Housing Supply Elasticity Across Canadian Metropolitan Areas

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Introduction and Motivation

- Moretti (2010): shocks to local labor market cause nominal-wage differences across cities

  ➔ worker in city A, affected by a shock to its labor market, earns higher wages than his/her counterpart in city B with no shocks to its labor market.

Introduction and Motivation (cont'd)

- Higher nominal and real wages in city A attracts workers from city B.
- The presence of new workers in city A increases demand for goods and services in city A, thereby increasing the price of non-tradable goods and services, particularly housing prices.
- The more inelastic the housing sector in city A, the more real effects of the labor shock would be offset by price increases.
- As such, it is of great concern to identify the barriers to housing markets and examine how elastic they perform in response to new demand.

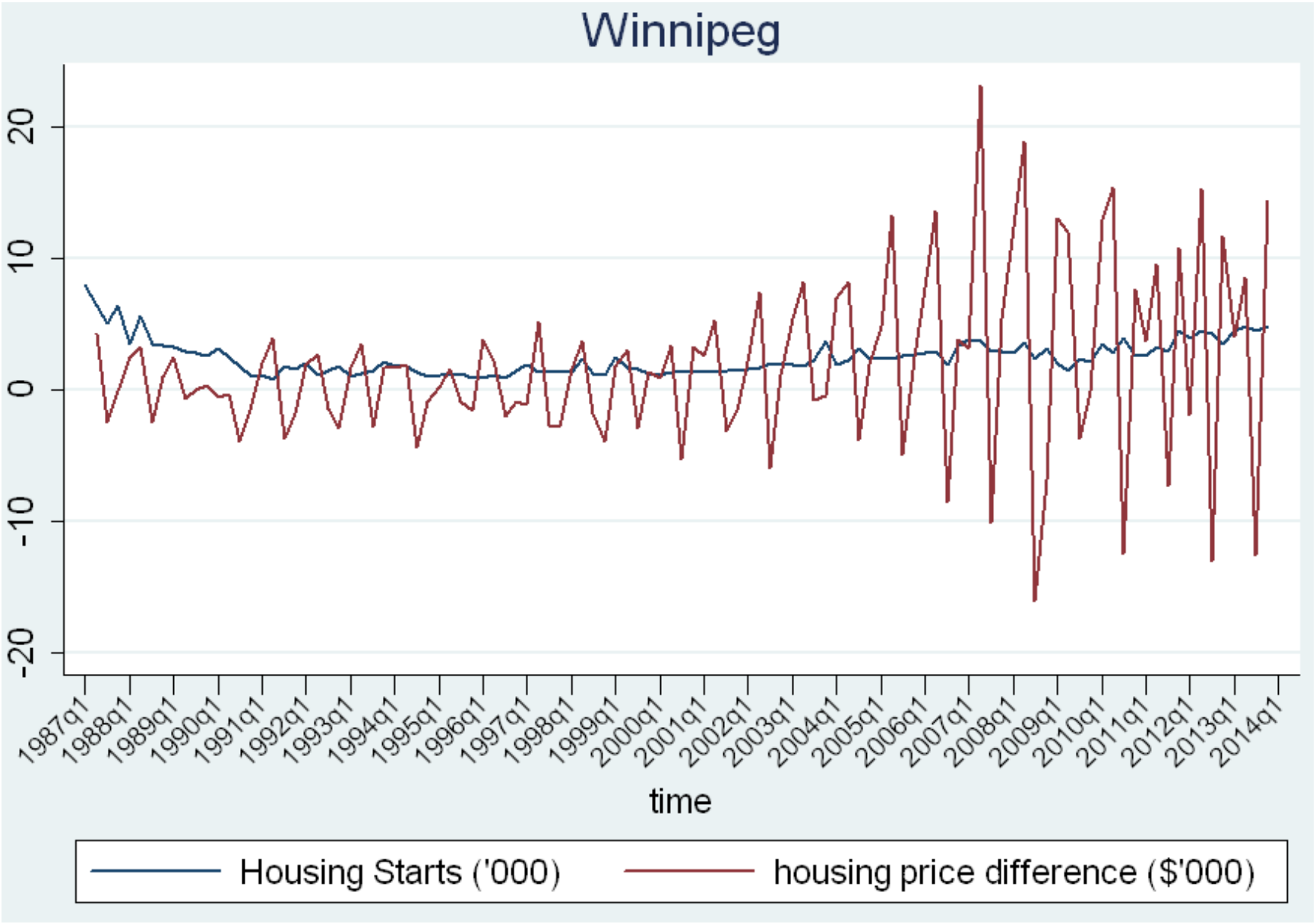
Results Preview

- Housing supply elasticity is examined for the case of Canada across its metropolitan areas from 1987 to 2013.
- Random Effect panel regression using IV approach to find the average housing-starts elasticity with respect to price changes.
- Housing market is performing inelasticaly across Canada such that the price-difference elasticity of housing construction is 0.2 which is less than one.
- Even though due to lack of data regulation and institutions are not studied, they seem to be significantly affecting the housing markets across Canada. Thus further research is needed on this part to find a solution for lack of data.

Data: Housing stock and prices

Table 1: Average percentage change 1996-2011

	Toronto	Vancouver	Ottawa	Calgary	Edmonton	Winnipeg	Hamilton	Montreal	Quebec
Housing Prices	134	170	145	199	198	180	134	192	188
Housing Stock	39	36	35	59	50	16	24	26	29
HP/HS	3.4	4.7	4.1	3.4	4	11.3	5.6	7.4	6.5


Winnipeg
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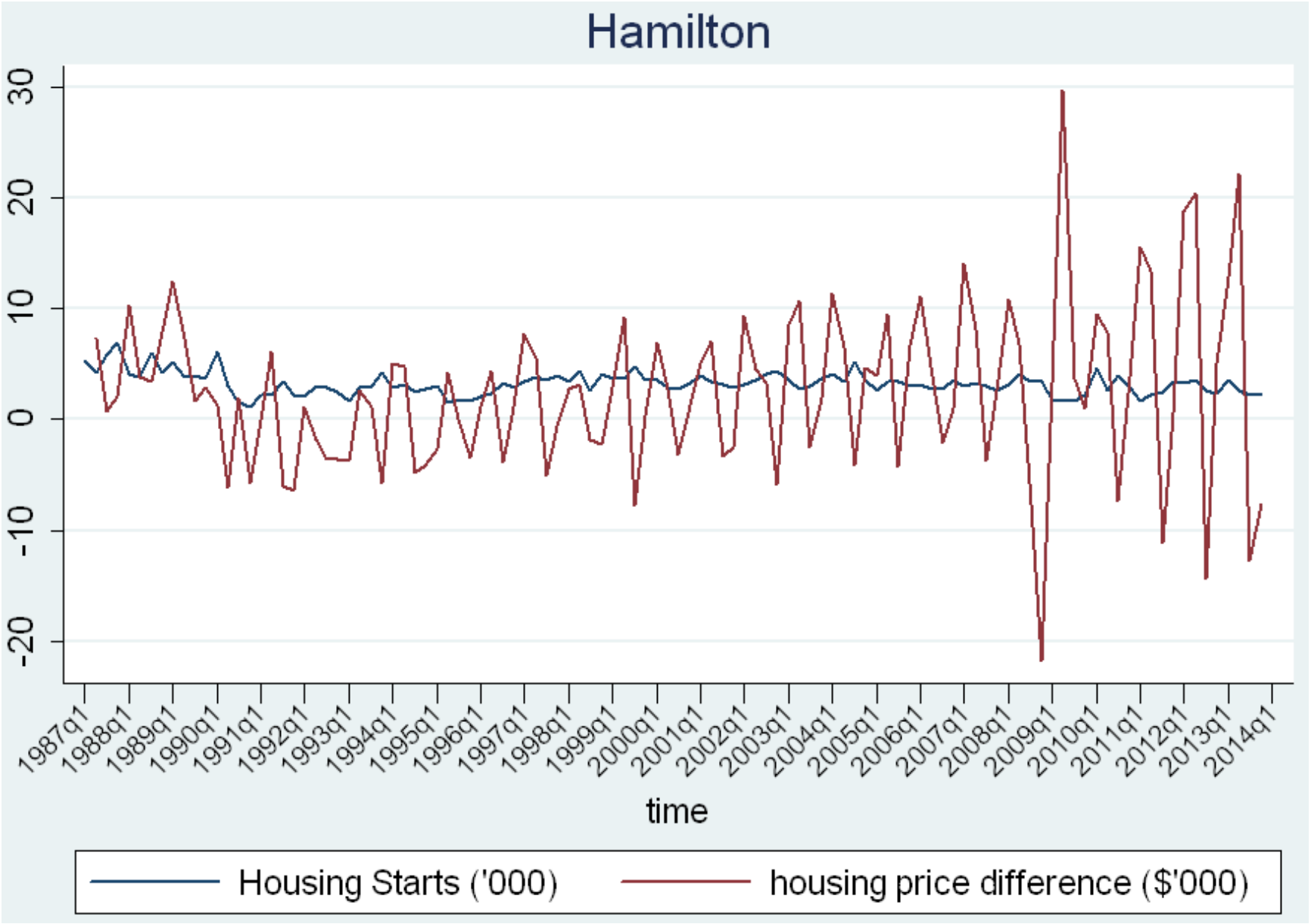
time
Housing Starts ('000)
housing price difference ($'000)


Hamilton
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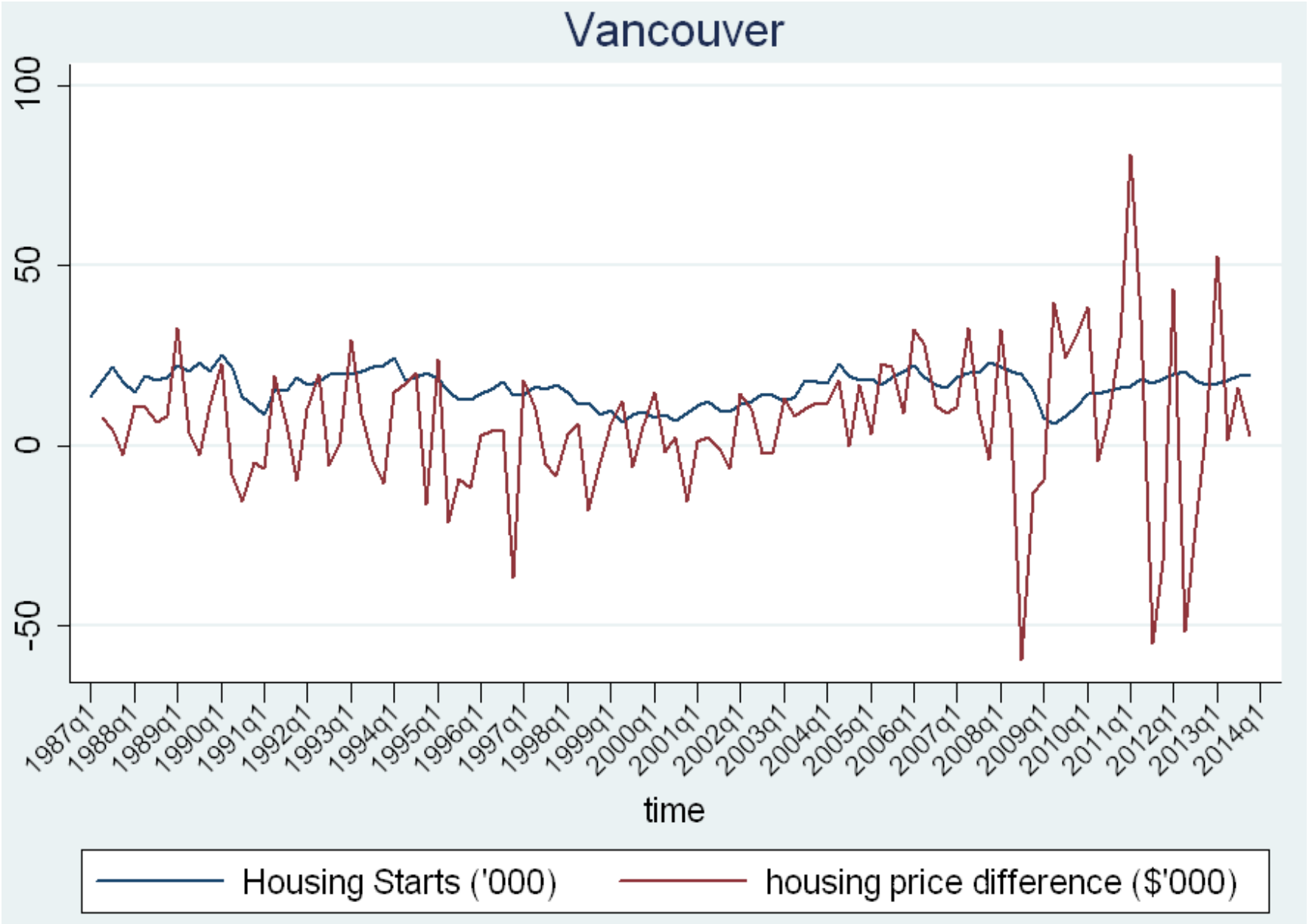
Housing Starts ('000)
housing price difference ($'000)


Vancouver
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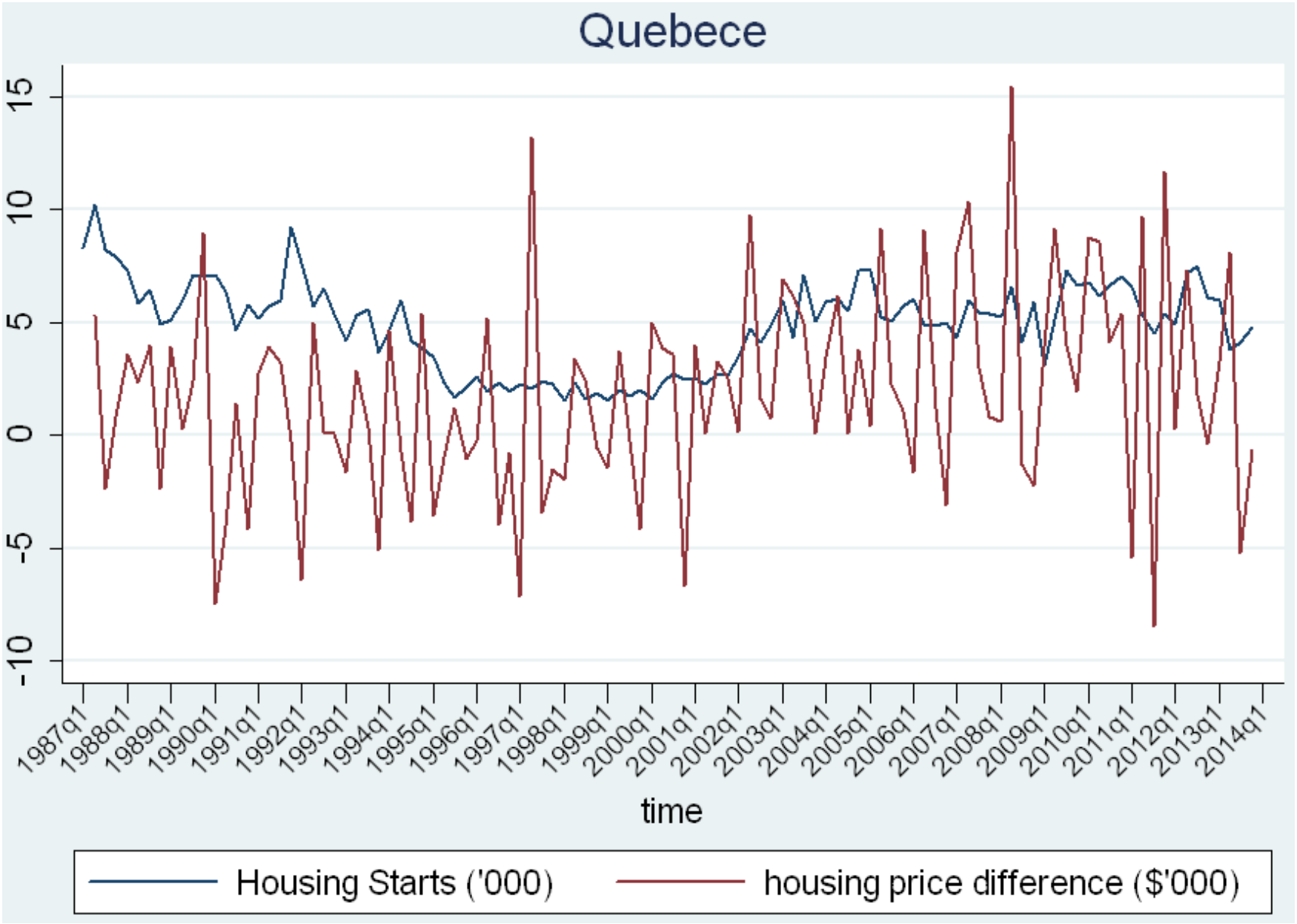
Housing Starts ('000)
housing price difference ($'000)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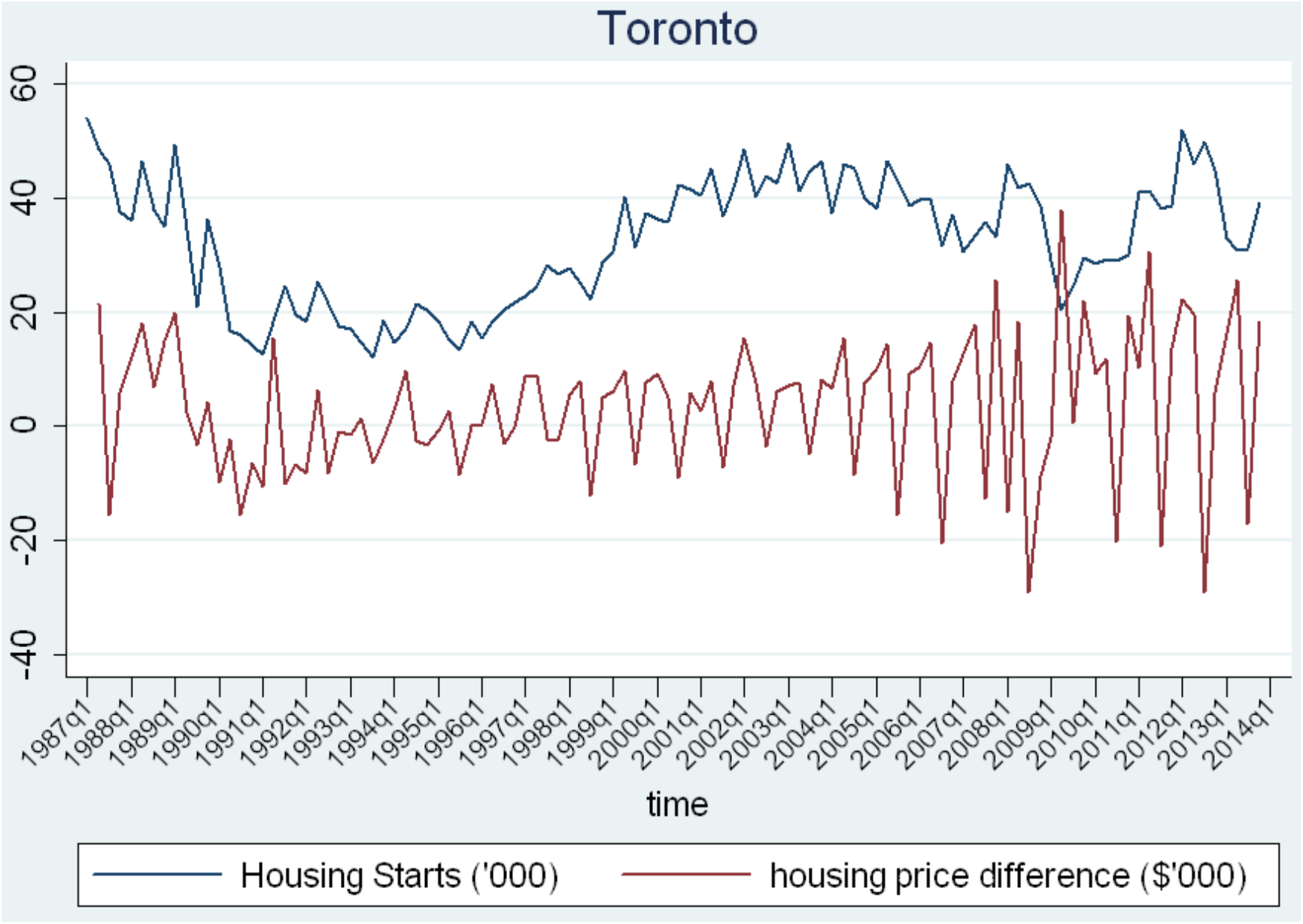
time
Housing Starts ('000)
housing price difference ($'000)


Toronto
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1987q1
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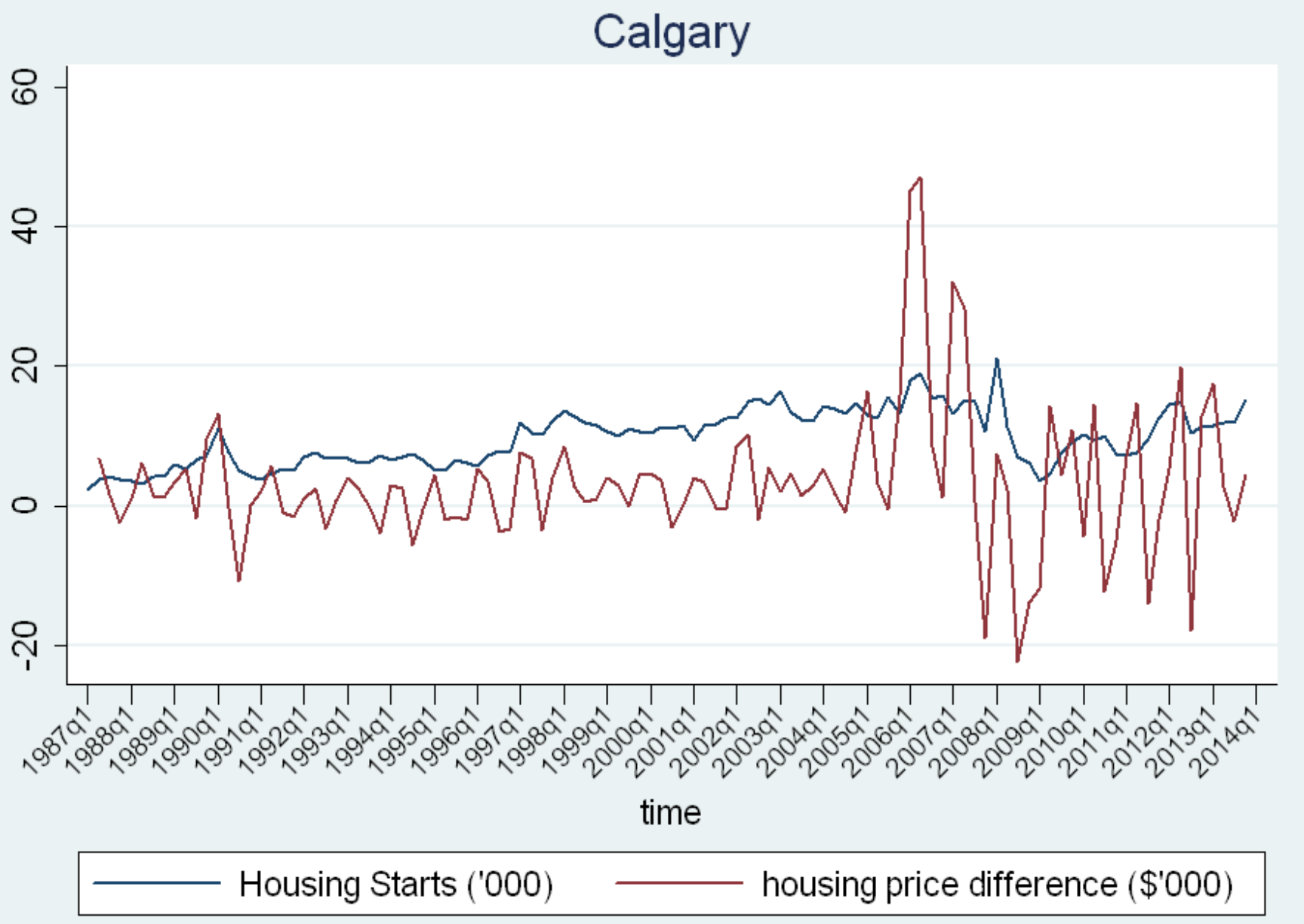
Housing Starts ('000)
housing price difference ($'000)


Calgary
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time
Housing Starts ('000)
housing price difference ($'000)

Econometrics Methodology

- *Annual data, from 1987 to 2013.*

- $hs_t = f(\Delta P_t, \Delta P_{t-1}, hs_{t-1}, \Delta pop_t)$

- Dealing with endogeniety problem due to mutual effect between housing starts and prices.

Econometrics Methodology (cont'd)

- Three potential instruments; GDP per capita, land prices and construction cost. (note that GDP is defined in local terms; i.e. gross metropolitan product):
- $\Delta P_t = g\left(GDP_{pc}, \Delta nhpil_t, \Delta nhpih_t\right)$
- To make sure that the endogeneity issue does exist, I performed the DWH test and the null hypothesis that the housing prices can be treated as exogenous was rejected at %1 level.

Econometrics Methodology(cont'd)

- However, over-identification test failed to accept the null hypothesis that all the instruments are valid.
- After testing different specifications, the two instruments of GDP_{pc} and $nhpih_t$ managed to survive all the tests related to IV (i.e. over-identification, under-identification, and weak instrument tests). Thus, the final specification for estimation model is as follows:
- $hs_t = f(\Delta nhpil_t, \Delta P_t, \Delta P_{t-1}, hs_{t-1}, \Delta pop_t\ )$
- $\Delta P_t = g\left(GDP_{pc}, \Delta nhpih_t\right)$
- Δpop_t is more correlated with hs_t than with ΔP_t. Moreover, the under-identification and weak-instrument tests further confirm that Δpop_t needs to be entered in the structural model not in the instrumental variable vector.

Econometrics Methodology(cont'd)

- Theoretically, it is expected that housing starts are a positive function of changes in housing prices and population, and a negative function of changes in land values.
- To realize that if the panel data is under fixed effects or random effects, the Hausman test is conducted. The test stat of 2.11 with the P-value of 0.71 indicates that we fail to reject the null hypothesis that RE model is consistent.

hs	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
hp						
D1.	.1550636	.0409242	3.79	0.000	.0748537	.2352735
LD.	-.0508132	.0182385	-2.79	0.005	-.08656	-.0150665
hs						
L1.	.7110795	.0799807	8.89	0.000	.5543201	.8678388
pop						
D1.	.0829757	.0271005	3.06	0.002	.0298597	.1360918
lnhpil						
D1.	-11.87579	6.571694	-1.81	0.071	-24.75607	1.004497
_cons	.1088329	.24384	0.45	0.655	-.3690846	.5867505
sigma_u	0					
sigma_e	2.7805275					
rho	0	(fraction of variance due to u_i)				

Instrumented: D.hp
Instruments: LD.hp L.hs D.pop D.lnhpil lgdppc D.lnhpih

Conclusion:

- Housing starts across Canada are not responsive to price changes, meaning that housing prices are not the main determinant of housing supply, and they are controlled by some other non-market factors.
- In terms of elasticity, housing market across Canadian metropolitan areas is very inelastic where the value of price-difference elasticity is approximately $e = 0.2\ (0.155 \times \frac{10.155}{8.465})$.

Future Work

- Completing time-series regressions, using ARDL approach, in order to find the elasticity for each individual city and make a comparison between cities.
- ARDL gives both shrot-run and long-run elasticities.
- From there, mean group estimation can be conducted to find elasticity across cities and net, compare it with RE estimation to see if there is any significant difference between these two approaches.

Data Limitation

- Unfortunately, due to lack of data, I was not able to capture how strict the land regulations and building-permit issuance are in Canada.
- It seems that issuing building permits plays a very substantial role in the supply side. Therefore, further study, especially on the process of warrant issuance for building permits, is needed to better understand the structure of housing supply in Canada.

Thank you