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Risk Analysis of the Real Estate Market in Switzerland (Diagnostic as of 2014-Q4)

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In collaboration with comparis.ch AG

Background

This work is collaboration between the chair of Entrepreneurial Risks at the Department of Management, Technology and Economics (D-MTEC) of ETH Zurich and comparis.ch. It has benefited from funding by the Commission for Technology and Innovation (CTI) in its launching phase and is partially funded by comparis.ch. The goal of this project is to study the real estate market in Switzerland to empower the buyers and sellers of this market with critical information on price dynamics in every Swiss district.

Data and Methodology

The data used in this analysis has been collected by comparis.ch between 1 January 2005 and 31 December 2014. The property market division of comparis.ch gathers data from the 17 largest property portals in Switzerland, creating a rich view on the market, but also introducing a large number of duplicate ads (5.7 million records are present in the raw data). These duplicate ads advertise the same property, during the same period, and sometimes, with conflicting information. Within the scope of this study, the identification of the duplicates is crucial, as they could potentially affect the price indices. Before performing any analysis, duplicates in the aggregated data set have been automatically removed using a classification procedure based on the Support Vector Machine (SVM) algorithm and string distance measures. The application of the de-duplication procedure to the comparis.ch database classified approximately 635'000 apartments and 697'000 houses for sale between 2005-Q1 and 2014-Q4, which amount to a total of about 1'332'000 residential properties (92'000 new advertisement since the previous report in 2014-Q2). This does not represent all the properties that were on the market in this period. However, it is assumed that the data collected by comparis.ch represents the market very closely. One important fact about this data set is that the prices are asking prices and not the final transaction prices. We have studied the development of prices in each of the 166 Swiss districts (see disclaimer). In order to analyze the market, the ads in each district were categorized by type (i.e. apartment or house), and subsequently subdivided in three groups, according to the number of rooms, as described in Table 1. The properties in each subgroup were aggregated quarterly using the median asking price and the median asking price per square meter for houses and apartments respectively.

Table 1: Categorization of properties based on the number of rooms.

Property Type	**Houses**		**Apartments**	
Measure	**Median Asking Price**		**Median Asking Price per Square Meter**	
Size	**Min # of Rooms**	**Max # of Rooms**	**Min # of Rooms**	**Max # of Rooms**
Small	1	4.5	1	3.5
Medium	5	6.5	4	5.5
Large	7+		6+	

Real Estate Market in Switzerland

Figure 1 shows the change in median asking price per square meter between the first quarter of 2007 and the last quarter of 2014 for all apartments listed on comparis.ch. The district of Imboden, labeled 1, shows the highest price increase, where the median asking price of apartments per square meter has increased by 84% since the first quarter of 2007.

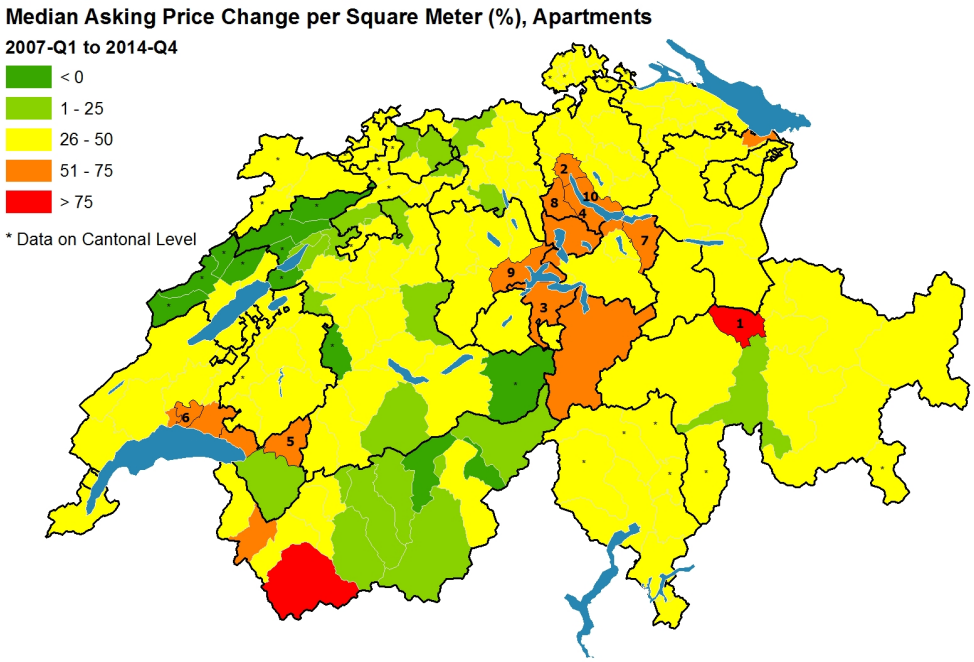


Figure 1: Change in median asking price per square meter for apartments in all Swiss districts between 2007-Q1 and 2014-Q4.

The regions marked with "*" represent the districts with not enough listings in either 2014-Q4 or 2007-Q1. The cantonal median price change per square meter values are shown for those districts. The top ten districts with the highest increase in the apartments' asking price per square meter between 2007-Q1 and 2014-Q4 are labeled in Figure 1 and listed in Table 2. The price change in the district of Entremont, although marked in red in figure 1, was based on too few advertised properties to be included in the top 10 districts with the highest increase in the asking price per square meter.

Table 2: Top 10 districts with the highest increase in median asking price per square meter for apartments between 2007-Q1 and 2014-Q4.

	District Name	Median increase in asking price per square meter
1	Imboden	84%
2	Zürich	71%
3	Nidwalden	64%
4	Horgen	62%
5	Riviera-Pays-d'Enhaut	59%
6	Lausanne	59%
7	March	57%
8	Affoltern	54%
9	Luzern	54%
10	Meilen	53%

Figure 2 shows the median asking price per square meter for apartments as of 2014-Q4. The districts with "*" marks represent the districts with not enough listings in the last quarter of 2014. The cantonal median prices per square meter for apartments are shown for these districts. The top ten most expensive districts as of 31 December 2014 are labeled in Figure 2 and listed in Table 3. The prices in the district of Saanen, although marked in red in figure 2, were based on too few advertised properties to be included in the top 10 districts with the highest asking price per square meter.

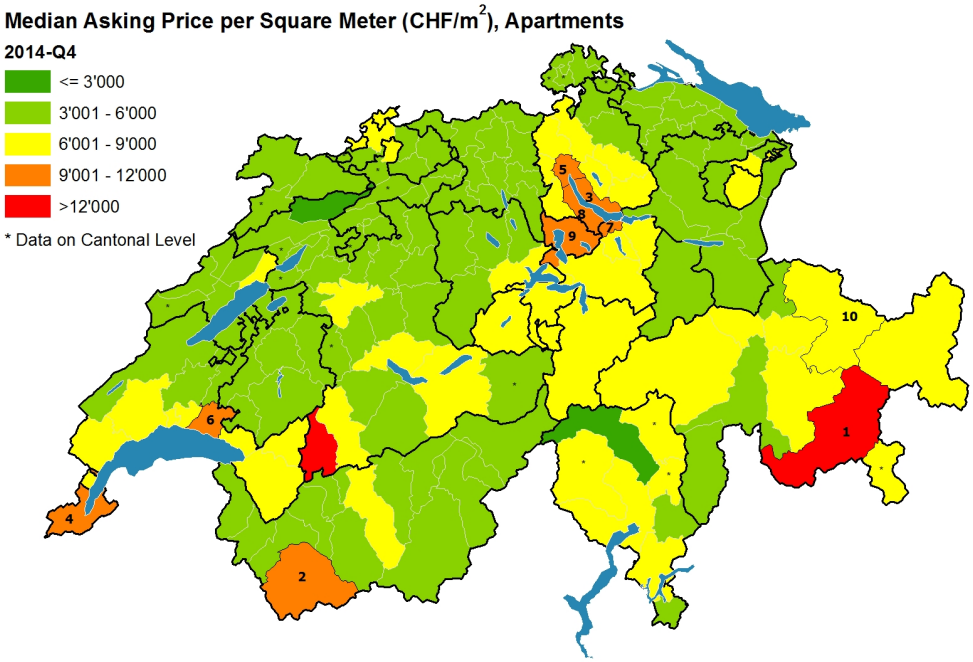


Figure 2: Median asking price per square meter for apartments in all Swiss districts as of 2014-Q4.

Table 3: Top 10 districts with the highest median asking price per square meter for apartments as of 2014-Q4.

	District Name	Median asking price per square meter (CHF/m^2)
1	Maloja	12'500
2	Entremont	12'000
3	Meilen	11'500
4	Genève	11'500
5	Zürich	11'500
6	Lavaux-Oron	10'000
7	Höfe	10'000
8	Horgen	10'000
9	Zug	9'000
10	Prättigau/Davos	9'000

The median asking prices for medium size houses (5 to 6.5 rooms) as of 2014-Q4 are shown in Figure 3. Districts with "*" marks represent the districts with not enough listings in the last quarter of 2014. The cantonal median asking prices for medium size houses are shown for these districts. The top ten currently most expensive medium size houses are labeled in Figure 3 and listed in Table 4. Please note that the absence of districts such as the city of Zurich in this list does not necessarily mean that the asking prices in those districts were lower than the ones listed in Table 2, but that there was most probably not enough medium size houses listed for sale during the last quarter of 2014 in those districts.

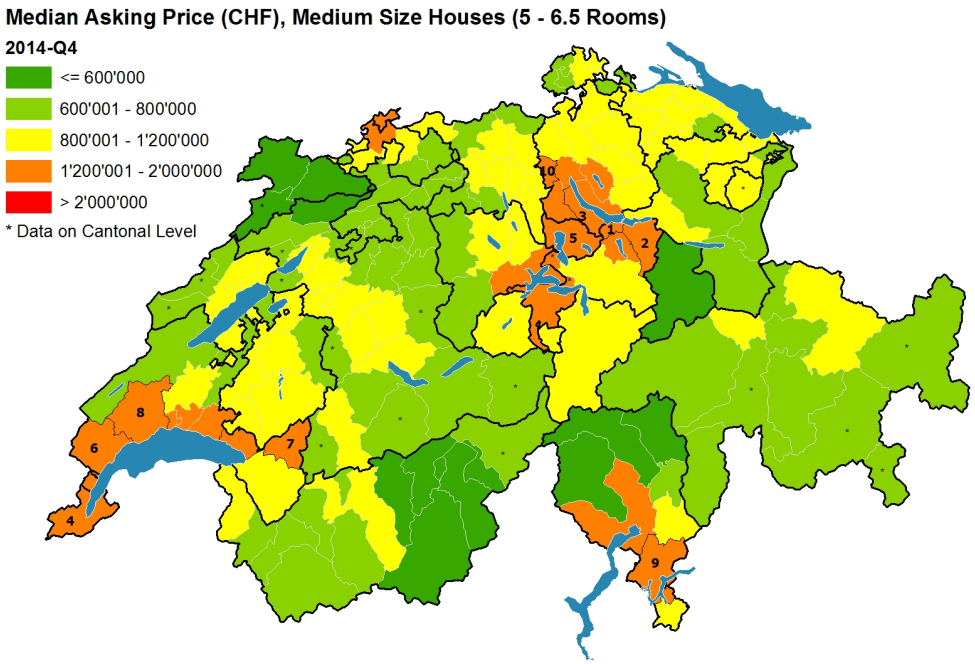


Figure 3: Median asking price of medium size houses (5 to 6.5 rooms) in all Swiss districts as of 2014-Q4.

Table 4: Top 10 districts with the highest asking price for medium size houses as of 2014-Q4.

	District Name	Median asking price (CHF)
1	Höfe	1'750'000
2	March	1'700'000
3	Horgen	1'700'000
4	Genève	1'600'000
5	Zug	1'550'000
6	Nyon	1'550'000
7	Riviera-Pays-d'Enhaut	1'450'000
8	Morges	1'400'000
9	Lugano	1'350'000
10	Dietikon	1'350'000

The Log-Periodic Power Law (LPPL) Model

The term "bubble" refers to a situation in which excessive future expectations cause prices to rise above long-term trends and/or above what would be justified by rent prices, incomes, demographics and other fundamental factors. Sornette and Woodard (2010) illustrate the concept of housing price bubble as follows: "During a housing price bubble, homebuyers think that a home that they would normally consider too expensive for them is now an acceptable purchase because they will be compensated by significant further price increases. They will not need to save as much as they otherwise might, because they expect the increased value of their home to do the saving for them. First time homebuyers may also worry during a housing bubble that if they do not buy now, they will not be able to afford a home later." Furthermore, the expectation of large price increases may have a strong impact on demand if people think that home prices are very unlikely to fall, and certainly not likely to fall for long, so that there is little perceived risk associated with an investment in a home.

We employed the log periodic power law (LPPL) bubble model to diagnose the risk of real estate bubbles in Switzerland. The LPPL model diagnoses a bubble as a transient, faster than exponential growth process, decorated with ever increasing oscillations representing the developing low frequency price volatility. Speculative bubbles are caused by 1) precipitating factors that change public opinion about markets or that have an immediate impact on demand and 2) amplification mechanisms that take the form of price-to-price positive feedback: the larger the price, the higher the demand and … the larger the price! The behavior of the market no longer reflects any real underlying value and a bubble is born. According to the LPPL model, a crash occurs because the market has entered an unstable phase and any small disturbance or process may reveal the existence of the instability. Like a ruler held up vertically on your finger, any small disturbance can trigger the fall. The LPPL model diagnoses also the end of bubbles, which signals a change of regime, in which the prices stop rising, and take a different dynamics. This can be a swift correction, like a crash, but also a slow deflation or stagnation. In fact, a less violent and slower end of bubbles is a better representative characteristic of real estate markets since properties are durable goods that people tend to hold whenever falling prices are observed. The tendency to hold is also due to significant friction and transaction costs. In this case, the crash is more in the volume of transactions than in the price itself, which may take a long time to show a significant correction. Moreover, a crash is not a particular event but is characterized by a probability distribution: the critical time is the most probable time of a crash (the end of the bubble). This is an essential ingredient for the bubble to exist, as it is only rational for financial agents to continue investing when the risk of the crash to happen is compensated by the positive return generated by the financial bubble, and when there exists a finite probability for the bubble to disappear smoothly. In other words, the bubble is only possible when the public opinion is not certain about its end and when its end may be smooth. Many examples of forecasting financial and real estate bubbles with the LPPL model have been reported and listed at http://www.er.ethz.ch/publications/finance/bubbles_empirical.

We applied the LPPL methodology to all subcategories of properties defined in Table 1, as well as to the aggregated index for apartments over the period of 2005-Q1 to 2014-Q4. The following classification is used to express the status of the districts based on the LPPL analysis:

Critical: a strong bubble signal from the LPPL analysis. This is an indication that a change of regime is imminent. The bracket of the expected time of the change of regime is only reported for this status.

To Watch: a bubble signal from the LPPL analysis. However, the signal is not as strong as the "Critical" case.

To Monitor: This status is only obtained after a district has been previously depicted as a "Critical" or "To Watch" district. The price could be increasing without (anymore) a bubble signal or decreasing but there are not yet enough data points to declare a confirmation of a change of regime.

Regime Change: This status is only obtained after a district has been previously depicted as a "To Monitor" district and the latest data points confirm a change of regime.

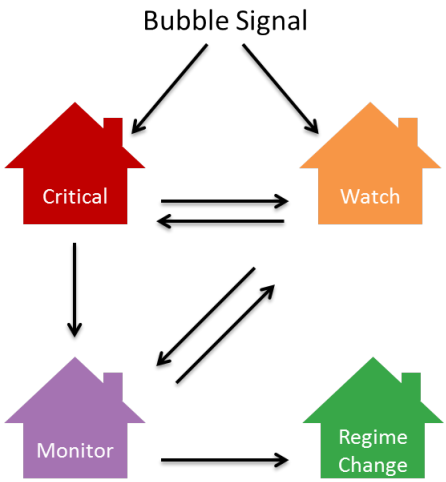


Figure 4: Classification of the districts.

- A "Critical" district can downgrade into a "To Watch" (respectively a "To Monitor" district), reflecting a weakening of the presence/strength of the bubble signals (respectively a preliminary diagnostic of a change of regime).

- A "To Watch" district can become a "Critical" (respectively a "To Monitor" district) when the strength of the bubble indicators increases (respectively when there is evidence of an on-going change of regime).

- A "To Monitor" district can become a "To Watch" (respectively a "Regime Change" district) when the presence of bubble signals is more strongly confirmed (respectively when the price dynamics has validated the end of the bubble).

The results of the LPPL analysis on the real estate market in Switzerland using the comparis.ch data from 2005-Q1 until 2014-Q4 are summarized in Figure 5 and are as follows:

- Critical: currently, none of the districts show signals that fall in this category.

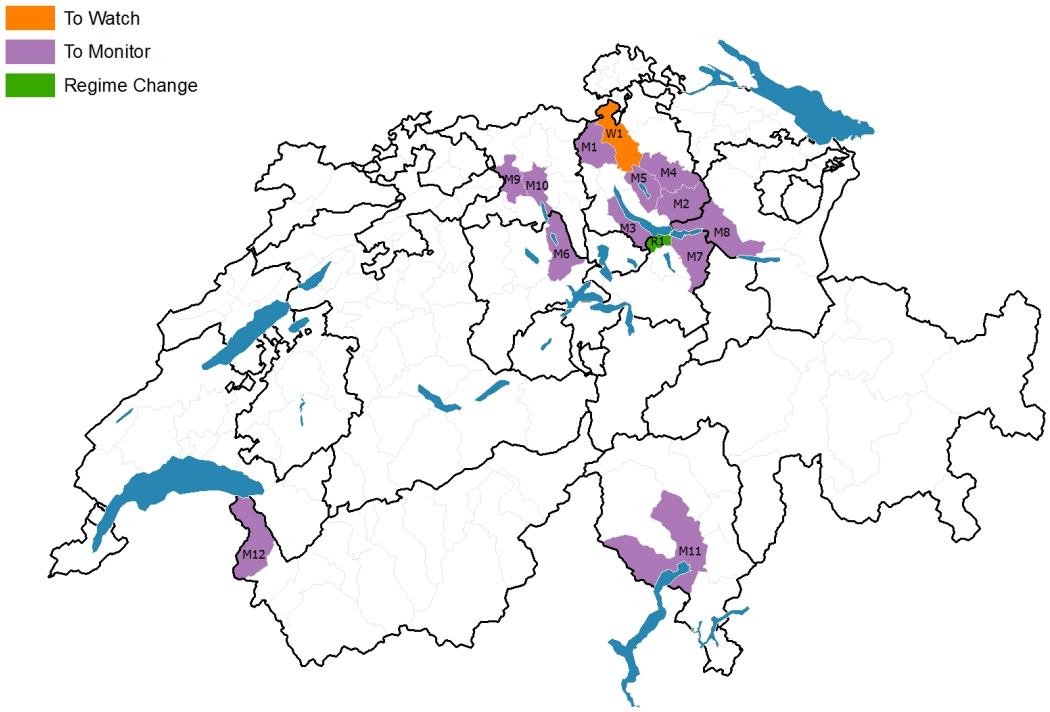
- To Watch: the district of Bülach (all/small size apartments, labeled W1) remains on the "To Watch" list. The LPPL analysis still reports a bubble signal for this district. There is no new "To Watch" district compared to what was reported in 2014-Q2.

- To Monitor: prices in districts labeled M1 through M12 should be monitored. The price dynamics in the districts of Pfäffikon (all size apartments, labeled M4), Hochdorf (medium size houses/all size apartments, labeled M6), See-Gaster (all size apartments, labeled M8) and Locarno (all size apartments, labeled M11) no longer seem to follow a super exponential trend (as was observed in 2014-Q2) and their statuses are downgraded from "To Watch" to "To Monitor".

  Other districts still in the "To Monitor" category are: Dielsdorf (all/medium size apartments, labeled M1), Hinwil (medium size houses/all size apartments, labeled M2), Horgen (all size apartments, labeled M3), Uster (all size apartments, labeled M5), March (all size apartments, labeled M7), Aarau (medium size houses/all size apartments, labeled M9), Lenzburg (medium size houses/all size apartments, labeled M10), and Monthey (all size apartments, labeled M12).

- Regime Change: The price dynamics in the districts of Höfe (all size apartments, labeled R1) clearly show a change of regime. The districts of Höfe was previously reported as "Critical" and later downgraded to "To Monitor".

Detailed results of these analyses are presented in Appendices A through C, where the developments in the asking prices along with possible LPPL scenarios (when applicable) are shown. It should be noted that the LPPL scenarios in Appendix A are indicators of possible critical times (80 percent confidence intervals, shaded regions) in the corresponding district and are not intended as future price indicators. In addition, the development of the reported districts in 2013-Q2, 2013-Q4, 2014-Q2 and 2014-Q4 can be found in Appendix D.



Label	District Name	Status	Property Type	Property Size	Critical Time
W1	Bülach	To Watch	Apartments	All/Small	-
M1	Dielsdorf	To Monitor	Apartments	All/Medium	-
M2	Hinwil	To Monitor	Houses/Apartments	Medium/All	-
M3	Horgen	To Monitor	Apartments	All	-
M4	Pfäffikon	To Monitor	Apartments	All	-
M5	Uster	To Monitor	Apartments	All	-
M6	Hochdorf	To Monitor	Houses/Apartments	Medium/All	-
M7	March	To Monitor	Apartments	All	-
M8	See-Gaster	To Monitor	Apartments	All	-
M9	Aarau	To Monitor	Houses/Apartments	Medium/All	-
M10	Lenzburg	To Monitor	Houses/Apartments	Medium /All	-
M11	Locarno	To Monitor	Apartments	All	-
M12	Monthey	To Monitor	Apartments	All	-
R1	Höfe	Regime Change	Apartments	All	-

Figure 5: Results of the LPPL analysis as of 2014-Q4.

The median asking prices per square meter for apartments in two geopolitically important Swiss districts (city of Zürich and the canton of Geneva) are presented in Figure 6. The developments of prices in these regions exhibited a steady and robust increase from 2008 to 2012 for the city of Zürich and from 2005 to 2012 for the canton of Geneva, followed by a different dynamics in which prices in the city of Zurich have stagnated and the prices in the canton of Geneva have also stagnated after a slight deflation.

The results reported hereby continue supporting the view that the market is entering a new regime. Not only our analysis at the district level has not yielded new critical regions, but also, the prices of apartments in geopolitically important regions such as Geneva and Zurich have stagnated for more than

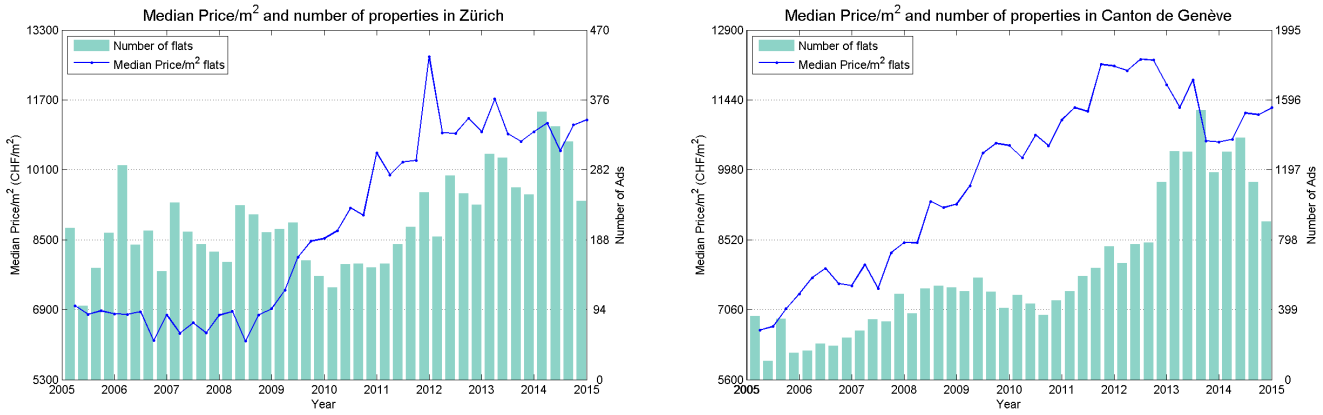


Figure 6: Median asking price per square meter for apartments. Left: City of Zürich, Right: Canton of Geneva.

one year. The application of our methodology to the national housing index[1] points out in the same direction. When using the national index data up to 2014Q3, we do not identify a bubble signal (though bubbles signals were identified using data up to 2014Q1 and 2014Q2).

As stressed before, the stability of the Swiss real estate market hinges on the international situation, which remains clouded. In the recent past, high demand for Swiss Franc as a safe currency, a low interest rate regime, and strong immigration have been correlated, and arguably favored the booming dynamics. A swift increase in the demand for Swiss Franc might prolong an accelerating price period. Whereas, a rise in the interest rate or severe restriction of immigration can lead to a stronger price correction. Furthermore, as the SNB has emphasized in the last Financial Stability Report (2014)[2], local banks remain significantly exposed to mortgage products, and thus constitute channels through which the effects of changing conditions can be amplified.

Recommendations

In general and in the absence of an exogenous shock, the "Regime Change" districts offer potential buying opportunities as the price dynamics have already changed into a new regime. The households who can afford to wait, may choose to postpone the purchase of their home in the "To Watch" and "To Monitor" districts, in the hope of profiting from a slight deflation.

After the Swexit[3] event of 15th of January 2015, the SNB will have an even larger difficulty in reigning in on the renewed attraction of real estate acquisitions, given that the interest rates will be pushed lower and will remain low for a very long time to combat the seduction of the Swiss Franc. Even the long term yields of the Swiss national bonds have turned negative at the time of writing, which means that investors are paying the Swiss government to have the privilege of buying its debts in Swiss francs! Notwithstanding the generally high prices of Swiss real estate, given the European conjecture and the exceedingly low interest rate, it remains rational for investors, and in particular for private households, to continue buying their own home. However, the measures taken by regulators with the

[1] Federal Reserve Bank of Dallas, International House Price Database http://www.dallasfed.org/institute/houseprice/
[2] Swiss National Bank, Financial Stability Report 2014
http://www.snb.ch/en/mmr/reference/stabrep_2014/source/stabrep_2014.en.pdf
[3] In analogy with the infamous Grexit, Charles Gave has coined this term to express that the decision of the Swiss National Bank (SNB) to abandon the cap on the value of the CHF in Euro was akin to the exit of Switzerland from the euro zone. Source: GavekalDragonomics, Ideas, January 16, 2015.

10% personal contribution and the higher margin requirement of banks are mitigating this force towards an appreciation of real estate prices in Switzerland. Overall, the complete false prices induced by the policies of central banks pushes towards a misallocation of resources to existing assets (real estate) at the expense of the more risky productive assets that are in general the cause of creation of new wealth. We expect this to continue for the foreseeable future due to durably extremely low interest rates as well as the attraction of the country for its economic performance in comparison with what can be expected for Europe in the coming QE (quantitative easing) regime.

Disclaimer

The districts map provided by the Swiss Federal Statistical Office (Bundesamt für Statistik, BFS) based on 2009 districts' divisions has been used as a basis for performing this study. The Swiss districts' borders regularly evolve (districts merge or split) and current districts name and borders might vary from the ones used in the presented maps. Therefore, the borders plotted in the maps presented in this study should be consulted when referring to the districts' names and the appropriate map(s) should always be accompanied with the district name when referring to the status of a district in this report.

Appendix A: Review of 2014-Q4 “To Watch” Districts.

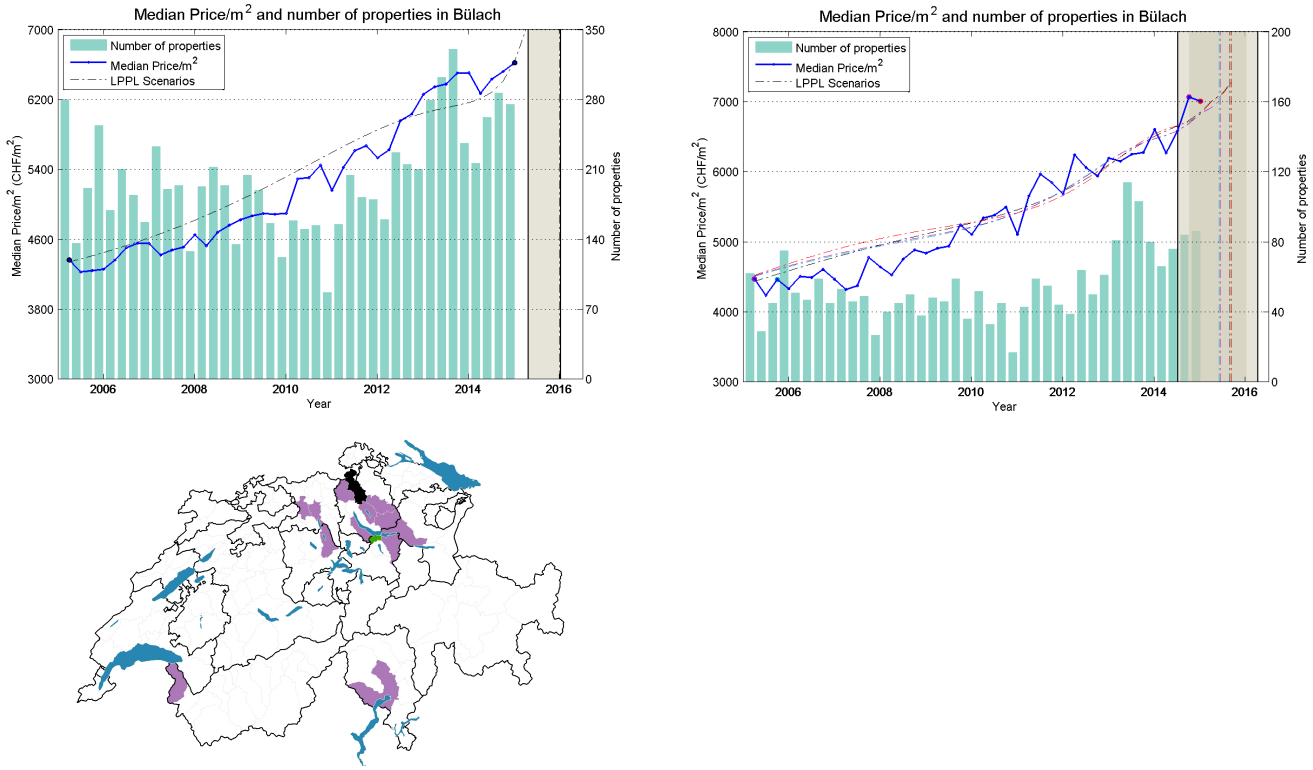


Figure A. 1: District: Bülach, Status: To Watch, Property type: all apartments (top left), small size apartments (top right).

Appendix B: Review of 2014-Q4 "To Monitor" Districts.

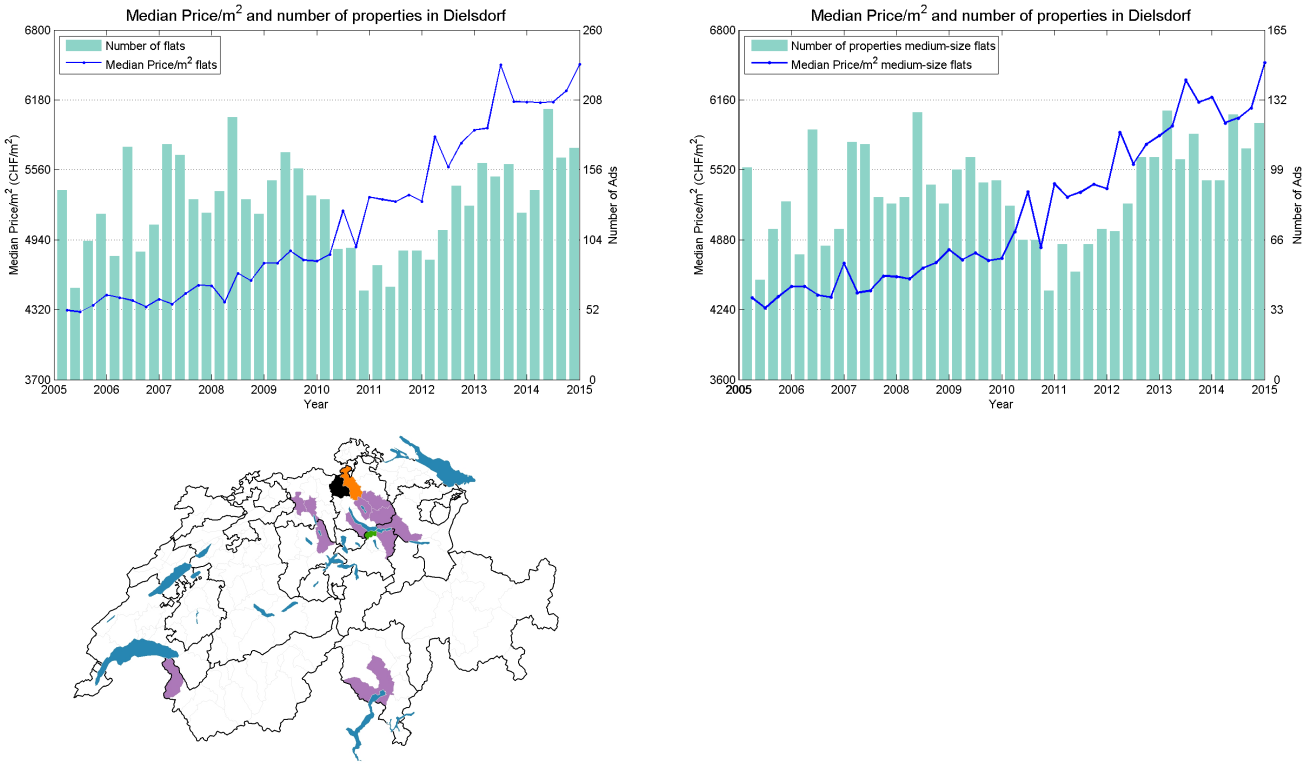


Figure B. 1: District: Dielsdorf, Status: To Monitor, Property type: all apartments (top left), medium size apartments (top right).

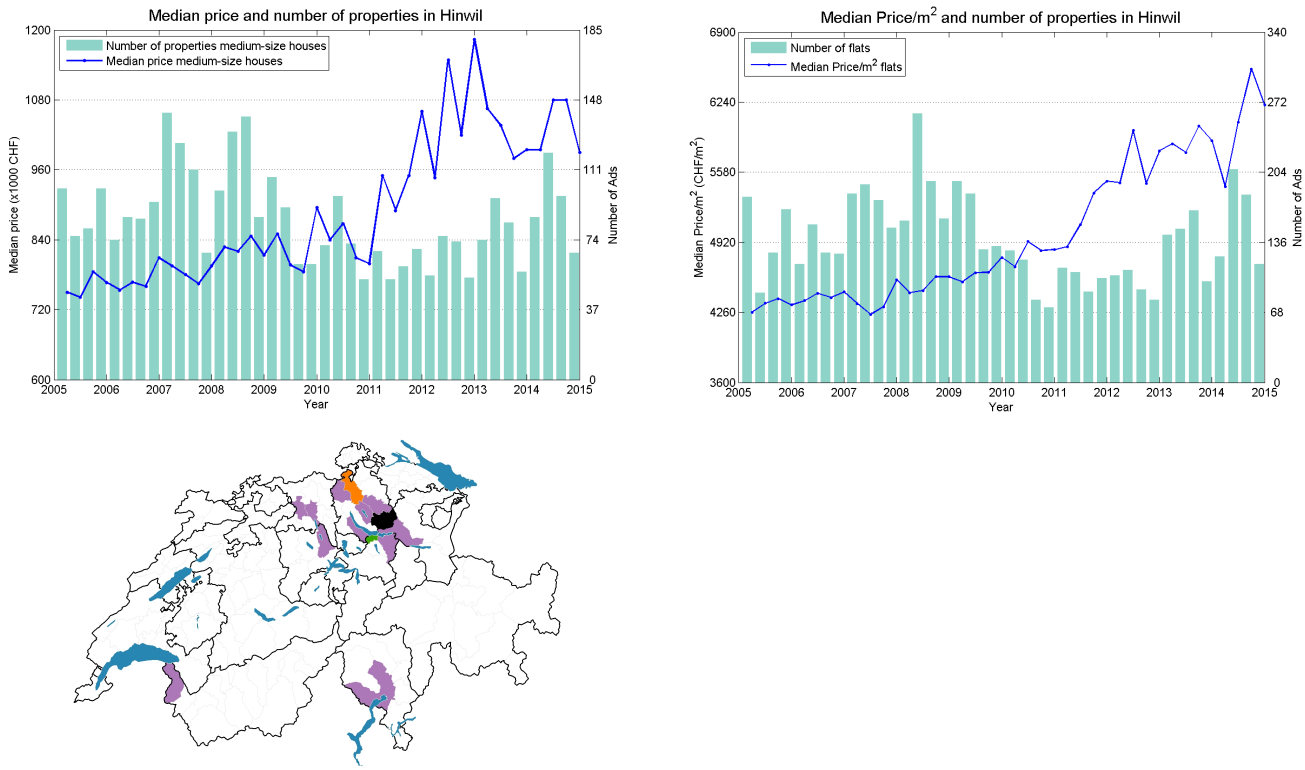


Figure B. 2: District: Hinwil, Status: To Monitor, Property type: medium size houses (top left), all apartments (top right).

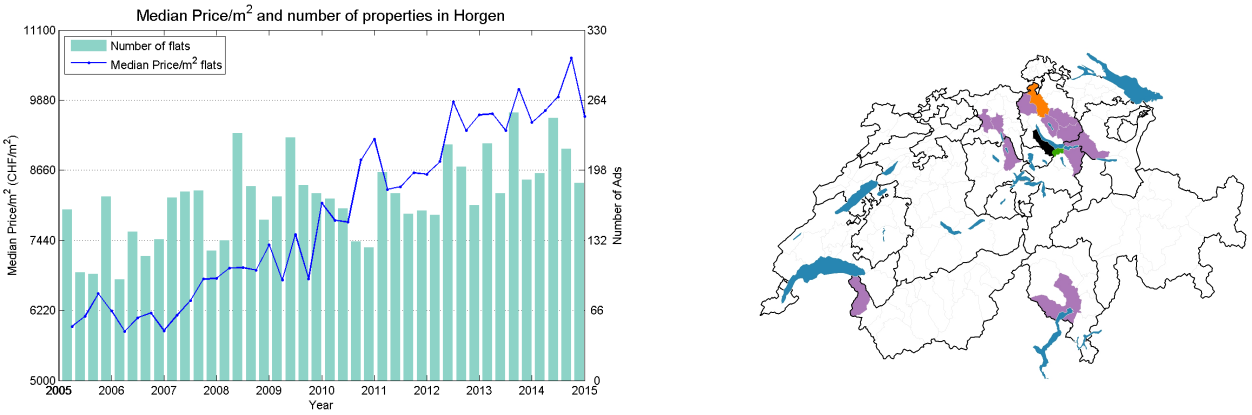


Figure B. 3: District: Horgen, Status: To Monitor, Property type: all apartments.

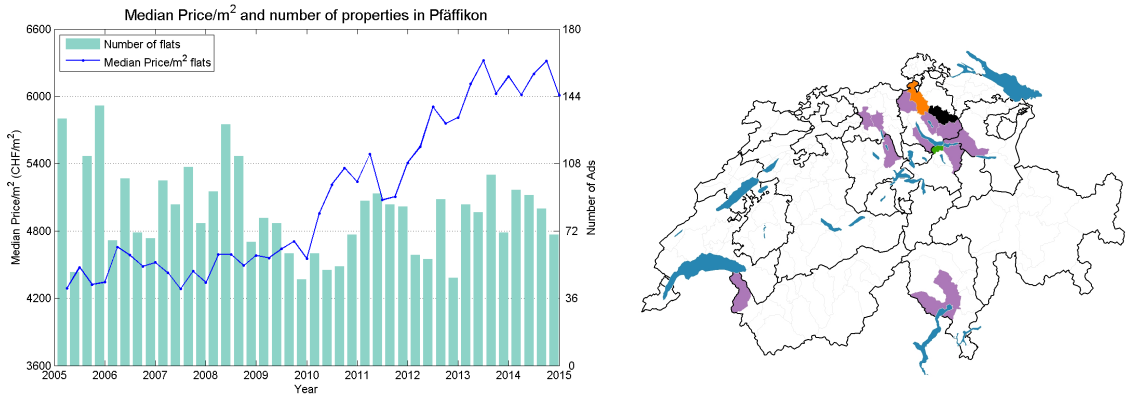


Figure B. 4: District: Pfäffikon, Status: To Monitor, Property type: all apartments.

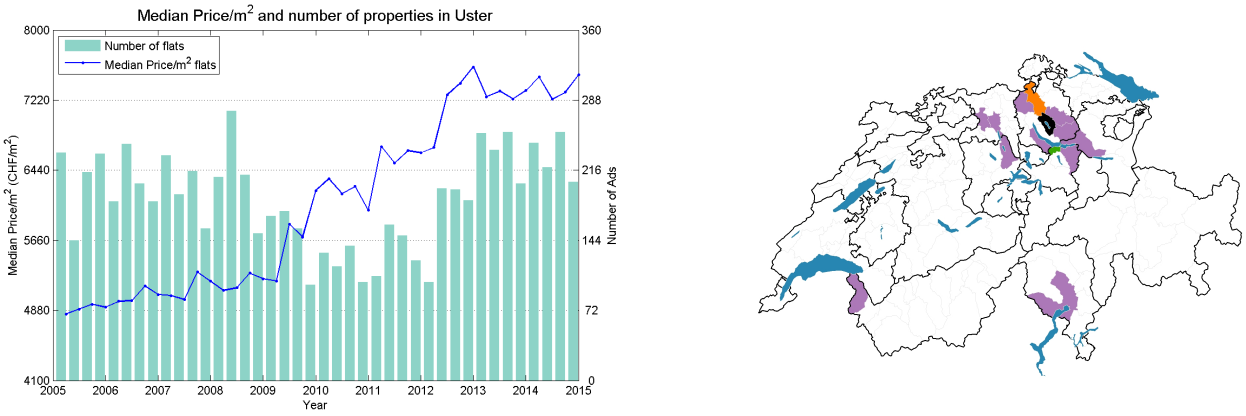


Figure B. 5: District: Uster, Status: To Monitor, Property type: all apartments.

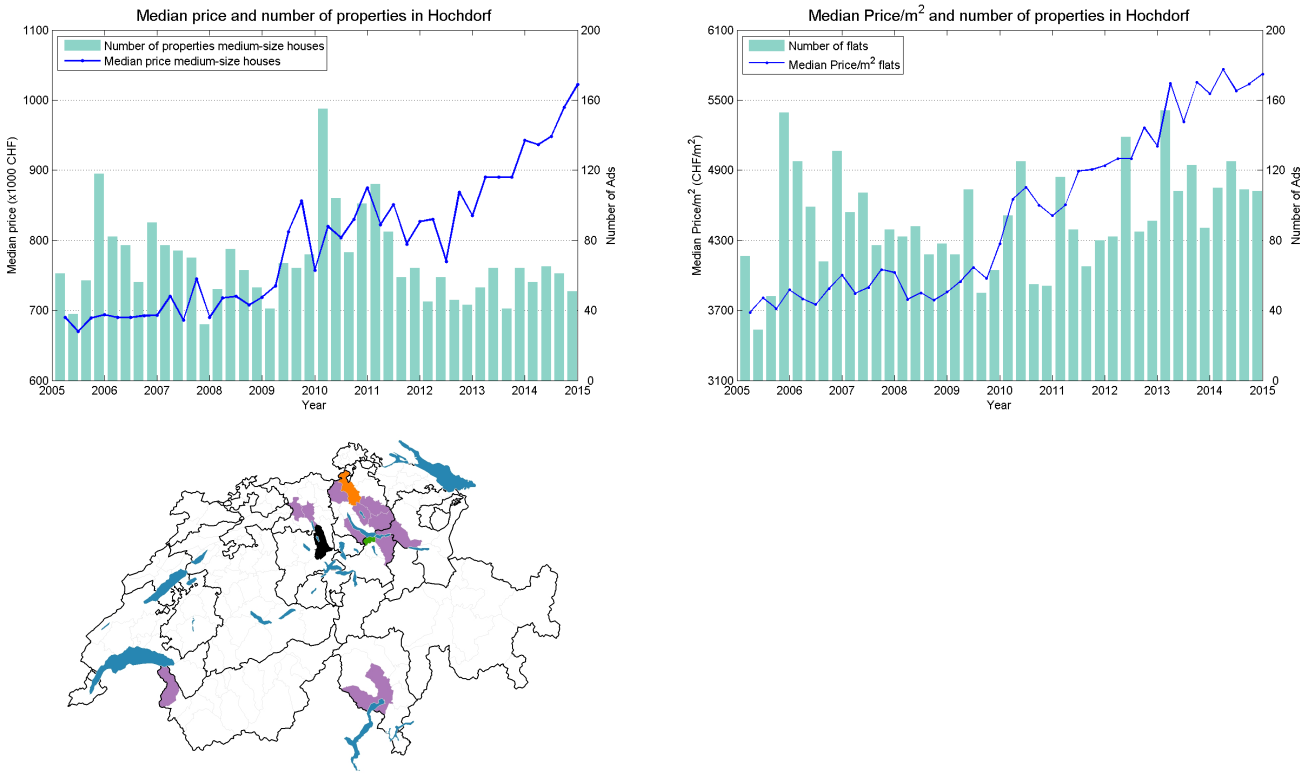


Figure B. 6: District: Hochdorf, Status: To Monitor, Property type: medium size houses (top left), all apartments (top right).

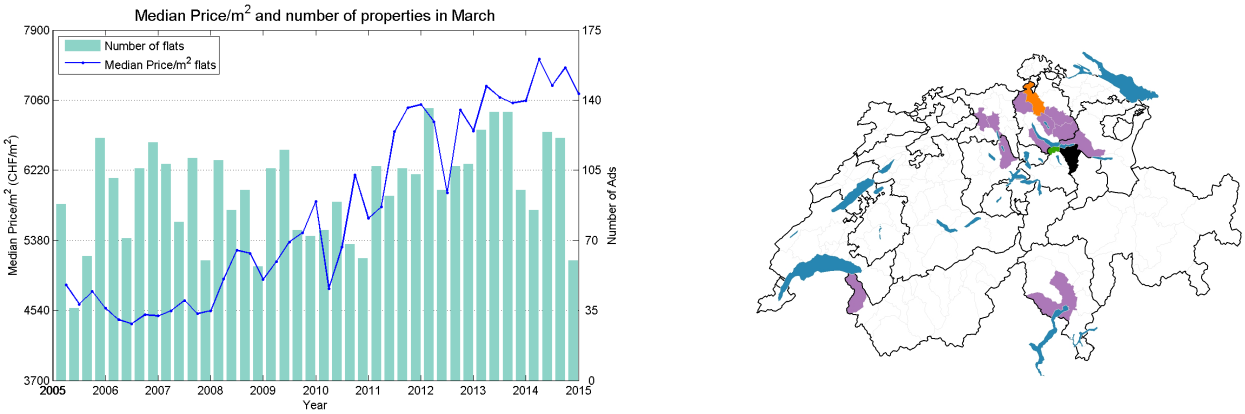


Figure B. 7: District: March, Status: To Monitor, Property type: all apartments.

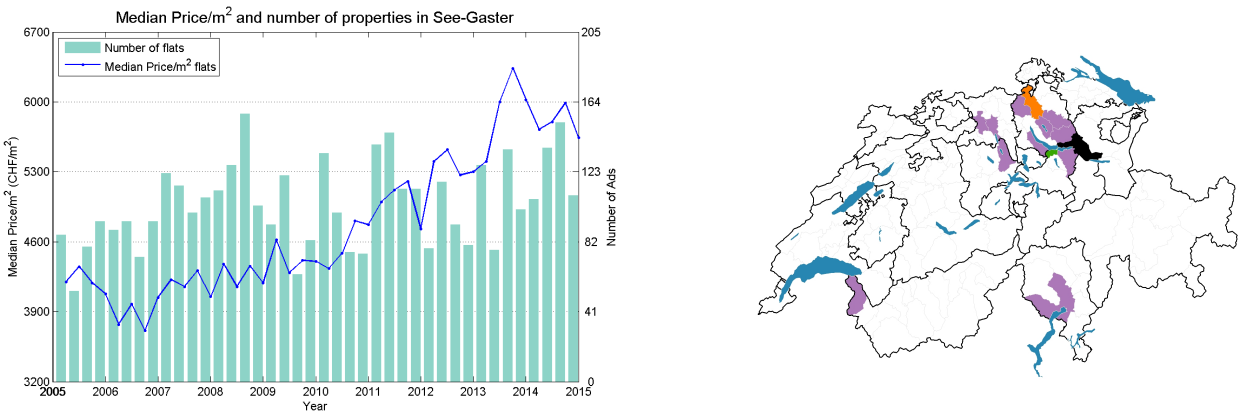


Figure B. 8: District: See-Gaster, Status: To Monitor, Property type: all apartments.

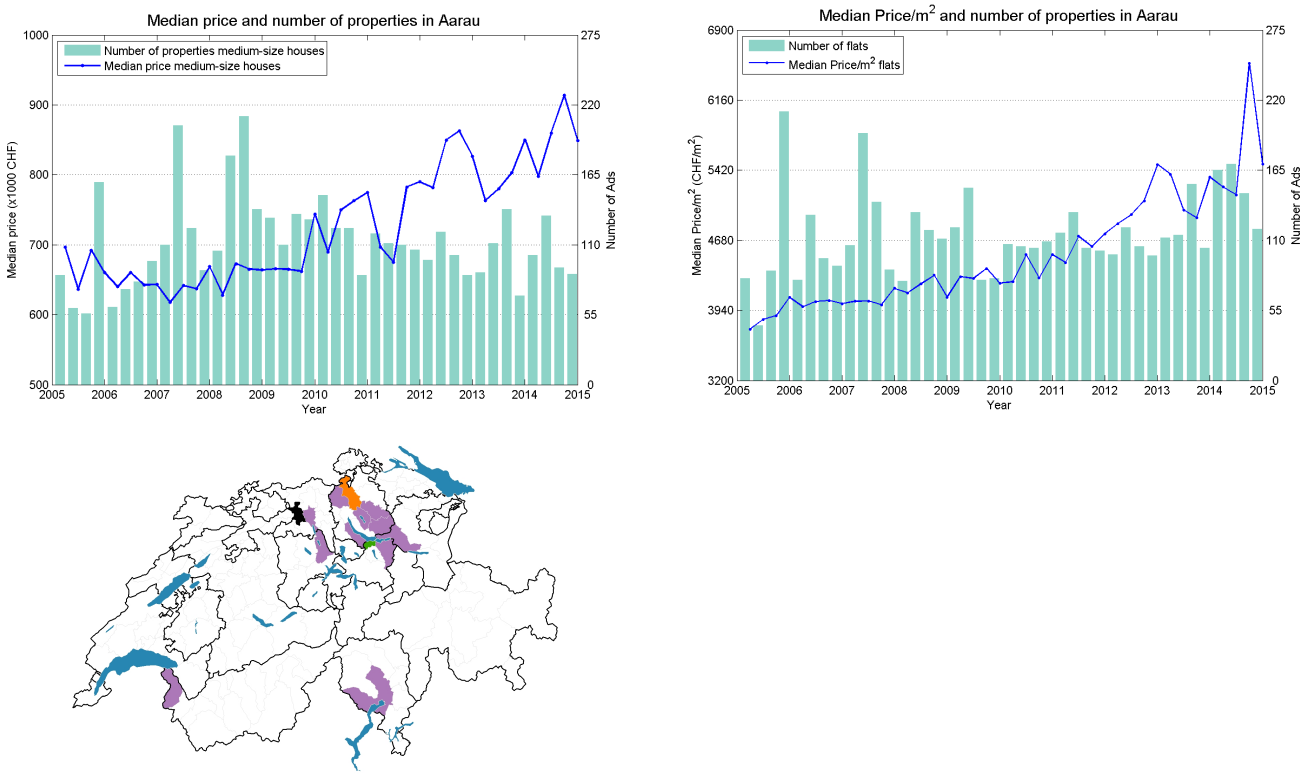


Figure B. 9: District: Aarau, Status: To Monitor, Property type: medium size houses (top left), all apartments (top right).

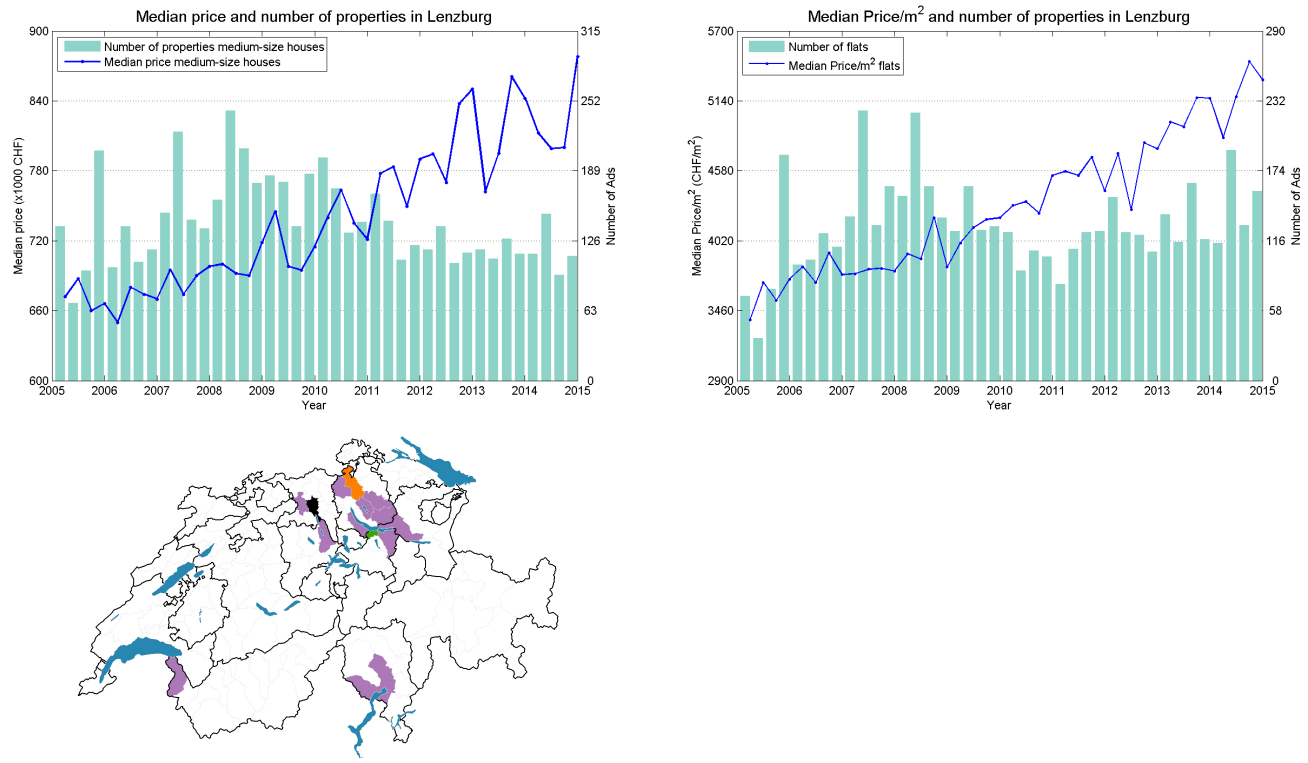


Figure B. 10: District: Lenzburg, Status: To Monitor, Property type: medium size houses (top left), all apartments (top right).

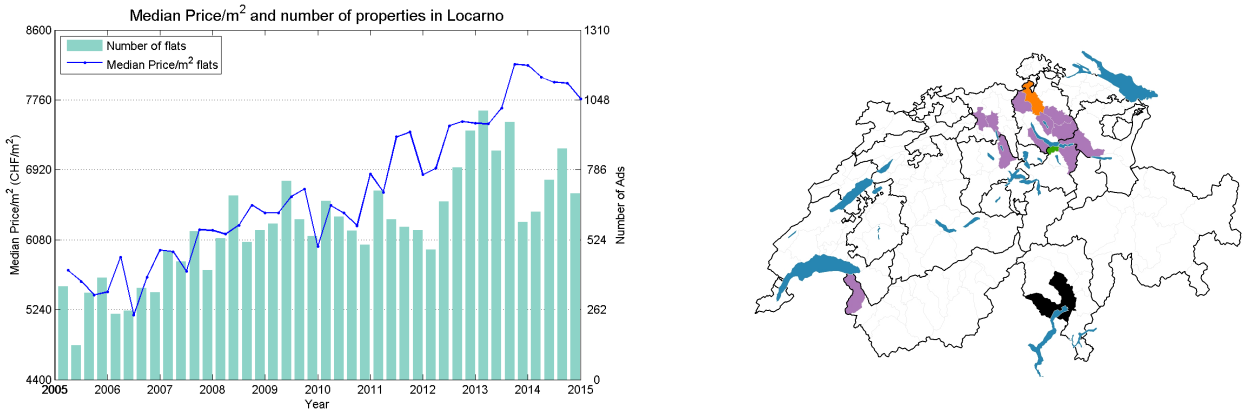


Figure B. 11: District: Locarno, Status: To Monitor, Property type: all apartments.

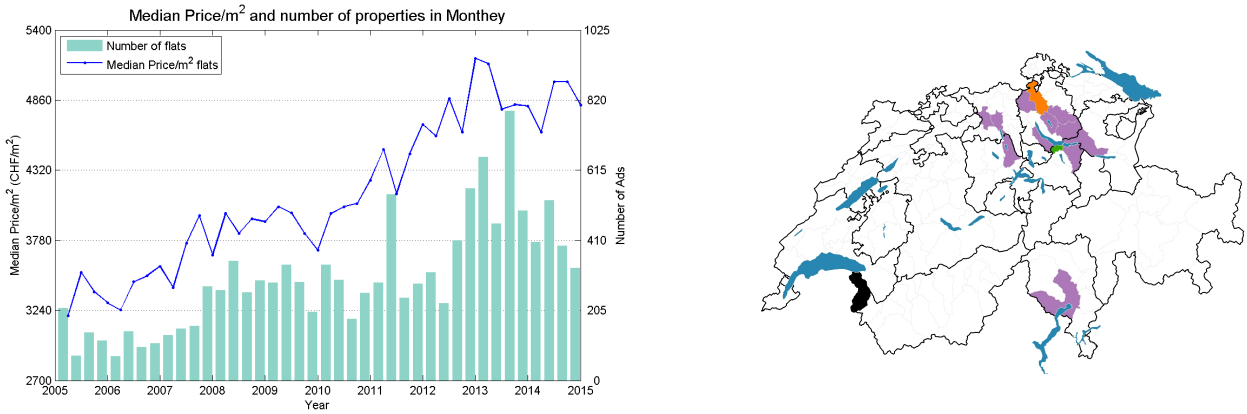
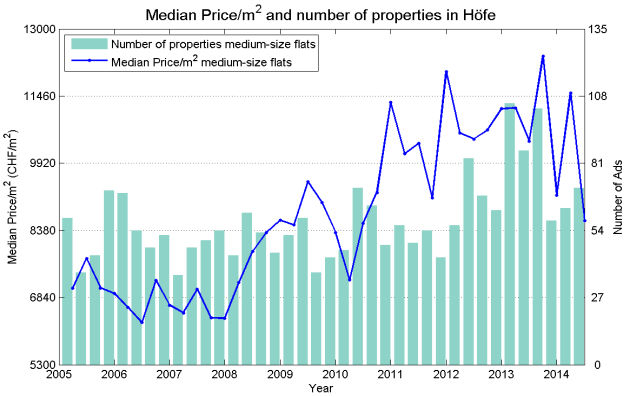


Figure B. 12: District: Monthey, Status: To Monitor, Property type: all apartments.

Appendix C: Review of 2014-Q4 “Regime Change” Districts.



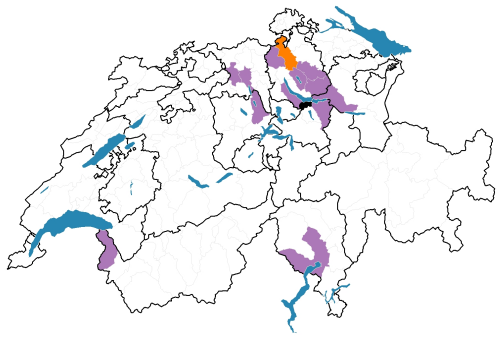


Figure C. 1: District: Höfe, Status: Regime Change, Property type: all apartments.

Appendix D: Development of the Reported Districts in 2013-Q2, 2013-Q4, 2014-Q2 and 2014-Q4.

District Name	Analysis as of 2013-Q2				Analysis as of 2013-Q4				Analysis as of 2014-Q2				Analysis as of 2014-Q4			
	Status	Property Type	Property Size	Critical Time	Status	Property Type	Property Size	Critical Time	Status	Property Type	Property Size	Critical Time	Status	Property Type	Property Size	Critical Time
Aarau	M	H/A	Med/All	-	M	H/A	Med /All	-	M	H/A	Med/All	-	M	H/A	Med/All	-
Affoltern	R	A	All	-	-	-	-	-	-	-	-	-	-	-	-	-
Baden	C	A	All	2013 Q3 - 2014 Q3	M	A	All	-	R	A	All	-	-	-	-	-
Bremgarten	R	A	All	-	-	-	-	-	-	-	-	-	-	-	-	-
Bülach	C	A	Med/S	2013 Q3 - 2014 Q4	C	A	All/Med/S	2014 Q1 - 2015 Q2	W	A	All/Med/S	-	W	A	All/S	-
Dielsdorf	C	A	All	2013 Q3 - 2014 Q3	W	A	All/Med	-	M	A	All/Med	-	M	A	All/Med	-
Dietikon	R	A	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Hinwil	M	H/A	Med/All	-	M	H/A	Med/All	-	M	H/A	Med/All	-	M	H/A	Med/All	-
Hochdorf	-	-	-	-	W	A	Med/S	-	W	A	Med/S	-	M	H/A	Med/All	-
Höfe	M	A	Med	-	M	A	Med	-	M	A	Med	-	R	A	All	-
Horgen	M	A	All	-	M	A	All	-	M	A	All	-	M	A	All	-
Jura-Nord Vaudois	M	H	Med	-	R	H	Med	-	-	-	-	-	-	-	-	-
Lausanne	M	A	All	-	M	A	All	-	R	A	All	-	-	-	-	-
Lenzburg	M	H	Med	-	M	H	Med	-	M	H	Med	-	M	H/A	Med /All	-
Locarno	M	A	All	-	W	A	All/S	-	W	A	All/S	-	M	A	All	-
March	M	A	All	-	M	A	All	-	M	A	All	-	M	A	All	-
Monthey	M	A	All	-	M	A	All	-	M	A	All	-	M	A	All	-
Münchwilen	M	A/H	Med	-	M	H/A	Med /All	-	R	H/A	Med /All	-	-	-	-	-
Pfäffikon	W	A	Med	-	W	A	Med	-	W	A	Med	-	M	A	All	-
See-Gaster	-	-	-	-	W	A	All/Med	-	W	A	All/Med	-	M	A	All	-
Uster	W	A	Med/S	-	M	A	All	-	M	A	All	-	M	A	All	-
Zug	R	A	All	-	-	-	-	-	-	-	-	-	-	-	-	-

Status: C: Critical, W: To Watch, M: To Monitor, R: Regime Change
Property Type: A: Apartments, H: Houses
Property Size: Med. Medium Size, S: Small Size