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Title

The effect of housing government subsidies on equitable access to social housing. A case study in Morelia city

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Summary

In consequence of rapid urbanization, cities through the globe come across a wide range of pressing issues that challenge local government capacity to successfully distribute same resources among a growing population. Providing access to housing for different income groups represents a major stress of cities in both developed and developing countries, nevertheless the approach to tackle land and housing market inefficiencies vary among countries. In Mexico, over time an array of diverse solutions and mechanisms to support the low-income population to access affordable housing have been implemented, however perhaps the most popular during the past decade has been the provision of subsidies to reduce the housing consumption costs. In response to the perverse unfair outcomes that previous subsidy programs have encouraged by allowing developers to build social housing projects for the low-income subsidized population in terms of location, government has for the first time linked the housing grants to their ultimate location in the city, in the attempt to encourage developers to supply affordable social housing in better located, serviced areas.

This research aims to analyse the relationship between government subsidies provided to the low-income and explain to what extent they influence equitable access to social housing, by analysing the impact of the intervention affordability, adequacy and access to the city of Morelia.

A single holistic case study of the city has been selected to conduct the explanatory research. The following mix of methods were utilized to collect and analyse primary and secondary information composed by qualitative and quantitative data:1) Secondary analysis 2) Content analysis and 3) semi-structured interviews. The selected informants are experts directly involved with the subsidy program administration, urban planning development, housing finance, academics and social housing real estate agents from Morelia City.

The study reveals that although the intention of the subsidy program to incentivize better located housing for the subsidized low-income has successfully discouraged development of social housing supply outside the delimited areas, however the results suggest that the location component for the subsidy authorization has virtually restricted land and housing market which in turn has pushed development towards the urban fringe authorized areas. In turn, accessibility, adequacy and affordability are rarely altogether guaranteed for the low-income population. Instead access to social housing is manifested in a trade-off these attributes that subsidized households must weight when they buy a house. In addition to that, uncertainty with regards of the program target population has led to several target scope modifications through the program which in turn have worsened the overall extent to which subsidies contribute to equitable access among low-income households.

Based on the combination of results and conclusions the research recommends that the implementation of national government subsidy programs should leave room for local planning development, the lack of this coordination prevents the program of enhancing equitable access for the low-income as the observed outcomes demand solutions that address the particular needs that are inherent to each city.

Keywords: Subsidies, Equitable access, Low-income, Social housing, Mexico.

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Abbreviations

CONAVI	Consejo Nacional de Vivienda (National Housing Council).
EAVM	Reporte del Estado Actual de la Vivienda en Mexico (annual report of the current state of housing in Mexico).
FONHAPO	Fideicomiso del Fondo Nacional de Habitaciones Populares (National Trust Funds for Popular Habitations).
FOVISSSTE	Fondos para la Vivienda del ISSSTE (Housung Fund for Public-sector Employees).
HUD	Housing Urban Department
INEGI	Instituto Nacional de Estadistica y Geografia (National institute of statistics and geography of Mexico).
INFONAVIT	Instituto del Fondo Nacional de Vivienda para los Trabajadores (National Institute of Housing Fund for private-sector Workers).
ISA	Indice de Satisfaccion del acreditado (Housing satisfaction survey).
PCU	Perimetros de Contencion Urbana (Urban contention perimeters).
PND	Plan Nacional de Desarrollo (National Development Plan)
PNV	Programa Nacional de Vivienda (National Housing Program)
PSEDATU	Programa Sectorial de Desarrollo Agrario y Territorio Urbano (Sectoral Program of urban and land development)
SEDATU	Secretaria de Desarrollo Agrario, Territorial y Urbano (Secretariat of Agrarian, Land, and Urban Development).
SPSS	
SHF	Sociedad Hipotecaria Federal (Federal Mortgage Company).
SNIIV	Plataforma del Sistema Nacional de Informacion e Indicadores de Vivienda (National system of housing information and indicators).
ROP	Reglas de Operación (Program Operation Regulations)
RUV	Registro Unico de Vivienda (Mexico's National Housing Registry).
VSM	Veces el Salario Minimo (Minimum wage).
VSMM	Veces Salario Minimo Mensual (Minimum Monthly Wage)

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The effect of housing government subsidies on equitable access to social housing: A case study in Morelia city.

Chapter 1: Introduction

1.1 Background

Prior to 1990 the task to build and finance social housing[1] in Mexico pertained to national government institutions. Later on, as the country underwent a neo-liberalization process, different public-sector institutions withdrew from constructing social housing on 1993 and the housing market was overtaken by real estate developers. Government institutions shifted their previous approach and focused solely on providing financial support to formal workers in order to enable home acquisition supplied by the private sector industry. Ever since, building social housing has been an attractive business for private developers because such projects provide an economic return in a predictable and quick manner (Cohrs, 2014).

The government sponsored agencies finance the private industry housing provision by allocating credits, loans, and subsidies following different criteria to select their target groups, such as income, economic sector, savings, and whether they belong to the public or private sector. In the country, broadly speaking the main government housing financial institutions are: INFONAVIT, FOVISSSTE, FONHAPO and CONAVI. The first two provide subsidized housing credit rate for the public and private sector correspondingly and FONHAPO provides subsidies and loans below market rates to non-affiliated[2], low-income households. The CONAVI allocates up-front subsidies to complement mortgage loans provided to the low-income in order to enhance their possibilities to afford housing. As the means and procedures of subsidy allocation vary among these institutions, they share a common priority: to financially support access to the housing market specially the low-income groups. Altogether these institutions finance up to 82 percent of the total credits and subsidies in the country and is now considered to have one of the largest market shares of government-sponsored institutions in Latin America (UN-Habitat, 2011, p.38).

As a developing country Mexico has undergone for the last decades a process of accelerated urbanization reaching 72 percent of its population living in urban areas by 2010 (UN-Habitat, 2011). As urbanization continues to put pressure on cities, demand for housing increases everyday hence the amount of credits and subsidies has also been steadily increasing since 1998 (CIDOC, and SHF, 2012). Additionally, stress to build affordable housing for the low-income continues to grow as a result of land and housing markets inefficiency.

On the one hand the land market has played an important role regarding location and prices of the social housing supply as a result of the 1992 reform of the 27th article of the Mexican constitution which allowed for the first time the possibility to privatize communal agricultural land or "ejidos" located in rural areas and conforming an important share of the national territory which before then could not be subdivided, sold or used for residential purposes. As the reform unlocked this land from the market, a rapid transition from rural land into buildable land occurred (Davis, Diane, et al., 2016). It is important to mention that the majority of cities in the country are surrounded by such agrarian land, hence enabling both the legal transition

[1] Social housing in Mexico corresponds to affordable housing in support of the low-income.

[2] Non-affiliated refers to the workers that are not formally employed.

from communal to private and the potential to change the land-use from agrarian to urban triggered an automatic response mainly from real estate and investors who showed special interest in this peripheral land due to the inherent expected value that it had, settling speculation tendencies and distorting the market dynamics.

Additionally, public housing finance institutions for years have encouraged the supply of housing that responds to a set of pre-established periodic national objectives based on the yearly allocated budget to subsidy programs, seeking to boost the country economy through the construction industry, and not necessarily responding to an authentic housing demand (Monkkonen, 2012, Rojas, 2016). Availability of land, a secure public financial support, and the lack of planning regulations stimulated rapid fragmented urban expansion where land is cheap in the form of low-density social housing developments. As a consequence of this urban growth trend and its social implications, the national development plan (PND 2013-2018) established a framework for housing policy, finance and development.

1.2 Problem Statement: Subsidies-Housing location

Government financing mechanisms have successfully attracted the private sector, who for the past decades has provided housing for low-income dwellers in the form of horizontal single-family houses on the urban peripheries (Kozlowski, 2015). Since 2001, increasing affordable housing production has been one of the main concerns addressed by national programs. This was a race that Fox the president at the time started, as he stated that his presidency would be remembered as the era of public housing, six years later over 2 million houses had been built by the private sector along the nation, financially supported by government programs. Nevertheless, although the housing deficit was efficiently reduced, the quantitative-qualitative relationship of this housing success was highly criticized because most of the houses took the form of massive developments, remotely located and poorly serviced with infrastructure and amenities. Authors attribute this outcome to a weak urban management and lack of coordination among housing and urban development policy makers (Rojas, 2016).

Ever since the foundation of INFONVIT and FOVISSSTE on 1972 as housing provident funds[3] for the formal private and public-sector workers respectively, the mandatory contribution from their salary has been used as a financing mechanism to provide credit and mortgage loans at subsidized rates below the market according to the workers monthly income. The outcome of this selective credit allocation was first, the exclusion of the population that does not actively participate on the formal sector and secondly it prevented the very low-income to access financial support in order to become home-owners. It was not until 1981 when the FONHAPO was founded, that subsidies and financial support were made available for the low-income regardless their non-formal working status and later on, in 2001 the CONAVI[4] was created under the same framework, yet again to subsidize only those who had access to credit. On that note, the implementation of subsidy programs seem to exist as a curative measure more than an actual solution to land and housing markets inefficiency.

By 2013 64 percent of the formal housing stock in Mexico was produced supported by government financial programs, while only 6 percent was financed by private lenders and the remaining 30 percent corresponded to informal settlements[5] (CIDOC, and SHF, 2013).

[3] HPF's are specialized financial institutions that collect mandatory savings from employees—from the public or private sector—expressed as a defined percentage of their salary (Chiquier, 2009).

[4] Back on 2001 known as CONAFOVI became CONAVI in 2006.

[5] Informal settlements refer to housing that is built incrementally on illegally subdivided land mainly on rural and peri-urban areas.

Moreover, for 2025 the country expects a formation of 2 million new households, which will result in the need of approximately 8.5 million new homes (Cadena, Remes, et al., 2011). So far, housing built by the private sector with public funds has showed a wide array of problems related to location, quality, access, and affordability, hence, understanding the relationship between housing market actors[6] is an imperative matter in order to improve policy, accessibility and the urban environment at large.

The tremendous success of the housing finance government programs to thrive access to housing came at the cost of an unprecedented urban expansion of many cities along the nation as documented on the research conducted by the secretariat of social development on "the expansion of cities" (SEDESOL, 2012). This study mapped the historical growth of the cities over one million habitants during the period of 1980-2010 and they found out that although the population of such cities had in fact doubled, the average urban layout of these cities had grown about seven times. Mexican cities have shown an increasing tendency towards rapid peripheral urban growth in the form of social housing, the combination of developers' seeking to maximize their profits, and government efforts directed to increase the housing stock have led to unprecedented levels of urban sprawl[7], disconnected growth, underserviced development, vacant housing, abandonment, socio-economic segregation, and low quality of life for residents, being today some of the most significant issues affecting the country prosperity (Davis, et al., 2016). On top of that, further studies conducted by national parties such as the "population and households census" (censo de poblacion y vivienda) and academics like Ortiz (2015) in his thesis "vivienda de interes social y calidad de vida en la periferia de la ciudad de Morelia" [social housing and quality of life in the peripheries of Morelia city], Kozlowski (2015) "Framing dispersal Mexico" have identified an increasing trend of peri-urban social housing developments being either abandoned or vacant.

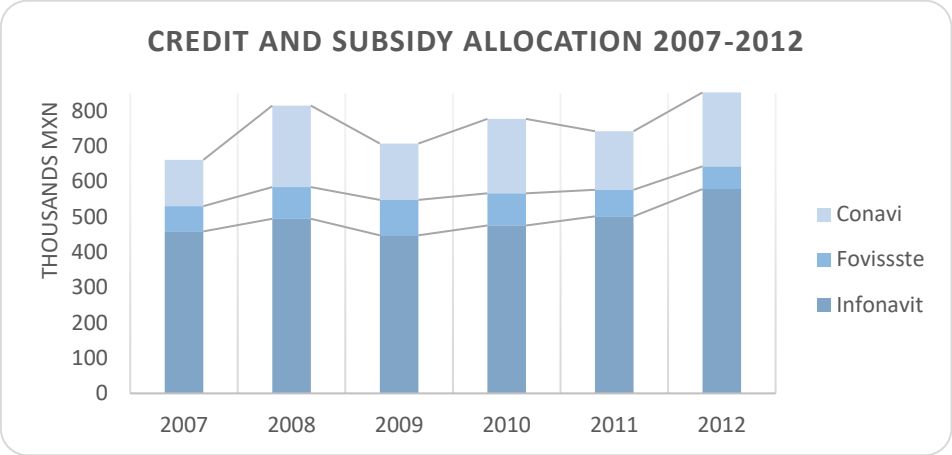
The fragmented planning development coordination of local and national actors, and the lack of regulations regarding new social housing supply were identified as a crucial driving forces of the problems above discussed leading to the creation of the SEDATU on 2013 as a federal institute to coordinate housing policy and urban development. Previous subsidy programs created by the CONAVI such as "Esta es tu casa"[8] had been able to target and reach the low-income, however, forasmuch as credit and subsidy allocation continued to grow prior to the reform implementation, as depicted in Figure 1, which shows that housing finance has effectively enhanced access to housing for the working sector through the main national housing institutes INFONAVIT and FOVISSSTE and for the low-income through the CONAVI programs, however the way they operate seems to be detached from equitable access, and although it has enabled the low-income to become homeowners, the location of the available social housing supply disregards transportation costs, access to services and adequacy standards affecting the overall quality of life.

[6] Private developers, land-owners, government housing institutions and subsidized households.

[7] For more information see Monkkonen (2011) Do Mexican cities sprawl?

[8] The subsidy program 'Esta es tu casa" took place during the period 2007-2013.

Figure 1. National number of credit and subsidy allocation



Source: CIDOC 2013

Aa a consequence of high levels of socioeconomic segregation[9] experienced in the last two decades, and as a better coordinated planning development started gaining importance the SEDATU adopted the CONAVI initiative to implement the "urban contention perimeters" or PCU's as a zoning regulation in the city that would become one of the criteria for approving the allocation of subsidies for the period 2013-2018 in order to prioritize and encourage intraurban serviced locations for new social housing development projects. This step towards a planned urban development policy represents a watershed for the urban layout and for the land market actors, analogous to the reform of the 90's which unlocked the ejido-land, quickly acquired and held as territorial reserves by real state and speculators, now once again restricted by the new regulations resembling a type of zoning for the subsidy allocation.

The current credit and finance program aim to guarantee housing affordability for the low-income and to financially stimulate private developers through the availability of subsidies to comply with the PCU's regulations in order to improve spatial access to the city. It is important to assess to what extent the implementation of the new reform and the planning intervention has influenced equitable access to social housing, considering that problems such as exclusion, segregation, and unaffordability remain and the low-income still struggle to afford intra-urban locations in the city, which in turn leads to equitability issues. Moreover, it is essential to understand how the availability of subsidies shapes private developers' behaviour in the current context. The following research focuses on the effect of this three-way relationship between real estate developers, public financing institutes and subsidized homeowners.

1.3 Research Objectives

The main objective of the research is to analyse the relationship between government subsidies provided to the low-income and to what extent they influence equitable access to social housing, in terms of affordability, adequacy and access to the city of Morelia.

[9] See Monkkonen 2012 "Housing finance reform and increasing socioeconomic segregation in Mexico"

1.4. Research Questions

Main Question

To what extent is the provision of government subsidies to home owners influencing equitable access to social housing in Morelia city?

Specific Questions

1) How are subsidies contributing to social housing affordability for the low-income?
2) To what extent are subsidies promoting social housing adequacy?
3) To what extent is the provision of subsidies enable equitable access to social housing?

1.5 Significance of Study

The importance of conducting this research derives from the need to understand the impact of social housing subsidies provided by government on housing affordability and analyse to what extent they contribute to equitable access. Research has been conducted regarding rapid peri-urban expansion triggered by social housing developments, and housing vacancy. Monkkonen (2014) has widely researched the housing finance system in Mexico and the historical impact it has had on social segregation, demand and vacant houses. Regarding housing finance programs Monkkonen (2011) and Velazquez (2015) have studied the different financing programs and how they have influenced demand of housing by the formal sector. Nonetheless, overall there has been a predominant focus on studying large metropolis mainly the metropolitan area of the valley of Mexico (Mexico City) and to a lesser extent Guadalajara, and Monterrey, and although they represent an important source of information about the trends in the country, the dynamics of the urban environment that take place at such scales are inherently conformed by a larger and complex set of variables.

Stephen Malpezzi another pioneer of urban development and housing subsidies, on his review of "Housing policies and urban development: lessons from the Latin American Experience 1960-2010" written by Eduardo Rojas (2016), highlights the need for a deeper discussion of housing finance, and further research on housing needs and housing prices for different market segments. Indeed, housing subsidy allocation programs are often modified seeking to better reach those in most need, but so far it remains unclear what is the relationship between government financing mechanisms allocated for social housing programs and access to affordable housing.

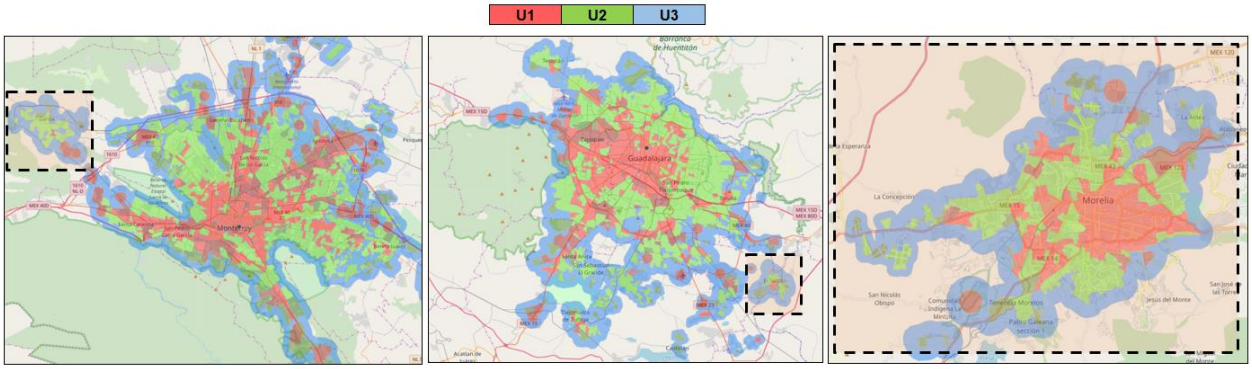
So far research has focused on the housing finance credit system evolution but not specifically on the up-front direct subsidies that are provided by the CONAVI through government institutions for the low-income. Additionally, for the city of Morelia the most recent research was conducted by Ortiz (2015) analysing "social housing and quality of life in the peripheries of Morelia city", however the focus of this study responds to the qualitative deficit situation of social housing on the periphery and is not necessarily limited to subsidized dwellings. To shed some light on this problem is essential, given the fact that it has been debated for a long time whether the provision of subsidies is indeed an efficient mechanism to support the low-income or whether they rather widen the affordability gap for those in most need as a consequence of a provoked market distortion.

The recent planning intervention and efforts to coordinate urban development taken by the SEDATU on 2013 have received little attention apart from an ongoing project conducted by the Harvard Graduate School of Design called "Rethinking social housing in Mexico" which

has focused on the redensification progress made based on different city case studies made since the PCU's were established and reported their results on multiple case studies conducted in different Mexican cities as published in their report "Building better cities with strategic investments in social housing" released on 2016.

To justify the selection of the city under study, different patterns were identified regarding the subsidy distribution along the PCU's in the municipalities that receive the most subsidies for new houses. The final decision of the selected location was followed by the realization that relevancy did not match the cites with the largest share of allocated subsidies for social housing which are located in the states of Nuevo Leon, Jalisco and Quintana Roo correspondingly, because the municipalities which receive more subsidies among these states are by default peripheral developments (see figure 2) that comprise a spatial manifestation of the main capital, hence conducting a study on equitable access results unnecessary. The municipality of Morelia on the other hand represents an optimal scenario to be analysed because subsidies are distributed along the main capital city.

Figure 2. Location of cities with the largest received number of subsidies



In short, this research seeks to add to the existing body of knowledge a better understanding of the impact that subsidies given to home-owners have on housing affordability, adequacy and accessibility for the target population under the new urban containment government approach at a city level, as the existing research has consistently focused on the access to housing finance and the negative impact that spatial segregation has on the quality of life, it remains important to comprehend how government grants enhance equitable access to social housing which in turn might partly explain why such unequitable spatial distribution occurs in the first place.

1.6 Scope and Limitations

This research seeks to investigate and analyse government housing subsidies that are granted altogether with a government loan as a mechanism to support low-income homeowners during the subsidy programme "*Esquemas de Financiamiento y Subsidio a la Vivienda*" 2014-2018. Given the fact that the existing subsidy programme by default excludes the population that does not have access to credit, equitable access in this research will be limited only to the formal-sector workers who have access to financial opportunities through government programs.

Over the time different institutions have been created (some even merged) as housing financing organizations and they have targeted different sectors of the market as discussed in the background section. For this research, subsidized loans and up-front cash subsidies provision will only consider data and outcomes from CONAVI through INFONAVIT which although is the largest stakeholder when it comes to housing market finance, it is conformed only by private-sector workers. Additionally, even when housing finance and subsidy schemes have evolved with time and have expanded the options from support to new home acquisition, to

also used-housing, and house improvements, housing policy is strongly and cultural preference is mostly oriented towards new-home acquisition. For this reason and because information related to used-houses acquisition is not representative enough, this research will focus only on new housing financed by government of formal workers form INFONAVIT.

Based on the approach that this research takes and according to the existing data the main limitations are listed as follows:

- *Political*: the selected period of time takes place after and before the presidential election campaign in the country which may affect to a certain extent the transparency and reliability of the published information.
- *Subsidy programme*: continuous modifications regarding the target population of the programme have been identified along the studied period of time.
- *The concept of equity:* the concept of equitable in this study comprises solely the sector of the population that has access to a subsidy from CONAVI which as mentioned before can only be possible when the users have access to credit.
- *The reform:* the implementation of the PCU's legally occurred on 2013, however enforcement as well as the delimitation of the perimeters suffered modifications during the period under study.

The limitations of this study and the effect on reliability and validity will further be explained on chapter 3. Following this introduction, chapter 2 presents the theory review of government intervention housing mechanisms and their impact on equitable access. Chapter 3 addresses the methodology used for the research. Chapter 4 presents the findings obtained from the data collection and finally chapter 5 presents conclusions and recommendations.

Chapter 2: Literature Review

2.1 A brief preamble to land markets

"Buy land, they are not making It anymore!" Mark twain had a clear understanding of how people behave when a resource is scarce. However, the last quote can be interpreted in two different ways; in one hand, it reflects the urge to acquire a scarce resource based on the intrinsic need that humans have to it. On the other hand, it also exhibits the tragedy of commons (Hardin, 1968), since this rational behaviour to acquire as much of a resource as possible considering only the personal benefit translates into excluding it from others.

A paradox emerges from landownership since it holds a dual function; freedom and theft (Ryan-Collins, Lloyd, et al., 2017). The latter debate has been discussed over the years, supporting ownership as freedom by John Locke (1986), Thomas Jefferson (1976), John Adams (1787), and arguing on behalf of property as theft Jacques Rosseau (1754), Pierre Joseph (1840), Karl Marx (1865).

The inevitable result of land ownership and rapid population growth is land scarcity. Hence, "society then has to do something dramatic to organise the relationship between its various members and land" (Wallace and Williamson, 2006, p.9). Historically, the way that different countries have managed property and its rights has varied depending on factors such as culture, localization, globalization and decentralization, therefore "land markets are socially constructed and require certain conditions to exist and thrive" (UN-Habitat, 2016, p.13).

Due to the inherent characteristics of land, and self-interest human behaviour, institutions and policy are needed to regulate market imperfections (Deininger, 2003). Collins (2017) further mentions some of the objectives of intervening the property market such as controlling territory, provide infrastructure and boost homeownership, and separates land policy interventions in two:

1) Interventions necessary to mitigate imbalances created by property markets in order to reduce social harm derived from economic rent (planning regulations and tax policies).
2) Interventions to land economy that pursue a specific goal (raise revenue through property taxes, incentivize certain behaviour from landowners, etc).

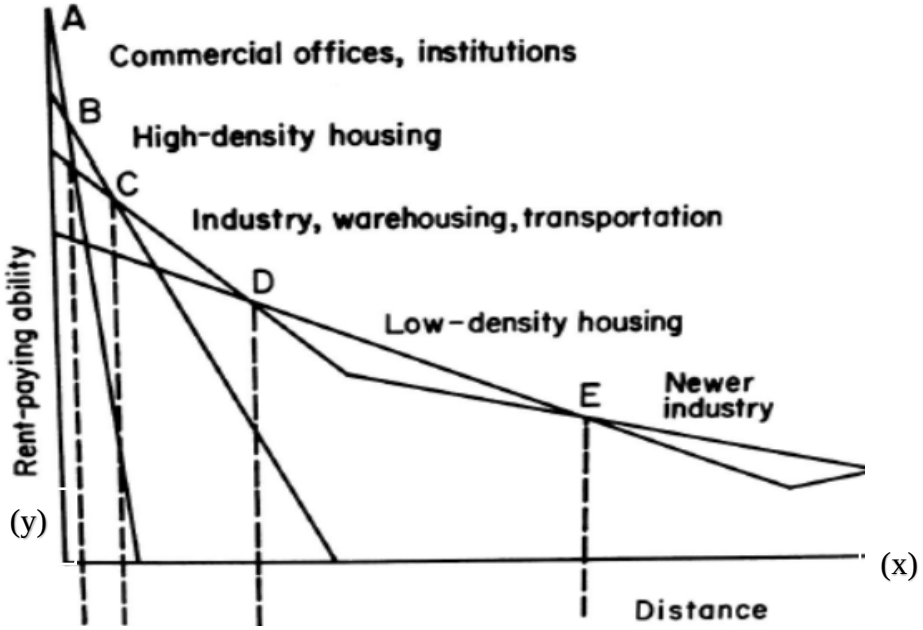
2.1.1 Urban land nexus

Scott (1980) described urban space as a "differentiated, polarized, locational mosaic" shaped by the interplay of firms, households and the circulation space that links different uses. By nature, while firms and households need each other, their clashing interests and the inelastic supply of space generates a paradoxical phenomenon born from their dual desire of proximity and avoidance (Scott and Storper, 2014). Moreover, the ability to pay for land will vary as well as the willingness to pay, depending on the location and the pursued use by different actors.

To better understand how location affects land use patterns, and hence prices, Bourne (1981) analyses a simplified version of three interacting users of the city; industries, office firms/commercial and housing to explain the bid-rent curves in a competitive real estate market (see figure 3). According to this simplified analysis based on the monocentric city model, users will bid proportionally to the benefits they can obtain from accessibility and centrality, and as a consequence of their different ability to pay they will end up outbidding each other. Land use

distribution in this diagram displays the firms at the centre of the city[10](y) as a downward steep line that is intersected by B that represents the next use in this high-density housing (B-C), followed by manufacturers or industrial uses (C-D) and low-density housing located between newer and older industry (D-E). The latter distribution explains why land prices tend to decrease as distance (x) from the city centre increases, since demand and competition for land also declines.

Figure 3. Urban land nexus



Source: Bourne (1981)

Nevertheless, as cities continue growing, the spectrum of the land use pattern is constantly changing and adjusting to market conditions. Zhu and Bostic (2009) argue that when it comes to land, the interaction of planning, economics and supply define to a great extent prices. Firstly, planning regulations affect how and when land is developed, as they restrict or enable different land uses. Secondly, the economic aspect defines and puts pressure on planning regulations aiming to boost the use of underdeveloped land, encourage the certain uses and at the same time it influences landowners' behaviour, as public locational investment can change the perception of the expected land value. Lastly, the availability of land and geographic constrains dictate planning regulations which in turn impact regional economic success. The latter interrelation can be understood as an iterative process (Zhu and Bostic, 2009).

The rent gradient however extensively explained and discussed by Ricardo (1891), Marx (1844) and Scott (1980) is a mere simplification of how markets behave, nonetheless, interventions and regulations such as subsidies and land policy affect land prices further distorting the rent gradient. The land price differentiation in turn brings different social distribution patterns that hinge upon the ability to pay of different groups, leading to a natural income segregation (under free market dynamics), however the segregation layout is a localized outcome of many different factors such as culture, availability of land, and policy, for example the patterns of socio-economic distribution of cities in the U.S and responds mainly to a cultural preference of high-income dwellers to live on large houses located in sub-urban areas where land is cheap and available, while low-income tend to live in central locations as they value proximity to jobs, and the benefits of lower house-prices away from the centre are

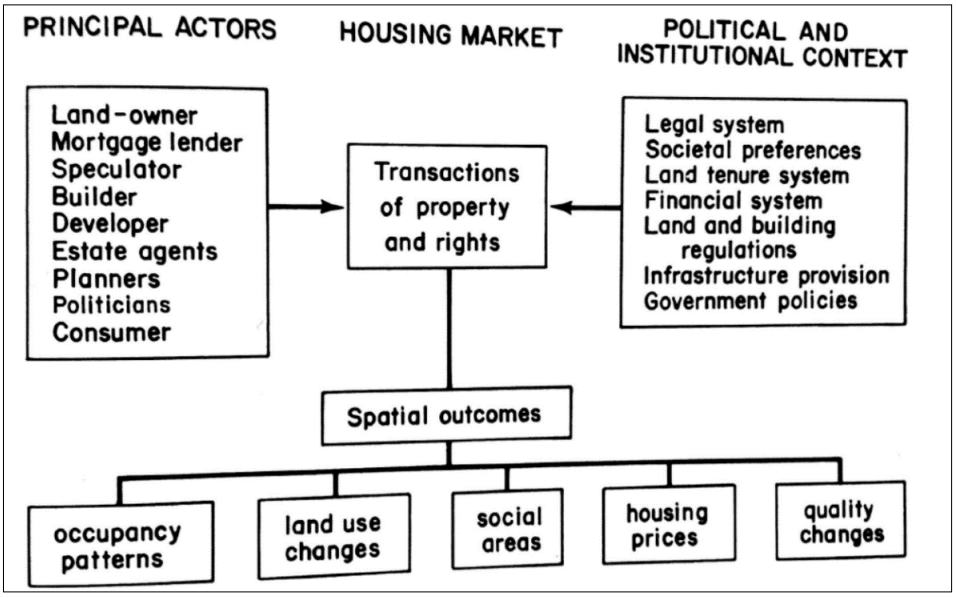
[10] Figure 3 is read as mirrored along the Y axis

outweighed by the communing higher costs (O'sullivan, 2012). An opposite trend can be observed in Latin American cities where the peripheral development is mainly occupied by low-income dwellers as the city centre hosts the upper income residents (Caldeira, 2000).

2.2 Land for housing

The previous section depicts the spatial layout of different uses in the city, however, it is important to mention and understand how other factors and actors affect the availability of land for residential development purposes. The housing market revolves around individual actions from land-owners, developers, planners and consumers defined by a specific political context and the existing institutions that complement the market in order to enhance transactions (see figure 4). As explained by Bourne (1981) the transactions that take place in the housing market, are governed by the politic-institutional framework that stipulates not only the way land for residential development is managed, but also determines the way development is financed and regulated, hence the author attributes occupancy patterns, land use changes and housing prices as the spatial outcomes of land and housing transactions.

Figure 4. Components of the urban housing market



Source: Bourne (1981)

Similarly, Angel (2000, pp. 192) considers housing policy as a key influencer of the availability of land for housing particularly the following three components:

1. Property rights
2. Infrastructure development
3. Regulatory regime

Property rights establish how and by who is land to be managed as it enables, limits or encourages access, playing a major role on the formation of formal and informal markets. Infrastructure development unlocks land for residential use as it extends services from the urban core areas, however, it can also restrict the supply of land for housing when the expansion of services is impeded and regulatory regimes represent a response of the desired spatial development of a city based on specific public objectives and market failure outcomes. On the one hand, local government might implement a strict regulatory regime seeking to control urban growth for different purposes such as improving the infrastructure efficiency of the city, redensifying intra-urban locations, or even trying to avoid metropolitan growth, this in turn

artificially reduces the availability of land for housing and distorts the market resulting in cities "with prices higher that they ought to be in the centre and artificially low at the edge" (Blais, 2011, p.225).

On the other hand, regulation regimes can also be very flexible or even removed by local parties in the quest to boost the economy encouraging urban development or to alleviate prohibitively high housing prices. Market actors will in turn respond to an established set of regulations in order to better meet their particular interests (Angel, 2000).

2.3 Housing Supply and Demand

> *"Housing is about everything other than houses! It is about availability of land, about access to credit, about affordability, about economic growth, about social development, about environment" (Housing minister of South Africa, 1997).*

Resembling land markets, housing supply and demand follow location principles based on accessibility, infrastructure and service provision.

Glaeser (2012) identifies centrality as one of the main housing price influencers. An interesting debate arises regarding housing prices and whether developers lead market prices or if they are only following demand. Reeves (2013) argues that the final price that suppliers set is the sum of their investment plus a profit in order to recoup their investment. On the other hand, Saunders (2016) considers housebuilders as "price takers, not makers" presuming that landowners and planners are in fact the main price settlers as the first ones demand high prices for their land, and the second restrict or confine the market, hence limiting supply. Similarly, Saiz (2010) states that developers are price takers of the locational competition among city users.

In contrast, Brueckner (2011) asserts that high prices in central locations induce developers to compete actively, consequently pushing up the prices. On top of that, land use regulations such as zoning, growth controls, and physical constrains that limit development also contribute to the housing price increase (Saiz, 2010). Furthermore, Ihlanfeldt (2007) conducted a study to measure the effect of land use regulations and the effect they have on housing and land prices and concludes that land use regulations restrict housing supply, contributing to housing prices increase because developers production costs are directly affected by such policies.

Considering that the housing market behaves differently than other commodities, O'Sullivan (2012), and Saunders (2016) mention some particular features of housing supply:

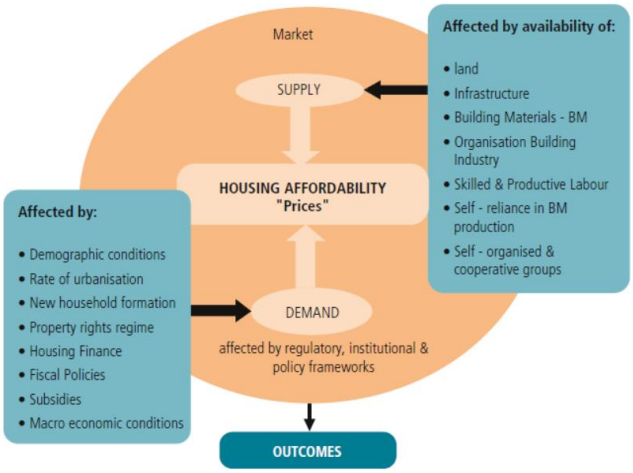
I. Houses are fixed in space (O'sullivan, 2012, p. 382)
II. Housing supply is not flexible to demand (King, 2015)
III. About one third of the price of a new house is determined by the market value of the land it occupies rather than the cost of its production.
IV. Housing is durable (O'sullivan, 2012, p. 382)
V. Housing is expensive (King, 2015)

Derived from these characteristics, supply of housing strikes as a matter that should be thoroughly planned. Nevertheless, a constant pressure to increase supply due to the emerging imbalance befalls onto local and national authorities. According to Reeves (2013), housing supply and demand imbalance are inevitable not only because of population growth, but mainly because of the laws of economics. On that note, "it is not in the interests of producers to manufacture or make available unlimited quantities of what they make, or even enough to meet actual demand" (Reeves, P., 2013, p.13). In relation to this, Evans (2008) carried out an economic analysis based on the Ricardian land rent model, and he explains that the rent (price) of land is determined by the demand. Additionally, the author mentions that the price of land will tend to be higher if the price of what it is for is higher, in other words, using housing as an

example, when the price of housing is high, land prices will be high, not because of the demand of land but because the housing demand. The availability of land for housing and its location are intrinsically related to the supply and demand, and pertain to affordability, as well as transportation systems and costs.

Analysing housing supply, demand and planning becomes complex because of market behaviour tendencies on the developers' side, availability of land, planning regulations, ability to pay from end users, and cultural preferences among others (UN-Habitat, 2010). Saunders (2016) believes that housing deficit occurs because of the way that builders operate, landowners' speculation, and planners' obstruction. In short, the combination of actors and interests explain to certain extent housing prices and land development. As shown in Figure 5, housing supply depends or is mainly affected by the availability of land, building materials and infrastructure. The demand side, additionally to new household formation and urbanisation, is affected by housing finance mechanisms and subsidies since they enable and often encourage users to access the housing market. Finally, both supply and demand play along with regulations and policies are the main price settlers, hence land and housing affordability is to a greater extent a result of this interaction.

Figure 5. The critical context of housing policies



Source: Acioly, C. IHS: 1994 2003.; World Bank, 1993

2.4 Equitable access to land and housing

2.4.1 Equitability

In terms of land and housing, equitable access revolves around affordability, adequacy, and accessibility[11]. Property market failure consequences spur the need of policies and regulations in order to achieve equitable access derived from inadequate supply, the building industry seeking profit, land-owners speculation, in the end high housing prices represent a problem in both developing and developed countries. At this point, housing need challenge does not only concern to supply but the ability to pay for it by all income brackets, specifically for the low-income (King, 2015).

[11] Accessibility or location efficiency refers to the ease of reaching services, activities, and destinations, together called opportunities (Levinson and El-Geneidy 2006)

In a broad sense, policies and mechanisms are designed to address "equal" opportunity disparities among citizens. However, the idea of providing fair opportunities to everyone is rather gaining more importance than providing same opportunities. When access to land and housing are the matter of discussion, the premise is that not everyone will have the same ability to access it, economically speaking[12], therefore providing same opportunities as a "one suit fits all" to strive accessibility inevitably leads to exclusion, not sufficing or satisfying those in the most need. In that sense, equitability is related to providing fair opportunities, specifically to those who struggle the most such as the low-income, the elder and vulnerable groups (Brown, 2010).

Perhaps the most suitable use of equitable has been provided by Fainstein (2010) on her dissertation of "the just city". The author sustains that "equality" demands a utopian redistribution unlikely to occur under the capitalist regime, aside from being founded on the deceiving idealization that every person should be treated the same, considering that such treatment leads to inequality in the first place. Better explained in her words: "*Distributional equity represents a particular concept of fairness in which policy aims at bettering the situation of those who without state intervention would suffer from relative deprivation"* (Fainstein, 2010, p.37) the author is indeed claiming for an appropriate treatment among groups.

2.4.2 Affordability

Authors and institutions have for long tried to agree on a definition of affordability when it comes to housing and an there is an ongoing debate about the standardization of the term. The U.S. Department of Housing and Urban Development (HUD) define housing affordability in terms of a maximum percentage that households should spend on either rent or mortgage, ideally never exceeding 30 percent of their monthly income, this is also known as the residual approach. Nevertheless, this method has been criticized by authors who argue that setting a fixed percentage for housing disregards the fact that non-housing costs will vary depending household type, personal preferences and needs (Jana, et al., 2016, Feldman, 2002, Chaplin and Freeman, 1999). In addition to that King (1994; 2015) highlights that this approach overlooks regional discrepancies in housing and non-housing costs, as well as household income instability over time. Some authors like Glaeser and Gyourko (2008) suggest that the income-ratio threshold fails to objectively assess the market conditions and may even lead to rushed conclusions misreading variables related to housing costs, poverty and individual consumption decisions. Moreover, the discussion about the affordability metric system has gone beyond the costs of purchasing or renting a house to comprise also transportation costs. Florida (2017) and Litman (2018), have suggested that including transportation costs is necessary in order holistically measure affordability in a more accurate, real and fair way. According to Litman (2018) the sum of housing and transport expenses of lower-income households shouldn't exceed 45 percent of their budgets. This suggested threshold specifies affordable to whom, and correlates housing affordability with location, hence under this framework low-cost houses are not necessarily affordable if access is limited by the location and households are doomed to spend more money and time commuting.

In contrast, it has been argued that standardizing a specific percentage of the income spent in housing by households should go beyond "valid or invalid" or "right or wrong" method, because the science behind the method should be a tool rather than an end, since "numbers do not speak for themselves" (Hulchanski, 1995, p. 477) and drawing a line for affordability

[12] This is of course without mentioning the legal and regulatory constraints.

inevitably requires a holistic ad-hoc approach beyond a rule of thumb that comprises different household types, consumption patterns and income variation.

Hilchanski (1995) identified six different uses for the housing expenditure to income ratio (see table 1) and assessed them based on the validity and reliability that they provide. The author states that in order to understand whether the method is properly being used, it is necessary to know what the intended reason behind the method is. On that note, he clustered uses "1, 2, and 3" as valid and reliable because they are used as means of researchers and administrators to (1)describe for example housing expenditure among different households groups, carry out a (2)comparison of trends over time among household types in order to test specific hypothesis or adding knowledge to a current aspect of reality and also as a (3)regulation to define eligibility or targeting among users to be subsidized based on their income. Furtherly, the author extensively discusses the low validity and reliability of the remaining uses "4, 5, and 6" because they tend to be used as the fundament of a general science that is based on a simplification of the reality and concepts such as willingness to pay, fairness and freedom of choice. He concludes that there is no such thing as a "golden" rule of thumb to follow and by all means encourages withholding from generalizing on a ratio if the intention is not to critically understand the housing situation.

Table 1. The housing expenditure to income ratio: six uses of the per cent of income 'rule of thumb'

Use	Explanation
1. Description	Describe a typical household housing expenditure
2. Analysis	Analyse trends, compare different household types
3. Administration	Administer rules defining who can access housing subsidies
4. Definition	Define housing need for public policy purposes
5. Prediction	Predict ability of a household to pay the rent or mortgage
6. Selection	Select households for a rental unit or mortgage

Source: Hulchanski, 1995, p. 476

> "*The only possible answer to the question lies in the absolute lack of validity any ratio has as a universal measure or indicator of housing need and ability to pay. No ratio as a generalizable statement about affordability makes any empirical sense. Any ratio used is, therefore, simply arbitrary. All an arbitrary measure requires is for many people to uncritically agree to use it and not another measure. A scientific measure, however, must pass the tests of validity and reliability, and does not depend upon the values or beliefs of individuals*" (Hulchanski, 1995, p.489).

2.4.3 Adequacy

Housing adequacy responds to a set of desirable, fair and minimum conditions. More often adequate housing is related to quality standards, however, authors have struggled to define what can be considered as a minimum or fair standard when it comes to housing, as it will vary across regions and households may have different expectations about the house they want. King (2015) states that quality of housing comes at a cost, hence access to good quality housing will be limited by ability to pay. Additionally, adequacy of housing can refer to a broad set of

characteristics such as size (floor area ratio), quality of materials, and whether it has access to basic services[13] or not (Cai, 2015).

In contrast, it has been argued that the provision of adequate housing measured through the fulfilment of a set of physical characteristics does not necessarily reflect a fair market distribution "it may be the case that houses are small or lack comfort, but I still think a city could be legitimately called just (though not necessarily pleasant) if it provides its limited or imperfect housing evenly across the population" (Brenner, 2012, p.188). Following up on Brenner's argument, it becomes interesting to note that if there was an even distribution of land for housing in the first place, factors that affect adequacy for instance overcrowding wouldn't take place.

As a result of markets failing to provide access to adequate housing at affordable costs, intervention by government either through regulations or economical support becomes a priority to maintain social welfare and equity among households.

2.4.4 Accessibility

Housing accessibility goes beyond the legal acquisition of a dwelling, it has to do with who can get access to it, by what means, and at what cost. Dijst et. al (2002) sub-divided accessibility into two components: personal and locational accessibility. On the one hand, personal accessibility comprises attributes such as age, gender, and income which in turn will vary among different groups and regions. On the other hand, locational accessibility is defined as a trade-off between transportation cost to attend daily activity places and the housing cost (Cai and Lu, 2015, Jana, Bardhan, et al., 2016). Moreover, proximity to facilities like schools, hospitals, recreation and working places complement access (Cai, 2015). The beforementioned approach highlights the importance of the spatial transport networks that connect housing to the city, and since this access implicates a share of the household budget is strongly correlated with affordability.

Economically speaking there are two main constrains when it comes to accessing the housing market: 1) ability to pay and 2) access to finance (King, 2015, Rojas, 2016). For this matter, public institutions design programs to complement low-income households ability to pay, either implicitly or explicitly through housing finance programs and subsidy allocation.

The debate that arises among authors who demand the basic services that housing should have access to in the end collides into one common claim: access to the city. *"The commitment to make the city accessible to each and every person irrespective of their purchasing power is a cornerstone of any project that aims to fairly distribute scarcity" (Brenner, 2012, p.178).* Especially because housing has been broadly misunderstood as a concept and as a solution, conceived as an isolated tangible good, as "bricks and mortar", solved on a spreadsheet, measures to remediate markets failing to provide for the disadvantaged have resulted in countless projects that are detached from the intrinsic needs that come hand in hand with the house. Some perverse results of such interventions seeking to solve housing accessibility for low-income groups can be observed in countries like Argentina, Brazil, Chile, Colombia and Mexico which have undertaken large-scale projects often in the urban periphery, providing poor access to basic services and infrastructure (Libertun de Duren, Nora Ruth, 2018) (Murray, 2015).

[13] Electricity, sewerage, running water, and solid waste disposal.

2.5 Public intervention rationale

> *"Much of government intervention is directly as a result of the failures or unintended consequences of past intervention" (King, 2015)*

Over the years government has intervened land and housing markets for different purposes such as, improving public health, social justice, economic redistribution, market inefficiencies, increase homeowner opportunities and stimulating economic growth (Hoek-Smit, 2008, Mayo, 1999, Rosen, 1983). Meeting housing demand has been relevant to national and at state level as a response to quantitative and qualitative shortages and markets failing to provide affordable housing that can be accessed by all (Reeves, P., 2013). The way that access to land and housing unravels in cities largely varies across countries based on income, financial support opportunities, tenure regime, location and technology among others (Brown-Luthango, 2010).

Often, efficiency and equity are regarded as the justification of government intervention (Hoek-Smit, 2008), since "*Left to the market alone, growing cities are unlikely to provide significant new affordable housing because construction and land costs do not justify construction of moderately priced housing*" (Voith and Wachter, 2009, p.129). Land and housing markets failure is a manifestation of their intrinsic inelasticity, hence moderating inefficient outcomes such as under-provision of affordable, good-quality housing call upon government support, since it is in the best interest of society to maintain a balanced and fair environment. Additionally, housing in most countries is considered to be a merit good[14] to which all individuals should have access to. Following this rationale, public intervention depicts the desire to provide social justice by enabling fair opportunity conditions among individuals, especially in developing countries where the economic inequality gap is larger.

Government intervention can embody a diverse array of actions and strategies to tackle outcomes that are considered inefficient or undesirable or simply because such are not complying with the socio-political objectives that a nation seeks. Tackling such market inefficiencies has been steadily gaining more attention by local government across the globe, and has led to the creation of unconventional mechanisms and instruments to encourage not only the provision of housing for low-income groups but also to incentivize developers to integrate a mix of income groups in their housing projects seeking to promote fairness and access (Calavita and Mallach, 2009).

Concerning housing systems, the introduction of a reform might pursue to enhance quality conditions, or a housing shortage but more than often a justification will lay on the fact that housing is too expensive and the income of some too low, hence the implementation of a subsidy represents a feasible mechanism to alleviate the economic disparity by providing direct or implicit support (King, 2015).

Similarly, Hoek-smit and Diamond (2003) identify the main strategies adopted by government when it comes to enhancing the housing market outcomes as follows:

1. Implementation of reforms and policies that facilitate private and non-profit lenders as well as developers to boost the low-income housing supply.
2. Improve the regulatory system in the different supply markets (land, finance, infrastructure) to allow more households to acquire authorized and healthful housing (Hoek-Smit and Diamond, 2003, p. 9).
3. The provision of subsidies

[14] Merit goods are goods that individuals ought to consume at a certain level because it is good for them and because they create positive externalities for society (King, 2006, p.37).

In that order, the authors call for actions directed towards regulatory and institutional reform previous to the use of subsidies, considering the unavoidable distortions that such cause to land and housing markets and highlight the importance of analysing in depth the objectives intended while designing subsidy programs in order to efficiently implement an ad-hoc solution (Hoek-Smit and Diamond, 2003, p.9).

Subsidies were defined back in 1969 by the U.S congress as "*an incentive provided by government to enable and persuade a certain class of producers or consumers to do something they would not otherwise do, by lowering the opportunity cost or otherwise increasing the potential benefit of doing so*". There is a general agreement that subsidies are used to encourage an activity being traditionally classified into supply and demand side, however it is argued that subsidy programs also have enacted as a financial mechanism to control the behaviour of landlords and households in order to meet public-political objectives (King, 2015). It can be said that different observed results of the provision of subsidies as support is indeed the basis of subsidies as control, together with the government role transition from being provider to merely supporter. On that note, the current taxonomy of subsidies rather varies as they can be implicit, explicit, pro-renters, pro-ownership, up-front or linked to credit. Rojas (2016) suggests that government housing intervention programs are in fact not contrasting solutions as in supply and demand, but a wide spectrum of plausible solutions (see table 2).

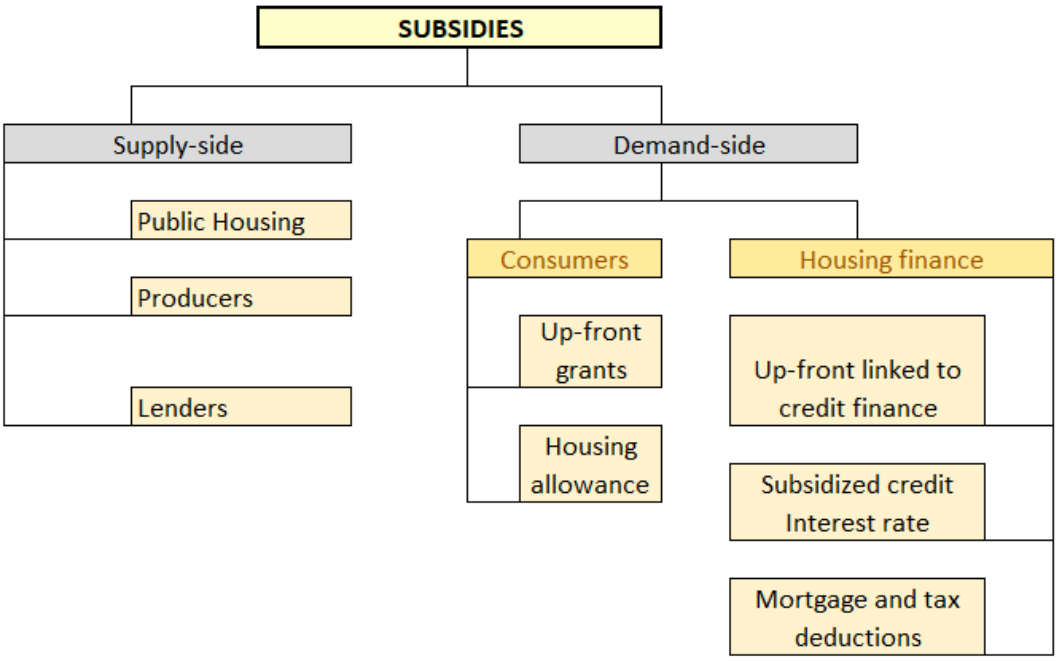
Table 2. Level of government intervention in the housing market

Level of intervention	Government intervenes to guarantee access to housing	Government intervenes to facilitate market housing supply
Strong	Provision of finished houses	Expansion of housing finance
Strong	Provision of incremental housing	Facilitation subdivision of land for housing
Moderate	Provision of serviced land for housing	Incremental housing finance
Moderate	Provision of subsidies for affordable housing	Housing vouchers
Low	Provision of subsidized housing finance	Housing upgrading

Source: Rojas (2016)

To better understand the types of subsidies Figure 6 summarizes the main approaches that public institutions implement regarding subsidies, and the next section briefly describes how these mechanisms work.

Figure 6. Type of subsidy intervention



Sources: Adapted from Angel (2000); Bourne (1981); Hoek-smit and Diamond (2003); Le chiquier (2009).

2.6 Supply-side intervention

Actions intended to increase the housing stock such as the direct provision of public housing from government, incentivizing private developers to build sub-market housed-price and subsidizing the private finance sector are considered to be "supply-side" alternatives. Interestingly enough, supply or "object" subsidies are justified under the premise that the low-income population should not be economically aided in kind because their precarious situation won't allow them to wisely spend, and trust on them remains questionable. Additionally, supply-side subsidies allow government to better control the quality of housing as well as regulate that end-users will not benefit excessively from public funds (King, 2006).

2.6.1 Public housing vs Social housing

Historically, during the industrial revolution unsanitary conditions among workers, housing deficit and unsafe conditions lead to the creation of public housing programs by national government in countries like the U.S, and U.K. (Carswell, 2012). Public housing therefore, originally intended to ensure adequate housing as a response to health and precarious conditions, and afterwards it remained a state responsibility, despite the fact that it was never intended to be a permanent measure. Dealing with housing shortages, safety and quality acted as the foundation of public housing programs, and although in the beginning the working class was the main target of this intervention, later in time the focus switched to the low-income population as it became evident that they were failing to access the housing market and social-rented dwellings, better known as public housing represented an affordable alternative offering below market monthly rent prices (Stoloff, 2004).

Later on, public housing started being criticized and its effectivity to reduce the housing cost started being questioned (Carswell, 2012). Such critiques pointed out that most public housing

represented an expensive solution, since new units had to be planned, designed, constructed and further allocated. Additionally, government resources limited the scale of accommodation projects and often housing programs had to be aborted to secure the national budget (Gilbert, 2012). A paradigm emerged then from having government leading housing programs, since designing, producing and allocating the dwellings resulted much of a burden and the achieved results were often not significant enough (Gilbert, 2012). More importantly, this approach aims to supply rented dwellings at a lower price, representing an implicit subsidy that physically locates the low-income in a determined space, allowing the possibility of users to prevail in these dwellings for an indefinite amount of time, even when their economic situation has improved, representing the major drawback of this approach as authors claim that *"needy low-income households might be denied to access social housing because more affluent households remain in occupation"* (King, 2006, p.47). On the same note, Webb (2012) underlines the possibility of households with a higher ability to pay making use of economic subsidies, hence demanding an intense and continuous control from government. Such need for more control and regulations, as well as the limited ratio of households aided through public housing programs are the main reason why authors for instance Webb (2012), Lindley (2015), and Mcdonald (2015) among others daunt this approach and encourage demand-side subsidies.

The meaning of social housing in the 21st century differs greatly between countries as a result of the end they pursue and the housing policy they adopt. Although generally social housing tends to be associated with social-rented dwellings owned by government[15], the term is no longer limited to social-rented houses and rather it is also used to refer to owner-occupied dwellings that are subsidized or financed by the public sector (Balchin and Stewart, 2001). Moreover, social housing has been defined as *"wide range of initiatives that aim to provide good-quality, affordable housing"* (Carswell, 2012, p. 697) whether it is rented of owner-occupied. Regarding the provision of the social housing units, public or government provision is no longer considered the main determinant of the definition per se, as worldwide programs are often managed by the private sector and non-government organizations (Carswell, 2012).

As a result of social housing program variations across regions and time, a definition has been far form standardized, generating confusion among academics, and representing a barrier in order to objectively assess and discuss such programs. On that note, Hansson and Lundgren (2018) have recently analysed the criteria (see figure 7) under which social housing is often adapted among different authors as follows:

Figure 7. Social Housing Defining Criteria

Tenure	Provider	Target group	Subsidy
• Rented • Owner-occupied	• Government • Private-for profit • NGO	• Low-income • Vulnerable groups	• Below market rent or house price

Source: Hansson and Björn Lundgren (2018)

The authors relate a lack of agreement on the definition as a consequence of some of the attributes being too broad, such as "low-income" and suggest a definition which encompasses the beforementioned aspects defining social housing as "a system providing long-term housing

[15] Social housing is often referred as social-rented housing specially in "advanced capitalist countries". see Balchin and Steward (2001).

to a group of households specified only by their limited financial resources, by means of a distribution system and subsidies." (Hansson and Lundgren, 2018, p.14)

Similarly, King (2015) suggests that there are mainly three aspects on which social housing mainly relies: 1) who funds it, 2) who owns it, and finally 3) who is it for. The type of tenure of these public programs varies amongst regions for example, government support for low-cost owner occupation is nowadays the main trend in Latin American countries (Balchin and Stewart, 2001, Rojas, 2016), nevertheless countries like Ireland and the United Kingdom built and owned social housing and eventually privatized it while some others like Germany, China, Singapore and the Netherlands continue to manage social housing as below-rental housing programs for the low-income. In consequence, King (2015) argues that there is no "particular model" or specific framework that categorizes social housing, and that if one characteristic must be emphasized it should be the target group intended to be assisted. In other words, social housing end is to support low-income users and maintaining certain quality standards on the housing provision, more specifically to those with "limited financial resources".

2.6.2 Subsidizing Producers (Incentives)

Privatization of the housing production started being discussed and supported as a result of neoliberalism and evidence of the poor results of relying in government. According to Gilbert (2012) "*governments should limit their activity to improving the planning, financial, and regulatory environment*" (p. 239). Thereupon, several studies and economic analysis proved public housing inefficient to achieve its main goal: improving housing conditions of low-income households (Mcdonald, 2015), and alternative ways to tackle affordability started developing, specifically through the implication of the private developers.

As a consequence, public programs seeking to encourage the provision of social housing shifted their strategy of providing housing units and rather focused firstly on motivating private developers to build affordable units and secondly subsidizing the low-income to enhance home-ownership. Private developers' efficiency and expertise to build housing is the main argument of advocates (Cohrs, 2009). Despite the fact that their involvement sums up to generate profit, the continuous pressure set by social housing demand often exceeding supply results in efforts from government to encourage their participation in the housing sector (Mcdonald, 2015).

Although incentives have also been used to support mixed income neighbourhoods, increase quantity, and quality the main objective they pursue is to reduce the price for low-income households (Carswell, 2012; King, 2015). Designed to stimulate affordable housing provision by the private sector, a wide variety of incentives have been implemented by government in different countries. Tax-break incentives or deductions as well as grants have been broadly used to attract the participation of developers into the social housing market. Moreover, land acquisition, construction regulations and density bonuses have been used as negotiating conditions between government and developers (Cohrs, 2009). Nonetheless, Woetzel (2014) acknowledges that for these measures to be efficient, market conditions and developer competition must be previously studied in order to encourage builders to consider affordable housing projects, and yet not encouraging a housing oversupply (Carswell, 2012). Additionally, the provision of incentives to build has been extensively debated, forasmuch as it is a response to a housing shortage, the efficiency of the new developments remains complex for government to control considering that when producers are allowed to manage the subsidies paid to them, guaranteeing the quality and fairness of the housing supply becomes a challenge (King, 2015, 132). Free market advocates often argue that housing is better provided by the private sector based on the assumption that supply would inherently adjust to the market

behaviour and hence would also compete to produce affordable housing (Gilbert, 2012). Unfortunately, this assumption while true to a certain extent, fails to consider complementary factors of competition such as location and quality. Whitehead (2017) agrees that housing provided by the private sector tends to be inadequate and presents low quality specially since it is often located in low demand regions, far from city centre, inadequately served. In the end, subsidizing the private sector may represent an expensive solution and, in all cases, should be an alternative analysed carefully enough and validated by the existing demand, in order to successfully encourage the supply of affordable housing rather than subsidize standard housing, as a result of developers seeking to profit from them (Woetzel, 2014)

2.7 Demand-side intervention

Demand side subsidies are an alternative oriented towards consumers. This mechanism enhances the "subject" ability to pay for housing and its designed to improve wellbeing, fairness and justice as well as increasing effective housing demand. The provision of this subsidies can either be direct (vouchers and grants) or indirect (subsidized finance housing) and some countries have designed subsidy programs that comprise both mechanisms, as further explained.

2.7.1 Subject subsidies

2.7.1.1 Housing allowances

The tendency to finance supply shifted towards demand or subject-subsidies around 1970, mostly in developed countries (King, 2015). Political pressure, decentralization processes and the growing tendency of "letting markets work" has resulted in public entities withdrawing from the housing production in countries like the U.S, Canada, Mexico, Brazil, and Spain. The idea of supporting low-income households directly, grew popular in different countries like the U.S, Australia and Canada, as advocates argued that with demand-subsidies recipients had more liberty to decide how to use them, resulting in a more fair system that wouldn't increase segregation or unbalanced housing contrary to public housing developments (Carswell, 2012). Known as housing allowances in Canada or presented as "vouchers" in the United States, demand-side subsidies are considered an entitlement for the low income, since it enables freedom of choice, unlike object subsidies. The possibility to choose by households represents a major advantage to authors, because it allows people to move while seeking for jobs and it promotes mixed communities instead of large social housing concentrations (Angel, 2000; Webb, 2012).

The pros and cons about shifting towards subject subsidies or readopting object subsidies has been extensively debated, but beyond mobility, cost-effective evidence along with the possibility to target those in most need[16] are some of the arguments that stand up for subject subsidies (King, 2006; Lindley, 2015). Regarding the economic aspect, for several years there was a debate with respect to the cost-effective benefits that both supply and demand side subsidies possessed. The main argument coming from subject subsidy defenders states that the overall cost is more effective because the target is not to pay for the construction and allocation costs, but to bridge the gap between the tenant income and the market price (Wolfe, 2011).

In contrast, inflationary effects were the main concern of opponents, for the vouchers could be used not only to buy houses but also renting and rehabilitating houses, hence encouraging property owners to increase the rent, resulting in housing costs rising not only for low income

[16] However, an ethical debate arises form possible stigmatization as a result of the targeting process, see Angel (2000) and King (2006).

but also for middle income households (Carswell, 2012). Another concern that has been pointed out about subject subsidies is that paradoxically they can create a "poverty trap" influencing individuals to remain in low-paid jobs in order to maintain the benefits they receive which otherwise they would lose if their income rises (King, 2016).

2.7.1.2 Up-front grants

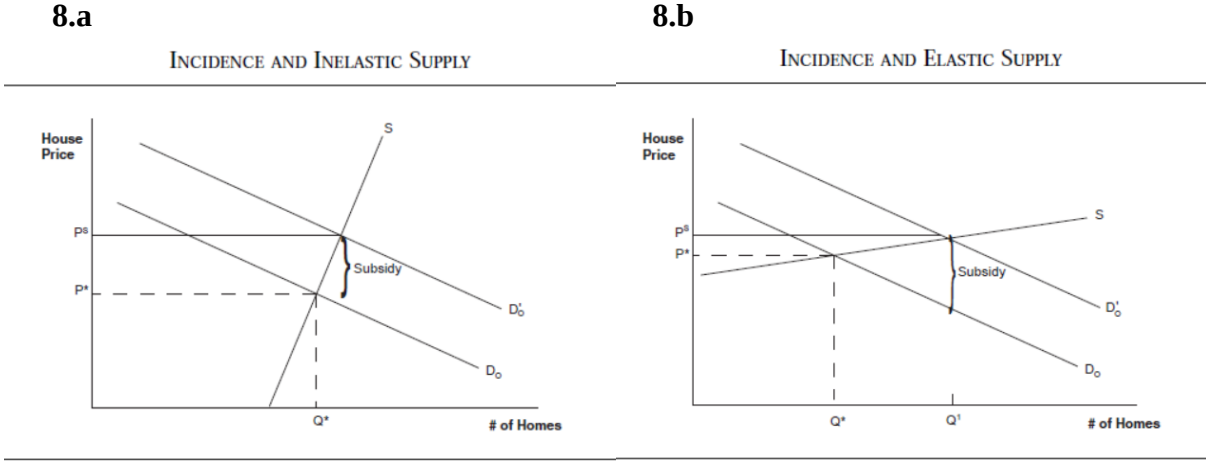
The distribution of up-front grants represents a radical public approach to assist the low-income population in accessing the housing market. This grant provided by government works as a direct cash allocation that seeks to be used for a loan down payment, serviced land or a house (Hoek-Smit and Diamond, 2003). Countries like Chile, Venezuela, Costa Rica and Germany have made use of this alternative mainly prioritizing households in the basis of need. Often these subsidy programs strive for encouraging home-ownership and are politically popular because they are transparent and in theory have a redistributive effect. It has been suggested that amongst the different subsidy programs, up-front capital support is one of the most efficient as this mechanism allows a more equitable distribution (Mayo, 1999; Hoek-Smit and Diamond, 2003).

In contrast, it has been argued that by encouraging housing demand in the absence of an elastic land and housing supply, subsidies might rather increase the prices, making it even less affordable for the low-income and potentially creating barriers for future home-buyers and for non-subsidized groups (Mayo, 1999, Yates, 2012). On this note, Hilbert (2015) states that there is enough empirical evidence in the U.S to support the house price capitalization[17] occurs, especially in supply constrained[18] locations as pointed out by Saiz (2010) in his economic review of housing supply through satellite-based geographic data. On this note, Glaeser (2008) elaborated an economic graphic review (see figure 8) that explains both the elastic and inelastic housing supply scenarios. Figure 8.a represents an inelastic market housing supply (s) where the initial demand (D_0) is enhanced by the provision of a subsidy, however the quantity of housing remains restricted and the initial house price (P*) increases in an equal proportion as the subsidy (Ps) offsetting the main purpose of the intervention, failing to enhance affordability not only for the targeted subsidized population, but worsening the ability to pay of those who did not receive a subsidy at all. Alternatively, figure 8.b represents a scenario with an elastic housing supply (s). In this latest scenario, the introduction of a subsidy increases the quantity of consumed housing (Q^* to Q^1) resulting in a minimal price increase as the subsidy in this case is captured by the home purchasers making housing cheaper as intended from the beginning.

[17] Price capitalization in the case of subsidies occurs when part of their value is captured by the house supplier and its reflected in the final price of the dwelling as an additional cost that is a result of the subsidy presence (Mayo, 1999)

[18] Supply constrains in this context refer to both geographic and regulatory.

Figure 8. Subsidy effects on elastic and inelastic housing markets



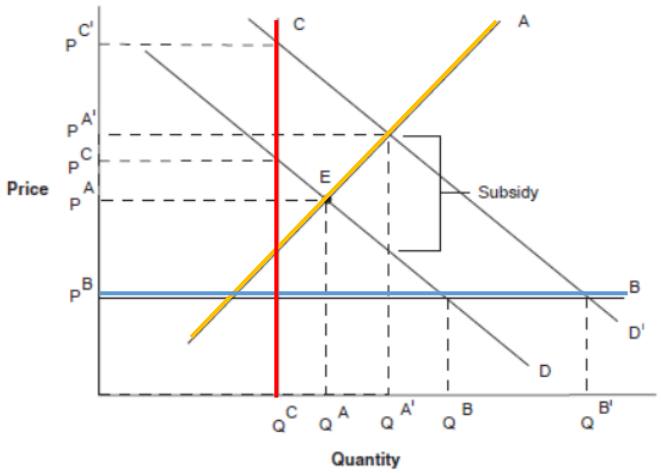
Source: Glaeser (2008)

Further, figure 9 summarizes the three different scenarios (by all means hypothetical and representative) of the land and housing supply elasticity as follows:

Table 3. Housing Supply-side subsidy effects

Supply curve	House price	House quantity	Capture of the subsidy
A-Moderate (yellow line)	Increases from P^A to $P^{A'}$ by half times the subsidy	Moderately Increases	Both the housing consumers and suppliers
B-completely elastic (blue line)	Price does not suffer a noticeable increase	Largely Increases	Consumers (best case scenario)
C- completely inelastic (red line)	Causes prices to rise from P^C to $P^{C'}$	No change in housing consumed	Suppliers (worst case scenario)

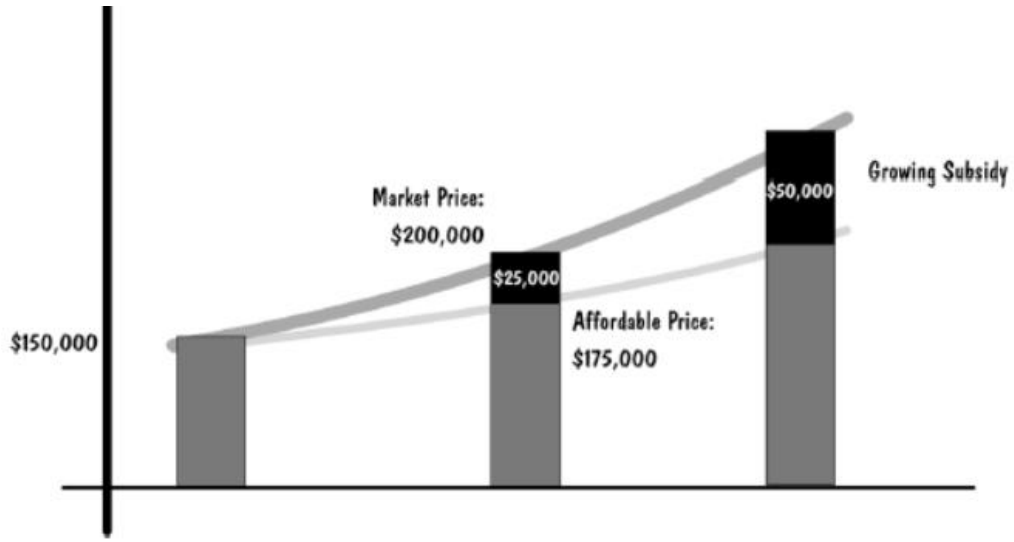
Figure 9. Demand subsidies and the elasticity of supply



Source: Glaeser (2008)

While countries struggle to enhance the supply of affordable housing and the need for larger subsidies and implementation of financing mechanisms continues to grow, municipalities face what can be called a vicious cycle. According to Davies (2008) the affordability gap is a result of housing prices rising at a faster rate than household incomes. Figure 10 depicts the increasing subsidies required to cover the existing gap between what households can afford and raising housing prices through time. Following this logic, larger subsidies will be required every year in order to thrive housing affordability which will in turn reduce the scope of the target population and the overall subsidy efficiency (Hoek-Smit and Diamond, 2003). Controversially, in this context "affordable housing" can only be accessed through the provision of the additional subsidy (King, 2015).

Figure 10. Affordability Gap: Growing subsidy needed



Source: (Davies, et al., 2008) Davies et al. 2008

2.7.2 Finance Housing Subsidies

An alternative to direct housing public intervention is the "pro-market" oriented intervention. In this approach, government plays the role of a facilitator rather than a provider. Housing finance on its own determines to a great extent they way that production and consumption of housing occur, and in most emerging economies that struggle due to inefficient land markets and housing shortages, access to finance remains limited. Consequently, leveraging access through the use of subsidies is today one of the most popular way to boost home-ownership in most Latin American countries, Africa and East Asia (Hoek-Smit, 2004). The supply of serviced land for housing, the provision and enhancement of housing finance are pivotal aspects of the housing market that government may intervene to facilitate in order to achieve particular outcomes (Rojas, 2016). The rationale behind government subsidizing housing finance relies on expanding the access to housing, however alternative strategies have been implemented to achieve this, such as, the creation of state-lending institutions that render loans at subsidized interest rates, linking subsidies to credit finance, and implicitly deducting taxes and mortgage interest (Hoek-Smit and Diamond, 2003, Chiquier, 2009).

2.7.2.1 Housing Interest rate subsidies using special funds

When market-based finance institutions fail to be efficient or to provide access for all income brackets, the creation of self-funded institutions, also known as housing provident funds managed by government become an attractive solution to provide loans at subsidized rates. In order to assist housing consumption, compulsory saving schemes deduct a percentage of workers' salary periodically. This mandatory contributions from employees in turn, enable subsidized housing loans for the contributors (Hoek-Smit, 2009). Countries like Mexico, China and Philippines have successfully made use of this saving schemes to expand housing finance (Chen and deng, 2014) although their efficiency, transparency and equity of this subsidies has been questioned by reason of their implicit nature and the limited scope only those who contribute to the fund (Hoek-Smit, 2009).

2.7.2.2 Up-front subsidies linked to credit finance

The public provision of capital subsidies linked to credit finance are implemented as a measure to either reduce the loan burden for households or to increase their ability to pay for a house, although more recently its use has been expanded to housing improvements. Egypt and Mexico have made use of this programs attempting to support low-income borrowers, improving access to the housing market (Hoek-Smit, 2009). In spite of that, as beforementioned efficiency of this approach relies on the supply response and moreover, although they are targeted towards the low-income, the beneficiaries of such programs will remain limited (Chiquier, 2009). Similarly, Hoek and Diamond (2003) highlight that when the market dynamics are not previously analysed, these demand-side subsidies may indeed perform as supply-side subsidies while developers and lenders make use of them like in the case of Indonesia, South Africa, and Mexico.

Additionally, Hoek and diamond (2003) state that subsidies implemented to improve market fairness must be aware of the overall equity. They break down subsidy equity into horizontal and vertical while the former regards the scope or number of people assisted in the same strata (income) and the latter refers to access across the different income groups. The authors suggest that to enhance horizontal equity, smaller subsidies are recommended in order to enhance the scope of the number of people assisted within a well targeted population. On the other hand, the authors mention that vertical inequity, occurs when a granted subsidy is equally large among different income brackets, enhancing the ability to pay of wealthier households to the extent that the housing solution they acquire is even unaffordable to the non-selected population that are economically better off. To prevent this, the authors recommend a subsidy that gradually decreases as income increases.

2.8 The effect of subsidies on housing and land (Summary)

> *"All housing subsidies distort markets to some degree (with the exception of programs that are so poorly designed that they do not have any effect on the behavior of consumers or producers" (Hoek, 2003, p.18)*

More than supporting or opposing to demand-side subsidies, literature urges necessary to ensure that such programs have a specific target and are well managed, otherwise "subsidies for homeownership have perverse distribution outcomes as they tend to favour homeownership for high-income households compared to households with lower income and net worth" (Salvi Del Pero, Adema, et al., 2016, p.32). The origin of markets failing to provide affordable housing must be further analyzed and better understood before the implementation of a subsidy

program because supply and demand constrains can be a symptom of different diseases such as inadequate policy regulations, reluctant housing finance systems for the low-income, constrains in access to serviced land (either because the existence of monopolies or legal ownership lack of clarity).

After analysing the arguments for and against the different subsidizing methods, the debate seems to collide into how much, why and when the government should intervene in the affordable housing provision. King (2016) comments on this conclude that rather than excluding each other, markets and state must be combined in the most efficient way to achieve a balance and emphasizes that this varies from country to country. Similarly, Lindley states that "*government should therefore be essential, minimal and time limited, acting as catalytic, not supplementary, nurturing the housing market to become sustainable*" (2015, p.5).

Despite being a common alternative used by government, subsidies are a mechanism that has to be carefully engineered, because similarly to taxes they influence and change the behavior of the different market actors. Saunders (2016) considers programs to increase affordability and access to homeownership as mechanisms that shouldn't be permanent as the effect they have tend to worsen market conditions when not carefully designed. For example, when a particular subsidy is designed with the intention to increase housing supply, receivers might as well make use of it to afford the already existing stock. Beyond the location of the houses, unintended distortions in the market are exacerbated by the introduction of subsidies, such as the type of housing produced, the quality of the houses (Hoek, 2003). In addition to that, Blais (2010) explains a controversial outcome of simultaneously subsidizing demand and supply respectively disregarding a holistic analysis, "duelling subsidies" as she calls them take place when a set of actions (in this case different subsidies) which are not consistent may mutually undermine their ultimate efficiency. The latter can be exemplified by government subsidizing developers to build affordable housing, which in turn is provided in the outskirts, and simultaneously subsidizes the low-income, who cannot afford central better located houses, as a result relative prices suffer distortions generated from the intervention itself.

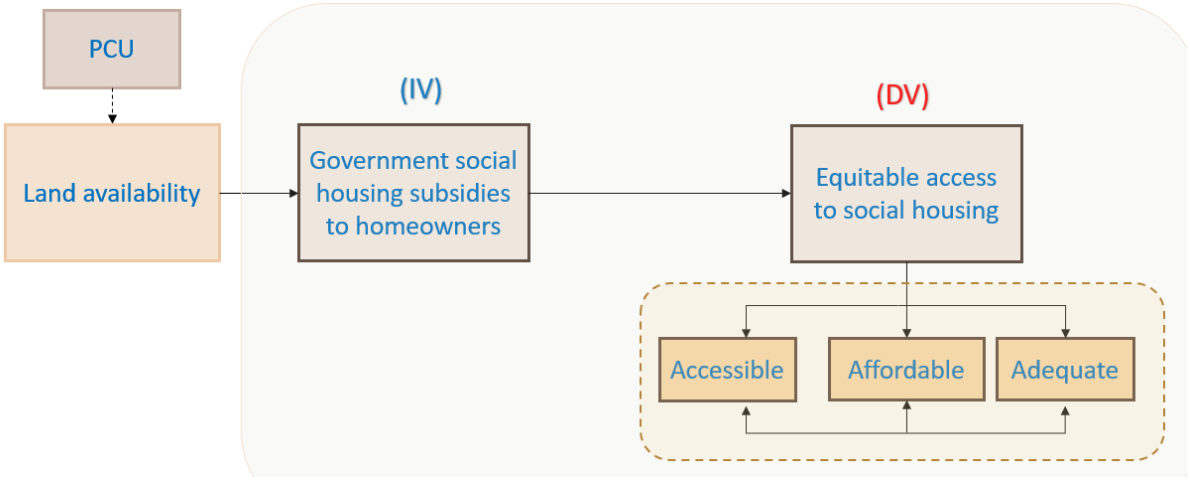
2.9 Conceptual Framework

The literature review suggests a causal correlation between subsidies and equitable access to social housing varies based on the focus group, strategy of the subsidy program, and the side of the intervention (supply-demand).

It is important to acknowledge the essential role that availability of land plays on housing markets as it has a direct impact on affordability and accessibility. Moreover, to highlight the fact that availability of land is being affected by the "*Poligonos de Contencion Urbana*" (PCU) reform as it determines the subsidy allocation dynamics, however both of these concepts are taken into consideration as a background for the present research to complement the analysis, hence measuring them per se goes beyond the scope of the study (see figure 11).

It is expected that the subsidy provision will directly affects equitable access to social housing, nevertheless it is unknown whether the outcome of intervention is beneficial or adverse. Going back to the research question (*To what extent is the provision of government subsidies to home owners influencing equitable access to social housing in Morelia city*) the notion of equitable access (dependent variable) in this study comprises a three-way relationship among affordability, adequacy and accessibility as it is acknowledged that these characteristics are interdependent and dictate the overall outcome of the subsidy intervention (independent variable).

Figure 11. Conceptual framework



Chapter 3: Research Design and Methods

3.1 Introduction

In this chapter the research strategy and methodology are explained in depth. The concepts extracted from the conceptual framework are operationalized into variables and indicators as a first step followed by a full description of the sample, data sources and content. Each step is pondered in terms of reliability and validity at the end of the chapter, as well as the implicated limitations of the study.

3.2 Revised Research Question(s)

The literature review covered has helped to better comprehend the rationale behind the use of subsidies as well as the different types and ways through which they tend to be applied. Derived from that, a careful targeting that responds to a previous analysis of the market conditions outstands as relevant in order to achieve efficiency and equity within the subsidy program.

The main research question and specific sub-questions have not suffered modifications and remain as presented in chapter 1:

To what extent is the provision of government subsidies to home owners influencing equitable access to social housing in Morelia city?

The following sub-questions intend to answer the main research question:

1. **How are subsidies contributing to social housing affordability for the low-income?**

This question seeks to answer how the current programme bridges the existing affordability gap for the low-income to become home-owners. The analysis comprised a comparison between the different income-brackets that compose the target group of the programme together with the different type of houses offered to this sector of the market. Affordability mainly responds to a trade-off between amount of subsidy in relation to income, time and price of housing. Additionally, the location of the subsidized houses and the approved for subsidy houses in the city was used to complement the affordability concept. While answering this question also helped to link the outcomes with the existing theory discussed on chapter two and analyse in what ways the programme under study is tackling affordability.

2. **To what extent are subsidies promoting social housing adequacy?**

In order to measure housing adequacy in this study the average size of the houses, quality of materials and the provision of basic services was analysed during the period of time. The trend within the duration of the program also provided an insight into the effects of the georeferenced subsidy policy regulations on the adequacy indicators.

3. **To what extent is the provision of subsidies enable equitable access to social housing?**

Finally, this question addressed the distribution and access to the subsidies among the different income groups, gender, housing solution[19], location and their relationship with the amount received during the programme. The subsidy program by default targets the low-income, however the regulations that specify the income present some modifications within the program, hence this question served the purpose of explaining under which conditions and to what extent the provision of subsidies enables equitable accessibility to social housing for the low-income.

3.3 Research strategy and Methods

The case study is selected as the most suitable research strategy based upon the decision to conduct a holistic approach to collect and analyse the extensive amount of data available taking place on real-life setting in this case the subsidy program during an extended period of four years[20]. Instead of only a number of neighbourhoods the selection of a single case study was adopted to analyse the whole city following the research objective to explain the causal relationship between subsidies and equitable access to social housing as this strategy allows to provide "richly detailed descriptions of the phenomenon under study" (Van Thiel, 2014, p.87).

The city of Morelia was purposively selected as a case study mainly because urban development in the municipality has followed a complex spatial socio-economic segregation manifested in large-scale social housing projects located in the periphery with the particularity of most of the projects being managed by a reduced number of developers. Based on that the analysis of the city provides an opportunity to reveal the consequent dynamics of equitable access to social subsidized housing after the implementation of the PCU reform (see section 3.4) derived from such a unique land and housing supply market limited competition. Additionally, as mentioned in section 1.5 (see figure 2) the optimal distribution of the grants within the municipality as opposed to the cities which received the largest number of grants suggests that Morelia city deserves special attention as the in-depth analysis of the city might provide a better explanation on the reasons behind a more effective and even distribution of the grants.

3.2 Research methodology

Usually, a case study will search grounds on qualitative data empirically collected to arrive at potential explanations or descriptions of a phenomenon supported by secondary sources that allow for corroboration and triangulation of the information (Van Thiel, 2014). This research however followed an inverse methodology first conducting a secondary analysis of quantitative datasets which results served as the main guidelines to carry on and integrate empirically

[19] Housing solution in this research refers to the type of housing in terms of price acquired with the subsidy.

[20] The duration of the program 2014-2018 including the latest preliminary data.

collected information. Generally a mixed method approach was used including primary and secondary data to integrate qualitative and quantitative data, in concurrence with the statement that "in combination, mixing both quantitative and qualitative provides a better understanding of problems than either approach" (Creswell and Clark, 2007, p.5). Generally, primary data is collected from the published subsidy datasets and from the conducted semi-structured interviews and secondary data is drawn from legislation, program regulations, official journals, policy documents, and annual reports (see section 3.5).

Primary data does not only refer to information that has been collected by the researcher himself but also includes existing material "that has not been produced for research purposes or that has not been used for research before" (Van Thiel, 2014, pp. 102). By reason of that, Secondary analysis is used to analyse the existing body of quantitative data collected from the government online databases which contain disaggregated data concerning the program subsidy provision which has not necessarily been used for research before rather than for planning and monitoring the program itself.

Alternatively, in order to enhance the primary method (secondary analysis) as "one type of evidence might not tell the complete story" (Creswell and Plano Clark, 2007, p.8) the semi-structured interviews conducted in the City of Morelia with experts and academics on the field of social housing market, real estate developers, and urban planners as a source of qualitative primary data permitted to better explain and provide a complete understanding of the primary method quantitative results (Creswell and Plano, 2007). Moreover, the semi-structured interviews further served the purpose of comparing and corroborating information with the previously analysed databases as a triangulation measure to enhance the validity and reliability of this study. (Van Thiel, 2014).

3.3 Operationalization: variables and indicators

The operationalization process represents the main challenge when using information from existing data sources (Van Thiel, 2014). These problems arise from the fact that the data has been collected for a different purpose, not necessarily research hence the researcher must find a way to match the variables derived from the research question to those that are presented in the existing data in order to adequately measure the intended variables, nonetheless, such matching process has to be carefully designed and justified (see section 3.5).

The concepts discussed in the conceptual framework (see section 2.2) and debated in chapter 2, for the present research are defined as follows:

Subsidy - As discussed in chapter 2 subsidies may take different forms, depending on who provides them and to what side of the market they are intending to support. The selected definition for this research is based on Oxley and Smith (1996) :

> "*An explicit or implicit flow of funds initiated by government activity which reduces the relative cost of housing production or consumption below what it otherwise would have been*"

Additionally, the definition of subsidies as implemented in Mexico:

> "*A non-recoverable economic support granted by the Federal Government which intends to support the low-income, intending to serve as an additional stimulation to encourage this segment of the population to access a housing solution that better adapts to their needs*" (Housing law, 2014)

Social housing - The definition of social housing in the present study was selected and adapted to the general perspective in Mexico as follows:

> *"Social housing is a system that provides affordable long-term housing to a group of households specified only by their limited financial resources, by means of subsidies*" (adapted from Hansson and Lundgren, 2018)

Equitable access - In this study equitable access is defined by a comparison between equality and equitability as discussed in chapter 2. By reason of that, equitable access to social housing for this study refers to:

> "*A distribution of both material and non-material benefits derived from public policy that does not favour those who are already better off at the beginning"* (Fainstein, 2010, p.36)

Affordability - The purpose of this research goes beyond assessing the percentage of income spent on housing but rather to understand and explain how the ability to pay for the low-income has been enhanced with the provision of subsidies, limited not only to the factual home acquisition but also the relation that it maintains with the location, target group, and service provision.

Adequacy - Housing adequacy is measured based on the compliance of a set of minimum conditions and regulations determined by the adopted national standards. For the purpose if this study adequacy refers to the fulfilment of characteristics such as housing size, quality of materials, and whether it has access to basic services or not. (Based on Cai, 2015)

Accessibility - For this research as a wholistic approach is the basis of the study, accessibility was measured in three different dimensions 1) Economic, 2) Spatial and 3) Social. (Based on Dijst et. Al 2002, and King, 2016)

Table 4 presents the operationalization of concepts and variables as well as the indicators that were adapted based on the existing information. Additionally, the variable "housing supply" although not being a part of the conceptual framework, is included in order to complement the lack of specificity of the housing subsidy location data, this is further explained in section 3.7.

Table 4. Operationalization of concepts and variables

CONCEPT	VARIABLE	INDICATOR	UNIT	DATA TYPE	SOURCE	COLLECTION METHOD
Housing Subsidies	Home-buyer subsidies	Target group	VSM*	Qualitative	Subsidy policy	Content analysis
		Number of subsidies	#	Quantitative	CONAVI/ INFONAVIT	Secondary analysis
		Average amount	$	Quantitative	SNIIV	Secondary analysus
	Housing Supply	Location	u1, u2, u3	Qualitative	SNIIV / RUV	Secondary analysis and interviews
		Type of housing (1)	Economica Popular Tradicional	Quantitative	SNIIV	Secondary analysis
		Amount of houses	%	Quantitative	SNIIV / RUV	Secondary analysis
Equitable Access	Affordable	Average cost of houses	$	Quantitative	SNIIV	Content analysis and interview
		Average income	$	Quantitative	Annual report	Content analysis
		Subsidy amount	$	Quantitative	SNIIV/ ROP	Secondary analysis
		Location (3)	u1, u2, u3	Quantitative	CONAVI MAP/SNIIV	Secondary analysis
	Adequate	House size	m2	Quantitative	SNIIV	Secondary analysis
		Number of rooms	#	Quantitative	SNIIV / RUV ENVI	Secondary analysis
		Quality of materials and surrounding environment	#	Quantitative/ Qualitative	ECUVE	Content analysis
		Perceived Quality of materials and environment	#	Qualitative	ISA/INFONAVIT	Content analysis
		Basic services (2)	Yes/No	Qualitative	INEGI BETA/PCU	Content analysis
	Accessible	Target group	Income	Quantitative/ Qualitative	ROP/SNIIV	Secondary analysis
		Gender	Male/Female	Quantitative	SNIIV	Secondary analysis
		Age	#	Quantitative	SNIIV	Secondary analysis
		Location proximity to infrastructure and amenities (4)	u1, u2, u3	Qualitative	PCU/RUV/INEGI	Secondary analysis

(*). VSM (Veces salario minimo) means minimum wage. In this indicator minimum wage refers to the income-bracket established by policy makers that will receive the subsidy.

(1). Type of housing in this indicator refers to the oficial categorization of houses established by the CONAVI depending on the house price as follows: Economica (118 VSM), Popular (118-200 VSM) and Tradicional (200-350 VSM).

(2). Basic services refer to: electricity, sewerage, running water, and solid waste disposal.

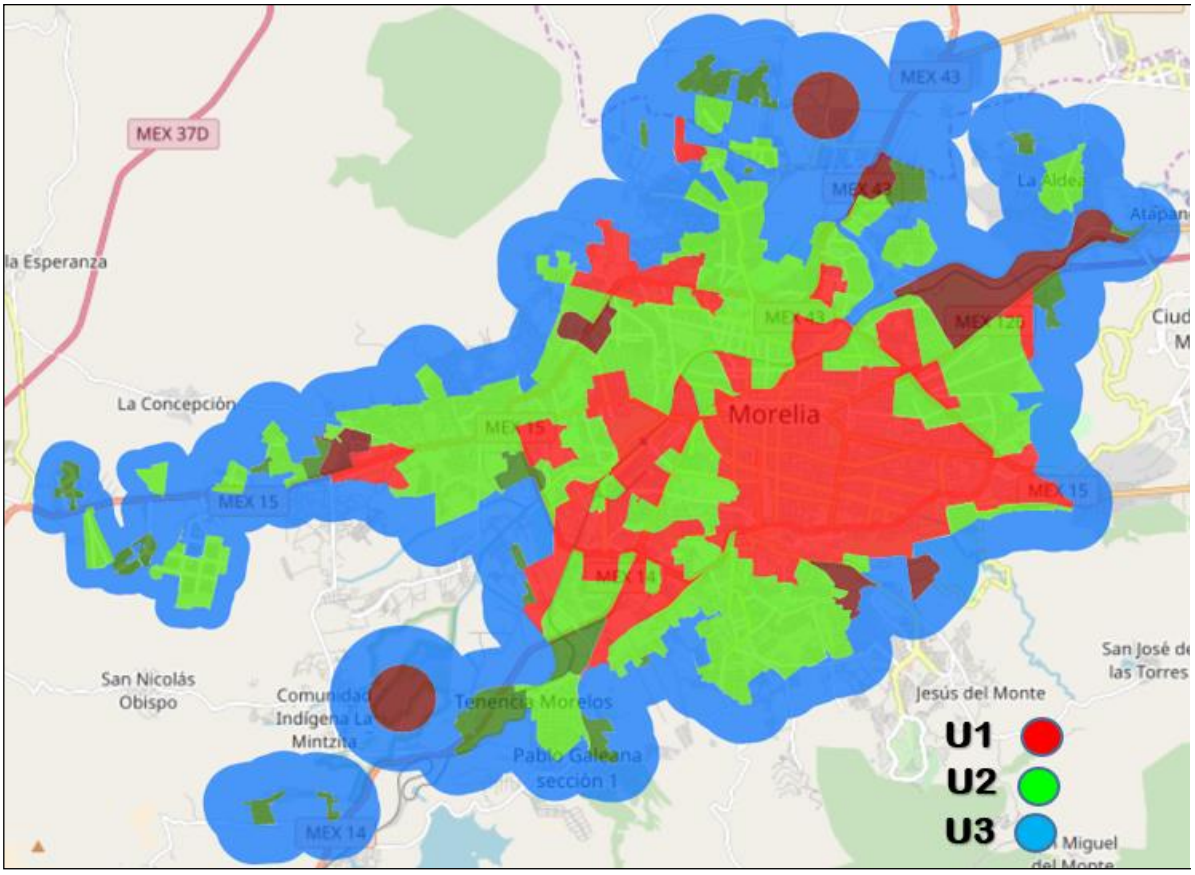
(3).Location of the housis based on the PCU's (see sample size section 3.5)

(4).Trasnsport infrastructure, schools, health centres, markets and shopping centres

3.4 Sample size

A sample is a selection from the total population of possible units of study (Van Thiel, 2014). For this research non-probability sampling was selected due to a purposive selection made from the study sub-units, in this case the universe of low-income subsidy holders that acquired new houses from CONAVI through INFONAVIT during the period 2014-2018[21]. By reason of that, a holistic approach of the city was conducted based on the Urban containment perimeters (PCU) implemented on 2013 (see figure 12).

Figure 12. Urban containment perimeters



Source: http://sniiv.conavi.gob.mx/oferta/mapa.aspx#

U1: Consolidated urban zone with full access to jobs, amenities and all services

U2: Urban zone still in consolidating process, provided with infrastructure, water and sewerage up to 75%.

U3: This area is considered a peripheral belt that surrounds the urban areas u1 and u2 delimiting the borders between urban and rural.

For the conducted semi-structured interviews a purposive sample of the interviewees was selected based on their involvement on the program administration, experience on the field and level of expertise (see table 5). In other words, the selection was made founded on theoretically relevant criteria, in order to avoid randomness (Van Thiel, 2014). A preliminary assessment of the market actors that are directly involved with the program in the city revealed that the

[21] For the year 2018 the data collected corresponds to the most recent update on the month of June.

subsidized housing supply is mainly controlled by a small number of developers from which three of the most relevant were identified and interviewed as their perception is important to better understand social housing market dynamics. In addition to that, information from public actors currently and formerly involved in the implementation of the subsidy program was integrated to enrich the primary quantitative results. Finally, experts that have studied social housing market dynamics, housing finance and planning development on the Municipality were consulted as their knowledge represents a relevant source of information to complement the analysis.

Table 5. Expert interviews

Category	Profession	Relation to the research subject
Interviewee 1	Economist	Formerly involved directly with the implementation of the subsidy program.
Interviewee 2	Architect	Currently involved directly with the housing institute on the department of finance and subsidy of the Municipality of Morelia
Interviewee 3	Urban planner	Formerly involved in the planning department of the Municipality of Morelia
Interviewee 4	Economist	Professor/Researcher expert on the subject of housing finance
Interviewee 5	Urbanist	Professor of urban regional management and development
Interviewee 6	Broker	Expert in the housing market dynamics and finance in the Municipality of Morelia
Interviewee 7	Social Housing Developer	Currently involved in the construction of social housing in the Municipality of Morelia
Interviewee 8	Social Housing Developer	Currently involved in the construction of social housing in the Municipality of Morelia
Interviewee 9	Social Housing Developer	Formerly involved in the construction of social housing before the PCU reform
Interviewee 10	Real Estate Developer	Currently involved in the construction of medium income housing in the municipality of Morelia

3.5 Data collection methods

In this section a description of the data collection methods and sources (see table 6) are broken down by each of the research sub-questions as follows:

1. **How are subsidies contributing to social housing affordability for the low-income?**

To answer this question primary and secondary data was used. Primary data was drawn from the SNIIV 2.0 online CONAVI database regarding the amount of the subsidy allocated to each home-owner, the income bracket they belong to, and the average price of the house bought with the subsidy. Based on this information, the analysis of the subsidy impact on the enhanced ability to pay (see section 2.3.1) was carried out considering the different income-price of house scenarios. In addition to that, the distribution of the subsidized houses along the PCU's was collected from the RUV databases as an indicator to measure affordability in terms of ability to pay for both the dwelling and the average transportation costs burden. Followed by that, affordability in time was also analysed during the programme period.

2. **To what extent are subsidies promoting social housing adequacy?**

This question required the collection of quantitative and qualitative data. Primary quantitative data was collected from the RUV databases regarding the size of the houses in order to analyse the relationship between size, price of housing and the PCU location inferred from the approved for subsidy housing and later compared with the real distribution among the PCU's. Secondary qualitative and quantitative information was drawn from three different sources: the ISA, the ECUVE and the ENVI published surveys conducted by the INFONAVIT and INEGI correspondingly. The review of this surveys served the purpose of assessing the household individual level of satisfaction with the physical conditions of the dwelling such as size, quality of materials, neighbourhood environment and provision of basic services.

3. **To what extent is the provision of subsidies equitable access to social housing?**

Firstly, the collection of primary quantitative data from the SNIIV was used for a descriptive statistics analysis concerning the subsidy allocation as a comparison between income, subsidy amount type of house acquired, gender and age. Subsequently, as some inconsistencies within the programme period were identified, the legal requirements of the program, the review of the housing policy, the PNV 2014-2018 and the ROP 2014-2018 was necessary. This information was further corroborated and complemented with the help of the semi-structured interviews conducted with policy-makers, urban planners and the subsidy programme personnel in order to understand the provisions of the law and the quantitative analysis results. Data regarding accessibility in terms of proximity basic infrastructure such as health centres, transportation, schools and markets of the subsidized households was collected from the RUV platform and matched with the PCU city zoning.

The review of the national development plan (PND), housing policy (PNV) and other non-formal reports such as the EAVM further helped add context to the overall analysis and understand the interaction between the subjects under study.

Table 6. Data sources summary

Type of Data	Data source	Description
	SNIIV 2.0	Managed and published by the CONAVI the National System of Housing Information and Indicators is an updated database used to measure and follow the current housing status as well as the subsidy demand.

Primary	RUV	Gathers information of the national housing registration, from this database information regarding new housing supply, housing type and PCU location of the new houses.
	INEGI BETA	This website makes use of basic statistics collected from national census, surveys and administrative records to generate demographic, social and economic indicators.
	EAVM Annual Report	This annual report presents the current trends of housing finance, statistics, conditions and forecasts nationally.
	Conducted interviews	See table 5
Secondary Data	ISA Report	This report is published by INFONAVIT, it contains a set of indicators that evaluate housing quality and functionality through a survey carried on to households that have acquired a home with a credit/subsidy.
	ECUVE *(INFONAVIT)*	The qualitative evaluation of housing and its surroundings measures the efficient use energy, water, amenities, neighborhood environment, dwelling dimensions, access to transport and services.
	National Development Plan (PND 2013-2018)	This six-year term national development plan establishes a set of objectives and strategies based on the current aspects of the country desired to be improved by the elected president and government party.
	Urban development sector program (PSEDATU 2013-2018)	Program derived from the PND objective to coordinate the national urban territorial development, it establishes the actors and entities that will manage and evaluate the program.
	Housing policy program (PNV 2014-2018)	Following the structure and objectives of the PND and PSEDATU, this program specifies
	Subsidy program regulations (ROP)	Created and updated every year by the CONAVI these regulations specify the target subsidy population, minimum and maximum amount available of subsidy and the requirements to have access to it.

3.6 Data analysis methods

The quantitative data collected from the databases was organized and analysed with the use of SPSS and Excel. The different variables under study were assigned with values that could be measured based on the existing information. Consequently, both descriptive and inferential analysis were carried out, first to be able to depict the trends of the variables over time and second to find out how housing subsidy distribution amongst different groups and characteristics relate to each other during the studied period of time.

Further, the qualitative information obtained from the semi-structured interviews was clustered by the characteristics of the type of actor (public, private, experts and academics) and analysed making use of the Atlas.ti software. The process consists on:

I. transcribing the recorded interviews (when possible) into a word document.
II. Based on the operationalization of the conceptual framework, a list of relevant characteristics (codes) was generated in order to identify similarities and patterns among the interviewees.
III. Making use of the software, the different codes were assigned to sentences or paragraphs as labels, summarizing the information.
IV. A comparison between transcripts was carried out through the analysis of pieces of information that contained the same code names, in order to analyse to what extent and when coincidence occurs.
V. Based on the data analysis, it was possible to draw conclusions and relate them to the literature review.

3.7 An overview of the limitations and their impact on validity and reliability

The analysis and description of the data and sources shed some light into further limitations than those previously mentioned in chapter 1. This section discusses the implications on the validity and reliability.

Reliability and Validity

The Case Study is by nature context related, while the high wealth of information collected enhances internal validity, external validity on the other hand is generally limited (Van Thiel, 2014). The externalization of this research results into other cities is fairly limited not only because the information used to explain the relationship between the studied variables of the case study is context related but because along the country delimitation of the PCU zoning varies among bigger cities that often receive more subsidies as they have a larger share of private sector workers who have access to credit and hence to subsidies. Repeatability of a study intending to measure the effects of subsidies and equitable access to social housing in different cities following this research framework could be possible with respect to the quantitative analysis as the information can be collected from the government databases, nevertheless, in order to arrive to valid conclusions further considerations on the city size, local regulations, land availability and housing supply are necessary.

Proving that the results of the research are not coincidental, but an outcome of a systematic procedure is necessary when it comes to internal reliability. For the present research which holds an explanatory nature, and as stated by Van Thiel (2014) a high level of reliability suggests that the offered explanation is most certainly the right one. Consequently, the main databases (SNIIV) were carefully reviewed and a complementary analysis was carried out to compare the databases with information published by the INFONAVIT to corroborate the information accuracy. Moreover, some indicators were added to better operationalize the

variables drawn from theory, such as the provision of services and amenities, as this are not represented in the databases because they are not a part of the subsidized household characteristics, however they were inferred from the corresponding PCU's and corroborated with the use of the digital INEGI BETA mapping tool.

It is worth to mention that information regarding the subsidized households and the location linked to the PCU's was intended to be obtained from the online database of the CONAVI, however, this information is not published and was denied when requested, providing only the final allocated amount of subsidy per each PCU but not specific about its relationship between household income, age, gender, or type of house. In order to overcome this lacking crucial segment of information and secure the internal validity of the research, an analysis of the housing supply within each PCU categorized as "approved for subsidy" was carried out and further integrated to the study as a new indicator that enabled a complete measurement of the housing subsidies variable.

Finally, constant modifications to the program regulations (ROP) during the studied period of time (2014-2018) were identified not only regarding the target population within what is considered to be the low-income, but also regarding the subsidy maximum and minimum earmarked amounts. However, for this research such alterations were used as an opportunity to establish a baseline of comparison to measure equitable access as scenarios among different groups under varying regulations and their outcomes across time.

Chapter 4: Research Findings

Based on the literature review a discussion arises in relation to the effect of granting subsidies and their ability to enhance access to social housing for the low-income. Theory so for suggests that the preconditions of the land and housing markets have to be thoroughly studied and understood under the specific context of the city in order to introduce a subsidy mechanism and effectively ameliorate access to housing for the target population.

This chapter first introduces the current housing policy and planning regulations that comprise the foundations of the subsidy program and lays out the rationale behind the targeting mechanisms and the implementation process and further depicts the general context of the land market and social housing supply and demand in Morelia city. Following on that, the concept of housing affordability has been measured upon the subsidized groups by means of the indicators presented in Chapter 3 providing an explanation and answer for the first research sub-question.

Subsequently, a discussion of the findings regarding the impact of the subsidy provision on housing adequacy is presented explaining the current trend and complementing this discussion with the perception of both the supply side and the demand side based on the measurement indicators selected on Chapter 3 responding to the second research sub-question.

At last, discoveries on the equitability of the provision of subsidies among the different groups and their respective characteristics under study were exhibited and interpreted altogether with the previous findings to answer last research sub-question. This final part provided the means to further explain and interpret the previous findings and address the main research question.

4.1 The urban development and Housing planning context

As documented by Uribe (2010) on the report of "Urbanization, society and environment on middle sided cities" the city of Morelia and its spatial growth has evolved through time from an "orthogonal" or rectangle grid urban layout, towards a radial city pattern. Historically the first period that corresponds to the foundation of the city back on 15th century until the middle

of the 20th century followed a planned urban development pattern, however this initiative was later abandoned due to a rapid urbanisation caused by the rural migration and further exacerbated by the neoliberal wave that politically facilitated and reinforced the deregulated growth. During this second period of time is characterized by a territorial expansion "without a plan" favouring individual private stakeholder interests rather than the public interest (Urbanizacion Sociedad y ambiente, Uribe, 2010). For the rest of the 20th century until the end of the 90's the city continued to expand and sprawl at a rapid pace through the streets Madero and Solidaridad (from east to west) and Calzada la Huerta and Morelos (north to south) from the city center towards the ring road "libramiento" which had previously confined the city growth (see annex 3 image 2, 3 and 4). This growth pattern was further exacerbated by the "ejido land" reform that allowed real estate developers to acquire large land reserves, naturally away from the serviced urban area as this land previously fulfilled a rural role hence characterized by its low cost.

According to the historical city growth analysis conducted by Uribe (2010) the beginning of the 21st century witnessed an aggressive nation-wide program that intended to remediate the housing deficit which was in part triggered due to the rapid urbanisation trend present at the time and the city underwent a peri-urban expansion in the form of massive social housing supply going beyond the Libramiento and reinforcing a radial urban growth along the roads that connect the city with the surrounding municipalities of Charo, Tarimbaro, Quiroga, Atapaneo and Cointzio (see annex 3 image 5 and 6) characterized by the physical, demographic and economic dynamic activity concentration towards the periphery (Urbanizacion Sociedad y ambiente, Uribe, 2010). As a consequence, the city evolved as a polarized urban tissue that agglomerated housing based on social and economic attributes, contributing to a spatial segregation that urged the public intervention to support those in most need that were systematically failing to access the formal housing market.

Alternatively, the revision of legislation, national development plans and housing finance programs (see annex 2, table 13) shows that by the end of the 20th century the provision of subsidies and financial support became a strategy heavily relied on by national government to counteract the low-income struggle to access the housing market. The review of the subsidy programs implemented since 1998 until the present time show the evolution of the prioritization of different income groups and sectors of the population over time and the underlining objective of providing economic support for the low-income. Additionally, access to credit was identified as a requirement to become an eligible candidate of the subsidy programs since year 2003 (see annex 2, table 10).

The revised programs and policy documents attribute the sprawl growth dynamics of the city to the lack of planning coordination among the three government levels in Mexico regarding urban planning leading to the current spatial, physical, social and economic consequences unmistakeably observed which in turn were addressed by the recently elected president on 2013 on the new national development plan (PND 2013-2018) and approached through the implementation of the Secretariat of Agrarian, Land, and Urban Development (SEDATU) as a federal institution to plan, coordinate, administrate, generate and execute public policy related to territorial management, adequate housing, urban and rural development, promoting consolidation of the cities to enhance their productivity, sustainability, mobility and quality of life (PND, 2013).

Further analysis of the policy documents reveals a complex description of the current housing finance and subsidy which are embedded in a broad set of plans and programs that often refer to each other to define concepts, delegate responsibility of implementation and enforcement. In order to bring clarity Table 7 consolidates the most relevant findings on housing and

subsidies presenting them in a hierarchic order firstly stating the right to access of a house and the way law, plans and programs strategically align to achieve it (see annex 2, figure 23). Additionally, a subtle emergence on the importance of land as a pivoting factor to enhance housing adequacy and accessibility through a better organized and coordinated urban expansion is observed from 2013 onwards.

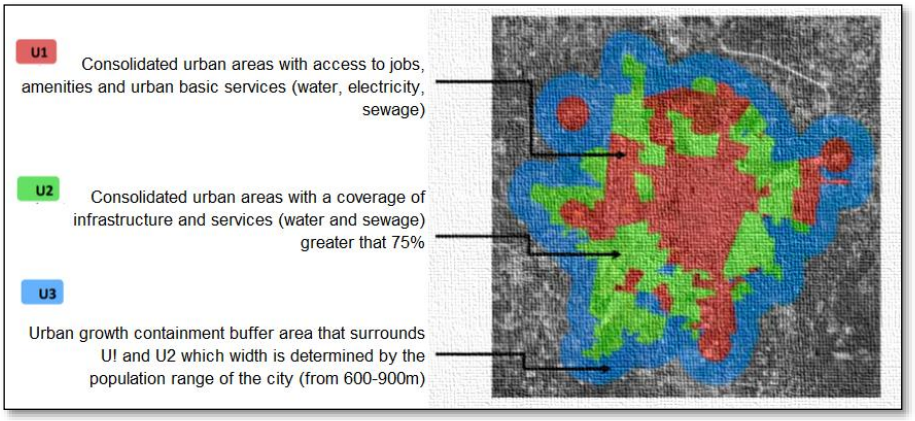
Table 7. Housing policy and subsidy summary

DOCUMENT	HOUSING		SUBSIDIES
The political constitution of the united Mexican states	Article 4th: All families have the right to an adequate house.	→	The law will determine the instruments and mechanisms to achieve this.
Housing law	Defines an adequate dwelling as the one that complies with the human settlement, construction and sanitary, ensuring livable spaces, basic services, legal tenure and safety.	→	Government will provide Land and Housing subsidies which will be allocated to the low-income following equity among regions and homeowners.
National Development Plan 2013-2018 (PND)	Enhance the coordination among national, state and local government to promote an inclusive Mexico by providing an environment for adequate housing.	→	Through public policy, housing finance, channeling credit and government subsidies towards programs that encourage an organized urban growth.
Sectoral Program of urban and land development 2013-2018 (PSEDATU)	Enhance housing access through well located, adequate housing solutions incentivizing an organized urban growth.	→	Generate an optimal supply of finance and subsidies for social housing.
Housing national plan 2014-2018 (PNV)	Control urban expansion by means of housing policy, enhancing housing quality and its environment.	→	Promote and ensure that housing finance and subsidy programs guarantee better dwelling location, adequacy and environment.
Subsidy program operation regulations 2014-2018 (ROP)	The main actions and target population specifics vary by year.		

Source: Author (2018)

Consequently, the identified tool to reorient new housing development to occur in better located and serviced areas with access to jobs, water, electricity amenities and transport (see figure 13) consists on the PCU's (*Urban Containment Perimeters*) which performs as a an indicating variable to channel government housing subsidies.

Figure 13. PCU delimitations



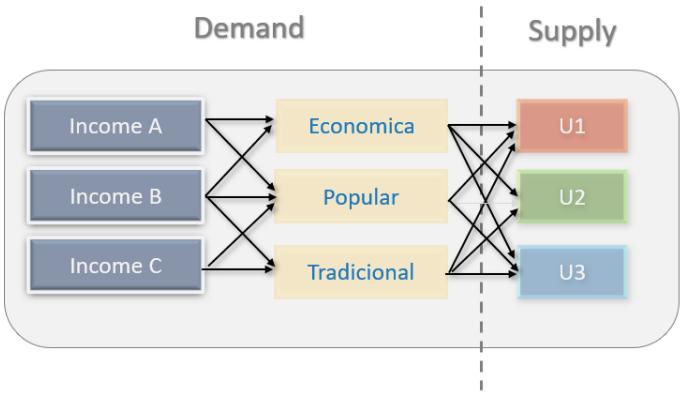
Scenarios based on program regulations

After the revision of the ROP during the period 2014-2018 two main program modifications were identified regarding the target income and the type of housing to be subsidized. Such alterations as mentioned in section 3.7 were used as an opportunity to compare the different outcomes of the subsidy program based on the target group. The research sub-questions will be addressed based on this grouping further explained below:

Subsidy holder income		House-price solution	
Income A:	this group comprises subsidized households from 2.6 MMS[22] or less	Economica:	Housing with a maximum price of 118 VSM
Income B:	this group is composed by subsidized households ranging from 2.6-4.0 MMS	Popular:	Housing priced between 118-200 VSM
Income C:	Subsidized households earning 4.0-5.0 MMS	Tradicional:	The price of this type of housing ranges between 200-350 VSM

Consequently, the possible scenarios are summarized on Figure 14 concerning combinations of both demand and supply of social housing.

Figure 14. Possible program subsidy scenarios



[22] Minimum monthly salaries = VSMM (Veces salario mínimo mensual)

4.2 Housing subsidies

The concept of housing subsidies is discussed in this section. Followed by that, the two variables that encompass this concept which are the home-buyer subsidies and the subsidized housing supply are exposed by means of each of the indicators. This first part is mainly descriptive, and the analysis of the indicators as explained in the operationalization table 3 is further explained.

4.2.1 Home-buyer subsidies

From the revision of the subsidy program the concept is defined as follows:

> "A non-recoverable economic support granted by the Federal Government targeting the low-income intending to serve as an additional stimulation to encourage this segment of the population to access a housing solution that better adapts to their needs" (ROP, 2014)

The previous definition suggests that the program *"esquemas de financiamiento y subsidios a la vivienda*" targets the low-income following a demand-side approach as it enhances their ability to pay and based on that allows the users to freely choose the type of housing that better "adapts to their needs" on the market as King (2016) explains. Based on that, it would be understood that the subsidies work under the demand-side approach because future home-owners are granted with the money and hence free to choose their housing solution in the market. Respondent 2 involved in the subsidy allocation department as follows explains the process as follows:

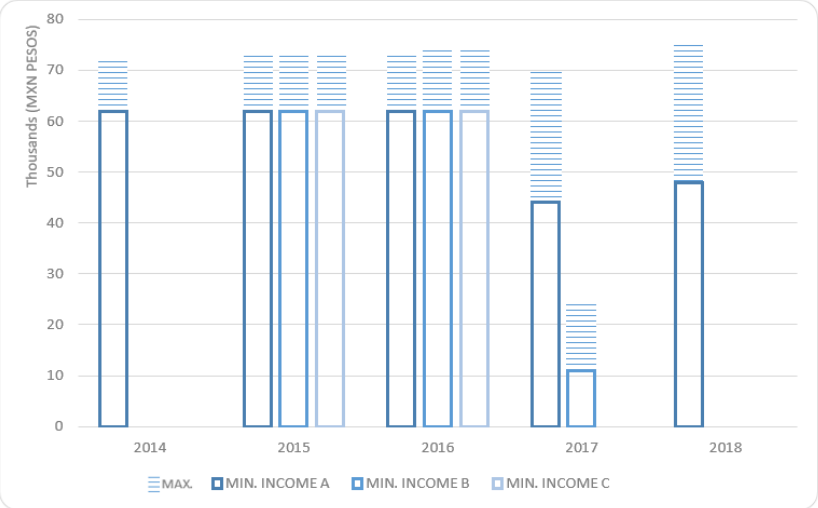
> "*The subsidy holder is informed of the amount that he/she will receive, so they know what is their new ability to pay and based on that they look in the market the house that better suits them, so the supply side can't really speculate with the subsidy, and even when in the end the subsidy will be paid to the developer, the beneficiary has the final decision of where they want to buy*"

In spite of that, there is a disagreement among respondents. Some argue that the subsidy intends to incentivize developers and favors them to sell houses. Strictly speaking, the subsidy seeks to give users the opportunity to access the housing market that otherwise would be unreachable for them, even when it does that by stimulating developers to build affordable houses through an incremental subsidy that highly rewards a better location and access to services.

4.2.1.1 Population Targeting and type of housing

The different income groups (as explained in section 4.1.2) are presented in Graph 1. Through the program, Income A (which corresponds to the lowest income) is consistently supported with the highest possible subsidy amount until the last two years of the program where a drastic reduction on the minimum amount available for households is introduced. Regarding groups B and C there are two main insights worth to highlight. Firstly, the scope expansion that occurs during the period 2015-2016 allowing for the first time households earning more than 2.6 VSM not only to benefit from the subsidy program but to enjoy the same minimum and maximum amount available. Secondly, the following diminution of the available minimum subsidy amount for income A and B that occurred on 2017 together with the deselection of income C group from the subsidized population and finally returning to the initial program target group selection on the last year.

Graph 1. Subsidy program regulated minimum and maximum subsidy amount



Source: Author (2018)

The target population and house-price alterations take place without further explanation and represent a barrier to assess the overall efficiency of the program. On top of that, these modifications directly affect both the value and number of houses supplied as Hoek (2003) suggests. Respondent 1 pointed out that by law the number of subsidies in the country is demanded to be equitable, in the sense that the budget is evenly distributed among the 32 states, however, because the subsidies are mainly allocated through the INFONAVIT, bigger cities often receive more subsidies as they host a larger formal-working population.

Another explanation of the subsidy program modifications based on the general consensus of the respondents lays on the fact that central government has a set of goals to be accomplished at the end of the period (e.g. number of dwellings to be built) in that sense, the reform becomes the strategy and the subsidy program enacts as the tool to achieve the preset objectives. On top of that lays the weight of the GDP percentage share that the construction industry represents for the country. Most of the respondents refer to the social housing supply as an essential economic sector that boosts the country economy as respondent 1 explains:

> "*The decision to expand the target income up to 5 VSM occurred because there was a concern regarding the internal demand based upon the importance of the housing industry since it generates approximately 11 percent of the GDP, there was a lot of pressure during 2013 as the new government had just arrived and there was a decrease on the external, and the intention was to reactivate the inner demand through the housing sector, that is why most of the time, ROP modifications that occurred were leaded by economic pressing factors rather than the social housing current need*"

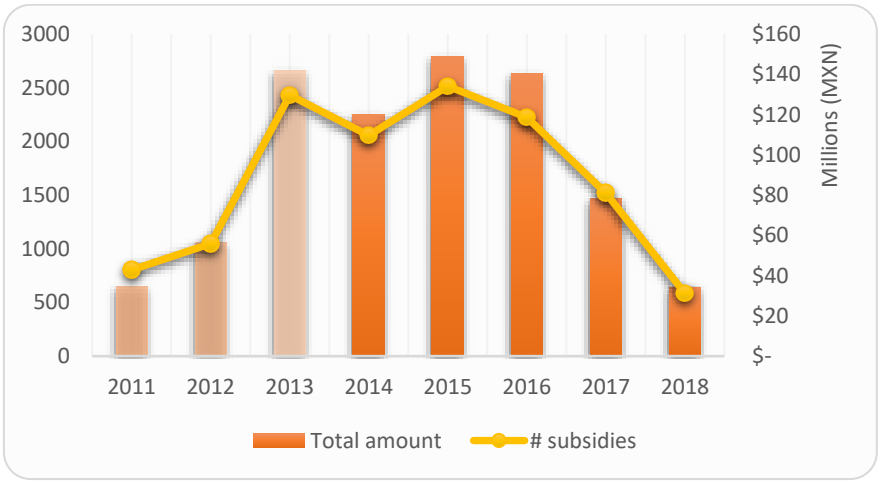
4.2.1.2 Number of subsidies

Graph 2 depicts the overall trend during the program period[23]. On 2013 a federal government transition took place and the subsidy allocated budget almost tripled reaching a number of subsidies never seen in previous programs (2011-2013). Followed by that, both the total amount and number of subsidies steadily decreased towards the end of the program, although it is worth to mention the difference between two different scenarios that are observed on the

[23] Preliminary data is showed in results for 2018

table: 1) from years 2014-2016 the intersection of the number of subsidy line on the low-edge of the total amount represents an overall distribution of subsidies among less people, opposite to 2) years 2017-2018 where the subsidy line rests above the subsidy amount, turned into more subsidies drawn from the shorter budget. The effects on equity of both these trends are further discussed in section 4.4.

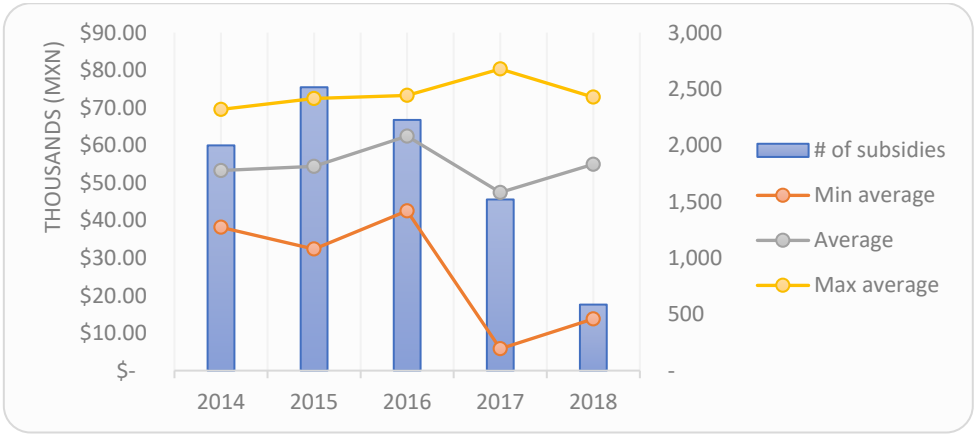
Graph 2. Program number of subsidies vs allocated amount



4.2.1.3 Average subsidy amount

As mentioned before, minimum and maximum subsidy amounts are established on the ROP and were displayed in Graph 1, nonetheless the summary of the findings of the real minimum, average, and maximum amount assigned to home-owners over time is shown in Graph 3. The maximum average line follows a consistent upward growth that matches the natural increase of the minimum wage, and in general from 2014-2016 the minimum and average subsidy amount are relatively high when compared to the last part of the program (2017-2018) where minimum and maximum subsidy amount depict a contrasting pattern.

Graph 3. Program subsidy granted amount average 2014-2018



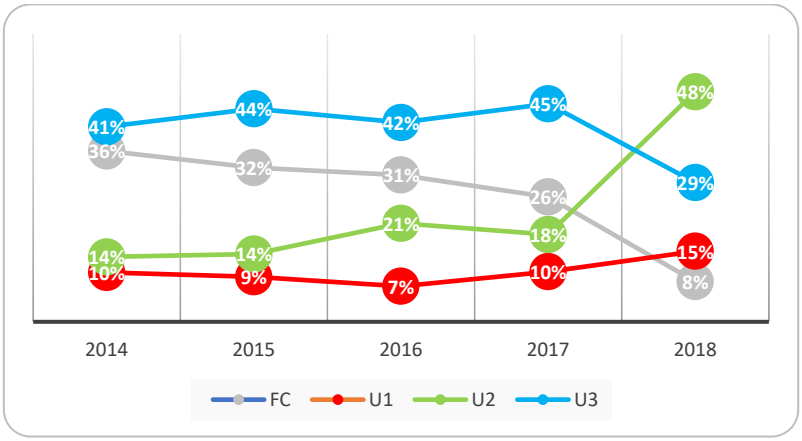
Source: Author (2018)

4.3 Housing supply

On 2006 the online platform “RUV” was created by the INFONAVIT and SHF. This tool was used to capture data of the overall housing supply and its location in the city. Graph 4 depicts

the supply trend during the subsidy program[24] exposing mainly the high percentage of housing built on the buffer zone (u3) that the city has experienced for the last decades. Despite that, from the data below it can also be inferred that the PCU reform has had an impact on the developers decision to build inside the perimeters as a steady decrease of units built outside them (FC) is observed, favouring a more even distribution of the houses among the PCU's by the from 2016 onwards.

Graph 4. Housing supply in Morelia city by PCU



Alternatively, it is interesting to see how the PCU implementation has worked not only as a channeling subsidy tool but moreover how it has implicitly served as a zoning regulation, with all the intrinsic economic consequences that this entails (see section 2.1.1 and 2.2). This is further corroborated by developers who have consequently been affected by the PCU reform even when they do not target their supply based on the subsidy availability, respondent 8 mentioned:

> "*Land prices considerably increased, that affected us as developers because it has limited our ability to acquire plots in central locations for housing, actually in perimeter U1 there are none and the few that exist are not used to build social housing*"

Some developers have deliberately decided to stop building subsidized housing for the low-income because the land that they own was acquired previous to the reform with the intention to build social housing however the increased value gained after the PCU delimitation encouraged them to target households with a higher ability to pay. On that note respondent 9 mentioned:

> "*We don't build based on the availability of government subsidies because our current projects are located in perimeter U2 and those programs prioritize cheap houses, and to build cheap houses you need cheap land which is located far from the city center, in the buffer zone[…] our location has positively been affected and our selling price has increased, which is the reason that we don't plan to participate based on the subsidy program*"

It seems that the change of rules collaterally shifted developers target population instead of encouraging them to comply with the new regulations. The fact that the number of subsidies has steadily been decreasing since 2016 could in first instance be interpreted as an outcome of these recent dynamics, however, respondents formerly and currently involved in the subsidy

[24] Note that this figure contains the total housing supply in the city of Morelia regardless of how it was financed.

program attribute this to the overall and persistent reduction of the federal budget allocated for subsidies. As a consequence, real estate developers who for years have built social housing benefiting mainly from the enhanced ability to pay of households have been slowly shifting their target population from low-income subsidy holders towards medium income home-owners as they perceive an increasing uncertainty with the current subsidy program.

On the other hand, interviewed field experts, developers and some academics do associate the decrease of the number and total amount of housing subsidies not only with the increase of land prices that occurred, but to the fact that the availability of land in areas U1 and U2 is scarce or physically not suitable to build houses. The discussion goes a step further as field experts highlight the controversies of the way that the PCU's are implemented as a "one size suit" for all cities in the county and the misleading indicators that they use to define each of the perimeters, for once, the industrial area in Morelia city which concentrates a high number of jobs according to the perimeters categorization is considered to be U1, even when residential use here would never be either approved nor appropriate. On the same note, respondent 3 who currently conducts research on the city development planning department comments that:

> "*The way that the PCU are designed does not match the reality, they are not accurate and do not correspond with the zones that should be used for housing development, most of the space in the city categorized as U1 and U2 consists of built up areas anyways*"

4.4 Equitable access

4.4.1 Affordability

Average cost of houses

The previous section described and explained the social housing supply panorama in the city under the PCU reform implementation which was useful to input the developer's perspective and allowed a better understanding of the housing supply dynamics. Developer's decisions and response towards the subsidy program inherently determines and is linked to affordability, adequacy and accessibility further described on this study.

In terms of affordability, the institute INFONAVIT regulates the housing expenditure of the formal sector workers. The income-ratio allowed to spend on housing is 30 percent of the monthly income for a credit-holder. As a result, the low-income workers ability to pay for a house seemed limited because long-term loans for this sector were not available. On that note the implementation of a subsidy program by CONAVI for workers earning less than 2.6 VSM (group A) seeking to increase their ability to pay for a house and decrease their credit burden.

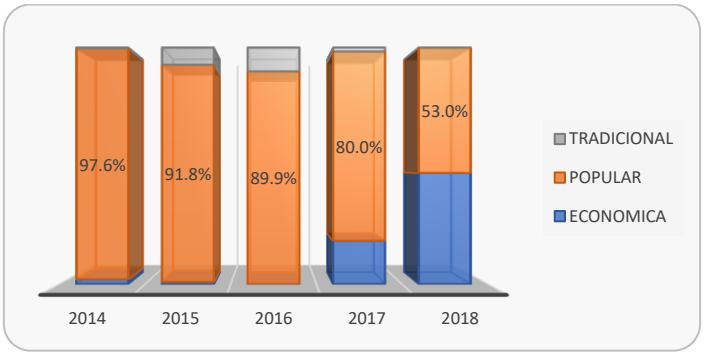
The discussion that arises from theory and academics is whether the introduction of the subsidies have an impact on the final selling price that developers ask for (see section 2.7.1.2). On this aspect, the analysis reveals two things:

1) On the one hand, the ROP by default control the maximum price of the houses that can be eligible to be bought with a subsidy, so in this sense the free market is restricted, and the selling prices hence are capped to match the household ability to pay. These regulations in turn are introduced with the intention to prevent that capitalization of the subsidy occurs, which is one of the main concerns of subsidizing the demand-side (Glaeser, 2008; Mayo, 1999).

2) On the other hand, the program considers three different ranges of house-price to acquire depending on the different ability to pay within the low-income (see graph 5).

The analysis shows that subsidized houses concentrate on the most expensive houses allowed to be bought within capped brackets corresponding to "popular". This trend can be observed since the beginning of the program because the price ceilings were established on the previous subsidy program "Esta es tu casa 2007-2012". This phenomenon has been discussed by Hoek (2003) who points out that when a program specifies house-price brackets or a certain type of housing *"the market will respond and will be flooded with houses of the maximum allowable price"* (p.18). The program modifications further help to analyze and corroborate this theory, note how on 2014 when solely income A was targeted, and the maximum subsidy did not variate with the house-price selection (see annex 2, table 11) most of the housing supplied and purchased corresponds to "popular" which can be as twice as expensive than "economic" of which supply is rather not significant. Moving on in time, years 2015-2016 came along with the target scope expansion that implemented an equal subsidy treatment among income groups. During this period, it can be observed how economic housing basically stops being purchased and subsidy receivers started acquiring "tradicional" type of housing which in fact is not even authorized by the ROP on the house-price regulations, however 9% on 2015 and up to 11% on 2016 of the total budget is allocated for this category. Finally, the last two years of the program exhibit interesting results of the last program modification that introduced an acute reduction of the minimum and maximum possible subsidy amount, hence during this last stage of the program, subsidies to acquire "economic" houses stand out with an increasing share for the first time during the whole period.

Graph 5. Subsidized type of housing according to price



Source: Author

Average Income

To provide a better understating of the situation Graph 6 presents the distribution of subsidies among the different income groups. The distribution of subsidies clearly favours income A through the program period, with a gradual increase of access for income B and C during 2015-2016 as a result of the ROP modification (see annex 2, table 11). For now what is important to note is that income A group which received most of the total budget for subsidies are not reaching for the least expensive houses but the middle-priced ones, and based on the information collected, this is not a matter of choice, but a matter of supply.

Using the RUV database facilitated to measure the total amount of houses registered per year since 2014 of each price-category (see figure 15). It turns out, that opposite to what would be expected the "economic" type is the main housing type supplied in the city with an average share of 60% of the market ¿why are the low-income then not selecting this option that wouldn't require them to get a larger credit? The results were then compared with the

"approved for subsidy"[25] published data and the results show that from the total supply, very few "economic" houses comply with the PCU location requirements[26], being on the majority of cases located in the buffer zone (U3) and in the worst case outside the perimeters (FC). Based on that it can be argued that most of the "economic" type of houses are not financed through government subsidies, because developers do not find profitable or don't manage to build them under what the new regulations consider to be adequate in terms of location, minimum services and so on. Consequently, developers that plan their projects in order to supply the subsidized population do settle their house-prices based on the cut-off point of the maximum price allowed, perhaps resulting in higher selling prices than if such regulations didn't exist, which in other words means that capitalization of the subsidy is taking place within the house-price brackets.

Graph 6. Number of subsidies per income bracket

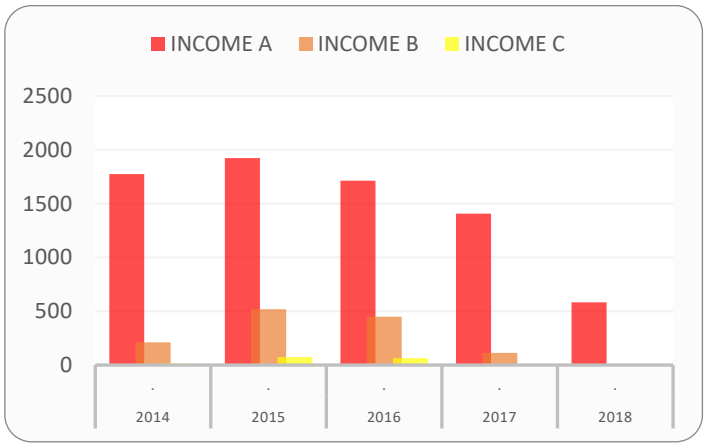
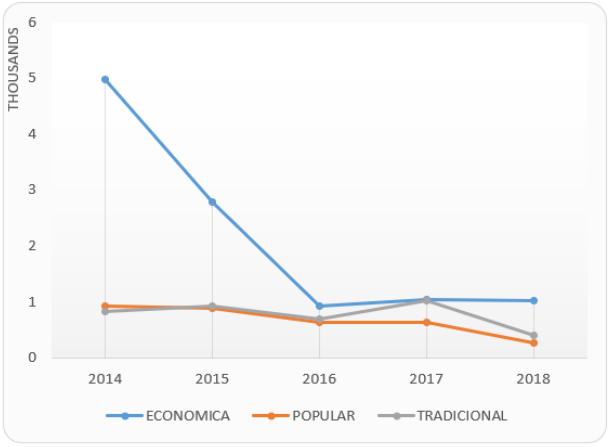
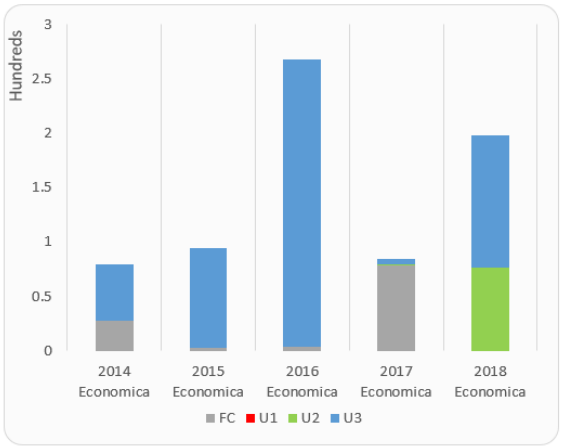


Figure 15. General Economic housing supply vs approved subsidy houses





Source: Author

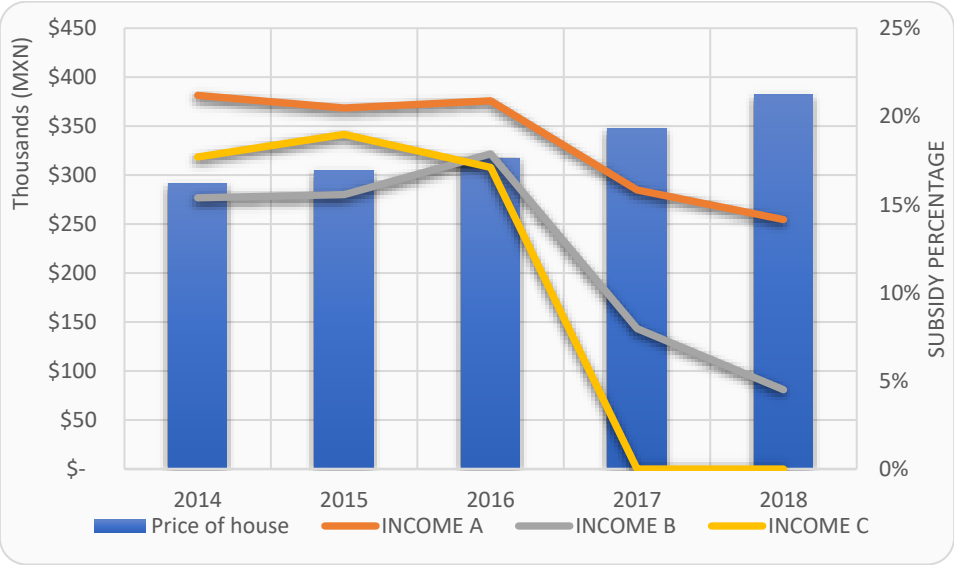
Regarding the relation between the income and the house-price it is important to mention that both are measured and linked to each other based on the minimum wage (see annex 1 table 11), so when the minimum wage increases so does the price of houses. In this case, the existing

[25] The category "approved for subsidy" depicts the number of houses registered on RUV and comprise houses in process of construction, recently finished houses and old houses.

[26] Other factors such as not providing basic services, or basic infrastructure also unselects the housing stock from the subsidy pool.

affordability gap cannot be attributed to housing prices rising at a faster rate than household incomes as Davies (2008) suggests (see section 2.7.1.2), at least for the formal sector population. As a result, for the program to effectively tackle the affordability gap, the subsidy amount (which is also calculated in the number of times minimum wage) would necessarily have to at least be consistent over time or increase in order to enhance affordability, however, as exhibited in Graph 7 the subsidy percentage lines for all groups only shows an upward trend in time until 2016 followed by an acute plummeting that persists until the current day. Additionally, the overlapping of the different income categories with the average price of a house[27] depicts how the subsidy managed to cover up to 22% of the house-price on year 2016 for income A and up to 18% for income B and C followed by a sharp decrease for all three groups ceasing to cover income C and barely supporting income B.

Graph 7. Subsidized house-price vs coverage percentage of subsidy



Most of the respondents attribute the subsidy diminution to the political pressure that came together with the restricted budget experienced on 2016. Respondent 2 asserts that:

> "*What happened is that the federal budget allocated on the last years radically decreased and for this reason it was decided that smaller subsidies should be allocated in order to benefit a larger number of people*"

The repercussions of this approach greatly affected affordability for the different income groups considering that a smaller subsidy granted to acquire a house implies that the subsidy-holder require a larger loan yet again to qualify for a larger loan workers income has to be greater. In other words, smaller subsidies would enhance affordability for the higher income groups. On that aspect, respondent 6 comments:

> "*Reaching more beneficiaries with smaller subsidies, defies social justice, because with the previous regulations if for example I needed one hundred to buy a house that costs two hundred and before I was granted with the one hundred and the rest was paid with a credit. With the new strategy, I can only get fifty so my ability to pay would have to be one hundred and fifty. In short, the program has now benefited two people but with a higher ability to pay rather than helping one person that probably needed it more*"

[27] The house-price for this calculation corresponds to the average price of a "popular" house as it represents the most subsidized type of house of the program.

This is also another reason why academics and field experts often refer to these program subsidies as supply-side because they actively and implicitly support developers to build more expensive houses targeting higher income groups.

Subsidy amount

Based on the review of the ROP and the information that respondents shared, the analysis of the subsidy amount distribution was conducted for each of the categories (see graph 8). According to what data shows, at the beginning of the program income A was not receiving the maximum amount with 80 percent of the subsidies ranging on the 40-60 thousand bracket and the rest not exceeding the 20 thousand, however as the budget for the program increased the allocated subsidies depict a drastic increment, only on year 2016 all participants of this group received the maximum amount. Simultaneously, income B and C were benefited with subsidies ranging from 40 to 80 thousand pesos, particularly income C received even larger subsidies than income B on years 2015-2016. Later, years 2017-2018 abruptly shift the range distribution from highest to intermediate amounts for income A and towards the minimum subsidy for income B.

Graph 8. Subsidy amount distribution per income group from 2014-2018

	INCOME A					INCOME B					INCOME C		
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016
-20 Thousand	21%	0%	0%	12%	0%	36%	0%	0%	85%	100%	22%	0%	0%
20-40 Thousand	0%	1%	0%	0%	3%	39%	1%	0%	6%	0%	0%	3%	0%
40-60 Thousand	77%	44%	0%	55%	52%	24%	97%	79%	4%	0%	78%	46%	36%
60-80 Thousand	2%	55%	100%	33%	45%	1%	2%	20%	5%	0%	0%	51%	64%
+ 80 Thousand	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Such distribution pattern is rather contradictory because it seems to follow an opposite logic. To discuss this let's focus on the fact that the program is broadly divided into two periods, the first one which enjoyed of more founds from government (2014-2016) and the second with a

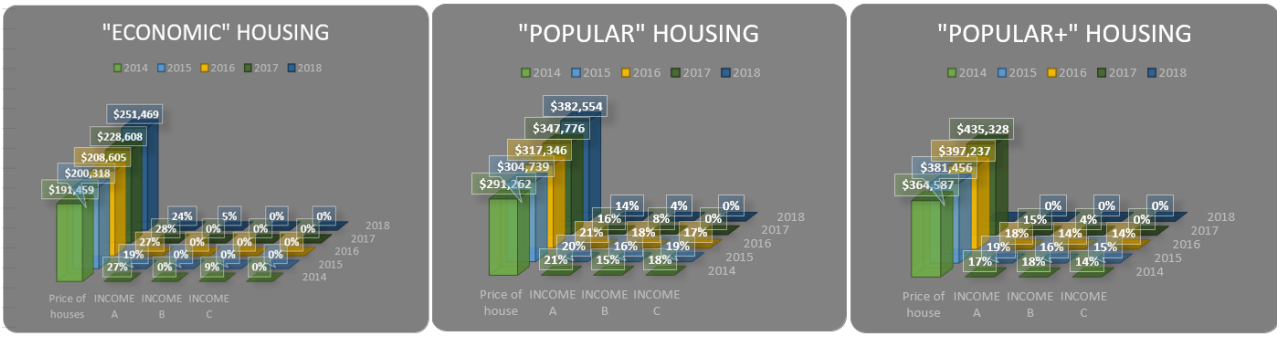
reduced budget (2017-2018). The first period follows a pattern that seeks to heavily subsidize households, regardless of their income. Conversely, the second period withholds from granting large subsidies, in favor of reaching more people with smaller amounts. This lack of consistency has further implications on equity and access among groups in time and moreover, it defies the main objective of the program which is to support the low-income to have access to a house. This was also highlighted by respondent 1:

> "*There is a clear lack of agreement upon the target population intended to be supported. The root of this alterations is linked to the fact that politically there is a set of goals assigned at the beginning of each year (e.g. number of houses, number of subsidies) and the programs often try to fulfill the materialization of this numeric goals*"

As a result, the justification of the subsidy program becomes rather ambiguous because before following the rationale of "subsidies as support" they perform as "subsidies for control" striving to fulfill the determined government objectives as King (2015) suggests (see section 2.5).

The layout of the subsidy impact on the overall of the house-price is graphically represented on figure 16. The average amount of a subsidy granted to each income category is compared against the average house-price type available for subsidy. Based on the below depicted scenarios, low-income subsidized home-owners that acquire an "economic" housing solution are the most benefited group from the program with a housing coverage of almost 30%, nevertheless as discussed before, this particular case of subsidized households reaching for this option occurred seldomly until the last two years (2017-2018). Instead, subsidized income A that acquired popular and "popular+" [28] type of house aided to complement an average of 20% of the house-price although gradually decreasing in time. Subsidized Income B and C on the other hand did not utilize the grant to buy "economic" houses and instead seem encouraged to buy more expensive houses "popular" and "popular^{+}" as their ability to pay was enhanced up to 18% and 14% correspondingly during year 2016 only. Nonetheless, coverage for both higher income groups is dramatically reduced by the end of the period (2017-2018) attributing merely to 4% a "popular" house for income B and support for income C disappears after 2016.

Figure 16. Affordability scenarios for different income groups and house-price



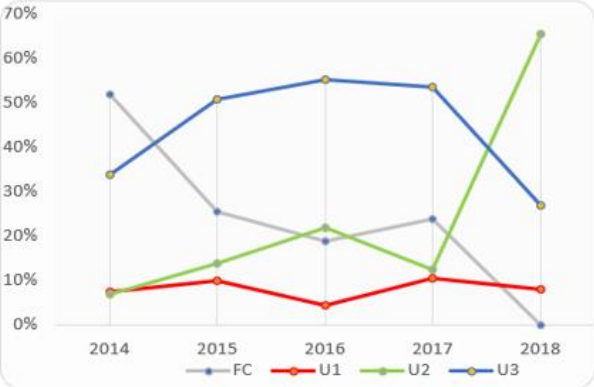
[28] Popular and Popular^{+} type of house are aggregated into one category on the analysed databases hence for this exercise the most expensive houses are matched with the latter.

Location

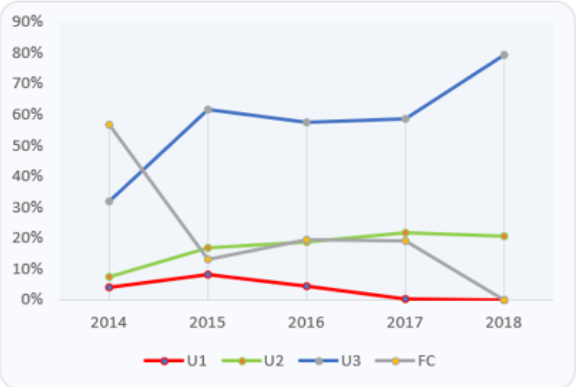
After discussing to what extent subsidies are enhancing the ability to pay of different income groups it becomes relevant to identify and link this aspect with the physical location in the city in line with each of the PCU's. For this purpose, two different databases were analyzed: 1) information collected from RUV regarding the new housing supply approved to receive a subsidy based upon the complying with the ROP criteria and 2) information provided by the municipality of the real number of subsidies granted by each of the perimeters. Both scenarios were compared, and the interpretation of the results is discussed below.

From Graph 9 there are two main results worth to mention. First, pertaining the housing approved for subsidy located outside the perimeters "FC" or "*Fuera de contorno*" shows an abrupt drop from 57% to 26% during the first year of the program but interestingly enough this percentage opposite to what could be expected does not reach 0% until year 2018. This issue was brought up to one respondent currently involved in the subsidy program and on this matter he responded that according to the ROP projects and new houses located inside the PCU's are prioritized and have access to the full maximum subsidy available, however during the first years of the program (from 2014-2016) he mentioned that the possibility to build outside the perimeters remained available with access to a minimum subsidy ("of course strictly complying with adequacy standards") because it was believed that an abrupt approach would negatively impact the overall economy, and it is only until 2017 when the introduction of "no exceptions" rule was adopted. Secondly, the graph shows that aside from the U3 preponderance of most approved houses for subsidy, a significant percentage of authorizations on U2 particularly outstands, especially when comparing such with the real subsidy allocation discussed next.

Graph 9. Housing approved for subsidy among PCU in Morelia City



Graph 10. Real distribution of subsidy among PCU's in Morelia City



Source: Elaborated with SNIIV and RUV

The real distribution of subsidies depicts rather a different scenario (see graph 10). With the exception of housing on "FC" which shows a better performance than expected showing an evident decrease of subsidies granted to build houses in the city outskirts after the first year of implementation[29] dropping from 57% to 13% and even while towards 2017 it slightly increased to almost 20% never did the majority of the subsidies were allocated outside the perimeters. On that matter, respondents involved in the real state remark that the reform influenced and changed their market strategy approach:

> "*it really affected the way we planned and bough land for residential use, we had projects to develop on land we owned between Morelia and Capula (adjacent municipality) and after the*

[29] The PCU's were established first on 2012 however they were not regarded as a requirement of CONAVI to grant the subsidies until the introduction of the reform on 2013 and enforcement on 2014.

reform we had to use it for industrial development, so it's been a couple of years since we are no longer buying land outside the perimeters, just in case"

Similarly, another respondent that previously worked in the land acquisition department for one of the biggest real estate developers of social housing in the state, mentioned that the set of regulations from CONAVI enacted as a watershed for project location planning and by default available plots offered to them outside the perimeters ceased to be considered. Instead, a rising incidence of subsidies allocated for houses in the buffer zone "U3" portrays a transition of the housing supply from "FC" towards this perimeter almost as a mirroring pattern, reflecting developer's willingness to qualify their stock for subsidy.

Perhaps the most remarkable fact that arises from the comparison between both graphs is the mismatch between authorized subsidies in perimeters U1, U2 and the real distribution of subsidized houses. The percentage of subsidized homeowners on perimeter U1 on 2014 although it was small (8%) consistently dropped during the program duration reaching 0% on the last year which based on the opinion of developers and field experts is attributed to the increase of price on land for housing in this zone after the reform. It is interesting to see the high percentage of housing approved for subsidy in U2 particularly towards the end of the program compared to the low performance observed in the executed allocation, thus this indicates these dwellings are being reached by a different sector of the population. Despite that, the fact the housing market dynamics on U2 show a positive slow but steady increase cannot be ignored. Based on these results, developers that have successfully managed to build social housing at affordable prices in this location were consulted and questioned regarding their approach. Respondent 9 currently involved in real state shares the following:

"*We are trying to provide housing for subsidy holders, but land is expensive and scarce in the delimited areas, as twice as much as we pay to build in U3, with those prices we cannot build houses targeting only the low-income because also the housing prices are capped, so what we have done and continue to do is that we plan for mixed-income neighborhoods for low and middle-income in such a way that in the end its us who are implicitly cross-subsidizing social housing*"

This strategy is rather unusual as it resembles the principles of inclusionary housing or mixed neighborhoods described by Angel (2000) and Webb (2012) nonetheless in this case completely voluntary. In order to be able to achieve this, real estate agents expressed that large-scale projects planned on a long term are needed.

Another yet to be discussed pivoting factor that challenges the development of affordable housing in intra-urban locations is the lack of coordination and coherence between Federal-Local plans. The implementation of the national housing plan (PNV 2014-2018) as explained in section 4.1 stipulates the mechanisms and strategies in order to achieve a set of forecasted goals. Main concerns of this plan consist on enhancing backward housing, quantitative and qualitative deficit, organizing urban development growth and consolidating the cities by means of densification, thus currently the restriction of finance and subsidies for housing outside of the PCU's. Nevertheless, land use planning regulations are managed by the municipalities and often this represents a barrier and a reason why more than often such National programs and regulations suffer changes and exceptions at the local level.

A good example of the implications of this was given by a Respondent 7 currently involved in the development of social housing projects:

"*We were considering to buy a plot of land located in U1 near the city center planning to build social housing, however the current local regulations only allowed us to build 70 houses per hectare, plus the allocation of parking space for the residents and additional parking space for guests, all kind of requirements that make no sense so in the end we couldn't succeed*

to build targeting the low-income, moreover we sold houses as twice as expensive to medium-upper income. So, in my perspective it's a matter of public policy, and the municipal codes and regulations should be aligned to effectively support national policies."

In general, academics and field experts applaud the federal planning intervention that the country compulsory needed and there is a general agreement that it has effectively contained cities in Mexico contributing to better located housing solutions, however changes on land uses that occur at the local level are highly criticized and signify a main barrier to control that public funds indeed reach the defined perimeters as they constantly suffer from spatial modifications. Additionally, the perception of the main aim of the program is distorted, one of the respondents working for the municipality said "*It is not a housing program, it is a housing finance program"* this conviction is in turn the root of local planners yielding under real estate developers pressure to approve and convert land use plans to build in far locations where they already own land or aim to get it, bilateral to the interest of the municipality to maintain a steady housing supply.

4.4.2 Adequacy

"*Mexico the region of home-owners" (Rojas, 2016)*

This statement helps to provide some context of the overall situation which is indeed observed in the city of Morelia. It is well known that those that ever are financially supported either by a credit or a subsidy or both will most likely seek to buy a new house and the fact that up to 80% of the subsidies are requested to fulfill this desire is enough to back that up. Owning a house is deeply culturally embedded and this fact has a very close relationship with the type, location and characteristic of the dwellings that people buy. The tradeoffs of the housing characteristics of a dwelling and its surroundings that users are willing to accept in order to own a home become clear.

4.4.2.1 House size

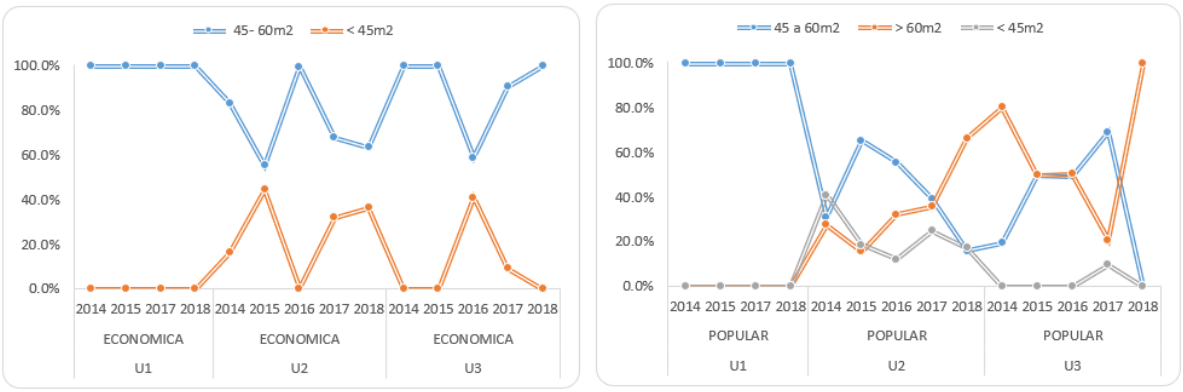
On 2013 the Federal government established on the National policy a minimum area of 40m2 for the new constructed houses in order to "increase the quality of life of the residents". Additionally, the INFONAVIT has implemented a regulation of a minimum two-room availability, and developers must comply with these parameters in order to receive a loan, hence a subsidy. An increasing tendency of bigger houses supplied in the city is observed based on the average dimensions registered during the program and the smaller size category shows a steady decrease after 2015.

To provide a complete panorama of the house-size situation, Figure 17 further depicts the variations on the size of the houses "Economic" and "Popular" type depending on the location of the city. The analysis reveals that "Economic" housing rarely exceeds 60m2 and the few exceptions were disregarded as they are not part of the subsidized categories. Interestingly enough, the economic type of house-size located in U1 does not range on the smallest dimensions as it could be expected, instead 100% of this type of houses are built with an average area of 45-60m2. Perimeters U2 and U3 host smaller "Economic" housing size as shown in the graph, however this pattern seems rather erratic and does not seem follow a consistent trend, and in all cases do not represent they main type of house that subsidized users acquire.

The "Popular" type of housing on the other hand has a wide range variation regarding size. From this type of house there are two things to highlight: 1) the number of houses ranging on the smallest category is rather low in all perimeters. Houses between 45-60m2 and bigger than

60m2 which comprise the majority of the cases show an increasing frequency the farther they are located from U1 locations. According to information provided by respondents involved in social housing development projects this tendency takes place for two reasons, first because of the availability of land and second to compensate a less optimal location with a bigger house-size that will reflect in the final price of the house and still be attractive for the market.

Figure 17. Economic and Popular house size vs PCU

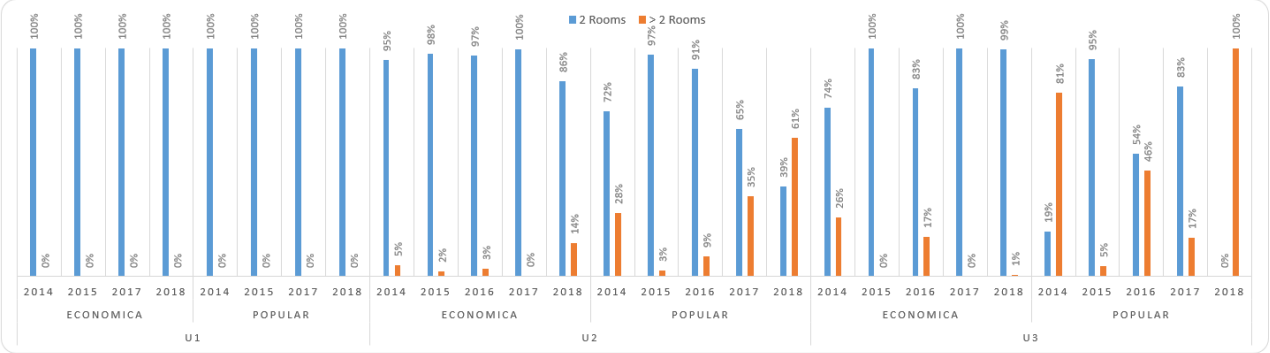


4.4.2.2 Number of rooms

Aside from the house-size, the number of rooms is deemed as an indicator of housing adequacy. Based on the national standards, over-crowding occurs when the number of house-members divided by the number of rooms equals or is bigger than 2.5. Following up on that, the average number of residents per house in the municipality is 4.0 and has remained constant (ENVI, 2014-2018) The latest ENVI (2016) survey reveals the highest percentage of subsidies were granted to families composed from 3 to 5 residents. Consequently, the number of rooms per type of house and by location was analyzed (see graph 11). The results show that with seldom exceptions, "economic" type of houses register only two rooms during the studied period despite the location of the house. Subsequently, "popular" type of houses resembles the same pattern of economic houses located in U1 however they do present a larger percentage with more than two rooms specially in location U2 where a steady increase can be observed from year 2015.

As a result it can be argued that subsidy holders must analyze the opportunity cost of finding a house that allows less crowding conditions, however having to renounce first on a less expensive solution if they prioritize this conditions, but more importantly they have to give up on better locations, perhaps this is one of the reasons why the majority of subsidies are distributed among "popular" type of house as it better fulfills the needs of home-owners.

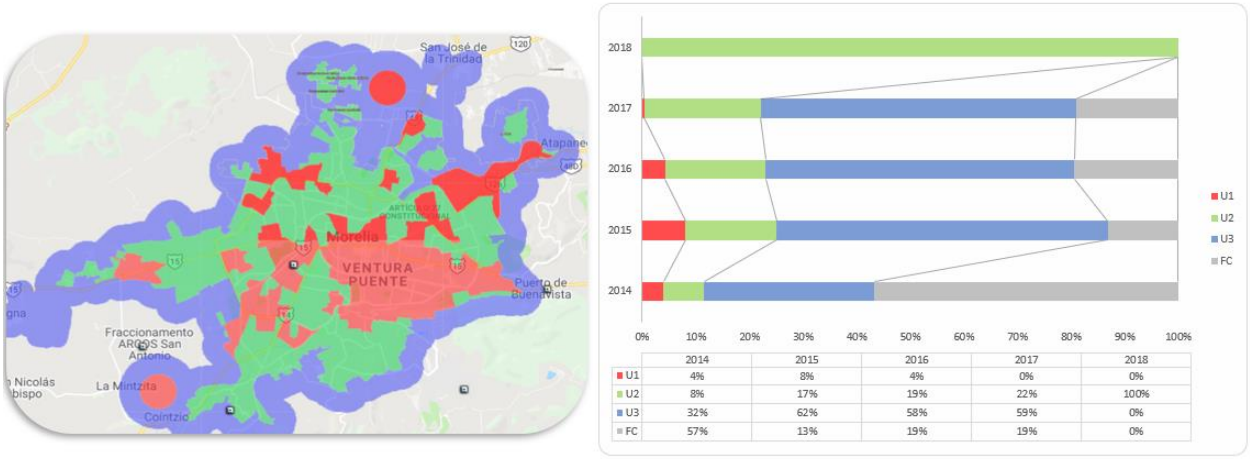
Graph 11. Number of rooms of House vs location



4.4.2.3 Subsidized housing service provision

As discussed in section 4.1 the location and provision of services are the most valued attributes for the subsidy grading system. The provision of basic services of the subsidized dwellings was inferred in the first instance from the polygon itself based on the information provided by the Municipality (see figure 18). According to the results, the share of subsidy holders who have acquired a house on a fully serviced location (U1) is limited and the trend does not show a positive development over the years. Instead, most of the supported households have systematically opted for housing solutions located in the buffer zone U3 where coverage of basic services such as water, electricity and sewage is not greater than 75%. This becomes rather preoccupying considering that half of the subsidized population found a housing solution in these areas. Consequently, an average of 20% of the supported population from 2014-2017 has been hosted in areas with service coverage greater than 75% corresponding to "U2" perimeter which must always be contiguous to "U1" zones hence households located in this areas enjoy a better proximity to jobs and service facilities than those in U3.Alternatively, it is fair to mention that the share of subsidy holders located in poorly serviced areas (FC) has significantly decreased since 2014.

Figure 18 . Services and Job proximity based on PCU distribution in Morelia City



	2014	2015	2016	2017	2018
U1	4%	8%	4%	0%	0%
U2	8%	17%	19%	22%	100%
U3	32%	62%	58%	59%	0%
FC	57%	13%	19%	19%	0%

4.4.2.4 House and environment adequacy

The previous section mainly describes an approximate service provision coverage of the subsidized dwellings based on the geo-referential measurement system used by the CONAVI, however it is possible to also include the overall evaluation of the development environment and the perception of the subsidized households that have inhabited the dwellings for at least two years making use of the information gathered by the INFONAVIT. Additionally, the main developers that build social housing for the subsidized population in the Municipality were identified and their participation on the market is summarized in table 8.

Table 8. Principal Social housing developers in Morelia City

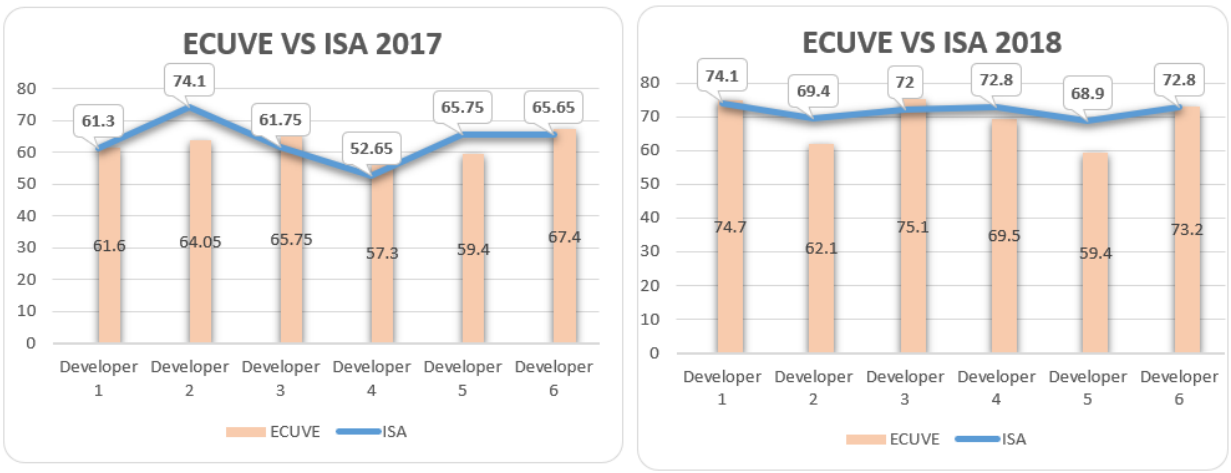
Year	Developer 1	Developer 2	Developer 3	Developer 4	Developer 5	Developer 6	Others
2014	52%	12%	11%	8%	0%	2%	15%
2015	54%	15%	9%	6%	7%	6%	2%
2016	49%	17%	7%	10%	12%	2%	3%
2017	42%	16%	17%	5%	1%	0%	19%
2018	58%	14%	8%	10%	10%	0%	20%

Source: Elaborated by the author with information from the SNIIV

The objective and subjective evaluation by the house holds of the dwellings supplied by the main developers exposed in the previous table is further integrated and compared in Figure 19. The information used for the comparison was obtained from the official online site of INFONAVIT where the information regarding ECUVE and ISA is presented by state at developer level in a quality index rating from 0-100 scale being 100 the maximum possible score to obtain and 60 the minimum satisfactory average score (see annex 2, table 12).

The results available from the last 2 years show that the assigned score of most of the developers barely meets the satisfactory average for both the real measured attributes and the perceived quality from the households on year 2017 (which evaluates the performance from the period 2015-2017) and it is interesting to see that in some cases (developer 2 and 5) households perception of the overall quality of the dwelling is better off than the one assigned during the appraisal. It is important to relate these results with the share of the market that developers hold, for example developer 6 has consistently got the best scores during a 4-year period as a result of their well-located environment-integrated projects however the subsidized population they have assisted comprised the smallest percentage during years 2014-2015 and currently they are no longer targeting the low-income as a result of the uncertain subsidy availability, hence the high score observed on year 2018 reflect the better quality of projects that target higher income home-owners, naturally better located and serviced.

Figure 19. Objective and subjective evaluation of subsidized dwellings in Morelia City



Source: Elaborated by author with information from INFONAVIT

4.4.3 Accessibility

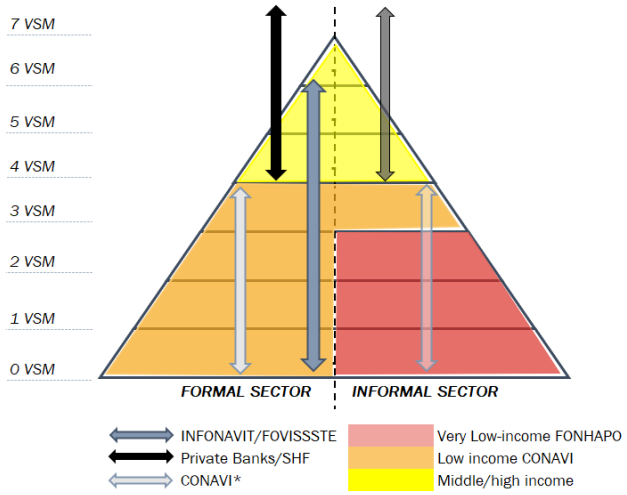
> *"Housing subsidies must be recognized as necessary when it comes to reducing economic inequalities across regions, seeking to find an equilibrium. They should not be permanent, they are not a compassion gift for those who have less resources, they are a mechanism that evens development and thrives the capacity of those that the market has provided with less*

opportunities. They should be regarded as a tool to boost local economies aside from the quality of life from the beneficiaries" (respondent 4, 2018)

The equitable aspect of access to subsidies has several times been brought up into the discussion previously in this research. In this section, a correlation of the findings regarding the different subsidized income groups, gender, age and location is exposed.

To begin with, the fact that access to finance and subsidies in Mexico is limited for the informal economy and for the those in most need, cannot be stressed enough when equity is being discussed. The focalization of different institutes and programs based on the economic sector and their income is portrayed on Figure 20. As depicted, the population is broadly divided into two sectors: formal and informal, which becomes the first legal filter of access, since the largest housing institutes that provide housing finance support do not cover the informal share and private banks do not show a high interest or trust in this sector. Further, because the subsidy program only contributes to those with access to credit a double barrier lays in between the informal and formal sector. Secondly, the CONAVI subsidy program targets both formal and informal sector, however access to subsidies to those who belong to the informal seems diminished by the lack of reliable agencies that provide funding instead of INFONAVIT, FOVISSSTE or ISFAM. The current situation hence, including the PCU reform and the housing development program are managed and designed for the formal economy.

Figure 20. Housing finance formal vs informal sector



Having established that, the discussion of the influence of subsidies on accessibility from the economic, spatial and demographic perspective is presented below.

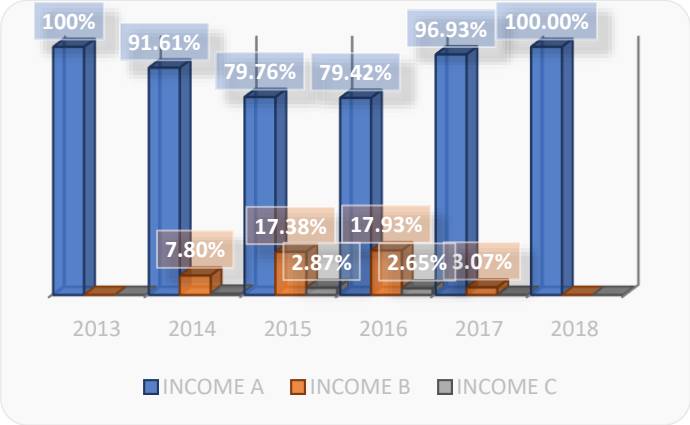
4.4.3.1 Economic

The analysis of subsidies presented in section 4.1.2 allowed to understand the target population and the program outlay among income groups and through the program modifications. Basically the shape of the subsidy program intentions was discussed then, and now the implications on accessibility are laid out.

On a first instance results show that the subsidy program has effectively prioritized the lowest income group consistently in time and to a great extent in kind, providing them with the highest coverage percentage. Followed by this, during years 2014-2016 access to subsidies for income group B and C was allowed hence an evident alteration of the distribution of the public

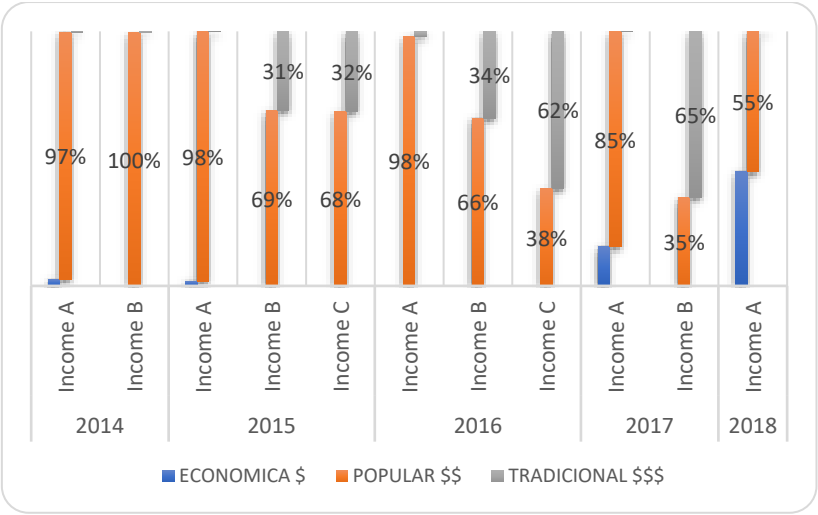
resources is observed (see graph 12). After the target income modification increased the possible population, almost up to 22% was captured by higher income participants.

Graph 12. Distribution of subsidies based on income



It has also been argued that subsidy programs that target only the lowest income generate an income gap for the people who cannot either qualify for a subsidy neither for enough credit to acquire a house. Findings of this study show that subsidized higher income B and C have utilized the grant to purchase more expensive houses up to 62% on year 2016 (see graph 13). Consequently, the criticism that arises from these results is not founded on the fact that subsidy receivers have acquired a more expensive dwelling, but to the fact that with a higher ability to pay they received the same treatment than the lower income group. A contrasting scenario can be observed during year 2017 income B were granted with subsidies 70% shorter and yet 65% of them managed to purchase more expensive houses, reflecting a fair distribution of the resources based on the real need of the different income groups.

Graph 13. Housing solution accessed by the subsidy holders



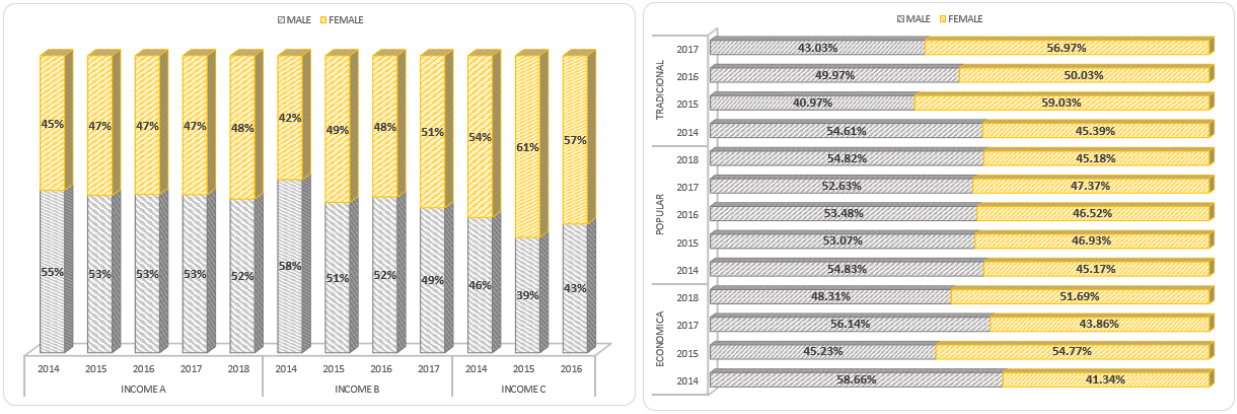
4.4.3.2 Demographic

This section discusses the findings that regard to the relationship between income, type of housing, and the amount of subsidy allocated based on the gender and age of the supported population.

The correlation of access to subsidies based on gender shows that generally, the male population has predominantly received more subsidies through the program. This occurs partly because the cultural role that the man performs in society, while this does not mean that women don't work, they often do so in the informal sector of the economy, increasing chances that more man will be the ones asking for a subsidy to complement a credit.

Through the program female subsidized home-owners from income A and B received in all cases less subsidies than male, however leaning towards a more even distribution in both cases by the end of the period (see figure 21). An opposite trend is observed for the female subsidized income C whom were granted with more subsidies than male. Despite the previous, it is important to remember that most subsidies were accessed by income A to purchase a "popular" type of house and according to the results, male population has maintained a consistent share of the subsidies average of 9% greater than female households.

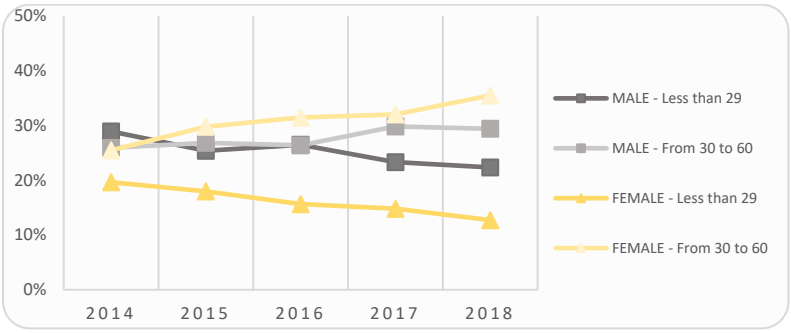
Figure 21. Subsidy allocation based on gender, income and type of house



Subsequently, the subsidy amount distribution granted to male and female was analyzed (see annex 2, figure 23 for detailed description). In terms of equitable access to the size of the grants, the results exhibited reveal two things: firstly, that female households have received heavier subsidies during the whole period and secondly that more male have been reached, nonetheless often with smaller grants. Additionally, a clear shifting pattern can be observed on the distribution diagrams bellow, notice how years 2014-2016 depict a concentrated frequency along the highest subsidy ranges as opposed to the last two years of the program which present a scattered distribution ranging from the smallest to the largest grants.

In terms of age the subsidy distribution shows a clear prioritization of older groups ranging from 30-60 years for both male and female however more acute for female subsidized participants towards the end of the program, resulting in older woman having greater access to subsidies than younger ones (see figure 22). Additionally, adults older than 60 years old did not receive subsidies for accessing a new house solution, as it is deemed that this sector of the population already owns a house and the subsidies that they reach for are oriented to improve or rehabilitate their dwelling.

Figure 22. Subsidy vs age



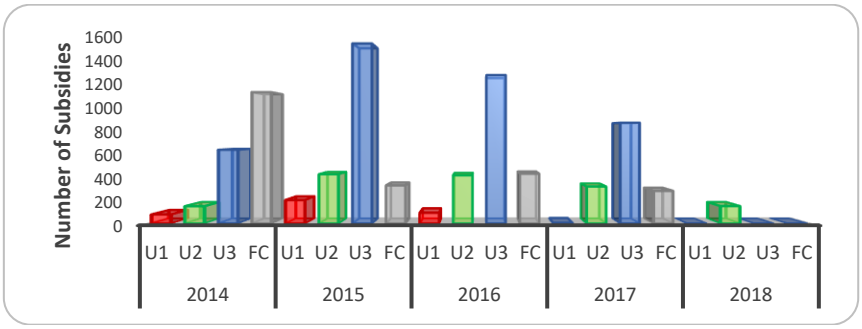
Additionally, accessibility to subsidies for vulnerable and disabled groups is not established in the program regulations, in that sense the program administration department adds that in the past subsidies were prioritized to cover for such groups however, it was complicated to monitor the reliability of applicants, and for this reason income became the main indicator from the demand side to allocate the subsidies.

4.4.3.3 Spatial

> *"The criterion of the just city is not the extent to which there is scarcity but how scarcity is distributed" (Brenner, Marcuse, et al., 2012, p.188)*

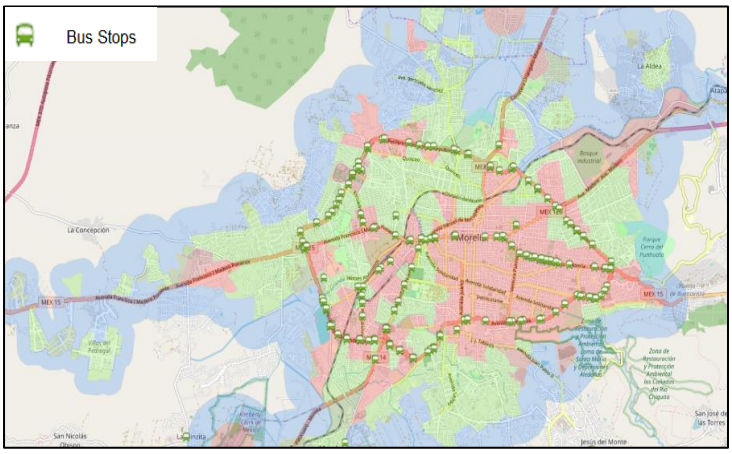
The panorama of the subsidized housing based on the information provided by the municipality by each year is depicted in Graph 14. Without any further categorization of the income group, gender, age or type of house-price obtained with the subsidy, broadly speaking the spatial distribution observed shows a concentrated tendency towards the buffer zone "U3" and to some extent in perimeter U2. These results isolated could be meaningless if the proximity to services, jobs and infrastructure was not compromised, nevertheless it is.

Graph 14. Subsidized housing location



For instance, the public transportation service of the city is highly oriented to serve central locations, as shown in Image 1 the system network depicts a ring pattern along the "periferico" road and it is noticeable that the transportation service beyond this ring is rather poor, especially towards the buffer zone "U3" where most of the subsidized dwellings are located. Moreover, health centers, schools, markets and shopping centers manifest a heavy concentration on the city center (see annex 4 image 7, 8, and 9). Based on the service distribution before discussed it can be said that subsidized home-owners are not being supported to access the city but to access a dwelling detached from the city itself. This becomes relevant because it affects household mobility and affordability as a result of households having to allocate a share of their non-housing expenditure on transportation, and moreover it jeopardizes housing adequacy.

Image 1. Bus stop distribution in Morelia City



Source: INEGI and RUV

Chapter 5: Conclusions and recommendations

Providing access to housing for different income groups represents a major stress of cities in both developed and developing countries, nevertheless the approach to tackle land and housing market inefficiencies vary among countries. In Mexico, over time an array of diverse solutions and mechanisms to support the low-income population to access affordable housing have been implemented, however perhaps the most popular during the past decade has been the provision of subsidies to reduce the housing consumption costs. The purpose of this thesis was to understand and explain the relationship between government subsidies provided to the low-income and to what extent they influence equitable access to social housing, in terms of affordability, adequacy and access to the city of Morelia

5.1. Conclusions on the research sub-questions

1. How are subsidies contributing to social housing affordability for the low-income?

This sub-question will be addressed based on the results pertaining the four evaluated components. The conclusions are presented below.

To begin with, findings concerning the price of the houses revealed an interest dynamic derived from the subsidy availability. The results suggest that the program regulates the housing-prices for two reasons: to ensure that the subsidies can effectively enhance affordability for the low-income and secondly, to ensure that subsidy holders receive the grant in accordance to their income. This in turn has prevented developers from controlling the market price and instead perform as price takers, in this case not as a result of a free locational competition in the city as Saiz (2010) suggests, but seeking to comply with the authorized selling price by the program. Nonetheless, the results reveal that within the house-price authorized categorization, developers have consistently supplied the higher-range priced type instead of the "economic" type, an outcome expected by King (2015) and Hoek (2003).

The second conclusion is related to the income of the subsidy holders. The analysis of the historical nature has allowed to compare the effect of the subsidies on affordability under the changing program regulations. The results corroborate that the main income subject of receiving a subsidy corresponds to the lowest-income group ("A") through the program, however, the support that has been granted has not been consistent and this has affected the overall affordability in two different ways:

1. Firstly, during the initial part of the program (2014-2016) the provision of larger subsidies helped to bridge the affordability gap of the lowest-income group while the budget was vast, covering up to 20% of the medium price house type, enhancing the ability to pay of higher income groups ("B" and "C") earning as twice as the original target population as expected by Salvi Del Pero, Adema, et al., (2016).
2. The price control that developers must adhere to if they want to match the subsidized low-income ability to pay to sell their houses prevents the need of larger subsidies to bridge a continuous growing affordability gap explained by Davies (2008). Nevertheless, the abrupt subsidy amount diminution by the middle term of the program decoupled from the house-price control modification, resulted in a reduced affordability

coverage of the total housing-price (up to 14% in the best case scenario) hampering the ability to pay of the low-income by filtering "the best of the worst".

Finally, the implications on housing affordability from linking the subsidy provision to the spatial location demarcated by the PCU's are twofold: first developers have been effectively discouraged from building housing outside the perimeters (FC), however the availability of larger subsidies in intra-urban locations U1 and U2 has not been a sufficient to drive the supply towards the better located areas. Instead affordable housing projects have shifted towards the buffer zone U3 as a result of the land prices increase in central locations. The latter has affected the subsidized households overall affordability as they are being pushed towards the urban fringe, adding an economic burden manifested in an increased transportation expenditure of households, an outcome deemed as unaffordable according to Litman (2018).

2. To what extent are subsidies promoting social housing adequacy?

As previously discussed, the subsidized housing supply location has been improved compared to the previous programs which allowed households and developers to agree on disconnected poorly serviced areas outside the perimeters encouraging a supply shift towards moderately better serviced locations. As a result of developers seeking to build affordable housing for the low income, and the continuous struggles that they have faced to build in central locations, most houses built for subsidy holders end up located in U3. Adequacy hence comes at a cost as King (2015) states, in this case the sub-optimal serviced areas in terms of basic infrastructure and jobs, an outcome observed by Whitehead (2017).

The main conclusion on the adequacy aspect refers to a critical trade-off that subsidized households seem obliged to accept with regards to the housing they are able to afford. On the one hand, the physical characteristics of the dwellings such as size and number of rooms comply with the minimum standard regulations deemed as adequate by Cai (2015).

On the other hand, the information revised on the subsidized home-owners evaluation of the qualitative conditions depicts a low satisfaction among households with regards to the housing environment and service provision, in contrast to the positive evaluation of the physical conditions of the dwelling.

3. To what extent does the provision of subsidies enable equitable access to social housing?

The conclusions on equitability are split based on the findings approached by the level of component evaluated.

The first conclusion is related to the income of the subsidized households. The identified program modifications depict a clear misunderstanding on the rationale behind the subsidy implementation. In principle, the law and the program regulations sustain that the provision of subsidies shall be equitable, however, the results exhibited an equal treatment on the distribution of the resources among the different income groups while the program population scope was extended (2015-2016). Moreover, the outcome of enhancing access with public resources of households with moderate higher incomes and access to alterative financial support seems rather controversial because it does so in detriment of those who don't. In that sense, the distribution of the grants is considered unequitable as it enabled access of those who were economically better off from the beginning (Fainstein, 2010).

In contrast, towards the end of the program the results show a radical shift on the strategy to enhance low-income housing access mainly driven by two factors: 1) the access deselection of higher income groups (2017-2018) and 2) the intention to reach the largest possible number of low-income households through smaller grants. Consequently, accessibility seemed again hindered, this time economically as a result of the subsidy amount reduction at a moment when the struggle to acquire better located houses due to present market distortions that the program itself had help nourish was not unknown. Hoek-Smit and Diamond (2003) support the idea of assisting as many eligible households as possible on the same income bracket by avoiding "excessively" large subsidies in order to enhance horizontal equity, nonetheless, based on the observed results it can be argued that expanding accessibility to increase the subsidized population has in turn jeopardized affordability because the elements in place of the program, such as the house-price regulation and market constrains were not modified to match the new approach.

The second conclusion has to do with access to housing regarding gender. The results portray a progressive scenario for male and female subsidized households, while a larger number of male has been consistently subsidized over the program, female subsidized households have however had access to larger subsidy amounts. Based on this fact it can be said that subsidies enable equity among genders as they respond to a lower ability to pay of female households paired with a heavier subsidy and the reach of a larger number of male households with smaller grants.

Thirdly, in terms of age the financial support has mainly been granted to households ranging from 30-60 years old which conform the stable active sector of the population that demand subsidies for new houses. Prioritization of vulnerable groups and disabled aside from the low-income is not considered in the program target population.

Finally, the relevancy of availability of land and the implemented restrictions have had a central effect on accessibility in terms of the location of subsidized housing. An undeniable consequence of the PCU zoning implementation has been the increase of land prices on intra-urban locations U1 and U2 and consequently housing has become more expensive resembling the scenario suggested by Ihlanfeldt (2007). As a result, three contrasting outcomes regarding location accessibility were identified:

1. The increase on land prices has been paired with developers' housing production costs, promoting the sprawl of affordable housing development as far as the virtual boundary U3 permits it, constraining access of subsidized households to the city services and infrastructure as stated by Blais (2011).
2. Secondly, some developers' have ceased to produce housing for the subsidized low-income population taking advantage of the increased value of land that they already own, or as a consequence of local planning restrictions which have discourage them from to continue targeting the low-income.
3. At last, land price increase has unexpectedly led developers' to plan their housing projects based on a mixed-income target population (see Calavita and Mallach 2009) to build on better located areas in such a way that they fulfil the program regulations, capturing a share of the subsidized population that in turn is cross-subsidized by the higher-income groups within the development , successfully enabling the low-income to access locations that they would otherwise not be able to afford.

5.1.3. To what extent is the provision of government subsidies to home-owners influencing equitable access to social housing in Morelia City? - conclusions on the main research question

The previous set of conclusions depict a complex and inconsistent scenario with regards to the effect of government subsidies on equitable access to social housing. In theory, the subsidy program intends to influence equity by delimitating "who gets what-where" aligning a set of tools to encourage a better located, adequate-affordable supply, however, in reality equitable access is hampered by the local land and housing dynamics which are not considered for the implementation of the subsidy, and instead the benefits of the intervention are read as a trade-off that burdens the low-income. Additionally, findings suggest that the program constant modifications spur new forms of inequity, ironically while attempting to enhance access.

The discussed findings led to the overarching conclusion that government intervention has indeed "stimulated the low-income to access a housing" by reducing the consumption costs but this contribution is disjointed from adequacy and access to the city. Subsidy holders are expected to be able to choose a house, and developers are expected to be encouraged to supply within better located areas, the one-size suit approach that government has implemented to strive equitable access for the low-income through the location regulations has merely consolidated the provision of social housing in areas that are "the least of the worst" and has bilaterally distorted the housing market elasticity increasing the prices as Glaeser (2008) asserts. In fact the among the possible scenarios that the author describes with respect to who captures the subsidy, he deems the worst when suppliers are the ones benefiting, however based on the findings of this research it could be argued that just as bad is the case where neither suppliers or consumers benefit as depicted in Morelia city.

> *"A pro-equity program favours the less well off more than the well-to-do. That is, it should be redistributive, not simply economically but also, as appropriate, politically, socially, and spatially" (Fainstein, 2010, p.36)*

5.2 Relevance of the main findings

Even though the findings of this study are context related, the identified outcomes derived from subsidy intervention contribute to the overall understanding of how land and housing actors react to location conditional grants. The comparative scenario analysis that under changing regulations further expose the consequences of the lack of consistency on both the target population and subsidy availably not necessarily encourages housing suppliers, it can instead generate uncertainty among developers, hindering the intervention efficiency.

Bearing in mind that the case study was conducted in a city where the social housing market that serves the subsidized low-income is to a great extent monopolized and the availability of intra-urban land for residential development is scarce, conducting research on contrasting scenarios as well as in bigger cities would further enhance panorama on the subsidy allocation recent approach governed by the land zoning regulations.

Additionally, the outcomes of this study could be used to compare a study that evaluates access to housing of non-selected low-income groups to assess whether the program is spurring inequity among the most in need.

5.3 Lessons learnt and Recommendations

The provision of subsidies to support the low-income have been present in the country for almost two decades now, programs have evolved and suffered modifications paired with national development objectives. So far, there is little effort to understand what causes housing affordability struggles in the first place. Program constant modifications expose the lack of clarity on who to support hence it is strongly recommendable that housing supply and demand are studied prior to intervention as Hoek (2003) suggests.

As previously discussed, the current mechanism implemented to designate the subsidy distribution, the "Urban Contention Perimeters" has been enforced along cities in Mexico without further consideration of neither local planning regulations, availability of land or the housing market dynamics. The delimitation of the perimeters is rather broad, and it leaves room for speculation, which in turn increases land prices that affect not only subsidized households and developer's that supply them, but also the non-selected program population (Mayo, 1999; Yates 2012). Morelia city is a good example to show how the hazardous outcomes of such top-down regulations. Generally, the rationale behind the method is quite innovative and it can undoubtedly be considered a first step towards more equitable spatial distribution of the low-income households, however, a better practice of the PCU's would be that one which followed ad-hoc regulations at a city level, perhaps identifying vacant available plots in better located areas strictly focusing the subsidy provision there, after all urban densification is part of the national development agenda.

Subsequently, the coordination of national urban development mandates with the local planning development is necessary effectively encourage the provision of affordable housing in better location by removing barriers such as parking and sub-division of land regulations which hamper suppliers ability to execute hosing at affordable prices.

Alternatively, the prioritized location designated areas should come hand in hand with the municipal provision of basic services and infrastructure. The current program favours intra-urban areas with larger subsidies because it is known beforehand that they are better serviced and in turn are more expensive. It is highly recommendable that local government invest in the provision of infrastructure in order to balance the house-price and avoid the scarce supply of serviced areas that increase land and housing prices.

Finally, this research has evaluated the effect of subsidies on equitable access to social housing, nevertheless, the subsidy program under study impedes low-income without access to credit to receive a housing grant. The latter further discredits the extent to which the program promotes equitability hence, it is recommended that the intervention finds a way to include this group.

> *"That is just how policy works. They are designed, implemented and based on the evaluated results they shall be either corrected, removed or continued. The worst practice is indeed not doing anything about it because even that becomes a practice itself" (Respondent 3, 2018)*

> *"Expose, Propose, and Politicize (Marcuse 2007). Expose in the sense of analysing the roots of the problem and making clear and communicating that analysis to those that need it and can use it. Propose, in the sense of working with those affected to come up with actual proposals, programs, targets, strategies, to achieve the desired results. Critical urban theory should help deepen the exposé, help formulate responses that address the root causes thus exposed and demonstrate the need for a politicized response. Politicize, in the sense of clarifying the political action implications of what was exposed and proposed and the reasoning behind them and supporting organizing around the proposals by informing action" (Brenner, 2012, p.44)"*

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Annex 1: Semi-structured interview list of questions

INSTITUTE FOR HOUSING AND URBAN DEVELOPMENT STUDIES (IHS)
ERASMUS UNIVERSITY ROTTERDAM, THE NETHERLANDS
MSC. URBAN MANGEMENT AND DEVELOPMENT

I am **ESTEFANIA ESPINOSA MIRANDA** a student pursuing Msc. Urban Management and Development at IHS, Erasmus University Rotterdam, the Netherlands. I am currently conducting data collection for my thesis to fulfil the requirements of the programme and award of degree. The research aims at explaining the influence of government subsidies on equitable access to social housing in the case of Morelia city. Therefore I would like to interview you to discuss some issues in my thesis. Information obtained will be handled confidentially and will be for academic use only.

Interview Guide 1: Subsidy Program administration department
Name:
Position:
Period in position:
Period in Department:
Questions

Can you briefly explain the mandate of your department?

Can you explain the subsidy allocation process?

What are the minimum and maximum subsidy amount authorized?

Who receives the subsidy household or the developer?

Is the subsidy holder free to choose their housing solution?

Are subsidies targeted to only formal sector workers?

Is there a specific prioritization criteria in terms of equity (e.g. vulnerable groups, disabled, etc) considered for the subsidy allocation?

What are the minimum quality standards stipulated in the program regulations?

Is the subsidy amount calculated to match the house-price among different municipalities?

Why do the program regulations keep constantly changing over the years?

Who is in charge of approving and modifying the program regulations ROP?

Why has the total amount of subsidies been decreasing?

Is there an official registry of the spatial location of the subsidized housing in the city?

Do developers receive an additional incentive to build affordable housing, (e.g. tax exemptions, provision of land, and so on?

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Interview Guide 2: Real estate agent
Name:
Position:
Period in position:
Period in Department:
Questions

Can you briefly explain about your work as a Social Housing Real Estate Agent?

Can you explain the land prices trend between 2013-2018 within Morelia city?

What is price settling process that you follow?

What is the target population of your housing development projects?

To what extent do your housing projects rely on government subsidies?

What has been your strategy to face the subsidy reduction that has been taking place?

What are the house-size dimensions of the low-priced developments?

Can you briefly explain what has been the impact of PCU reform has had in your housing development projects?

Have you been able to build housing for the low-income in locations U1 and U2?

Can you mention the local planning development constrains to build in central locations?

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Interview Guide 3: Field experts and Academics
Name:
Position:
Period in position:
Period in Department:
Questions

Can you briefly explain your experience/involvement on social housing for the low-income?

What is your opinion on the PCU reform implementation that took place on 2013?

Has the reform had an impact on the housing supply for the low-income in terms of quality, location and affordability?

To what extent do finance mechanisms such as subsidies influence quality of the materials, house size and basic services?

How has the housing national plan promoted access and right to the city for the different income groups?
Can you explain what is the coordination process among government levels with regards the PCU regulations?

Annex 2: Additional program information

Table 9. Housing Policy structure after 2013 reform

DOCUMENT	ESPECIFICATIONS
The political constitution of the united Mexican states.	Each and every Mexican decent, decorous housing. The law will establish the necessary instruments and strategies necessary to accomplish this objective.
Housing Law	Coordinate the PND, PSEDATU, urban planning and housing programs.
National program of urban development 2013-2018 (PNDU)	Action 2: Inclusionary Mexico Housing policy following four principles: i) Enhance cross-section coordination. ii) Move on towards a smart and sustainable urban development model iii) Effectively reduce backward[30] housing. iv) Ensure decent/appropriate housing for all Mexicans.
Sectoral Program of urban and land development 2013-2018 (PSEDATU)	i) Promote territorial planning and wellbeing through the efficient land use development. ii) Incentivize planned human settlements, populated areas, and metropolitan areas. iii) Promote a compact city development model, competitive, inclusionary, sustainable enhancing mobility and quality of life. iv) Encourage housing access through well located and adequate solutions, following the minimum international quality requirements/standards.
National Housing Program 2014-2018 (PNV)	i) Control urban expansion by means of housing policy ii) Improve quality of housing in urban and rural environment responding to the housing demand. iii) Diversify housing solution programs responding effectively to the different population needs. iv) Generate ideal credit and subsidy programs. v) Coordinate and enhance the cross-sectional relationship between the federal, state and municipal government entities regarding housing policy. vi) Generate high quality information in order to better contribute to the housing program development over time.
Program operation regulations (ROP 2014:2018)	Specifications of the target population according to their income, house price maximum and minimum,

[30] Backward housing refers to abandoned houses due to a low quality of materials

Figure 23. National legal framework

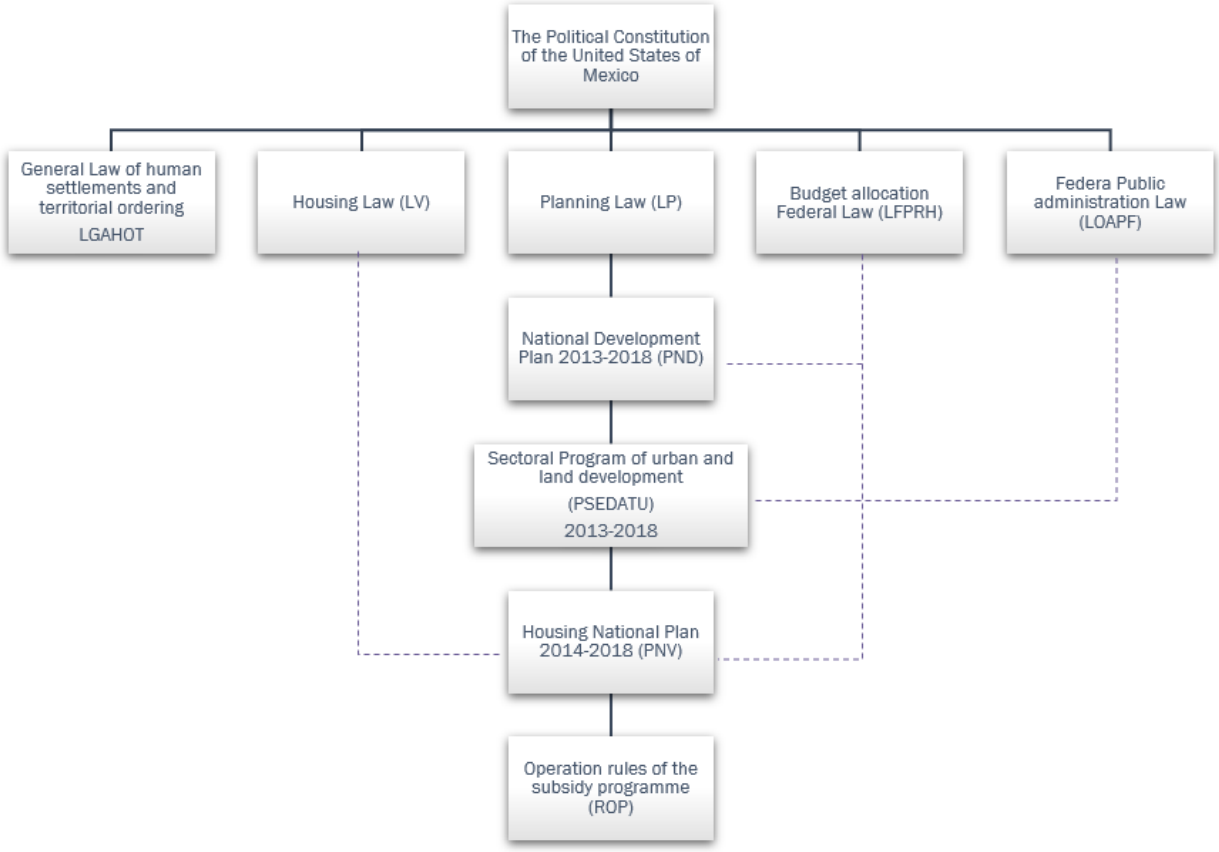


Table 10 Historic Subsidy Program evolution

Name of the program	PROSAVI	VIVAH	TU CASA	ESTA ES TU CASA	ESQUEMAS DE FINANCIAMIENTO Y SUBSIDIO A LA VIVIENDA
Duration	(1998-2001)	(2000-2002)	(2003-2010)	(2007-2013)	(2014-2018)
Institution	FOVI	SEDESOL	FONHAPO	CONAVI	CONAVI
Objective	***Support the acquisition of new houses for "head of the family"***	***Improve the quality of life of the extreme poverty population enabling access to home-ownership supplied with basic services through subsidies***	***Provide economic support to low-income families though different housing solutions.*** (3)	***Provide economic support to low-income families though different housing solutions.***	***Provide economic support to low-income families though different housing solutions.***
Target population	Affiliated (1) and non-affiliated workers	Extreme poverty persons (2)	Affiliated and non affiliated workers	Affiliated and non affiliated workers	Affiliated and non affiliated workers
Requires access to credit	Yes	No	No	Yes	Yes
Requires savings	No	Yes	Yes	Yes	Yes
Solutions	New houses (three different price options)	Construction of new houses in government reserves/user land	New houses, house improvements	New houses, used houses, serviced plot, self-construction, house improvements.	New houses, used houses, serviced plot, self-construction, house improvements.
Wage bracket	Maximum 5 VSM	Maximum 3 VSM	Maximum 3 VSM	Maximum 2.6 VSM	Varies from 2.6-5.0 VSM

Source: Adapted form CANADEVI, 2010

(1). Affiliated refers to the sector of the population that works for either INFONAVIT or FOVISSSTE
(2). Extreme poverty is measured by a set of government instruments
(3). Different housing solutions refers to a set of alternatives rather than only the economic support for new houses

Table 11. Program subsidy regulations

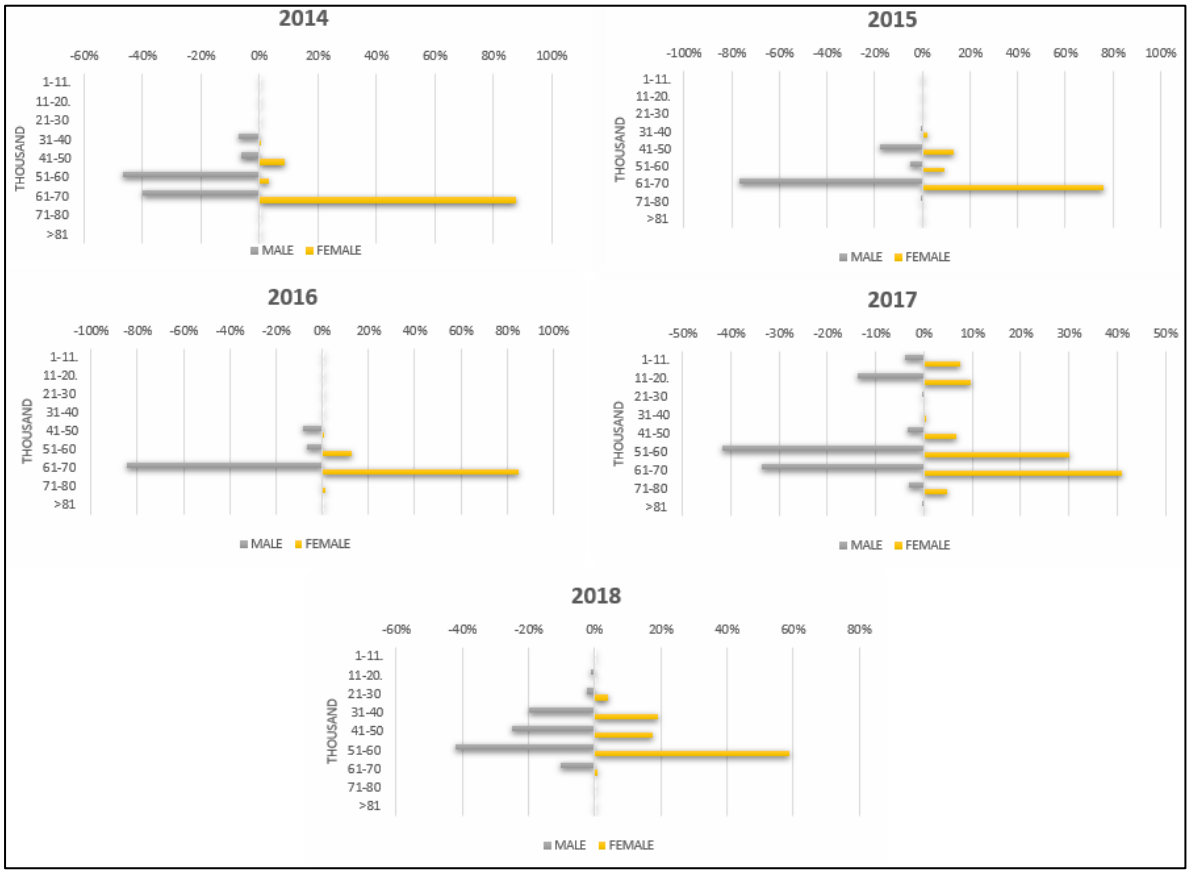
INCOME/YEAR	2014		2015		2016		2017		2018	
LESS THAN 1.5	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
ECONOMICA (60-128 VSM)	32.0	37.0	32.0	37.0	32.0	37.0	25.0	35.0	25.0	35.0
INCOME A										
ECONOMICA (60-128 VSM)	29.0	34.0	29.0	34.0	29.0	34.0	18.0	29.0	18.0	29.0
POPULAR (128-158 VSM)	29.0	34.0	29.0	34.0	29.0	34.0	18.0	29.0	18.0	29.0
POPULAR (158-200 VSM)	30.0	33.0	30.0	33.0	30.0	33.0	18.0	27.0	18.0	27.0
INCOME B										
ECONOMICA (60-128 VSM)	0.0	0.0	29.0	34.0	29.0	34.0	4.0	10.0	0.0	0.0
POPULAR (128-158 VSM)	0.0	0.0	29.0	34.0	29.0	34.0	4.0	9.0	0.0	0.0
POPULAR (158-200 VSM)	0.0	0.0	30.0	33.0	30.0	33.0	0.0	0.0	0.0	0.0
INCOME C										
ECONOMICA (60-128 VSM)	0.0	0.0	29.0	34.0	29.0	34.0	0.0	0.0	0.0	0.0
POPULAR (128-158 VSM)	0.0	0.0	29.0	34.0	29.0	34.0	0.0	0.0	0.0	0.0
POPULAR (158-200 VSM)	0.0	0.0	30.0	33.0	30.0	33.0	0.0	0.0	0.0	0.0

Table 12. Quality Index components

Quality of house and environment	**ECUVE**: Objective quality of the dwelling measured through a physical appraisal, it evaluates the quality of the materials, service provision, proximity to amenities, size of the dwelling, and community environment.
	ISA: Subjective quality of the dwelling, surroundings and community measured through a conducted survey that takes place every six months and it comprises the individual evaluation of a random selection of creditholders that have purchased a house and inhabited for at least 24 months.

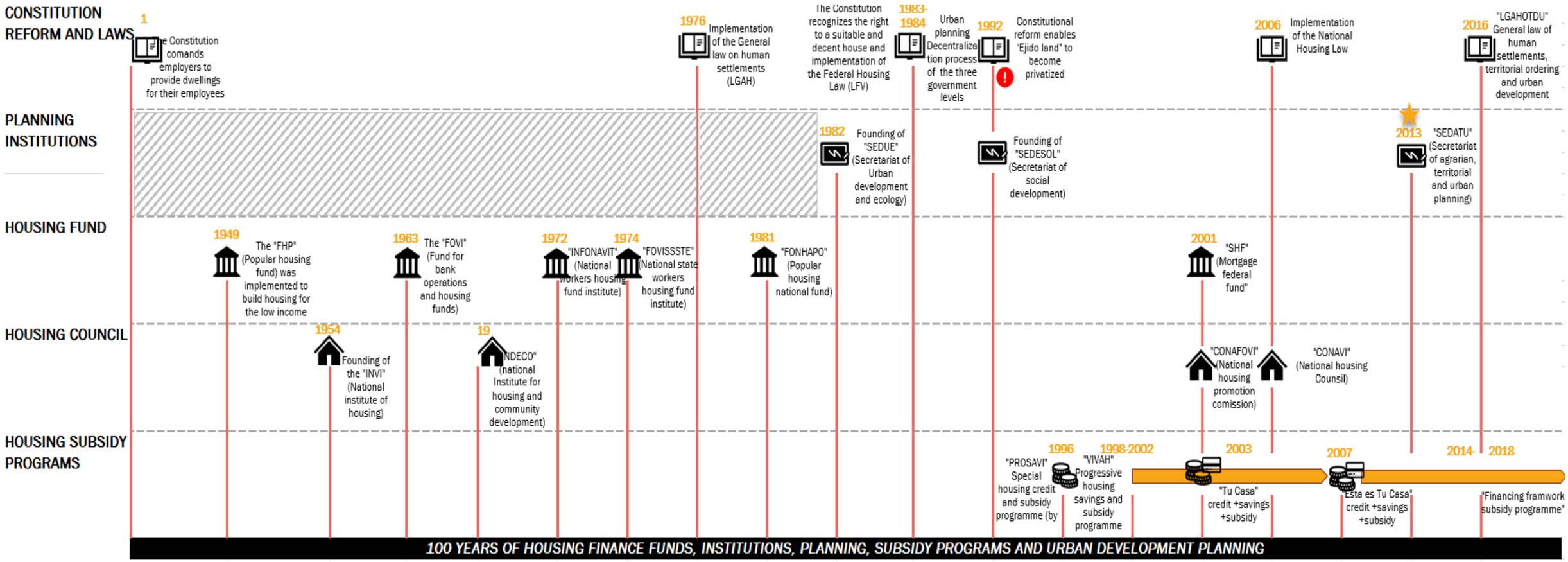
Source: INFONAVIT

Figure 24. Subsidy amount distribution per gender and year



Source: Author (2018)

Table 13. One hundred years of housing finance, institutions, planning and subsidy programs



Source: Author

Annex 3: Morelia City Image Compile

Image 2. Morelia City Urban Layout 1985

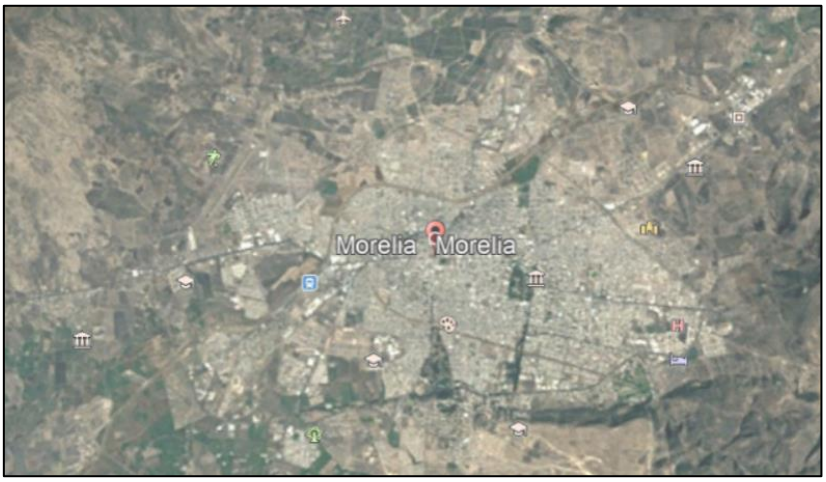


Image 3. Morelia City Urban Layout 1995

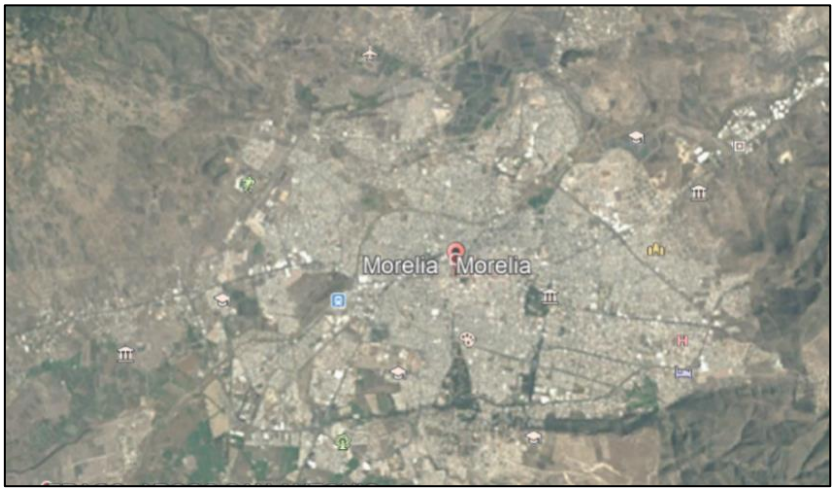


Image 4. Morelia City Urban Layout 2006

Image 5. . Morelia City Urban Layout 2011

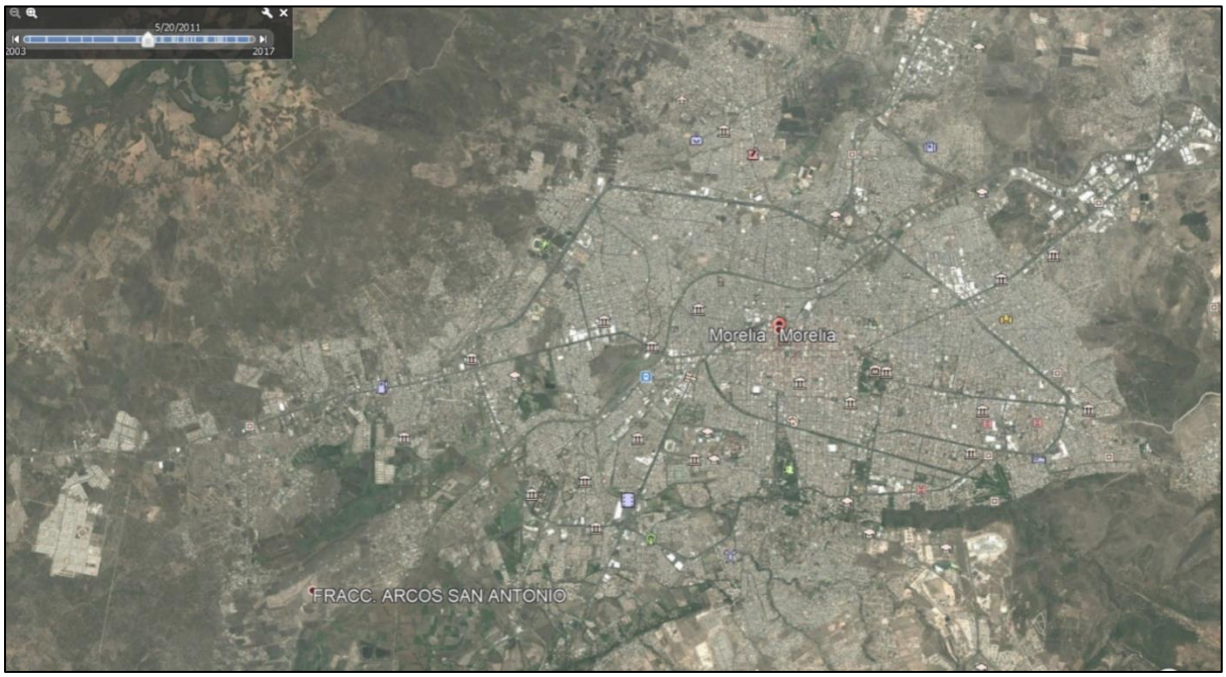
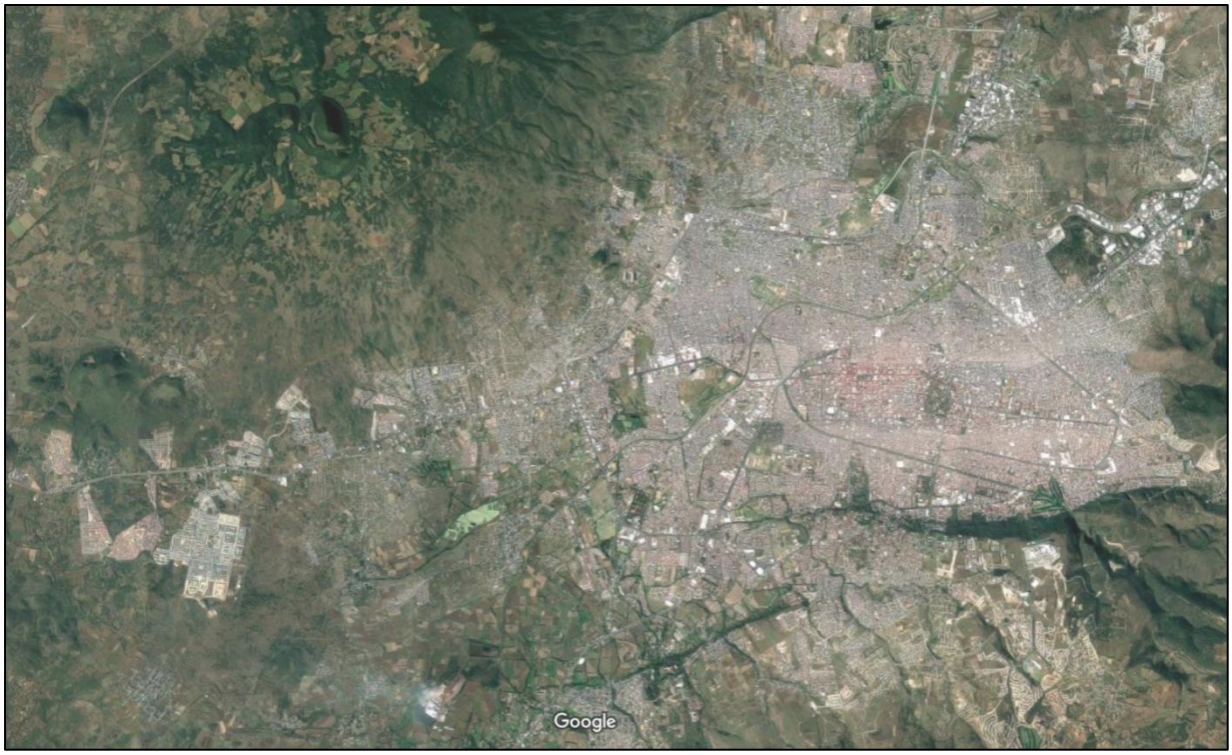


Image 6. Morelia City Urban Layout 2017



Annex 4: Morelia City service provision mapping

The following images were captured from the RUV databases and can be accessed on the following link: http://sig.ruv.org.mx/.

Image 7. Health centre distribution along PCU in Morelia City

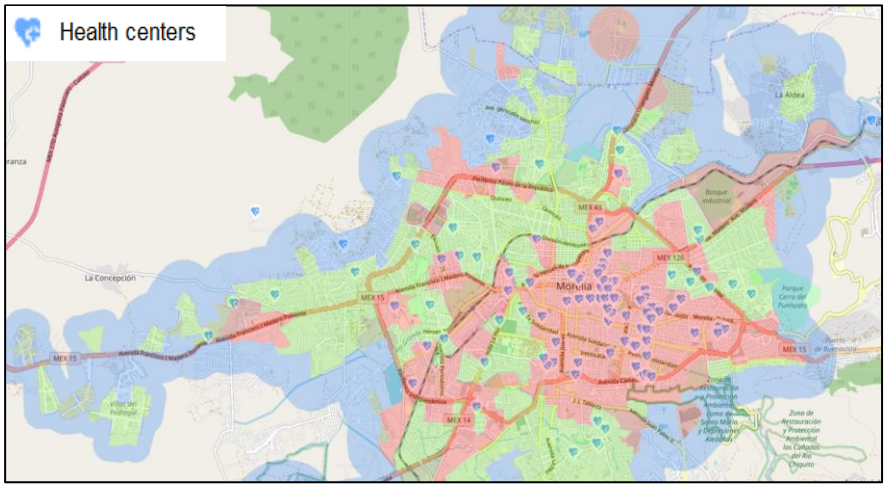


Image 8. Markets and shopping centre distribution along PCU in Morelia City

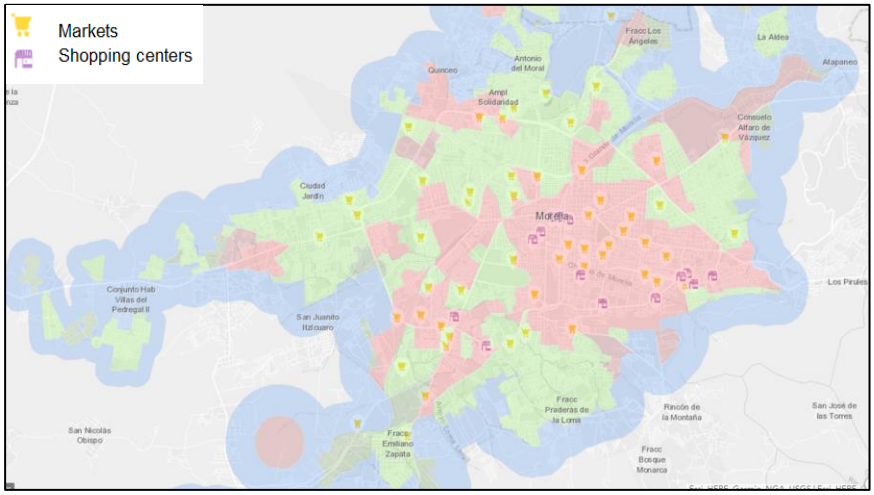
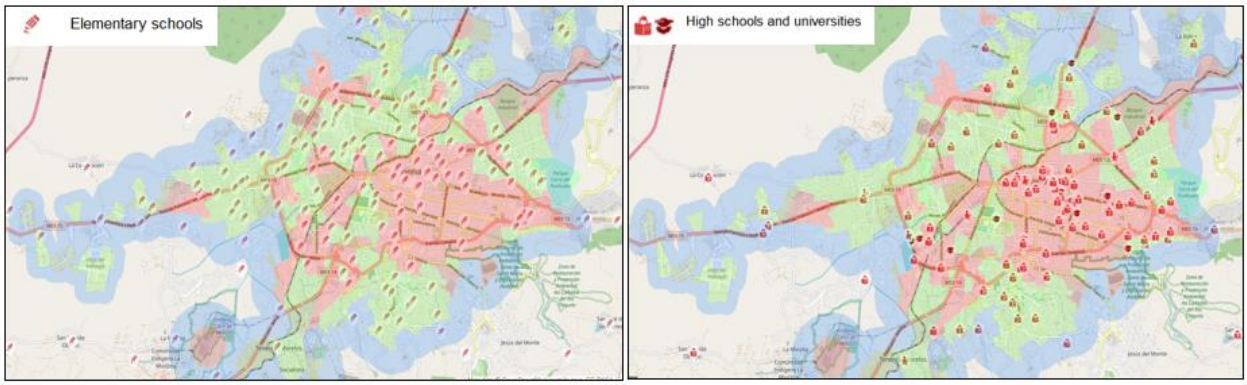


Image 9. School distribution along PCU in Morelia City



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