In the empirical analysis of section 5, only local information from vacancy rates enters our micro specification. Information on turnover and on home ownership rates is unavailable at the annual frequency. Similarly, the market impact from nationwide rent control is only indirectly captured as an explanation for moderate price movements in Swiss house prices.

3. Econometric Specification

We estimate the impact of immigrant inflows on house prices at the district level. Our empirical baseline specification follows Saiz (2007)

$$\Delta p_{it} = \mu_t + \beta\left(\frac{\Delta I_{it}}{POP_{it-1}}\right) + \gamma_1 \Delta u_{it-1} + \gamma_2 X_i + \varepsilon_{it}, \qquad (1)$$

where $\Delta p_{it} = ln(p_{it}/p_{it-1})$ denotes the annual change in house prices in district i at time t. The immigration effect is captured by $\left(\frac{\Delta I_{it}}{POP_{it-1}}\right)$, the immigrant flow relative to the population at $t-1$ for area i. Changes in

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[5]These turnover rates are indicative for select districts based on information from Wüest and Partner (2004a).

unemployed divided by population is denoted by Δu_{it-1}. Further, μ_t is a year fixed effect and X_i is a set of control variables, capturing region-specific characteristics. The shock to house prices in region i at time t is ε_{it}.

The specification in first differences assumes that regional fixed effects are filtered out. Still, we are interested in regional indicators that capture common information across local regions. These five indicators are an index for district size (8 different categories), an index for district typology (14 different categories from agglomeration to rural), an index for district language (4 categories), a dummy for economic strength (+1 if receives fiscal transfers, 0 otherwise), and an index for social economic status (index from 0 to 100 based on education, job possibilities, income).

The coefficient of interest, β, is interpreted as the percentage change of house prices associated with annual inflows of immigrants equal to 1% of a district's population. Because of the annual frequency of our sample, β is interpreted as a short-run estimate in which the supply of housing does not respond immediately to immigration.[6] In other words, an increase in

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[6]Gonzalez and Ortega (2009) and Saiz (2007) also work with annual data and interpret β as a short-run estimate capturing demand effects. Instead, the literature that relies on census data such as Greulich et al. (2004) and Ottaviano and Peri (2007) for the United States interpret the results at the decennial frequency as long-run estimates. The latter

immigration into a district raises its local population and thereby the demand for housing. The increase in local demand raises prices and results in a positive β. This positive effect of immigration on house prices also assumes that natives are not infinitely sensitive to changes in housing costs and that native displacement from the local housing market is not complete. One interpretation for this effect offered by Saiz (2007) is that immigrants are less sensitive to housing costs, because local immigrant-specific amenities and networks are more important to them.

An empirical shortcoming of the baseline equation (1) is that we do not include a measure of household income for the full sample estimates. This limitation is due to data availability.[7] The absence of Swiss income means that our estimates for β in equation (1) are subject to an omitted variables bias. In other words, OLS estimates overstate potentially the immigration effect. For a restricted sample with household income at the district level, we show that the omitted variables bias linked to income does not influence

interpretation assumes that housing supply varies in response to immigration, while the former interpretation does not.

[7]Income data at the city level is available only for the cantons of Basel-City, Zurich and Thurgau for the year 2000. We are therefore unable to construct a measure for income changes at the district level for the full sample.

our empirical results.

Potential measurement problems for our measure of immigrant flows raise concerns of the attenuation bias for our estimate of β, see Aydemir and Borjas (2006). Immigration flow is measured as the annual change in the number of foreign nationals residing in Switzerland. Because the immigration stock varies in response to naturalized citizens and births of foreign nationals, our measure of immigration flow is contaminated. This measurement problem drives the OLS estimate of β towards zero. Although at the national level the difference between foreign nationals and foreign born population is small by international comparisons, it is difficult to determine how large the measurement problem is across regions.[8]

Establishing causality through an exogenous source of fluctuations in immigration inflows represents an additional concern for OLS estimation of β in equation (1). Immigration to a local area is likely to be an endogenous event. For example when controlling for local factors, immigrants may prefer areas where housing costs are increasing more slowly. This sensitivity to

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[8]Swiss record keeping of immigrants follows the "ius sanguinis" concept. In 2006, foreign nationals were 20.2% of the population, while foreign born were 22.9% of the population. See table 3 in Münz (2008) for European comparisons.

rising housing costs biases the OLS estimate of β towards zero.

To overcome problems of measurement error and of endogeneity linked to $(\frac{\Delta I_{it}}{POP_{it-1}})$, we employ an instrumental variables (IV) strategy based on the settlement patterns of immigrants in previous periods. This instrument strategy has been used previously by Saiz (2007), Gonzalez and Ortega (2009), and Ottaviano and Peri (2007). The instrument is constructed such that it is independent from local contemporary demand factors, which possibly affect the settlement choices of immigrants. The instrument, referred as the "supply push component" by Card (2001), is constructed as follows:

$$SP_{it} = \sum_c \frac{\lambda_{ci}^{1997}\Delta I_{ct}}{POP_{it-1}}, \quad \text{with } \lambda_{ci}^{1997} = \frac{I_{ci}^{1997}}{I_c^{1997}}. \tag{2}$$

The share of immigrants from country c settling in district i in 1997 is denoted by λ_{ci}^{1997}.[9] The variable, $\Delta I_{ct} = I_{ct} - I_{ct-1}$, is the year-to-year change in the national level of immigrants from country c. By summing $\lambda_{ci}^{1997}\Delta I_{ct}$ over origin countries, we hope to obtain a predicted measure of total immigrant inflows in district i at time t that is orthogonal to local demand conditions.

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[9]Munshi (2003) shows that settlement patterns of previous immigrants determine location choices of arriving immigrants from the same country of origin. We construct the instrument with 11 countries of origin: Austria, France, Germany, Italy, the Netherlands, Portugal, Serbia, Spain, Turkey, the United Kingdom, and other.

Finally, the instrument is normalized by the population in district i at $t-1$.

4. Data and Descriptive Statistics

The annual sample is from 2001 to 2006. The hedonic adjusted prices are for single-family homes, multi-family homes, and condominiums, spanning 85 districts that have a residential population of at least 25,000 inhabitants in 2001.[10] Similar data for rents are unavailable at the district level. The average annual increase in house prices from 2001 to 2006 is 1.52% for single-family homes, 2.06% for multi-family homes, and 1.43% for condominiums (weighted by population over the 85 districts).[11] The examined areas encompass 96.38% of the Swiss residential population. Data on house prices are from Informations- und Ausbildungszentrum für Immobilien.

Data on the number of foreigners grouped by their country of origin are

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[10]The term "district" refers to the 106 MS-Regionen, see Wüest and Partner (2004a) for further definitions.

[11]The respective unweighted figures are 1.20% for single-family homes, 2.08% for multi-family homes, and 0.99% for condominiums, suggesting that home prices for larger districts grew slightly faster. The fact that new construction investment as a percentage of GDP stagnated at 6% throughout our sample is a further reflection of the moderate price growth for Swiss homes. Weak persistence is a further implication of the moderate house price inflation.

available at the city level. Between 2001 and 2006, Switzerland had an overall positive net migration rate of 2.9 per 1,000 inhabitants, consistent with the European average of 3.0 per 1,000 inhabitants, see Münz (2008). For our sample of 85 districts, the figure rises to 3.3. The source is the Federal Office for Migration. Further, data on the number of unemployed for each city are from the State Secretariat for Economic Affairs. Last, data on the total resident population and on the five socio-economic and regional indicators for each city are from the Federal Statistics Office. Information at the city level is aggregated to match our housing data at the district level.

Table 2 shows descriptive statistics for immigration, house prices, and the vacancy rate for 10 districts with the largest immigrant-to-population ratio and 10 districts with the smallest immigrant-to-population ratio. Despite modest house price inflation and immigration flows at the national level, the statistics, except for the vacancy rates, show considerable variation at the local level. The first column records the immigrant-to-population ratio for 2001. The unweighted average of the 10 largest immigrant cities is more than three times larger than the unweighted average of the 10 smallest immigrant cities. The second column documents larger immigrant cities in 2006 have larger populations by a factor of three. The third column displays the

aggregate change in immigration between 2001 to 2006 over the population from 2001. Again, larger immigrant cities experienced greater immigration flows than did smaller immigrant cities. The unweighted averages differ by a factor of 13. The next three columns show the cumulative price change over the sample for single-family homes (sfh), multi-family homes (mfh), and condominiums (con). Larger price changes are observed for larger immigrant cities. Particular large differences between large and small immigrant cities arise for condominiums and single-family houses. The last column presents the vacancy rates for 2006. Again, larger immigrant cities have lower vacancy rates. The differences between the averages for the largest and smallest immigrant cities however are not strikingly large. This evidence suggests that the Swiss house market is tight irrespective of location.

5. Estimation Results

In this section, we show that immigration flows are coincident with increases in house prices using price indexes of three different home types. This result is surprising given the low level of house price inflation. We first present baseline estimates based on equation (1) in Tables 3 and 4. Thereafter, we conduct numerous checks to determine the robustness of our point estimates

for local immigration flows. In particular, we show that income is not an important determinant of house price inflation. This result suggests that our estimates of β in the baseline specification do not suffer from omitted variables bias due to the absence of income.

Table 3 presents OLS regressions for single-family homes, multi-family homes, and condominiums. All regressions are estimated with time effects. In addition to our baseline specification with five regional controls shown in columns 1 to 3, separate regressions are also estimated without regional controls in columns 4 to 6 and with regional fixed effects in columns 7 to 9. The coefficients of the regional and time controls are not reported in the tables. Heteroskedasticity-robust standard errors are reported in parentheses, while robust standard errors controlling for district clustering are reported in brackets.

The OLS regressions for the three house prices show that the coefficients for immigrant flows lie between 0.361 and 0.914. The price impact from immigration is highest for multi-family homes, followed by single-family homes, then condominiums. This ordering is consistent with the average price increases for the three house types. The regressions show that controlling for regional factors matters. The estimated price impact from immigration is

highest for the specification without regional controls, followed by the specification with regional fixed effects, and then the specification with regional indicators. Apart from the specification without regional controls, no clear pattern of significance emerges for $(\frac{\Delta I_{it}}{POP_{it-1}})$.

Table 4 presents IV regressions for the same specifications shown in Table 3. For all IV specifications, the price effects through immigration are larger than the OLS estimates. This result suggests that the OLS estimates are biased downward due to measurement and endogeneity problems, a finding consistent with Saiz (2007) and Gonzalez and Ortega (2009). The regressions of the baseline specification with regional indicators are in columns 1 to 3. The coefficient estimates of the immigrant-price effect are significant and range between 1.456 and 3.485, depending on house type. More specifically, an immigration inflow equal to 1% of an area's population is associated with an increase in single-family house prices is 2.7%.

The regressions without regional controls are shown in columns 4 to 6. As in the OLS regressions, regional controls matter in the IV regressions. The significant coefficient estimates tend to be larger than those in the specification with regional controls. This result suggests that our regional controls capture common information across districts, absent in the regressions in

columns 4 to 6.

Next in columns 7 to 9, we present regressions with fixed effects. Although our specification in first differences should eliminate regional fixed effects, including them reduces concerns about the validity of the instrument in that it allows districts to experience specific shocks. The coefficient estimates are slightly lower with respect to our preferred specification with regional controls in columns 1 to 3. As expected with fixed effects, the standard errors increase such that only multi-family homes remain significant at the 10% level.

Table 4 Panel B shows the first-stage regressions between the endogenous variable ($\frac{\Delta I_{it}}{POP_{it-1}}$) and the instrument, SP_{it}. Our estimate for the instruments in the specification with regional controls is 0.856, without regional controls is 0.861, and with fixed effects is 1.132. Each of these instruments are significant at the 1% level. As a further check of the instruments, the F-test for weak instruments is used. The F-tests for the joint significance of the excluded instruments range between 11.70 and 25.93, suggesting that our instruments do not suffer from the criticism of weak instruments.

Next, Table 5 presents several robustness tests for single-family homes with regional controls. Almost all robustness checks show that our baseline

estimate of 2.7 is not sensitive to alternative specifications. Column 1 replicates the baseline estimates from Table 4 for comparative purposes. As a first simple check, we present the estimate without unemployment in column 2. The estimates for $(\frac{\Delta I_{it}}{POP_{it-1}})$ in columns 1 and 2 are identical.

The next three columns consider the role of income changes, which should impact house prices in a positive manner. In column 3, we add changes in taxable household income (per capita) for the 85 districts for 2002 to 2006. Column 3 shows the immigrant effect for $(\frac{\Delta I_{it}}{POP_{it-1}})$ rises to 3.245 in the specification with lagged changes in household income. To determine whether income or the smaller sample that excludes 124 observations is responsible for the stronger price effect, column 4 shows the specification without income for the restricted sample. Although income enters significantly in column 3, the regression in column 4 shows an estimate of 3.334 for $(\frac{\Delta I_{it}}{POP_{it-1}})$. This evidence suggests that changes in household income do not strongly impact house prices.

As an additional check for income, immigration effects for high- and low-income growth districts are considered separately. To test for nonlinear effects in income changes, we include an interaction term $(\frac{\Delta I_{it}}{POP_{it-1}})^{high} = (\frac{\Delta I_{it}}{POP_{it-1}}) * d_{high}$, where d_{high} is a dummy that takes the value 1 if a district's

income changes are above the 75th percentile and 0 otherwise.

The regressions with high- and low-income districts are shown in column 5. Compared to the baseline estimate of 2.7, the effect is higher in the districts with lower income changes (3.184) and slightly lower in regions with high income changes: 3.187 - 1.148 = 2.039. For both groups, the null hypothesis that the coefficients are equal to the baseline coefficient is rejected. A $\chi^2(1)$ test = 4.52 for equivalency with the baseline estimate for the high growth districts has a p-value of 0.033 and a $\chi^2(1)$ test = 3.460 for the low growth districts has a p-value of 0.063. An explanation for these results is that the immigration effect is partly compensated by high income growth.

As a further robustness check, we consider whether the 11 largest districts with a population greater than 150,000 influence our estimates.[12] Column 6 shows that the coefficient estimate for $(\frac{\Delta I_{it}}{POP_{it-1}})$ falls to 2.1 in the restricted sample that excludes the 11 largest cities compared to the baseline estimate of 2.7 in the full sample. A $\chi^2(6)$ test with a p-value of 0.017 rejects the null that the immigration effect from the sample without large cities is the same as the baseline estimate. We interpret this result to mean that our baseline

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[12]The 11 districts are Aarau, Basel-City, Basel-Lower Area, Bern, Geneva, Glattal-Furttal, Lausanne, Luzern, St Gall, Winterthur, and Zurich.

estimates are driven by large city dynamics. An explanation for this large city effect is simply that immigrants are more likely to reside in larger districts because these regions offer better job opportunities and amenities. Indeed, over 40% of the total immigrants live in the 11 districts with populations larger than 150,000.

A final check examines whether local tightness in the housing market influences the baseline estimate. Column 7 shows the regression of the baseline specification with local vacancy rates. This added variable is insignificant and has no influence on the baseline estimate of 2.7 for ($\frac{\Delta I_{it}}{POP_{it-1}}$). We interpret this result to mean that the housing market is tight throughout Switzerland and therefore cannot help explain local differences in house prices.

To better understand the price effect from immigration of 2.7 for single-family homes, we calculate the average impact from immigration on house prices. First, we consider the average immigrant flows over the 85 districts from 2001 to 2006. This annual average is 0.33% of a district's population. The overall immigration effect for single-family houses in our sample is 0.33% * 2.7 ≈ 0.99%. This means that almost two-thirds (0.99%/1.52% ≈ 0.60) of the total price increase is attributed to demand effects of immigration.[13]

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[13]The numbers for multi-family homes are (0.33% * 3.5 ≈ 1.15%, yielding 1.15% / 2.06%

This average impact effect from immigration flows is higher for Switzerland than the average estimate of one-third for Spain's boom episode examined by Gonzalez and Ortega (2009).

6. Conclusions

We find that an increase in immigrant flows equal to 1% of the total population in each district is coincident with a 2.7% price increase in Swiss house prices for single-family homes. The short-run estimates for an environment of low house price inflation are consistent with international evidence found for episodes with higher house price inflation. The results show that rent control and low home ownership rates, distinct features of the Swiss housing market, do not mitigate the house price effect associated with immigration.

≈ 0.55 of the total price increase. Similarly, the numbers for condominiums are (0.33% * 1.5 $\approx$ 0.5%, yielding 0.5% / 1.53% $\approx$ 0.35 of the total price increase.

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Table 1:Average Annual Real Increase in Single Family House Prices1970-2006

Germany	-0.38
Switzerland	0.34
Japan	0.36
Sweden	1.00
Finland	1.59
Norway	2.19
Italy	2.23
USA	2.29
Denmark	2.42
Canada	2.53
France	2.55
Australia	2.97
New Zealand	3.19
Netherlands	3.26
Belgium	3.58
Ireland	3.90
Spain	3.95
United Kingdom	4.14

source:finfacts.ie

Table 2: Descriptive Statistics

District	Immigrant to Population Ratio $(I / Pop)_{2006}$	Population Pop_{2006}	Change in Immigrants over Population $((I_{2006} - I_{2001})/Pop_{2001}) \times 100$	Relative Change in House Prices $((P_{2006} - P_{2001})/P_{2001}) \times 100$			Home Vacancy Rate (in %) (in 2006)
				sfh	mfh	con	
Largest immigrant-regions							
Lausanne	0.34	250132	3.40	18.61	19.95	16.30	0.16
Genève	0.32	439785	1.06	34.30	29.13	30.71	0.22
Aigle	0.31	37017	6.40	23.57	31.26	15.44	1.56
Vevey	0.31	83'288	3.49	19.08	20.98	16.08	0.38
Basel-Stadt	0.29	190324	2.03	13.72	10.82	14.87	0.90
Limmattal	0.29	75639	1.92	9.06	6.71	10.98	0.83
Untersee	0.28	53'666	4.30	4.29	11.20	2.91	1.23
Bellinzona	0.27	45180	1.23	9.96	15.70	8.23	1.09
Lugano	0.27	128607	7.73	11.77	14.06	10.50	0.50
Zürich	0.27	369335	0.72	21.03	14.33	22.56	0.05
Average	*0.30*	*167297*	*3.23*	*16.54*	*17.41*	*14.86*	*0.69*
Smallest immigrant-regions							
Surselva	0.10	25471	0.97	5.87	10.95	4.32	1.14
Erlach-Seeland	0.09	51'726	0.16	-0.09	6.67	-0.24	1.30
Linthgebiet	0.09	57085	0.17	5.15	9.38	4.96	0.92
Weinland	0.09	28590	0.86	1.33	6.64	2.13	1.00
Uri	0.09	34'575	0.41	0.74	8.87	0.31	0.76
Burgdorf	0.08	72037	-0.33	-0.48	6.39	-0.40	1.31
Thun	0.08	117893	-0.12	2.95	8.59	2.98	0.45
Sense	0.08	39490	0.50	-1.26	9.70	-2.05	0.85
Aaretal	0.05	59809	0.38	-0.25	6.15	0.13	1.53
Oberes Emmental	0.04	24658	-0.60	-1.65	7.56	-2.32	1.39
Average	*0.08*	*51'133*	*0.24*	*1.23*	*8.09*	*0.98*	*1.06*
Average over all 85 regions	**0.18**	**83'377**	**1.56**	**7.18**	**12.49**	**5.97**	**1.02**

Notes: Table 2 shows the regions with the 10 largest and 10 smallest immigrant-to-population ratios (in 2006). The changes in immigration and house prices display the aggregate changes over 2001 to 2006. House price changes are shown for single-family homes (sfh), multi-family homes (mfh), and condominiums (con).

Table 3 - OLS Regressions

	with Regional Control Variables			w/o Regional Control Variables			with Regional Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	sfh	mfh	con	sfh	mfh	con	sfh	mfh	con

Sample: 85 MS Regions from 2001-2006

Panel: OLS Estimates- Dep. Var. is the y/y Ln-change in House Prices (Δp_{it})

	(1) sfh	(2) mfh	(3) con	(4) sfh	(5) mfh	(6) con	(7) sfh	(8) mfh	(9) con
$\Delta I_{it} / Pop_{it-1}$	0.553	0.803	0.361	0.829	0.914	0.610	0.569	0.800	0.388
	[0.408]	[0.391]**	[0.269]	[0.432]*	[0.398]**	[0.300]**	[0.272]**	[0.238]***	[0.206]*
	(0.345)	(0.371)**	(0.234)	(0.354)**	(0.361)**	(0.250)**	(0.493)	(0.472)*	(0.322)
Δu_{it-1}	-0.111	1.833	0.954	0.468	1.480	1.636	-0.309	1.901	0.817
	[1.144]	[0.862]**	[0.833]	[1.055]	[0.760]*	[0.814]**	[1.404]	[1.224]	[1.062]
	(0.914)	(0.954)*	(0.696)	(1.116)	(0.930)	(1.020)	(1.128)	(0.879)**	(0.803)
Year FE	y	y	y	y	y	y	y	y	y
Observations	510	510	510	510	510	510	510	510	510
Regions	85	85	85	85	85	85	85	85	85
R-Square (within)	0.56	0.88	0.32	0.53	0.87	0.23	0.58	0.89	0.27

Notes: Table 3 displays the baseline OLS relation between changes in immigration and the Swiss house price index. The dependent variables are the annual change in the logarithm of the house price indices, Δp_{it}, for single-family homes (sfh), multi-family homes (mfh), and condominiums (con). $\Delta I_{it} / Pop_{it-1}$ is the y/y change in immigrants relative to the population in region i at time $t-1$. Δu_{it-1} denotes the change in unemployed divided by population in region i and time $t-1$. All estimations include fixed effects by year. Columns 1 to 3 estimate the baseline specification with 5 regional indicators. Columns 4 to 6 show the estimates without regional control variables, and columns 7 to 9 account for regional differences by including regional FE. Heteroskedasticity-robust standard errors in parentheses; clustered standard errors (by region) in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%.
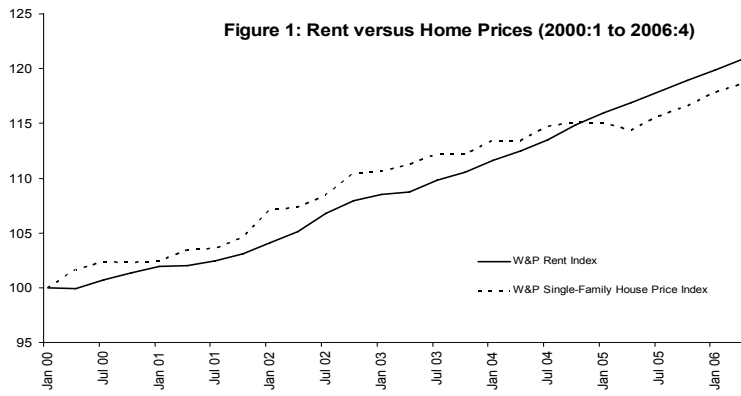
Table 4 - IV Regressions

	with Regional Control Variables			w/o Regional Control Variables			with Regional Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	sfh	mfh	con	sfh	mfh	con	sfh	mfh	con

Sample: 85 MS Regions from 2001-2006

Panel A: 2nd Stage Estimates- Dep. Var. is the y/y Ln-change in House Prices (Δp_{it})

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta I_{it} / Pop_{t-1}$	2.749	3.485	1.456	4.398	2.363	3.537	2.569	2.833	0.653
	[1.009]***	[1.078]***	[0.710]**	[1.246]***	[0.865]***	[1.064]***	[1.659]	[1.629]*	[1.347]
	(1.027)***	(1.122)***	(0.736)**	(0.958)***	(0.776)***	(0.772)***	(1.774)	(1.534)*	(1.265)
Δu_{it-1}	-0.193	1.732	0.913	0.368	1.439	1.554	-0.378	1.831	0.808
	[1.055]	[0.849]**	[0.787]	[1.045]	[0.737]*	[0.854]*	[1.059]	[0.828]**	[0.778]
	(0.901)	(1.015)*	(0.725)	(1.228)	(0.921)	(1.200)	(0.962)	(1.034)*	(0.757)
Year FE	y	y	y	y	y	y	y	y	y

Panel B: 1st Stage Estimates - Dep. Var. is the y/y Change of Immigrants to Population Ratio ($\Delta I_{it} / Pop_{it-1}$)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SP_{it}	0.856	0.856	0.856	0.861	0.861	0.861	1.132	1.132	1.132
	[0.193]***	[0.193]***	[0.193]***	[0.169]***	[0.169]***	[0.169]***	[0.331]***	[0.331]***	[0.331]***
	(0.201)***	(0.201)***	(0.201)***	(0.136)***	(0.136)***	(0.136)***	(0.331)***	(0.331)***	(0.331)***
Observations	510	510	510	510	510	510	510	510	510
Regions	85	85	85	85	85	85	85	85	85
R-Square (first stage)	0.15	0.15	0.15	0.11	0.11	0.11	0.09	0.09	0.09
F-Test (1st stage with clustering)	19.62	19.62	19.62	25.93	25.93	25.93	11.70	11.70	11.70

Notes: Panel A in Table 4 displays the 2nd stage of the instrumental variables (IV) relations between changes of immigration and the Swiss house price index. The dependent variables are the annual change in the logarithm of the house price indices, Δp_{it} for single-family homes (sfh), multi-family homes (mfh), and condominiums (con). $\Delta I_{it} / Pop_{t-1}$ is the y/y change in immigrants relative to the population in region i and time $t-1$. In Panel B the first-stage relation is displayed. The instrument SP_{it} is the estimated immigrant change, based on the settlement patterns of immigrants in 1997. All estimations include fixed effects by year. Columns 1 to 3 estimate the baseline specification with 5 regional indicators. Columns 4 to 6 show the estimates without regional control variables, and columns 7 to 9 account for regional differences by including regional FE. Heteroskedasticity-robust standard errors in parentheses; clustered standard errors (by region) in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5 - Robustness

Panel A: 2nd Stage Estimates- Dep. Var. is the y/y Ln-change in House Prices (Δ p_it)

Sample: 85 MS Regions from 2001-2006

	(1) Baseline	(2) w/o Unemployment	(3) Restricted Sample with Income	(4) Restricted Sample w/o Income	(5) differentiated by High vs. Low Income	(6) excl. Large Districts	(7) incl. Vacancy Rates
$\Delta I_{it} / Pop_{it-1}$	2.749	2.75	3.245	3.334	3.187	2.115	2.741
	[1.009]***	[1.009]***	[1.095]***	[1.096]***	[1.154]***	[0.817]***	[1.000]***
	(1.027)***	(1.027)***	(0.928)***	(0.930)***	(1.105)***	(0.919)**	(1.025)***
$(\Delta I_{it} / Pop_{it-1})^{high}$					-1.148		
					[0.684]*		
					(0.816)		
Δu_{it-1}	-0.193		-0.447	-0.542	-0.260	1.329	-0.232
	[1.055]		[0.639]	[0.633]	[1.039]	[3.173]	[1.038]
	(0.901)		(0.862)	(0.861)	(0.914)	(2.070)	(0.895)
$\Delta \ln y_{it-1}$			0.031				
			[0.012]***				
			(0.013)**				
Δv_{it-1}							0.004
							[0.005]
							(0.005)
Year FE	y	y	y	y	y	y	y

Panel B: 1st Stage Estimates - Dep. Var. is the y/y Change of Immigrants to Natives Ratio (ΔI_it / Pop_it-1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SP_{it}	0.856	0.855	1.147	1.156	0.723[a]	0.987	0.854
	[0.193]***	[0.193]***	[0.246]***	[0.246]***	[0.217]***	[0.181]***	[0.194]***
	(0.201)***	(0.201)***	(0.172)***	(0.171)***	(0.230)***	(0.215)***	(0.201)***
$(SP_{it})^{high}$					1.554[b]		
					[0.163]***		
					(0.156)***		
Year FE	y	y	y	y	y	y	y
Observations	510	510	304	304	510	444	510
Regions	85	85	85	85	85	74	85
R-Square (first stage)	0.17	0.15	0.26	0.25	0.08[a] / 0.25[b]	0.16	0.15
F-Test (1st stage with clustering)	28.95	19.65	21.68	22.11	15.52[a] / 47.09[b]	29.85	19.38

Notes: Panel A of Table 5 displays the baseline relation between changes of immigration and the Swiss house price index. The dependent variable is the annual change in the logarithm of the house price index, Δp_{it}, for single-family homes (sfh). $\Delta I_{it} / Pop_{it-1}$ is the y/y change in immigrants relative to the population in region i at time $t-1$. $(\Delta I_{it} / Pop_{it-1})^{high}$ is the y/y change in immigrants in high income regions. Δu_{it-1} denotes the change in unemployed divided by population region i and time $t-1$, $\Delta \ln y_{it-1}$ is the change in the log of per capita income, and Δv_{it-1} is the change in the home vacancy rate. In Panel B the first-stage relation is displayed. The instruments are the estimated immigrant changes, based on the settlement patterns of immigrants in 1997, SP_{it}, and $(SP_{it})^{high}$ respectively. All estimations include fixed effects by year and control for regional effects. Heteroskedasticity-robust standard errors in parentheses; clustered standard errors (by region) in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%. [a] First stage regression of (SP_{it}). [b] First stage regression of $(SP_{it})^{high}$.

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Figure 1: Rent versus Home Prices (2000:1 to 2006:4)

W&P Rent Index

W&P Single-Family House Price Index

Source: Wüest and Partner, Zurich

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