Immigration and Urban Housing Market Dynamics: the Case of Haifa

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Abstract

This paper addresses the interplay between demographics and housing market dynamics in Israel. The case of Haifa offers a typical non-controlled experiment on how demographic shocks and associated changes in housing demand affect the housing market. The number of inhabitants rose in the 1990s to 250,000 with about 66,000 immigrants. The aim of this paper is to analyze how the housing market absorbed the demographic shock.

Keywords: Demography, residential real estate, price dynamics
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1 Introduction

Israel experienced a large influx of immigrants during the early 1990s. By the turn of the century more than one million immigrants (on a population of 4.5 million early 1990) or 535,000 households immigrated to Israel. The population rose from 4.5 to almost 6.4 million by 2000.

The city of Haifa being the third largest city in Israel was no exception, as most immigrants settled in the country's central areas – viz. Haifa, Tel-Aviv and Jerusalem area (Portnov, 1998). The number of inhabitants rose in the same period to 250,000 with about 66,000 immigrants. Immigrants typically enter rental or lower end owner-occupier submarkets. Immigrants are sometimes being associated with higher crime rates, although opposite views have been documented in the literature also. The large influx of immigrants most likely affects the housing market significantly. The aim of this paper is to analyze how Haifa's housing market absorbed the demographic shock.

The case of Haifa offers a typical non-controlled experiment on how demographic shocks and associated changes in housing demand affect the housing market. Figure 1 clearly indicates the demographic shock in 1990-1991 with annual growth rates of nearly six percent after which annual growth rates flattens.

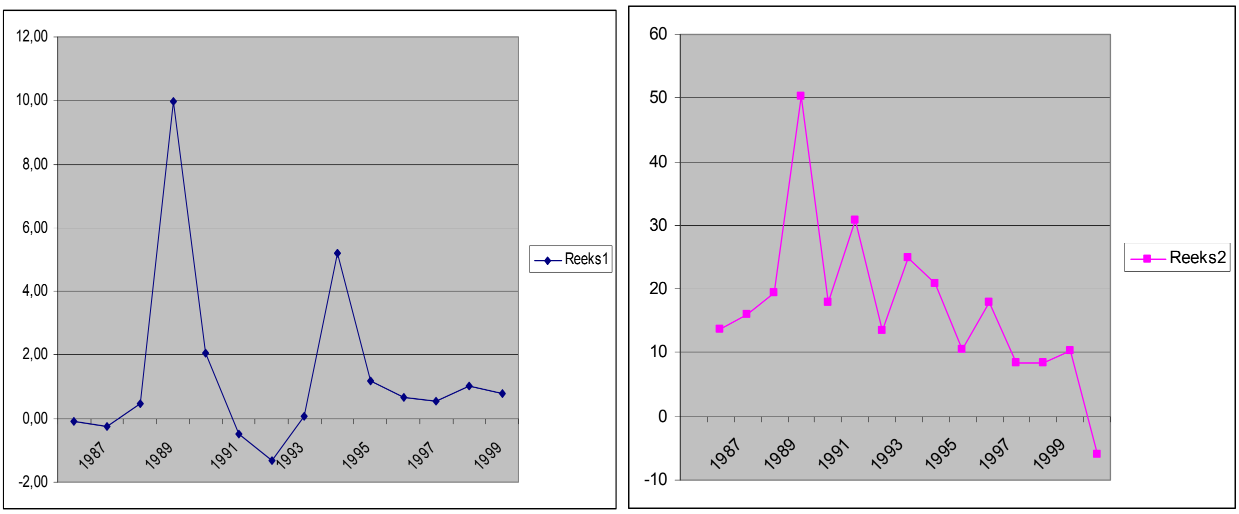

Figure 1 Annual population growth (left) and annual house price change (right) for Haifa 1985-2000

The specific pattern offers the opportunity to measure the effect of a large, sudden, incidental and unanticipated shock not analyzed in earlier studies. Earlier studies focused on post-war baby booms represent large but gradual and aniticipated changes in demographics (Jaffee and Rosen, 1979).

Alperovich (1997) studied the effect of immigrants on house prices in Israel between 1959 and 1988. The settlement of immigrants in Israel in the 1990s offers the unique opportunity to measure an unanticipated shock. Never have immigration rates in Israel been so high after the 1967 Six-Day War as in 1990/1991.

The impact of demographic shocks on housing markets has been subject of earlier studies on which we draw on in this paper. Mankiw and Weil (1989) considered the impact of demographics on housing markets in the US. Their research initiated a couple of subsequent papers addressing the issue as to whether demographics and housing markets are interrelated for Canada (Engelhardt and Poterba, 1991) and for Japan (Ortake and Shintani, 1996). The question whether demographics and housing markets are interrelated seems natural, though the literature is mixed on how shocks are absorbed. What is the mechanism through which demographic shocks are absorbed: is it through higher prices, through changes in the stock, or both? Does the housing market return to the same equilibrium price level as prior to the shock? Households entering the housing market may encounter great difficulties to obtain affordable shelter and may experience great price risks in subsequent years. As such, the issue is important from a public policy perspective as it may call for active government intervention providing affordable housing.

Mankiw and Weil (1989) find that demographic shocks lead to higher house prices. Engelhardt and Poterba (1991) question this result on the basis of their finding that at least in Canada the adjustment mechanism is distinctly different. Holland (1991), Swan (1995) and Ohtake and Shintani (1996) more fundamentally question the modelling approach by Mankiw and Weil and point out that they incorrectly address time series properties, particularly, non-stationarity of the series. Ohtake and Shintani find that demography and housing stock are cointegrated on the basis of which they formulate an error correction model for house prices. Their results suggest long-run adjustment through the housing stock with effect of demographics on house prices through short-run adjustment. The natural question arises as to whether a demographic shock in Haifa created a ripple effect through time by which house prices first rise and then dampen over time.

We analyze whether demographics and house prices are co-integrated and address the following questions: Does housing demand by immigrants make house prices peak? How do real price dynamics evolve? Do price dynamics vary across submarkets? Do submarkets' prices converge or diverge?

The organization of this paper is as follows. Section 2 reviews the literature on housing market fundamentals. Section 3 describes the Israeli housing market and the data. Section 4 presents the empirical model and discusses the empirical results. Conclusions and directions for future research follow in Section 5.

2 Housing market fundamentals

Understanding how housing markets operate is of great importance in our understanding of how the housing market absorbs demographic shocks. The interaction of housing supply and demand has been subject of many studies by economists, geographers and sociologists. The basic questions are as to whether and how shocks generate a ripple effect through time by which for example house prices first rise and then dampen through time. The literature suggests a strong interrelation between the dynamics of demand, price, and housing supply. We start-off with a discussion on housing demand.

Housing demand – The literature indicates that changes in aggregate housing demand are associated with changes of the population and changes within the population. Changes of the population relate to demographic phenomena, with changes within the population relating to shifts in household preferences relating to income, wealth and taxes. Changes in housing demand are generally associated with residential mobility as changes in housing demand are generally associated with moving (see Clark and Dieleman, 1996; Van der Vlist, 2001). The literature, particularly the search theoretic literature, indicates that housing market outcomes reflect local economic conditions (see e.g. Hwang and Quigley, 2006; Van der Vlist et al., 2002b; Dieleman et al., 2000). Expectedly, changes in housing demand affect both house prices and housing supply. We now turn to the short run house price dynamics and housing supply adjustments, in preparation to the long run interplay between demand, price and supply dynamics.

House price – A vast literature considers house price dynamics and its determinants by means of time series and a time series- cross section (panel data) analysis. One of the crucial issues in house price developments across time relates to the construction of house price indices. Basically, heterogeneity in house amenities makes house price measures depending on unobserved house quality renders simple comparisons of mean or median house prices across time invalid. To reduce measurement error in house price developments over time repeated sales house indices have been proposed (see Malpezzi, 1999; Hwang and Quigley, 2004; Jansen et al, 2008).

Housing supply – The literature emphasizes the important role of housing supply in the operation of the housing market. The recent literature reflects the upswing or renewed interest in housing supply issues. Supply-side factors such as local land-use regulations for new construction, allocation rules in rent-regulated markets, have a great impact through the availability of housing and its associated price (Van der Vlist et al, 2002). Also, the effects of supply shifters, such as construction costs, play a role. Gyourko and Saiz (2006) suggest that construction costs hikes may be differentially capitalized into house costs across markets. The surveys of Barker (2003), Meen (2005), Vermeulen and Rouwendal (2007) indicates the interest from both public policy and academia. The literature suggests that housing supply typically does not react instantaneously nor outside the local jurisdictional context which stresses the crucial role of land use regulation in shaping tomorrows housing markets. The effect of local housing market regulation on the housing market is at the centre of today's housing market debate. Harter (2004) use the Malpezzi's regulatory index on housing supply with regulatory index constructed using variables of approval time, waiting time for permits, zoning regulation, moratoria and infrastructure adequacy measures.

With the above insights from the literature we now turn to the interplay between demand and house prices. Harter (2004) investigates the effects of income shocks on house prices in a vector error correction model. Her results suggest an error correction term of -.22 indicating a 22 percent correction between housing prices and income. Summarizing the evidence on the transitory dynamics of demand, prices and supply, we expect that a large influx of immigrants increases the demand for housing, leading initially to higher prices and subsequently higher land conversion rates which will dampen housing prices (DiPasquale and Wheaton, 1994; Hwang and Quigley). In the empirical part of this paper we analyze this fundamental relationship by considering whether demographics and house prices are co-integrated. Moreover, we consider the speed at which adjustment in house prices take place.

3 Immigrants, homeownership and Haifa's Housing Market

Israel is a country of immigrants. Over half of the Jewish population in Israel is first generation immigrants, and the overwhelming majority of the other half is comprised of sons and daughters of immigrants. It is important to stresss that Israel's immigration policy, unlike that in most other countries, does not stem from economic considerations. The "Declaration of Independence" of Israel (May 14, 1948) contains an explicit statement that "The State of Israel will be open to Jewish immigration and for the ingathering of the exiles". Hence, when the economic and political systems of the former USSR changed, the state of Israel opened its gates to Jewish immigrants without placing any constraints. This led to an unexpectedly large influx of immigrants which entered the housing market (Deri, 1992).

The Israeli government responded by initiating various programs to accommodate the immigrants (see also Portnov, 1998):

a) a rent assistance program to renters;
b) government mortgage programs to owner-occupiers;
c) legislative amendments in land use planning procedures;
d) supply programs.

Rent assistance - To help the immigrants, the government established a rent assistance program offering a fixed monthly allowance to households regardless of the rented property. Many immigrants decided to co-reside, sharing a dwelling with one or two other households, bidding their joint rent allowance to the market. This strategy made rents rise sharply, letting rents of modest dwellings double or even triple. The sharp rise, however, prevented non-immigrant households to access the rental market, making them homeless and creating social disorder. Homeless families protested against the situation by putting tents in public areas in the central districts, with at its climax including more than two thousand families living in about 70 tent sites (Deri, 1992).

Government mortgages – To promote home-ownership the Israeli government offered mortgages at below-market interest rates. Different mortgage programs are offered to young couples, single-parent families and new immigrants. These programs differ in the amount and payment conditions based on equity considerations (Ginsberg, 2001). Mortgages are typically granted on the basis of credit worthiness with asset value serving as collateral for the mortgage.

In practice, government mortgages differ from commercial mortgages in two important respects. First, in contrast to commercial banks contrary government mortgage institutes do not test households' credit worthiness in terms of potential down payment and monthly payments. Secondly, they do not require official housing appraisals with asset value serving as collateral for the mortgage. The rationale for both conditions is that the vast majority of the recent immigrants neither had a steady income to finance monthly mortgage payments nor assets for substantial down payment. Hence, dwellings became heavily mortgaged which were sometimes granted from multiple government mortgage programs or granted to different immigrant families. Immigrants often received one or two government-mortgages to purchase one dwelling unit. Also, one out of three immigrant families bought an apartment together with another household, mostly related to the family (i.e. father or mother in-law) (Ginsberg, 2001). As a result government-mortgages may be seen as low-interest loans rather than mortgages.

Land use planning procedures – To boost new construction legislative amendments were made to enable faster land-use planning approval of projects. (see Portnov, 1998)

Supply Programs - Several measures were implemented to foster housing construction, both by private contractors and through government initiative. Supply programs provided incentives for construction companies. Also supply programs included reduction in the prices of government-constructed housing. The renewed government participation in the construction of housing constituted a reversal of trends. Israel government was active in the housing construction market during the 1970s. Its role was reduced during the 1980s (see Portnov, 1998). At the beginning of the immigration wave the total number of 'starts of dwelling construction' was less than 20,000 units per year, with only a few thousands of public sector 'starts of dwellings construction'. By 1991, the number of dwellings starts increased to about 84 thousands, with majority of dwellings starts initiated by the public sector. Government also induced private contractors to build in the poorer and more peripheral regions of the country introducing granted bonuses schemes and buy back guarantees (Portnov, 1998; Beenstock and Felsenstein, 2003). At the turn of the century, 74 percent of Haifa's dwelling stock is owner-occupier, with 20 percent commercial and remaining six percent public rental units (Hazam and Felsenstein, 2007).

4. Data

The data analyzed cover housing transactions in Haifa between January 1989 and June 1999 and come from a mortgage database. The data include information on the date of transaction, transaction price, mortgage type, size of the apartment, and address (location). Most of Haifa's housing stock consists of flats in few storied buildings.

Apartments vary in market value even in the case of identical characteristics because of its location. We define sub-markets as we expect a high correlation between price and neighbourhood socio-economic characteristics, like income, vehicle ownership, years of education. We use location to complement the transaction data with submarket socio-economics characteristics. The CBS 75 statistical tracts for Haifa allow identification of homogenous tracts in terms of neighbourhood socioeconomic characteristics. We use the 1995 census CBS socio-economic scores for this purpose. Two peaks characterize the distribution. There are high concentrations of average income statistical tracts (10-11) and of wealthy statistical tracts (clusters 17-19). The average socio-economic score of Haifa is above national average.

For our analysis, Haifa's statistical clusters were aggregated to form four sub-markets: low; medium-low; medium-high; and high. The sample includes 41 statistical tracts, representing approximately 70 per cent of the city's population and 7,264 transactions records which is about a quarter of the dwellings transactions in Haifa in the observed time span. Note that we do not have repeated sales prices to measure price developments of the same unit over time. To account for heterogeneity in transactions within tracts we convert NIS house prices into a house price per squared meter (NISM2). (Observe that as transactions relate to apartments only the issue of heterogeneity is perhaps moot.) Table 2 and Figure 3 give details of the sample.

In the empirical analysis we use mean average transaction price by tract and by year to investigate the impact of immigration on house price dynamics. To base mean average prices by tract on sufficiently large numbers of transactions for each and every year of observation we aggregate some tracts resulting. Hence, the data set is a balanced panel made up of 34 tracts and 11 years which gives a total of 374 observations.

Table 1 Transactions by submarket

Sub-market label	1	2	3	4	Total
Description	Low	Low- medium	Medium – high	High	
Socio-economic clusters	5-8	9-12	13-16	17-20	
Number of tracts	5	7	8	14	34
Total transactions in the sample	1341	2900	1426	1597	7264
Transactions financed with governmental mortgage (in %)	81	73	51	29	60

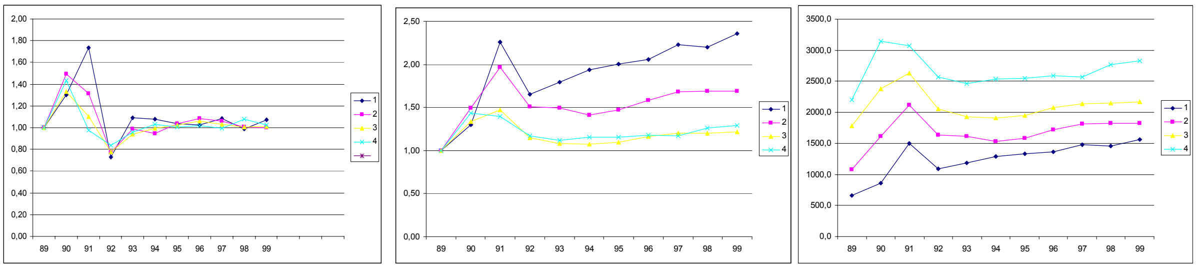

Figure 2 Annual change in NISM2 (left) and index (center) and NISm2 (right) by submarket

Figure 2 graphs mean house prices per square meter by sub-market. Figure 2 shows that the rise in mean price per square meter differs among sub-markets, though they follow the same general pattern, broadly speaking. The right hand side shows that there is some price convergence across submarkets.

Table 2 Summary statistics

		Sub-market				POOLED
		1	2	3	4	
NISM2	Mean price per square meter (NIS/M2)	1251 (379)	1668 (351)	2106 (366)	2661 (696)	2056 (773)
M2	Apartment size (M2)	75.2 (11.7)	76.5 (6.7)	84.7 (8.6)	111.6 (32.2)	91.9 (27.5)
DMORTGAGE	Government mortgage (share)	.84	.74	.53	.34	.57
BUILD	Building starts Haifa (number)					1288 (429)
IMM	Immigrants Israel (number)					89124 (49488)
	N	5	7	8	14	34
	NT	55	77	88	154	374

5 Empirical Results

5.1 Empirical Model

The issue we address is whether there is a ripple effect over time such that house prices first rise and then dampen out. The rationale is as follows. Government mortgages are such that they in the first place enable immigrants to buy dwellings in the lower end of the housing market. This provides an economic rent to owners in this sector which induces owners sell their properties to the immigrants and create demand in a higher price market. Thus there are shocks at all levels of the housing market but not necessarily at the same time and of the same magnitude. This is in line with Portnov (1998) who for Israel at large observes two opposite movements with new immigrant households moving into the central areas (as in the case of Haifa) and established households moving outward. Particularly, new construction in peripheral regions attracted only very few new immigrants.

The model we are considering is presented in equation (1). The logarithm of the average price per squared meter is a function of its one-period lag, the logarithms of the current number of immigrants into Israel, current building volumes in Israel, size and the proportion of mortgages made available by the public sector. Moreover there are region and time specific dummies in this parsimonious autoregressive, distributed lag (ADL) model. Observe that the number of immigrants relate to Israel, not Haifa, since the latter is unknown. Similarly for building volume. The size variable as measured by average squared meters is included to account for an important house characteristic

$$\begin{aligned} \log(NIS/M2)_{it} &= \gamma \log(NIS/M2)_{i,t-1} + \beta_1 \log IMM_t + \beta_2 \log BUILD_t + \beta_3 \log M2 + \\ &\beta_4 DMORTGAGE + \alpha_i + \mu_t + \varepsilon_{it} \end{aligned} \qquad (1)$$

For the autoregressive parameter the inequality $|\gamma| < 1$ is assumed to hold to ensure stability. The error terms ε_{it} are assumed homoskedastic, serially uncorrelated, $iid(0, \sigma_\varepsilon^2)$ and independent of the explanatory variables for all tracts *i* and years *t*. Since the lagged dependent variable is by construction correlated with the fixed effects which renders the standard least squares dummy variable method (LSDV) inconsistent (see Davidson, R and J.G. MacKinnon, 1993; Baltagi, 1995). The literature suggests several alternative estimators conditional on the structure in the data, viz. the magnitude of the autoregressive parameter γ, the relative within group variance $\sigma_\mu^2 / \sigma_\varepsilon^2$ and the magnitude of *N* and *T* (Blundell and Bond, 1998). Arellano and Bond (AB hereafter) (1982) propose a linear generalized method of moments (ABGMM) estimator in which instruments are used on the basis of first differences. ABGMM is consistent if there is no second order serial correlation after first-differencing (see Arellano and Bond, 1991; Baltagi, 1995). In panel data with higher orders of serial correlation the moment conditions of the ABGMM are invalid. Also, with $|\gamma|$ close to unity or $\sigma_\mu^2 / \sigma_\varepsilon^2$ being high, lagged levels become weak instruments such that ABGMM performs poorly (Blundell and Bond, 1998). Blundell and Bond also present an alternative GMM that imposes further restrictions using additional moment conditions. Both GMM estimators are for N is large and T fixed.

In a Monte Carlo study, Bruno (2005) finds that biased-corrected LSDV (LSDVC) outperforms the GMM estimators in terms of bias and mean squared error for N and T being fixed.

To sum up, the literature suggests that GMM seems most suitable for panel applications with large N and fixed T whereas LSDVC outperform GMM in panel applications with fixed N and T. Since in the present case N is small we opt for LSDVC.

5.2 Empirical results

We first address the time series properties of the variables before turning to the substantive findings. First we test for unit roots. Our tests for panel unit root consistently reject the null hypothesis of a unit root. Particularly, the Fisher test for panel unit root using an augmented Dickey-Fuller test gives $\chi^2(68) = 500$ which suggests the rejection of the null hypothesis of a unit root in NISM2. Tests for panel unit root for IMM and BUILD suggest the rejection of a unit root also. These results relate to individual time series.

Secondly, to test whether the variables in the model are cointegrated we use the Westlund (2007) cointegration test available in Stata. Two out of four statistics suggest to reject the null hypothesis of no cointegration. These inconclusive results might be due to the fact that the test is justified when T is substantially larger than N and sensitive to restrictions on the short run dynamics in testing. (Testing for cointegration while not restricting the short run dynamics still remains to be done. We proceed on the assumption that the variables in the model are cointegrated).

We now turn to the impacts of the explanatory variables on house prices. The estimates for the ADL model are given in Table 3 (pooled model) and Tables 4-5 (submarkets). The estimates of the coefficient of the lagged dependent variable satisfy the inequality specified above which suggest stability. Moreover, there is a correction of approximately 30 (pooled model and model for submarkets 1 and 2) and 17 percent (submarkets 3 and 4). The former is much higher than the 22 percent of Harter though not unlikely given the specific housing programs in Israel. Malpezzi (1999) finds estimates in the range of 16 – 32 percent in the literature which suggest that our estimates are not unreasonable. Another important finding is that the coefficient of immigration is positive and significant in the pooled model and the model for the aggregated[1] medium-high and high submarkets, though substantially smaller than for the lagged dependent variable. The impact of immigration for the two lower submarkets positive, though not statistically significant. The differences between submarkets are not so easy to grasp. Othake and Shintani (1996) also find that demographic shocks have a significant effect on the house price through the short-run adjustment process, but no effect in the long run suggesting that housing supply is elastic. However, if

[1] We aggregated the submarkets because of the small number of observations for the separate submarkets

this were the case, one would expect building activities to be negative and statistically significant. The estimate for building activities is negative but insignificant in all models. The insignificance might be due to the fact that building activities relate to Israel at large rather than to Haifa. Observe that this finding is consistent with the findings for USA metropolitan areas (Hwang and Quigley, 2006). For Haifa, these results may very well relate to the immigration process. The size effect is in line with expectations, though not significant for the higher market segments. The proportion of mortgages provided by the public sector has the right sign but is not significant

The estimates obtained can be used to estimate the long run effect of LIMM on LNISM2. For the pooled model for example we find a long term effect equal to .089/(1-.332)= 0.13. That is, an increase of the LIMM leads to a long term price increase of 13%.

Table 3 LSDVC dynamic regression (bootstrapped SE), pooled

Log NISM2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Log NISM2 t-1	.3252606	.0483564	6.73	0.000	.2304839	.4200373
Log M2	.2269612	.1083833	2.09	0.036	.0145337	.4393886
Log IMM	.0722659	.0344901	2.10	0.036	.0046665	.1398653
Log MA(3)BUILD	-.0379329	.0557686	-0.68	0.496	-.1472373	.0713715
DMORTGAGE	.0659078	.074075	0.89	0.374	-.0792766	.2110921

- see Table 2 for description of variables
- MA(3) refers to moving average over t-3 years

Table 4 LSDVC dynamic regression estimates(bootstrapped SE), submarket 1 and 2

Log NISM2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Log NISM2 t-1	.3380301	.0611456	5.53	0.000	.2181868	.4578733
Log M2	.3894866	.1867845	2.09	0.037	.0233957	.7555775
Log IMM	.0122673	.0773255	0.16	0.874	-.139288	.1638225
Log MA(3)BUILD	-.0215756	.1062727	-0.20	0.839	-.2298662	.1867151
DMORTGAGE	-.0456514	.1754588	-0.26	0.795	-.3895443	.2982415

* see Table 2 for description of variables

Table 5 LSDVC dynamic regression estimates(bootstrapped SE), submarket 3 and 4

Log NISM2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Log NISM2 t-1	.1718905	.063679	2.70	0.007	.0470819	.2966992
Log M2	.1362633	.1461756	0.93	0.351	-.1502356	.4227622
Log IMM	.0945885	.0420377	2.25	0.024	.0121961	.1769809
Log MA(3)BUILD	-.0757335	.0682311	-1.11	0.267	-.209464	.0579969
DMORTGAGE	.1378176	.0877395	1.57	0.116	-.0341487	.3097838

* see Table 2 for description of variables

6 Conclusions

In this paper we consider the impact of immigration on housing market dynamics in Haifa. Israel experienced a large influx of immigrants during the early 1990s. By the turn of the century more than one million immigrants (on a population of 4.5 million early 1990) or 535,000 households had immigrated to Israel. The population rose from 4.5 to almost 6.4 million by 2000. The case of Haifa offers a typical non-controlled experiment on how demographic shocks and associated changes in housing demand affect the housing market. The number of inhabitants in Haifa rose in the 1990s to 250,000 with about 66,000 immigrants.

The data for Haifa suggests that house prices vary across submarkets in response to a demographic shock. Prices remain stable. Moreover, house prices in Haifa tend to convergence across submarkets with lower end submarkets ending up with higher house price rises than higher submarkets.

Tests for panel unit root reject the null hypothesis of unit root. Furthermore, two out of four statistics lead to the rejection of the null hypothesis of no cointegration. These mixed results might relate to the fact that those tests are justified when T is substantially larger than N and sensitive to restrictions on the short run dynamics. Testing for cointegration while not restricting the short run dynamics remains to be done.

Preliminary estimates of the parameter for the lagged dependent variable suggest stability and indicate a correction in house prices of 17 percent in the higher end submarket and 40 percent in the pooled and lower end market. This latter result is much higher than the 22 percent of Harter though not unlikely given the specific housing programs. These estimates can be used to estimate the long term effect of LIMM on LNISM2. The estimates for the pooled model for example suggest a long term price effect of 13% (.089/(1-.332) for immigration.

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