Price Effects of a Voluntary Affordable Housing Program[1]

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Abstract

Housing prices in Auckland, New Zealand, have persistently increased in the last decade, to fast-track development of housing, Special Housing Areas (SHA) were created in September 2013 and were supposedly a measure to mitigate Auckland's housing crisis and improve affordability. SHA resemble Inclusionary Zones initiatives implemented in the United States and Europe as most development projects had to provide at least 10 per cent affordable housing or at least target specified population groups. However, it is not clear the extent of the success (or failure) of SHA as they were disestablished by May 2017 and there is no empirical research on the subject. This paper analyses the price effects of the establishment of SHA within a quasi-experimental approach. We used a dataset for more than 150 thousand sales transactions between 2011 and 2016 and applied a Difference-in-Difference (DiD) methodology. The results indicate that the creation of the SHA generated an average price increase of approximately 5%, and more generally that affordability did not improve, but rather worsen. These findings are robust to specifications that restrict the distance from the SHA, and to the inclusion of geographic and time fixed effects. This paper contributes to the literature by identifying a causal relationship between the implementation of voluntary Inclusionary Zones and market outcomes.

Keywords: Difference-in-Difference, Inclusionary Zoning, Price convergence

JEL codes: D04, Q51, R15, R31

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1. Introduction

Housing affordability has become a controversial and politically sensitive issue in many cities of the developed world. To solve or attenuate that problem, Inclusionary Zoning (IZ) programs have been aggressively proposed, which require or encourage new residential developments to make a certain percentage of the housing units affordable to low- or moderate-income households. These programs characterise for their clear mandate for developers to set aside residential units for affordability purposes (mandatory IZ), or for their incentive-based schemes to motivate development of affordable housing (voluntary IZ).

IZ is considered as ground-breaking because it helps to generate affordable housing through focused and flexible local policy rather than through distant and rigid national prescription (Calavita and Grimes 1998). IZ may be an effective alternative to produce affordable housing that would not otherwise be produced without resorting to public subsidies or by producing the affordable units in segregated, stigmatized and geographically dispersed areas (Schuetz, Meltzer, and Been 2011, 2009; Kontokosta 2014). However, IZ programs may also imply additional costs on developers because of price-controlled housing, actually increasing prices and then counteracting any affordability target (Schuetz, Meltzer, and Been 2011). IZ may also produce density and stigma effects that decrease demand for market rate units (Hughen and Read 2014), and also lead to size decreases on single-family houses (Bento et al. 2009).

IZ has generated considerable attention and controversy among policymakers, developers, and advocates (Schuetz, Meltzer, and Been 2009). In September 2013, the Special Housing Areas (SHA) were implemented in Auckland, New Zealand, with the rationale of increasing land supply and, consequently, improving housing affordability. The remarkable feature of the SHA was its voluntary nature relying on the fast-tracking of the resource consenting processes as the sole incentive to developers to deliver affordable housing. The SHA were the key instrument of the Housing Accord and Special Housing Areas Act (HASHA) and the Auckland Housing Accord (AHA) as a temporary measure until the Auckland Unitary Plan (AUP) became operative (by late 2016)[5]. Under the SHA, any project above 14 dwellings was requested to allocate a percentage to affordable housing. Most large developments had to provide at least 10 per cent of affordable housing set at prices that were affordable to specified income groups (Auckland Council 2013). By 30 June 2016, 154 SHA had been

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[5] After the amalgamation of the former seven legacy district (2010-12) into what is now known as the Auckland Supercity, the AUP was conceived as a unifying framework of the former Regional Policy Statement and other district and regional plans (Auckland Council 2013).

declared in 10 separate tranches (see Figure 1) with an estimated final capacity of almost 62,500 dwellings once fully developed. Disestablishment of the SHA began in September 2016, and the last one was disestablished in May 2017.

However, voluntary IZ programs such as the SHA are usually not favoured because of lax monitoring and enforcement or weak incentives, in contrast to mandatory programs that generate strong responses from developers and differing degrees of success on the supply of affordable housing (Calavita and Grimes 1998; Schuetz, Meltzer, and Been 2009, 2011). Mandatory IZ programs in the US usually include a combination of regulatory relief or cost-offsetting measures, e.g., density bonuses, flexible zoning standards, tax exemptions, impact fee waivers or deferrals, lower parking requirements, relaxation of design restrictions, and alternatives to developing affordable units onsite (Schuetz, Meltzer, and Been 2009). The purpose of those measures is to fill the gap between what it costs to provide housing and what lower-income households can afford (Calavita and Grimes 1998). Thus, voluntary programs are not expected to have economic impacts because development requirements are not binding to developers (Bento et al. 2009).

In fact, the empirical literature has vastly focused on the effects of mandatory programs, and is dominated by theoretical or descriptive work, and correlational studies. In turn, research about the effects of voluntary programs, and the SHA themselves, remains scarce. More noticeable, past quantitative studies did not employ proper empirical strategies to ensure clear identification of a causal relationship between the implementation of IZ and market outcomes. This paper fills this gap in the literature by examining the price effects of the SHA within a quasi-experimental approach.

We used a dataset for more than 150 thousand sales transactions between 2011 and 2016 and applied Difference-in-Difference (DiD) regressions. Our results show that the voluntary SHA program generated, within their designated area, an average housing price increase of about 5%, and an increase in the price per square meter of nearly 4%. These findings are robust to specifications that restrict the distance from the SHA, and to the inclusion of geographic and time fixed effects. Furthermore, we find that the SHA program increased the probability for transactions of costly properties and did not increase the probability of transactions of houses defined as affordable.

Our results imply that the SHA program was relatively successful on fast-tracking dwellings supply in areas that would not have been developed otherwise. But when development was allowed under a speedier process, developers seemed to have relied more on building first the more profitable houses (i.e. more expensive) rather than affordable, which resulted on further price increases (contrary to what was expected from the SHA program). Furthermore, as the program was voluntary and conceived as a temporary measure without stringent enforcement and control mechanisms, the affordability requirements were not binding and developers preferred to wait until the termination of the program, and profit of the persistently increasing prices occurring within the time-frame of our analysis.

Consequently, the program did not meet the affordability goal embedded in the HASHA and the AHA, but rather affordability worsened. The policy contribution of this paper relies on its timing as other cities in New Zealand (Tauranga, Wellington, Nelson, Queenstown and Hamilton) are considering the implementation of similar programs, where effects are qualitatively similar to those explored in this paper (James 2017).

This paper is structured as follows: Section 2 is a literature review about Inclusionary Zones, which are similar in nature to the SHA program but with a critical difference on their mandatory nature. Section 3 describes the SHA program in Auckland. Section 4 contains the empirical strategy. Section 5 presents results. Section 6 discusses the implications of our results.

Figure 1: Special Housing Areas in Auckland, New Zealand
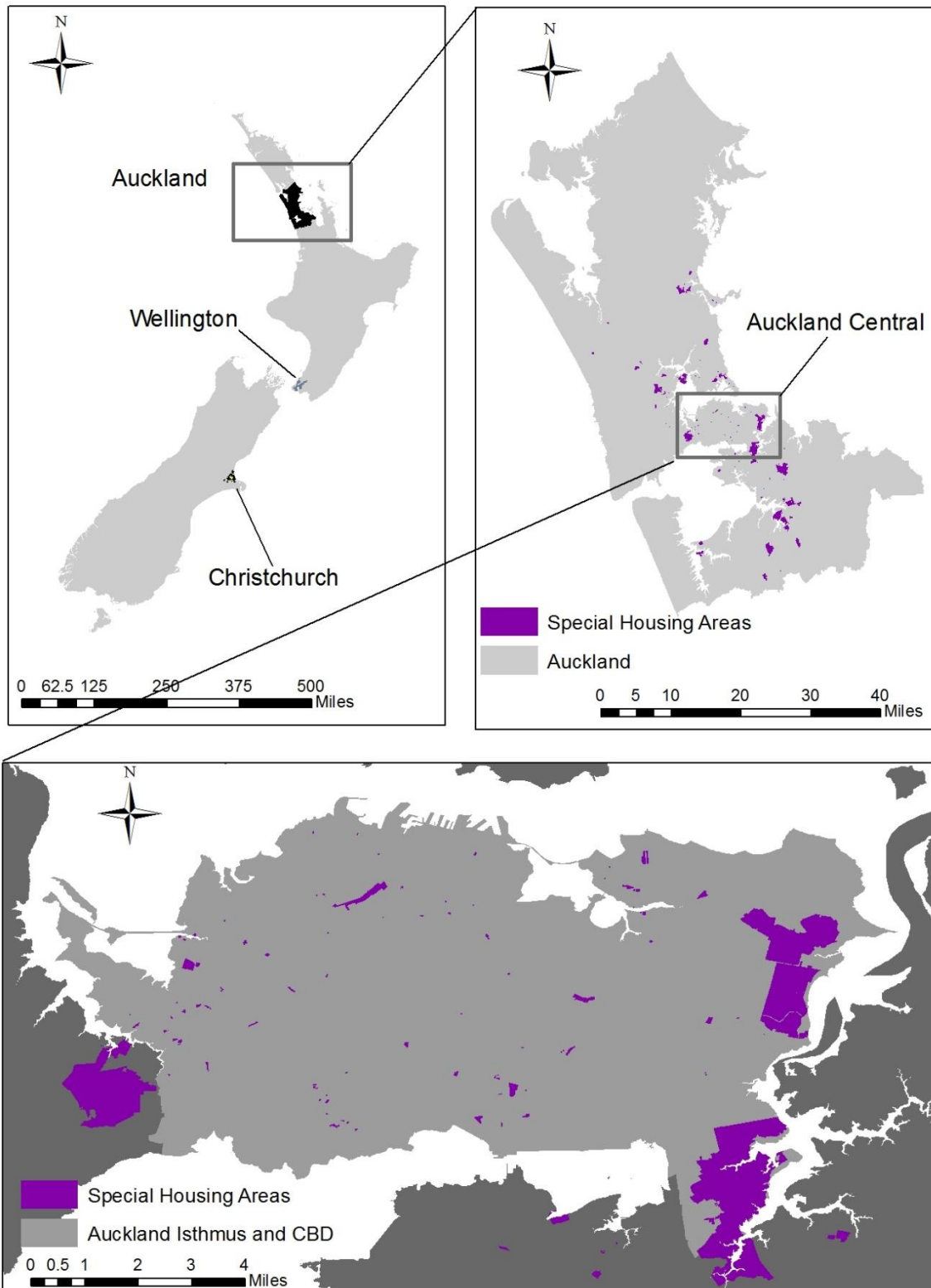
2. Literature Review

From a theoretical standpoint, Clapp (1981) describes the potential reaction of developers to IZ programs, where they may attempt to subsidize the affordable units by raising the prices of units allocated to high-income households, resulting on a decline in construction activity. Similarly, Tombari (2005) argues that the benefits of IZ programs are minimal, costs are high and the program overall creates distortions on housing supply and prices. Powell and Stringham (2004), through a before-and-after analysis of housing units in Los Angeles and Orange counties in California, suggest that because of mandatory IZ market-priced homes became more expensive, supply of new homes was constrained, and affordable units were not produced. Nonetheless, despite the theoretically consistent results of Powell and Stringham (2004), their empirical strategy is doubtful because they assume that all prices variation in the region were because of the program, holding constant other potentially confounding effects.

Knaap et al. (2008) rely on multivariate statistical analysis to examine the impact of IZ programs on the production and prices of housing in northern California. They found that the impact differs across the distribution of prices. That is, IZ lower the price for houses below the median price and raise prices for houses above the median. Bento et al. (2009) found similar results also using California housing data between 1988 and 2005. IZ produce measurable effects on housing markets in jurisdictions that adopt them; namely, the price of single-family houses increases, and the size of single-family houses decreases. In the same vein, Schuetz et al. (2011) using data from the San Francisco metropolitan area and suburban Boston, conducted panel data analysis and found that IZ contributed to further increasing housing prices and lowering rates of construction during periods of regional house price appreciation.

The ultimate aim of IZ programs is to increase the supply of affordable housing. Past studies however provide mixed evidence. Using data from the city of Los Angeles, Rosen (2002) found no correlation between the adoption of an IZ program and the supply of affordable housing. There is also some descriptive research suggesting that when IZ programs are implemented, the production of affordable housing lagged initially but increased over time (Crook *et al.*, 2002; Monk *et al.*, 2005; Whitehead, 2007; Norris and Shiels, 2007). There are also a set of case-studies that conclude optimistically that IZ are a viable strategy to increase the supply of affordable housing and mixing low- and high-income residents (Calavita, 2004; Calavita and Grimes, 1998; Calavita, Grimes, and Mallach, 1997).

Literature about the impact of IZ on housing supply and prices is clearly dominated by theoretical or descriptive work, or by correlational studies, where the focus has concentrated on mandatory programs. Rigorous quantitative empirical research about the effects of voluntary programs is scarce. Limitations on the field occur due to the difficulty of obtaining accurate data on the presence and characteristics of IZ programs across jurisdictions and over time. More importantly, past quantitative studies did not employ proper empirical strategies to ensure clear identification of a causal relationship between the implementation of IZ/SHA and market outcomes. Most of the relationships reported rely on descriptive measures that at best can be considered as correlations. This paper intends to fill this gap in the literature.

3. Special Housing Areas

New Zealanders have become accustomed to having almost every day on the front page of every major newspaper some news on soaring housing prices and its impact on home insecurity and population well-being. In particular, housing prices in Auckland increased by 45% between 2014 and 2017 (CoreLogic 2018). A number of reasons are usually mentioned, namely, stagnant housing supply not matching population growth, regulatory constraints, and the high cost of construction in New Zealand. In December 2012 it was identified that Auckland suffered a shortfall of new dwellings ranging between 20,000 to 30,000, and a need for 13,000 new homes each year for the next 30 years (Auckland Council 2012).

The fundamentals of the SHA are sourced on the Housing Accord and Special Housing Areas Act enacted in September 2013 (Government of New Zealand 2013b). The Act introduced the Housing Accords as joint frameworks through which the central government and territorial authorities could work together on housing issues identified as relevant to improving housing supply and affordability in the district of the territorial authority (Auckland Council 2013).

The Auckland Housing Accord is then an agreement between the government and the Auckland Council that provides the Council access to new flexible power to streamline resource consent. The AHA intended to encourage a quicker and more streamlined consent process with greater flexibility that is, the fast-tracking of planning permission for new residential development (Murphy 2016; Preval et al. 2016). The SHA were the key instrument to increase affordable housing supply. The SHA were previously areas zoned for industrial or commercial purposes (brownfield land), or undeveloped areas (greenfield land),

that were rezoned for the purpose of residential development. The implementation of any SHA was jointly approved by the Council and the Government (Auckland Council 2013).

Under the SHA, approval of resource consents consisted on a 20-day waiting period for the Council to reach a decision. In turn, under the ordinary consenting process through the Resource Management Act, there was a higher level of uncertainty. If a development project was deemed to have impacts on the environment or third parties, affected parties were notified to have their saying on the viability of the project. This implies that the processing time frames may be longer and the costs higher. Uncertainty occurs as it may not be obvious if a development would be contested by third parties, which could lead to hearings and negotiations. The Consenting Guide of the RMA (Ministry for the Environment 2013) specifies that councils could take at least 5 months to make decisions on resource consents.

Developers could propose SHA and housing projects to the Council, where projects should have capacity for at least 50 dwellings or vacant residential sites in greenfield areas; or have capacity for at least 4 dwellings or vacant residential sites in brownfield areas. Infrastructure and construction costs were burdened by private developers. Any project above 14 dwellings was requested to allocate a percentage to affordable housing. Most large developments had to provide at least 10 per cent of affordable housing set at prices that were affordable to specified income groups (Auckland Council 2013). For affordability purposes, the SHA had to meet either of two criteria, namely: Criteria A where dwellings prices did not exceed 75 per cent of the Auckland region median house price, or Criteria B where dwellings were sold or rented to households on up to 120 per cent of the median household income for Auckland and at, or below, a price that the household spends no more than 30 per cent of its gross household income on rent or mortgage repayments. Buyers were requested to own and occupy the affordable dwelling exclusively as their residence for no less than three years after gaining title to the dwelling, and to be a first home buyer and any other real property (Auckland Council 2013; Government of New Zealand 2013a).

Most importantly, the HASHA and the AHA are explicit on the premise that Auckland's stringent land use planning rules were the primary cause of increasing housing prices and unaffordability (McArthur 2017; Murphy 2016). Thus, affordability should be addressed by increasing land supply, but setting aside other demand factors (e.g. liberalised mortgage markets, tax system, user cost of capital, unbalanced competitive conditions for buyers) (Murphy 2016; Fernandez 2016). Moreover, it is not clear the extent of the success (or

failure) of a voluntary program such as the SHA. By 2017, a total of 3,105 homes were completed in the SHA since the Accord began (Ministry of Business Innovation and Employment 2017), and it is not known how many complied with any of the affordability criteria. The AHA had set an initial target of 39,000 housing units, but official reviews of the progress of the SHA have emphasised the speed of the consenting process and the volume of consents issued (MBIE, 2014) and little attention has been given to the volume of affordable housing generated (Murphy 2016), let alone the price effects of SHA.

4. Methods

4.1 Study Timeframe and Data Sources

The study area corresponds to the Auckland Region and includes about 150 thousand sales transactions between 2011 and 2016. This time period for the analysis captures a number of changes: (i) sharp and persistent price increases because of speculation, (ii) the amalgamation of the former seven Legacy Districts into the Auckland Supercity, (iii) massive immigration rates both international and domestic, and (iv) increasing construction costs. As shown in Figure 2, there is a whole business cycle affecting housing market conditions. The global financial crisis (GFC) affected the number of sales between 2007 and 2010, after which a recovery and boom phase began by 2012 where prices skyrocketed in Auckland, though a similar trend of dwelling supply is not observed.

It is agreed that land use planning in Auckland has not kept pace with the pressure of an increasing population (NZIER 2015), which in combination with constrained topography and stringent regulations, has contributed to the increases of prices (Saiz 2010). Thus, the emphasis of the HASHA and the AHA on land supply being the best mechanism to improve affordability. However, our results below disprove the logic of increasing land supply as the sole mechanism for affordability purposes.

Figure 2: Sales and Selling Price – 2004-2016 by quarter
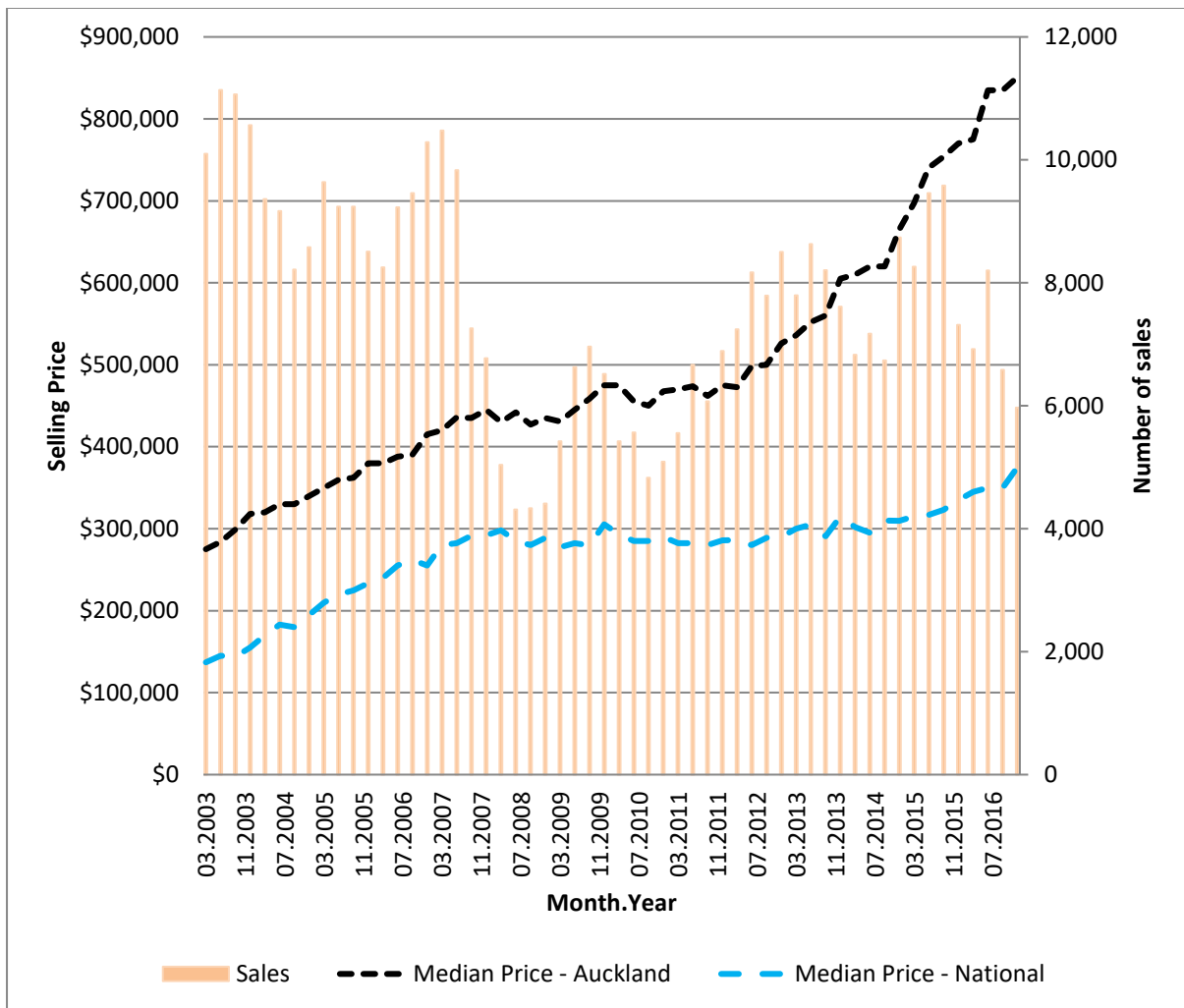
Price data were compiled from the Auckland Council Valuation and Rates Department. All transactions are georeferenced, which allows to identify dwellings location inside a SHA, as well as to calculate distances to the nearest SHA. As does not exist a centralized dataset on housing projects completed, let alone whether they meet any of the affordability criteria, the approach of this paper is on evaluating the price effects under the quasi-experiment setting imposed by the Auckland Housing Accord. The first round of SHA were approved in October 2013, and their disestablishment started in September 2016). Data spans between the 2011Q1 to 2016Q4.

Auckland has undergone major political and governance reforms in the last decade. In 2007 the NZ central government set up a Royal Commission on Auckland Governance to report whether the seven (legacy) districts of the former Auckland Regional Council should amalgamate into a "Super City". By March 2009, the Commission reported that the "Super

City should be set up to include the full metropolitan area under an Auckland Council with a single mayor and 20-30 local boards by October 2010". A number of Acts and amendments were enacted during 2009 and 2010 to shape the formation of the new city, and by October 2010 the new local authorities were elected. The Auckland Council was finally established in November 2010, and by June 2012 a unified long-term plan was developed. This date may be regarded as the finalisation of the amalgamation process as the Council adopted a unified rating system (policies and mechanisms) for the entire region. The amalgamation produced numerous general equilibrium effects that are unobservable. Hence, to control for the disestablishment of the legacy districts and other effects from the amalgamation, we introduce in our regressions fixed effects for each AU, which are geographical areas smaller than the former legacy districts[6]. Seasonality is controlled by adding time effects by month and in addition some specifications include quarterly trends by legacy districts to allow for independent trends.

4.2 Empirical Strategy

The formation of a SHA involved a process where developers proposed to the Council that areas in the city would qualify as SHA, the Council would then require the central government to sign-off the SHA designation. The size of SHA was heterogeneous (see Figure 1), and it was not necessary that lots or parcels to be empty, that is, other dwellings or developments may have already existed inside the SHA before its designation. After designation, the boundaries of a SHA were set, and it was usually located inside an AU, though cases exist where a SHA could overlap more than an AU.

The empirical approach of this paper relies on the assumption that the proposal, formation and implementation of any SHA obeyed profit-maximizing behaviour of developers. Behaviour is configured based on land, demographic characteristics and other decision rules that may not be directly observable to the researcher. That is, the formation of any SHA could be considered as a treatment effect where the location of a dwelling inside of it was not random. Thus, in order to estimate the (causal) price effects of the creation of the SHA we need first a suitable counterfactual. In words, we need to estimate the average prices that would have occurred for houses inside the SHA should the program had not existed. If SHA

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[6] Census Area units (AU) are non-administrative geographic areas within urban Auckland normally containing a population of 3,000 – 5,000 people (Statistics New Zealand 2016). These are defined for the purpose of taking a census but may coincide with the limits of neighbourhoods. The AUs are also used to define public schools zones and even to proxy for the local labour market. Hence, the introduction of AUs fixed effects also controls for unobserved neighbourhood characteristics (school quality, unemployment or crime rates).

were randomly assigned, the treatment effect could be easily estimated by differencing mean prices between dwellings inside and outside the SHA. This strategy would imply that dwellings outside the SHA are a good counterfactual of those inside them. However, the assignment of SHA was not random, so that the price difference between SHA and non-SHA dwellings cannot be only attributed to the program, even after controlling for observables.

A historical comparison would also be problematic. In particular, the upwards trend in prices that are related to external factors imply that on average housing became less affordable in the whole city. Therefore, an estimation of the price change would be partially explained by factors affecting dwellings inside and outside the SHA simultaneously. Hence, to estimate the price effects of SHA we use a Difference-in-Difference (DiD) approach, in which the identification strategy implies that in the absence of the treatment, prices of dwellings inside the SHA would have moved similarly to prices outside the SHA. That is, we assume that the trend of prices outside the SHA is a good counterfactual of the trend of prices inside the SHA.

Our identification strategy effectively eliminates the omitted variable bias created by the non-random assignment, or by the variables constant over time but particular to each group. It also cancels out the dynamic factors equally affecting both treatment and control groups (e.g. general equilibrium effects). Our basic specification is as follows:

$$\log(price_{it}) = \alpha + \beta SHA_i + \gamma P_t + \theta(SHA_i * P_t) + u_{it} \tag{1}$$

where, SHA_i is a binary variable that equals one if the dwelling is located inside a SHA; P_t is a binary variable that equals one for the after treatment period.[7] The treatment effect is captured by θ which corresponds to the coefficient of the interaction between SHA_i and P_t. This setup is extended to more sophisticated specifications including monthly fixed effects, and AU fixed effects, the interactions between legacy districts and quarters fixed effects, and the age of the dwelling. We also restrict the observations outside the SHA to units located within 1 km. to the nearest SHA. To consider the dependency over time and across units within geographic areas, the standard errors are clustered at the AU level.

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[7] In most cases the after treatment period is in October, 2013. For SHA located in the New Lynn Area Units it is November, 2013; for the Albany Area Units it is May, 2014; and for Otahuhu Area Units it is June, 2014. We code our after treatment indicator accordingly.

5. Results

Table 1 shows descriptive statistics of the variables of interest. We trim the dataset and use prices between the 1st and 99th percentiles to eliminate outliers and non-arm's length transactions. We use about 150 thousand sales transactions occurring between 2011Q1 and 2016Q4 to isolate the treatment effect and to construct the control and treatment groups. Roughly 4% of sales correspond to houses located inside a SHA, 67% of them were sold after September 2013 when the Housing Accord came into force and the SHA program was implemented, and thus about 3% of the whole dataset consists on houses on which we will explore the treatment effect.

Table 1: Descriptive Statistics

|	Mean	SD	p5	p50	p95
Sale price ($)	657,597	366,014	241,000	580,000	1,380,000
Price per square metre ($)	5,564	2,870	2,653	5,054	9,943
Age (years)	33.75	26.03	5.00	26.00	90.00
Floor size (m^2)	125.36	56.01	49.00	113.00	235.00
Dummy SHA: House inside SHA (0/1)	0.04	-	-	-	-
Dummy Time: Sale after September 2013 (0/1)	0.67	-	-	-	-
Treatment: Dummy SHA * Dummy Time (0/1)	0.03	-	-	-	-

5.1 Identification Strategy

We use the natural logarithm of the sale price of dwellings as the main outcome variable. Figure 3 shows the trends of the outcome variable between 2011Q1 and 2016Q4 for dwellings inside and outside the SHA. The red vertical line indicates 2013Q4, the period when the AHA came into force and, consequently, the beginning of the SHA program. It separates the before and after treatment periods. For Figure 3 only, we exclude observations belonging to SHA established after September 2013 (New Lynn, Otahuhu and Albany.), for which the after-treatment period is defined differently (See Footnote 7). This exclusion is to avoid mislabelling observations as treated when they were not treated yet. Notice that before 2013Q4, the two price series track each other closely though means are different, which is explained by the non-random assignment of treatment. We assume there is a common trend behind this behaviour to support our identification strategy.

Figure 3 shows that by 2015Q1, the prices inside the SHAs were closed to those outside them. The change is not immediate or right after the implementation of the program because dwellings development may take months for completion and other tranches of SHA are incorporated into the program. The price series are no longer showing a common trend and, even more, SHA prices appear to close the gap with respect to non-SHA houses. Thus we argue that any trend deviation in the prices of the treated, relative to those of the non-treated, is directly attributed to the effect of the treatment (the SHA program), and not to differences in other characteristics of the treatment and control groups (Lechner 2011). Therefore, the price convergence of the price series justifies the estimation of the treatment effect using a DiD approach. Figure 3 also suggests a positive treatment effect, the SHA caused price increases rather than reductions as the AHA intended.

To formally test the identification strategy, we include leading indicators for each of the 3 months prior to the beginning of the program. Results show that the estimated treatment effects are robust to the inclusion of the leading indicators.

Figure 3: Log price (mean) before and after the creation of SHA
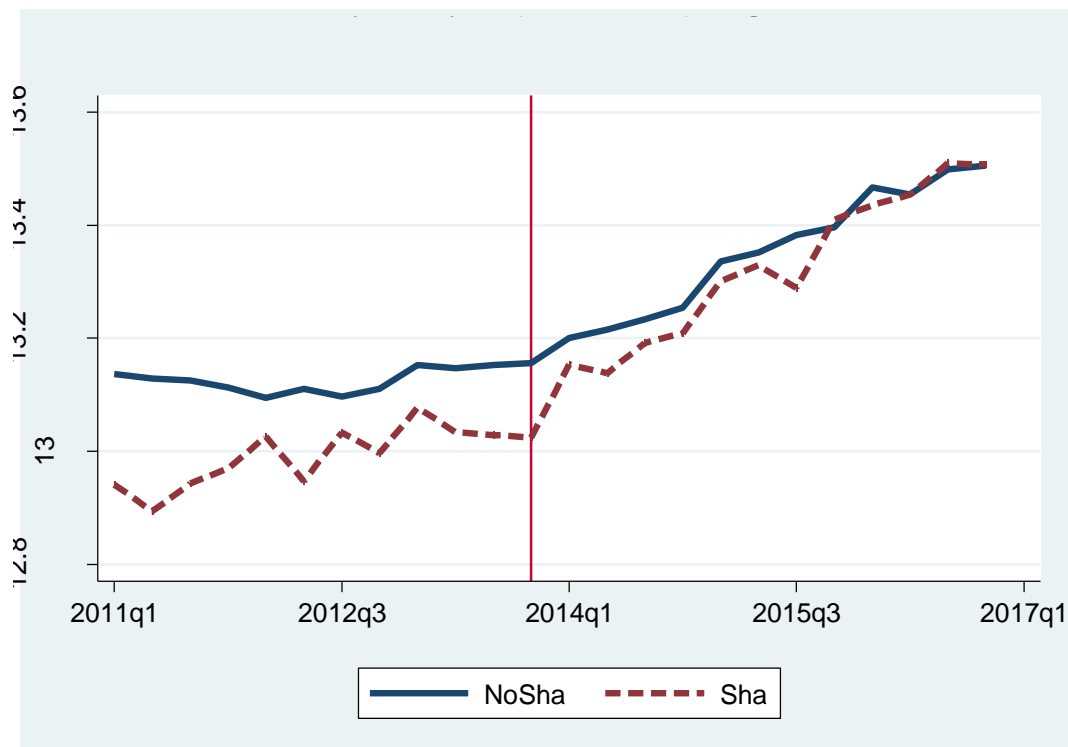
Note: SHA in New Lynn, Otahuhu and Albany excluded

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5.2 Estimation of Treatment Effects

Table 2 shows the results for the average price effect. Each column represents a separate regression. Column 1 corresponds to our basic specification plus AU and monthly fixed effects. Column 2 adds a set of interactions between quarters and legacy district indicators to allow for quarterly trends for each of the former legacy districts. Column 3 adds the age of the house at the moment of the transaction. Even though age is potentially an endogenous variable, we use it to account for its effect on the price. Column 4 restricts the observations of houses sold outside the SHA to a distance of 1 km to the border of the nearest SHA. Finally, Column 5 adds leading indicators for each of the 3 months prior the beginning of the program.

Panel 1 of Table 2 shows that the coefficient for the treatment effect, for the log of housing price, is robust to the different specifications, including the addition of leading indicators. It ranges between 5.2% and 5.6%, and is significant at around the 10% level, which are interpreted as the program causing an average price increase of about 5% in houses inside a SHA. Panel 2 shows that results, for the log of price per square meter, are robust to different specifications. The effect ranges between 3.8% and 4.1% and are significant at the 5% level.

To explore in further detail the effects of the program, we estimate regressions by property status, i.e., new and previously owned houses.[8] Results for the new properties are presented in Table 3, and the specifications are the same as in Table 2. Panel 1 corresponds to new properties, the first 4 columns correspond to the log of the price and the last 4 to the log of the price per square meter. The treatment coefficients are robust across specifications and imply an average effect on the price that goes from 17.3% to 20.1%. The results are similar for the price per square meter. The coefficients in this panel are significant at least at the 10% level. These results serve as evidence that the SHA program caused new houses and land parcels to enter the market but at high (non-affordable) prices.

Though the SHA program aimed to the development of new projects, we cannot rule out contamination effects on previously owned properties. Panel B of Table 3 shows effects on the average price of previously owned properties ranging from 4.6% to 5.2%, though significant at the 10% level only in 2 of the specifications. For the average price per square meter the estimated effect ranges from 3.5% to 3.8% and is significant at least at the 5%

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[8] A property is defined as new if it is less than two years old.

level. The contamination effect is consistent with literature studying the effects of new and more valuable houses on the price of older ones (Rossi-Hansberg, Sarte, and Owens 2010).

Table 2: Price Treatment Effect of SHA

	(1)	(2)	(3)	(4)	(5)
Panel 1: Log of price					
After Treatment	0.079*	0.082**	0.075**	0.008	0.008
	(0.043)	(0.038)	(0.035)	(0.019)	(0.022)
SHA	-0.078	-0.080	-0.078	-0.078	-0.078
	(0.050)	(0.050)	(0.050)	(0.049)	(0.050)
SHA*After Treatment	0.053*	0.056*	0.052*	0.052*	0.052
	(0.029)	(0.030)	(0.030)	(0.030)	(0.034)
R^2	0.479	0.479	0.472	0.481	0.481
N	171,383	171,382	147,517	88,127	88,127
Panel 2: Log of price per square meter					
After Treatment	0.025	0.027	0.037*	0.003	0.005
	(0.021)	(0.017)	(0.020)	(0.017)	(0.017)
SHA	-0.086***	-0.088***	-0.086***	-0.085***	-0.083***
	(0.023)	(0.023)	(0.022)	(0.022)	(0.022)
SHA*After Treatment	0.039**	0.041***	0.041***	0.038**	0.036**
	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)
R^2	0.438	0.438	0.439	0.464	0.464
N	171,365	171,364	147,504	88,119	88,119
Au and Month FE	YES	YES	YES	YES	YES
Quarter by Legacy District FE	NO	YES	YES	YES	YES
AGE	NO	NO	YES	YES	YES
Distance from SHA < 1 km.	NO	NO	NO	YES	YES
Leading indicators	NO	NO	NO	NO	YES

Note: Each column in each panel presents results from DiD regressions. The treatment effect is estimated by the interaction SHA*After Treatment. Leading indicators correspond to each of the 3 months previous to the beginning of the program. Robust Standard Errors clustered at the AU level in parentheses; * p<0.1; ** p<0.05; *** p<0.01.

Table 3: Price Treatment Effect of SHA by Property Status

	Log of Price					Log of price per square meter				
Panel 1: New Properties										
After Treatment	0.702*	0.756*	0.752*	0.362***	0.328***	0.036	0.057	0.055	0.359***	0.351**
	(0.414)	(0.395)	(0.397)	(0.117)	(0.118)	(0.216)	(0.225)	(0.224)	(0.089)	(0.093)
SHA	-0.168*	-0.184*	-0.187*	-0.195*	-0.234**	-0.228***	-0.238***	-0.240***	-0.206**	-0.218**
	(0.102)	(0.109)	(0.107)	(0.101)	(0.106)	(0.088)	(0.086)	(0.085)	(0.082)	(0.089)
SHA*After Treatment	0.173*	0.184*	0.186*	0.201**	0.236**	0.199**	0.200**	0.202**	0.170**	0.179**
	(0.089)	(0.097)	(0.095)	(0.090)	(0.094)	(0.083)	(0.081)	(0.080)	(0.079)	(0.087)
R^2	0.557	0.559	0.559	0.577	0.577	0.412	0.413	0.413	0.410	0.410
N	5,411	5,411	5,411	3,169	3,169	5,411	5,411	5,411	3,169	3,169
Panel 2 : Previously Owned Properties										
	Log of Price					Log of price per square meter				
After Treatment	0.070*	0.073**	0.063**	0.002	0.002	0.026	0.028	0.038*	-0.000	0.002
	(0.040)	(0.035)	(0.032)	(0.018)	(0.021)	(0.023)	(0.018)	(0.022)	(0.016)	(0.016)
SHA	-0.077	-0.079	-0.076	-0.076	-0.075	-0.084***	-0.086***	-0.083***	-0.082***	-0.080***
	(0.049)	(0.048)	(0.048)	(0.048)	(0.048)	(0.023)	(0.023)	(0.022)	(0.022)	(0.023)
SHA*After Treatment	0.049*	0.052*	0.047	0.046	0.045	0.036**	0.038***	0.037***	0.035**	0.033**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.033)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
R^2	0.474	0.475	0.467	0.476	0.476	0.438	0.439	0.440	0.466	0.466
N	165,972	165,971	142,106	84,958	84,958	165,954	165,953	142,093	84,950	84,950
Au and Month FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Quarter by Legacy District FE	NO	YES	YES	YES	YES	NO	YES	YES	YES	YES
AGE	NO	NO	YES	YES	YES	NO	NO	YES	YES	YES
Distance from SHA < 1 km.	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES
Leading indicators	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES

Note: Each column in each panel presents results from DiD regressions. Leading indicators correspond to each of the 3 months previous to the beginning of the program. The treatment effect is estimated by the interaction SHA*After Treatment. Robust Standard Errors clustered at the AU level in parentheses; * p<0.1; ** p<0.05; *** p<0.01. A property is defined as new if it is two or less years old.

One of the goals of the SHA program was to increase affordable housing, which could still be consistent with the price increases estimated so far (e.g. expensive houses subsidizing the affordable). To explore affordability we generate an indicator variable that assigns the value of 1 to the properties sold at a price lower than 75 per cent of the Auckland region median house price. This is Criteria B of the SHA program used by the Auckland Council to define housing affordability. Then we fit a linear probability model using the same specifications utilized before to estimate the effect of the program on affordability. We repeat the same exercise but for an indicator that defines a property as expensive if it was sold at a price greater than 125 per cent of the Auckland region median house price

Panel 1 in Table 4 shows results for affordable houses where none of the coefficients is significant at standard levels. Results in Panel 2, in turn, show that the treatment coefficient ranges between 5.9% and 6.2% and is significant at the 10% level. That is, the SHA program increased the probability for transactions of costly properties and did not increase the probability of transactions of houses defined as affordable.

Hence, our results are evidence that voluntary IZ programs that are similar in nature to the Auckland SHA are not effective on improving affordability. Price increases occurred as new houses were built and sold at prevailing market prices, those houses were not directed to the target population and were not within the categories to meet the affordability criteria. By 2017 a total of 3,105 homes were completed in the SHA since the HA began (Ministry of Business Innovation and Employment 2017), but no records exist to identify which of those houses were actually affordable. But as our results reveal a greater likelihood of costly transactions compared to affordable transactions, it is unlikely that the price increases occurred in order to subsidize the affordable units.

In summary, our findings prove that the SHA program did not improve affordability but rather worsen it.

Table 4: Treatment Effect of SHA on the probability of Affordable and Costly Transactions

	(1)	(2)	(3)	(4)	(5)
Panel 1: Affordable = 1					
After Treatment	-0.029*	-0.042*	-0.042*	-0.008	-0.007
	(0.024)	(0.024)	(0.023)	(0.031)	(0.031)
SHA	0.083**	0.090**	0.082**	0.082**	0.083**
	(0.039)	(0.038)	(0.038)	(0.038)	(0.039)
SHA*After Treatment	-0.032	-0.039	-0.031	-0.028	-0.029
	(0.030)	(0.028)	(0.029)	(0.027)	(0.031)
R^2	0.313	0.315	0.312	0.326	0.326
N	171,383	171,382	147,517	88,127	88,127
Panel 2: Costly = 1					
After Treatment	0.028	0.026	0.008	-0.012	-0.016
	(0.028)	(0.023)	(0.016)	(0.021)	(0.023)
SHA	-0.059	-0.059	-0.056	-0.056	-0.061
	(0.064)	(0.063)	(0.063)	(0.062)	(0.062)
SHA*After Treatment	0.062*	0.062*	0.058*	0.059*	0.064*
	(0.034)	(0.034)	(0.035)	(0.034)	(0.037)
R^2	0.322	0.323	0.321	0.327	0.327
N	17,1383	171,382	147,517	88,127	88,127
Au and Month FE	YES	YES	YES	YES	YES
Quarter by Legacy District FE	NO	YES	YES	YES	YES
AGE	NO	NO	YES	YES	YES
Distance from SHA < 1 km.	NO	NO	NO	YES	YES
Leading indicators	NO	NO	NO	NO	YES

Note: Each column in each panel presents results from DiD regressions. The treatment effect is estimated by the interaction SHA*After Treatment. Leading indicators correspond to each of the 3 months previous to the beginning of the program. Robust Standard Errors clustered at the AU level in parentheses; * p<0.1; ** p<0.05; *** p<0.01. Affordable assigns the value of 1 to the properties sold at a price lower than 75 per cent of the Auckland region median house price. Costly assigns the value of 1 to properties sold at a price greater than 125 per cent.

The supply-side approach taken to address Auckland's housing has been slow to tangibly increase the housing supply, or mitigate the growth of a housing market bubble (McArthur 2017). Furthermore, the legislation provides no criteria for ensuring that the housing that is built within a SHA is affordable to low income households or that any affordable housing is retained (Murphy 2016). In addition, providing dwellings at 75% of the median regional house price offers no guarantee that the units will be affordable and there is no mechanism for ensuring that any affordable dwellings remain affordable. Thus, from the developer's perspective these criteria could be met by simply including an appropriate product mix (one

to five bedroom units) (Murphy 2016), and motivating the shift in the upper portion of the price distribution.

Thus, the estimated effects on prices could be driven by a change in the characteristics of the properties, i.e., single or multiple-unit dwellings. For example, the positive price effects could be explained by a higher proportion of single-unit dwellings relative to apartments. To explore this possibility, Table 5 shows estimations of the treatment effect of the program on the Probability of Transactions of Single Unit Properties. None of the treatment coefficients is significant at standard levels. Hence, the program did not change, on average, the nature of single units despite having positive effects on prices.

Table 5: Treatment Effect of SHA on the Probability of Transactions of Single Unit Properties

	(1)	(2)	(3)	(4)	(5)
After Treatment	-0.092**	-0.091**	-0.095**	-0.038	-0.038
	(0.043)	(0.039)	(0.039)	(0.039)	(0.039)
SHA	-0.036*	-0.037*	-0.038*	-0.034	-0.033
	(0.022)	(0.021)	(0.021)	(0.021)	(0.020)
SHA*After Treatment	0.007	0.008	0.002	-0.003	-0.003
	(0.015)	(0.014)	(0.017)	(0.016)	(0.016)
R^2	0.198	0.198	0.199	0.228	0.228
N	171,383	171,382	147,517	88,127	88,127
Au and Month FE	YES	YES	YES	YES	YES
Quarter by Legacy District FE	NO	YES	YES	YES	YES
AGE	NO	NO	YES	YES	YES
Distance from SHA < 1 km.	NO	NO	NO	YES	YES
Leading indicators	NO	NO	NO	NO	YES

Note: Each column in each panel presents results from DiD regressions. The treatment effect is estimated by the interaction SHA*After Treatment. Leading indicators correspond to each of the 3 months previous to the beginning of the program. Robust Standard Errors clustered at the AU level in parentheses; * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

6. Discussion

Inclusionary zoning (IZ) has received wide attention since their implementation in the 1970s in the United States. There is an extremely nuanced mechanism around IZ for providing affordable housing (Schuetz, Meltzer, and Been 2009), and is usually regarded as a focused and flexible local policy rather than a distant and rigid national prescription (Calavita and Grimes 1998). Mandatory IZ programs require developers to set aside below-market-rate

units, whereas voluntary programs rely mainly on providing incentives for developers to deliver affordable housing (Schuetz, Meltzer, and Been 2011). The difference between mandatory and voluntary programs is not trivial. Nonetheless, there is no general agreement on the market effects of IZ and whether they succeed on improving affordability conditions for the target population.

The majority of studies focus on the mandatory or voluntary nature of the IZ, where voluntary programs are argued not to have economic impacts (Bento et al. 2009), whereas those mandatory may be relatively successful on providing affordable houses, though they also produce density and stigma effects that decrease demand for market rate units (Hughen and Read 2014), and lead to size decreases on single-family houses (Bento et al. 2009). Despite the extensive literature, empirical studies do not draw a clear difference between the effects of the voluntary or mandatory programs, they rely on correlational or descriptive approaches (Schuetz, Meltzer, and Been 2011; Calavita and Grimes 1998) to estimate the market effects of IZ but fall short on identifying whether those effects are clearly linked to the IZ or other confounding factors.

This paper approaches a voluntary IZ program as the Special Housing Areas in Auckland, New Zealand, and uses a quasi-experimental design to identify the causality between a voluntary IZ program and price effects. We use a large dataset of about 150 thousand sales transactions between 2011 and 2016. Our identification strategy relies on the assumption that, in the absence of this program, the trends of prices of properties located outside the SHA are a good counterfactual of the prices of properties located outside them.

We find that the SHA program not only did not improve affordability, but actually worsened it. Our estimations of the effect on average prices are robust across different specifications and imply a price increase between 4 and 5 per cent. Price increases occurred not only on new houses but also on those previously owned. The program did not increase the probability of transactions of affordable properties, but rather increased the probability of transactions of costly ones.

Consequently, the policy questions that arise are: what weakened the SHA program?, or why were the affordability requirements not binding to developers?

First, the Auckland Housing Accord gave special power to the Auckland Council to streamline resource consents and to establish the Special Housing Areas (SHA) (Government

of New Zealand 2013a). The Accord may be regarded as a pragmatic and successful form of local– central government cooperation (Murphy 2016). However, the program incentives relied on the fast-tracking of the resource consenting process, rather than on a clear and binding mandate to deliver affordable housing. The incentive was the fast-tracking of the consenting process only. However, IZ programs in the US usually include a combination of regulatory relief or cost-offsetting measures, e.g., density bonuses, flexible zoning standards, tax exemptions, impact fee waivers or deferral, lower parking requirements, relaxation of design restrictions, and alternatives to developing affordable units onsite (Schuetz, Meltzer, and Been 2009). The purpose of those measures is to fill the gap between what it costs to provide housing and what lower-income households can afford (Calavita and Grimes 1998). In combination, these not only mitigate costs, but would have made the adoption of the SHA program more political palatable (Wiener and Barton 2014). Without offsets and flexibility, the SHA became a constraint or an exaction on new development (Schuetz, Meltzer, and Been 2011). That is, fast tracking the consenting as the only cost offsetting mechanism was not enough to trigger the SHA affordability requirements (Hughen and Read 2014; Schuetz, Meltzer, and Been 2011; Stabrowski 2015).

In fact, the fast-tracking of the consenting process resulted on the developers being able to offer an additional attributes to their products, i.e., rapid delivery of new constructions. At this point it is necessary to resort to the fundamentals of microeconomic theory and recall the definition of Lancaster (1966, 1971) through which a product is conceived of as a bundle of characteristics that have want-satisfying properties to the consumer. Therefore, it can be expected that when an attribute is added to a product, and if this attribute is valued by the consumer, there will be an increase in the price of the good. In this case, the construction requirements of affordable houses were almost non-existent, the SHA program simply allowed developers to offer new homes with an additional attribute (a shorter delivery time), which allowed developers to set higher prices. Hence the SHA program at the end became a governmental incentive that benefited developers through allowing them to extract a greater surplus of the consumer. In words, this program, instead of meeting the objectives of affordability, that would increase the welfare of consumers, favoured a transfer of wealth from the consumers to the developers (i.e. producers), an unintended consequence of the program.

Second, since the beginning of the SHA program there was uncertainty regarding its permanence. The SHA were the key instrument of the Housing Accord, and regarded as

temporary measure until the Auckland Unitary Plan (AUP) became operative by late 2016. In comparison, relatively successful IZ programs in California have a permanent feature where the affordability requirements date since the 1970s or are expected to bind for at least 10 or more years (Schuetz, Meltzer, and Been 2009). The SHA program in turn was expected to last around 3 years, developers may have decided for the option to wait until the termination of the program, and make profit of the persistently increasing housing prices occurring within the time-frame of our analysis. This could explain why prices did not decrease within the SHA, but prices actually increased, which could be explained instead by the timing of development relying first on more profitable (and expensive) houses and later (or never) on more affordable houses.

In addition, in 2013 discussions about the Auckland Unitary Plan began which involved rezonification of a number of residential areas to allow densification and further development, though no significant changes on the consenting procedures were introduced. Thus, the rezoned areas were no subject to the affordability requirements. Though no binding commitment on rezoning occurred until 2016, announcement effects occurred that may have led developers to wait for the new zoning rules coming into force. As developers could receive lower revenues on the affordable units, there were expectations of greater profits under the rules of the UP rather than the SHA program.

Third, there is no clear-cut definition between voluntary and mandatory programs. Calavita and Grimes (1998) argue than in California about 60% of IZ programs are mandatory, but others though voluntary are functionally mandatory because developers cannot secure building permits without agreeing first to provide affordable units. This indicates as well that an effective IZ program is dependent not only on the structure of the program, but also on the commitment of the public agency responsible for its implementation and monitoring. That is, unless strict performance standards and procedures are established, relying on self-regulation does not boost affordable housing production. Thus, affordable housing and the performance of the program are tied to the monitoring and adjustments introduced to improve the program (Schuetz, Meltzer, and Been 2009). For the case of the SHA, it is not known whether monitoring and enforcement schemes existed, which weakened its purpose and mandate. The AHA is not explicit about the voluntary or mandatory nature of the program, and there is no mentioning of monitoring or enforcement controls, and penalties in case of non-compliance with the delivery of affordable dwellings. Thus, even when the SHA provision is consented, no mechanisms exist to ensure the implementation. This results in a "paper chase" because of

the excessive focus on compliance with ordinances rather than responding the question whether enough housing is being constructed (Calavita and Grimes 1998). Still, claiming that mandatory program would have stimulated more affordable housing in Auckland is not evaluated in this paper.

Fourth, the Housing Accords and SHA Act prescribed that SHA should be implemented in areas where adequate infrastructure exists or is likely to exist. In fact, the Housing Accord accelerated the supply of greenfield land, that is, undeveloped land used for agriculture or landscape design without proper urban infrastructure. By 2017, 36 out of 154 SHA were located in greenfield land and accounted for 65% of the total SHA land (Ministry of Business Innovation and Employment 2017). As the private development of urban infrastructure would amount on top of housing costs, developers were discouraged to supply housing at all.

Finally, in this paper we do not explore the role of macroeconomic or general equilibrium effects on the formation of prices. We could mention nonetheless that the peak of the housing market, in terms of the number of sales, was reached in 2014, after average growth rates of 55% annually since 2008. From 2015 and onwards sales halted and slightly decreased because of the introduction of loan-to-value ratios for mortgage lending in October 2013 (20% deposit for owner occupier loans and 35% for investors). In general, Auckland housing market cooled down. This indicates that the mechanisms to achieve affordability would operate more on stimulating the demand side of the housing market in addition to introducing a more comprehensive range of tools and incentives to the supply.

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