Driving people insane – Are long commutes a threat to the labor market of Irvine?

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Abstract

Irvine is a master-planned city located in Southern California. Despite only formally existing since 1971, the city has grown to be a highly desirable location for people and companies alike. While the city has the highest jobs to population ratio across the entire country it is simultaneously seeing fewer options to expand. Jobs continue to grow and this is increasingly attracting commuters from outside of the city. Commuting conditions are getting more extreme by the year, while the labor market of Irvine does depend on these commuters. This research aims to find out who those commuters are and if some groups are more disadvantaged than others. Quantitative data is used to analyze characteristics of commuters and the magnitude of commuter traffic to jobs in Irvine. Additionally semi-structured interviews with experts are used to analyze these results and to find out if the City of Irvine needs to take measures to improve the circumstances and opportunities for the most disadvantaged groups. Results indicate that the city is becoming increasingly expensive for lower-income groups. However, it remains unclear whether circumstances are dire enough for the city that drastic measures need to be taken.

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1. Introduction

The ability to own a car and using it to go wherever you want has been an integral part of American culture for a long time. As cars became more affordable and their performance increased, it meant that more Americans could buy one and use them to access more places from where they lived. This also meant that as the relatively young U.S. cities were beginning to take shape, they were also a lot more spread out when compared to older European cities. This high degree of car ownership led to many functions of a city to also spread out further, increasingly leading to car dependence. This new type of low density spread out city structure, often referred to as urban sprawl, is often seen as inefficient, bad for society and unsustainable for the environment (Bruegmann, 2015). As undesirable as sprawl may be, it does not change the fact that it can be found virtually everywhere throughout the U.S. As a result people in the U.S. also have commutes that are longer than most other places around the world. In 2018 the average worker in the United States would commute 25.7 minutes to work, with 4.31 million households having commutes to work of over 90 minutes, the so called super commutes (Data USA, 2018).

For most people super commutes are undesirable and as distance from work increases, the likelihood to relocate and decrease said distance from work also increases (Clark et al., 2003). However, this is not always possible. Within urban areas in the United States the working and middle class are increasingly priced out due to rising rents and home values (Shaw, 2020). Many of these urban areas are dealing with a simple supply and demand issue where favorable high-employment cities are simultaneously becoming more desirable and less affordable (Shaw, 2020). Many processes that drive urban and economic growth, such as gentrification, eventually lead to more segregation and inequality and lead to the disappearance of middle-class neighborhoods (Florida, 2017). As a result it is not always possible for people to relocate closer to work, which could work to displacement of workers on the labor market. Long commutes can be a consequence of that problem.

Within the United States the state of California is often seen as the economic powerhouse of the country, as it is the most populous and generates the largest share of the country's GDP. The average Californian commute is 27.6 minutes, slightly longer than the national average of 25.7 minutes mentioned earlier (Data USA, 2018). This is especially noticeable for commutes in Southern California, as these have been ranked as most stressful in the entire nation (Robert Half, 2017). These stressful conditions are partly due to the length of the commutes, but traffic congestion also plays a large role. Previous research has connected it to problems at work such as decreased job satisfaction and task motivation (Wener et al., 2005). Commuting stress also has negative effects on emotions, leading to feelings of irritation, frustration and anxiety (Wener et al., 2005). It seems that even though long and stressful commutes are quite common, the consequences that come with them are undesirable for those who experience them and could negatively impact performance at the workplace.

Roughly 8% of the population of California lives in Orange County, which is located in Southern California. It only equals 0.5% of the state’s land area, and is expected to grow with an additional 10% predicted population growth until 2040 (OCgov, 2018). The city of Irvine is located in this area and is no exception to these developments. The city is a master-planned community, which means that it did not develop organically and dynamically like most other cities would. Instead, the 93.000 acres of undeveloped land were carefully planned throughout the years by the Irvine Company. Even though the city only formally exists since 1971, it already has accumulated a population of over 270,000 people. The weekday population of the city even grows to about 350,000 people due to education and business communities located within the city (Albert Grover & Associates, 2016). This

means that throughout the day a considerable amount of people is commuting back and forth for work, education, or other reasons.

It is common in the U.S. to take the car to work, for which residents of Orange County also are not any different. 88% of all Orange County residents drove to work in the year 2016 (OCgov, 2018). An additional 6% worked from home, which means that only 6% of all residents commute to work by all other means of transportation (OCgov, 2018). These commutes are also longer in Orange County when compared to the national average and both commutes in the category 60-89 minutes and 90+ minutes are more prevalent in Orange County (Data USA, 2017). The city of Irvine is also experiencing a larger share of the super commutes of 90 minutes and longer with a total of 3.56%, slightly higher than the 2.95% national average. This is partly due to the fact that the city is relatively young while simultaneously experiencing a rapid job growth. Between 2012 and 2017 the amount of jobs in Irvine grew from 220.000 to 270.000 (OnTheMap, 2019). This job growth of 50.000 outpaced the 46.000 additional citizens that the city gained in the same time span (US Census Bureau, 2019). This indicates that the city is desirable for people to locate themselves here, as there are many opportunities.

As mentioned earlier, many cities are becoming increasingly unaffordable for lower and middle class workers (Shaw, 2020). Irvine shares these characteristics, as it is a desirable high-employment city that is becoming increasingly unaffordable and where companies experience difficulty attracting middle-skill employees (OCgov, 2018). This creates the task for businesses in the city to find other ways to attract employees from neighboring cities by means of commuting, for example. As Irvine is located in Southern California this also means that its commuters could be prone to the long and stressful commutes that were mentioned before. However, it is not clear yet who these commuters are and why they choose to commute, or if it even is their choice. What is clear, however, is that they are occupying jobs in Irvine and thus currently play an integral part in the labor market of Irvine. In order to better understand the interaction of Irvine's growing job market, housing market, commuter flows and what this could mean for its labor market years to come, the following research question and sub-questions were developed.

> *Main research question: Are long commutes a threat to the labor market of Irvine?*
>
> *Sub question 1: To what extent does housing affordability in Irvine influence commuting patterns into the city?*
>
> *Sub question 2: Are there particular demographic/age groups that most experience commuting stress?*
> *Sub question 3: To what extent is Irvine's job growth impacting commuting patterns into the city?*
> *Sub question4: Is the City of Irvine building sufficient housing to accommodate for job growth in the city?*
> *Sub question 5: Are there particular employment sectors that most experience commuting stress?*

The next section of this paper will be the theoretical framework, which serves to delve deeper into the possible causes and consequences of excessive commuting. After knowing more about these underlying mechanisms, more will be known about what needs to be researched in order to answer the research question. This brings us to the third section of this paper, the research design. After the data has been collected it will all be analyzed in the fourth section, the data analysis. The fifth section

of this paper will be used to bring together de data that has been collected and analyzed. This section will also link back towards the second section, the theoretical framework, in order to explain what the data shows. The sixth and final section of this thesis will be the concluding section, in which the research question and its sub-questions are answered. Additionally this section will also serve to make policy recommendations and recommendations for further research.

2 Theoretical Framework

2.1 Geographical size and location of Irvine in Southern California.

Since Irvine is the city that is central in this analysis, it is also important to gain a better understanding of its geographical context within Southern California. In figure 1 Irvine and the borders of the city are shown, as well as its geographical location within Orange County. As seen in figure 1 Orange County is located in between Los Angeles and San Diego, the number one and two most populous cities of California respectively. What also becomes clear is that Los Angeles County and San Diego County are a lot bigger than the main cities located in those counties. This is different for Orange County and the cities located within them. Despite Orange County only being 0.5% of California's land area it is home to 8% of the state's total population (OCGov, 2018). As a result Irvine and the other cities located in Orange County have to be more efficient with the limited space that they have. However, Irvine is generating a lot more jobs within the city boundaries than their population size would require. Irvine has the highest jobs to population ratio that you can find anywhere in the United States, with a ratio of 94.8% (Greater Irvine Chamber, 2021). This means that for every 1000 people living in Irvine there is a total of 948 jobs available in the city. Realistically this means that Irvine becomes attractive for commuters from surrounding cities, as there is a large supply of jobs to be found in Irvine. Since Irvine is relatively small it does not take long for one to be labeled as a commuter when living outside of the city. However, in the previous section the relatively high share of super commutes of Irvine was mentioned, which is an indication that Irvine is not only attracting workers from within Orange County (Data USA, 2017). A super commute of over 90 minutes would be enough to reach beyond any of the surrounding county borders, which puts a lot of strain on the infrastructure of Southern California.

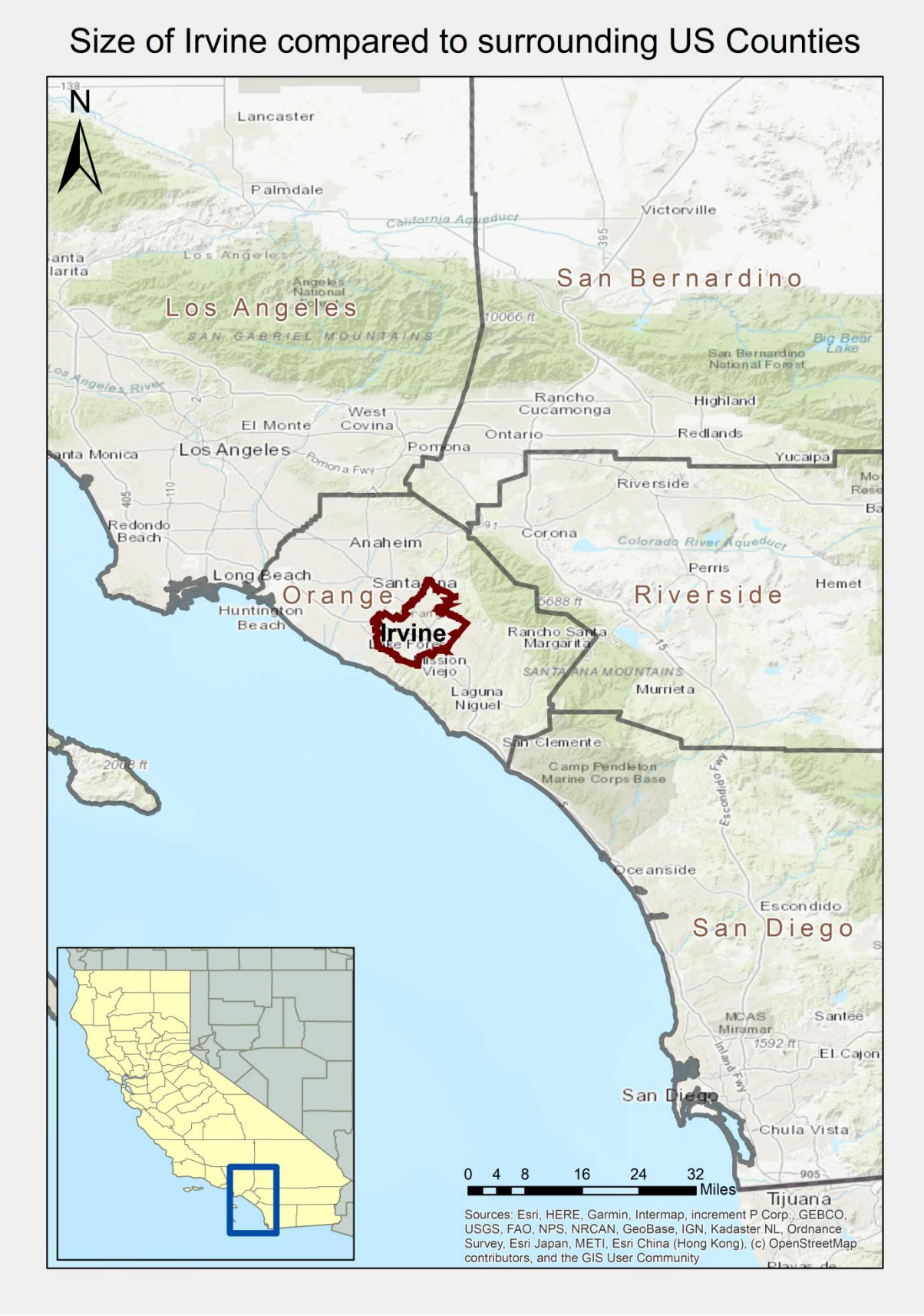

Figure 1: Geographical size and location of Irvine compared to surrounding US counties (Hansma, 2021)

2.2 Housing shortage in California

According to a statewide survey distributed by the Public Policy Institute of California, further abbreviated as PPIC, many Californians see housing costs and homelessness as the state's most important issues (PPIC, 2020). This is no surprise when looking at the disproportionately high shares of their income that is spent on housing. In California the median household income is 22% higher than the national median household income, but renters in California are simultaneously tasked with paying 44% more than the nationwide median (PPIC, 2020). As mentioned earlier, buying a house instead of renting is not an option for most people either since entry-level homes are already too expensive for most people who want to live and work in Orange County (OCgov, 2018). According to the PPIC this issue is prevalent in many coastal areas in California, with Orange County mentioned in the top 10 most expensive Californian counties (PPIC, 2020). They further state that almost a quarter of the homeless population of the United States is living in California and that an additional two million employed Californians aged 25-64 are currently living in poverty, which is a total of 12.2% of all working adults in that age category.

A simple solution to alleviate stress on the housing market would be to increase housing supply to meet housing demand and drive down the prices on the housing market. However, the amount of issued housing permits is not able to keep up with the amount needed to meet demand. U.S. census data has shown that between 2007 and 2017 only 24.7 housing permits were issued per 100 new residents (Next10, 2018). This is significantly lower than the nationwide average of 43.1 and placed California on the 48th place within the nation, finishing above only Alaska and Michigan (Next10, 2018). Looking at these numbers it becomes clear that not only the housing supply is far lower than demand, but also that this deficit of sufficient housing is only increasing each year. An analysis by McKinsey Global institute (2016) calculated the deficit of housing supply, referred to as the housing backlog, at a total of 2 million houses. If the state of California would continue at that pace they would be faced with a projected housing backlog of 3.5 million houses by 2025 (McKinsey, 2016).

2.3 Housing supply and affordability in Orange County & Irvine

In Orange County as a whole 22% of the population is under 18 and another 15% of the population is 65 years or older. This group together represents more than a third of the County’s population and most of them are not employed. Though these numbers are for the county that Irvine is in and not Irvine itself, it is expected that these numbers will be similar. Furthermore there are also people who are unemployed for other reasons or who have found a job outside of Irvine, which makes finding affordable housing challenging for people who work in the city. This is especially true if one takes the aforementioned high jobs to population ratio into consideration. The issue of housing seems to be persistent across the state of California, as they have the worst statewide housing crisis in the United States (Woldoff, 2020). An estimated number of 180.000 additional housing units are necessary each year in the state of California to keep up with demand, even though in not a single year between 2007 and 2017 this number managed to even exceed 100.000 (Woldoff, 2020). It could be expected that house prices are driven up as a result of this, as it seems like housing supply cannot keep up with demand. When looking at median list prices in Irvine over a time span within the aforementioned period it seems like this would be the case. In January 2012 the median list price of homes in Irvine was $509.000 and in January 2017 this had grown to $888.000 (Zillow, 2020). For comparison Orange County saw a growth from $471.000 to $683.000 in this same time span and for the entire state of California this was a jump from $303.000 to $491.000 (Zillow, 2021a; Zillow, 2021b). This shows that even though housing affordability is a problem throughout the entire state of California, both the absolute and the relative increase in house prices was larger in Irvine.

When analyzing this trend the first thing that comes to mind is that increasing housing prices could price the lower and middle class out of Irvine. This could be a problem, as there are many stores, restaurants and other facilities that the city needs in order to sustain itself and its population. One could imagine that those who fill those occupations are not among the top earners within a city and could subsequently struggle to afford a place to live, as housing in Irvine continues to become more expensive. According to traditional geographical economic bid rent theory developed by Alonso (1960), poorer citizens would generally locate themselves around the outskirts of a town. This is due to the fact that all sorts of land users would try to compete for the most accessible land in a city, within the central business district. This would then generally result in retail and office users paying the most for a central location and residential users to locate around that (Alonso, 1960). However, this structure does not seem to be present in Irvine. First of all there are two central business districts, the Irvine Business complex and the Irvine Spectrum, located at the western and eastern part of the city respectively. Additionally the University of California Irvine is located towards the southern part of the city, which further influences the traditional bid rents that a city would have. Lastly it is also worth mentioning that Irvine is home to many plazas spread across the city that offer many shopping options, which also differ from the traditional central retail location that cities would have. This combined with the scarcity of housing in Irvine results in higher land values and housing prices throughout the city, increasing the difficulty for poorer households to find affordable housing.

In Orange County, the county that the city of Irvine is a part of, it was stated that in 2018 one would need to make almost $60.000 per year in order to afford rent for a median-priced one-bedroom apartment (OCgov, 2018). If first-time homebuyers would prefer to purchase an entry-level home instead, then they would need to earn more than $100.000 in order to qualify for a house in Orange County (OCgov, 2018). It is important to note that these numbers are for Orange County as a whole and that Irvine is more expensive than some other cities within the county, which means that these numbers could potentially be higher in Irvine. In 2017 there were 35.563 jobs reported in Irvine where workers would earn $1.250 or less and an additional 64.911 jobs where workers earned between $1.250 and $3.333 (United States Census Bureau, 2019). According to the aforementioned necessary minimum wages in order to afford a home in Orange County, these people would not be able to do so on their own. Orange County reported that even though middle-skill job openings with an average annual salary of $53.110 are growing in the area, the job openings are significantly harder to fill than other job openings. The amount of qualified candidates to fill said openings for middle-skill jobs is too few to meet its demand (OCgov, 2018). This could be an indication that the middle-class is getting priced out of Irvine and Orange County as a whole, as it becomes less affordable to live here. When housing becomes too scarce and too expensive it could also impact the decision to move away from those places, which not only affects the lower skilled workers, but also higher skilled workers (Bean et al., 2018). Cities that receive large amounts of capital investments, like Irvine, are an example of this. As they become more expensive and desirable to live in by households with higher incomes, the lower income households get forced out of the city while still depending on them. This leads to a structural displacement of working class residents in cities that become more expensive (Stein, 2019). Those living outside of Irvine or Orange County who would still like to work in Irvine have no other choice than to commute.

2.4 Commutes and their effect on well-being

Long and stressful commutes are not out of the ordinary in Southern California and many people here are willing to accept them as a fact of life. An explanatory factor for this is that longer commutes tend to also be associated with higher salaries (Morris & Zhou, 2018). It could thus be the case that many people there are willing to sacrifice some of their free time to commit to a longer

commute as long as they are properly compensated (Lorenz, 2018). People have some kind of reservation distance related to offered wages at jobs, which means that people generally are willing to travel further when said wage goes up (Ruppert et al., 2006). This is in line with classical urban economic theory that furthermore states that this could be one of many ways in which people maximize their utility (Lorenz, 2018). Other related aspects could be lower housing prices elsewhere or more desirable neighborhood characteristics (Renkow & Hower, 2000; Plaut, 2006).

Apart from the aforementioned reservation distance, there also seems to be an indifference zone that plays a role in considering a change of residential area (Getis, 1969). Within this indifference zone people do not care too much about their work accessibility. This would consequently then also mean that distances outside of someone's indifference zone increase desirability to relocate closer to work. Households that experience employment changes outside of their previous work zone are much more likely to change their residential location than those with different jobs within their previous work zone (Brown, 1975). Similar results are also found by Clark & Burt (1980) who state that households are more likely to relocate closer to work as the distance from said workplace increases. Other research shows that commute distance is not only linked to the likelihood to relocate, but also for people to quit their jobs (Zax & Kain, 1991). It thus seems like it would be important for housing to be available and affordable in areas where jobs are centered. However, this does not seem to be the case for Irvine. As mentioned above the house prices of Irvine are becoming increasingly unaffordable for the lower- and middle-class (Zillow, 2020). With companies experiencing increasing difficulty to fill middle-skill job vacancies, it could indicate that qualified people are unwilling to opt for a commute to said jobs. Having the ability to relocate closer to work when commutes are becoming too long or stressful seems to be necessary for people of all wage classes for the Irvine labor market to function well.

When compared to other modes of transportation like walking or taking public transportation, driving is the most stressful (Legrain et al., 2015). Individuals with longer and more stressful commutes also tend to report lower well-being due to having less time to spend on leisure or on family life (Lorenz, 2018). Even though individuals might put more emphasis on higher wages, many governments and other international organizations are starting to recognize the importance of subjective well-being and even start to prioritize it over traditional measures of individual welfare like GDP (OECD, 2013). How commutes play a role in subjective well-being is also receiving more attention, as its complex link to the economy and societies is starting to be recognized (Banister et al., 2011). People who accept longer and more stressful commutes might be compensated accordingly, however, they report a lower job satisfaction and a decreased task motivation (Koslowsky et al., 1995; Schaeffer et al., 1988). Not only stressful commutes but also longer commutes have negative effects on well-being. Even though long commutes might be a factor in making the commute more stressful, this does not necessarily have to be the case. Increased commuting time is associated with lower levels of reported life satisfaction (Hilbrecht et al., 2014). Explanations for this could be that commuting time is not always directly compensated for and lengthens the workday, which decreases time available for social relationships and leisure (Sandow, 2014). Utilizing social relationships and using leisure to unwind are positively related to increased life satisfaction and mental well-being (Hutchinson & Kleiber, 2005), which could indicate that deprivation of such tools could take this ability away. This means that there could also be benefits for the city of Irvine if it can reduce long and stressful commutes that a large amount of its workforce is prone to.

2.5 Population growth in California and the ageing society

As the previously mentioned increasing housing backlog suggests, the population of California

continues to grow steadily. In 2019 the state reached a total population of 40 million, placing it well above the second most populous state of Texas, which hasn't hit the 30 million milestone yet. However, the state is not growing in the same way as it used to. Until the 1990s the state of California gained population increases from natural increase, internal migration and international migration. Currently the outflow of internal migration is larger than the inflow, which means that more Americans are leaving the state than those who are coming into the State. Furthermore, In the past decade birthrates in California have reached their lowest point yet (PPIC, 2020). With fewer children being born than ever before and house prices too high for most first-time homebuyers, this would lead to an increasingly aging Californian population. In figure 2 below the projected population change in California from 2018 - 2030 can be seen.

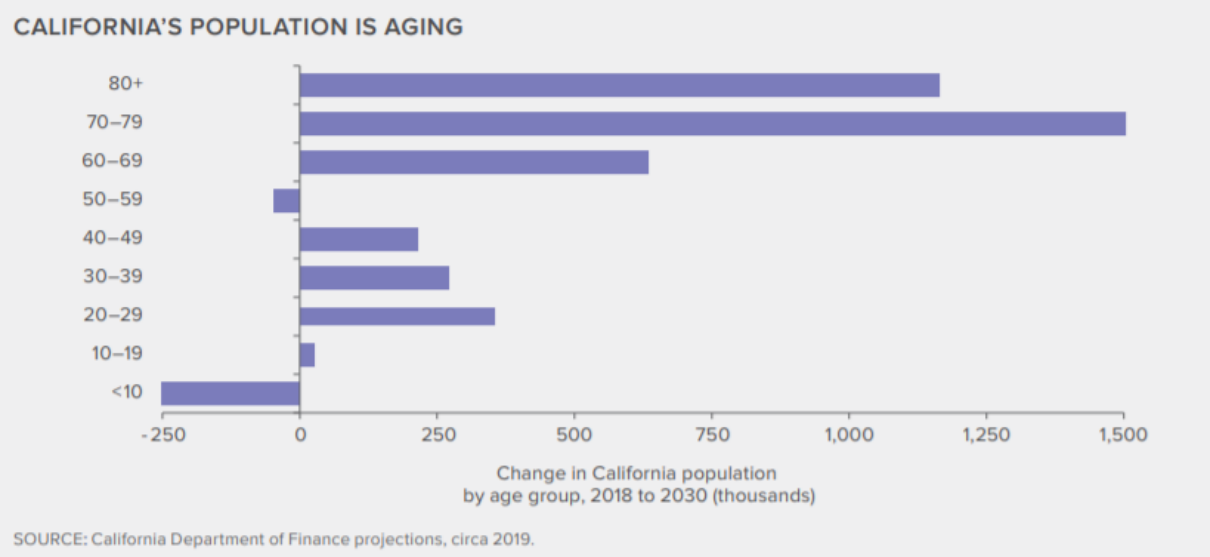

Figure 2: Demographic development in California till 2030 (California Department of Finance, 2019)

Figure 2 shows that at the current pace, without incentives to attract young migrants, the population of California will indeed age quite significantly. The three categories above 60 years old are all growing faster than any younger age category and that the amount of children is even going to decrease when compared to before. Where Californians aged 65 or above made up 5.7 million inhabitants or 14% of the total population, that amount is expected to grow to 9.1 million or 19% of the total population by 2030 (PPIC, 2020). In Orange County this percentage was 15% in 2018 and is expected to grow to 26% by 2040 (OCgov, 2018). Usually an aging population also means that the labor force participation decreases. At the moment the labor force participation in California has reached a historically low amount of 62%. Though the aging population is not the only explanatory factor, as youth employment is also falling, it definitely is a factor that plays a large role (PPIC, 2020). California is not the only place where an ageing population is becoming a problem, as most mature economies are dealing with the same issue. The term silver economy has been coined to address this issue, which entails the transition of economic activity towards fulfilling the needs of an increasingly ageing society (Leśna-Wierszolowicz, 2018). The silver economy primarily revolves around economic opportunities gained from goods and services for the elderly population. This means that instead of a burden to society, the ageing population can instead be seen as an opportunity for economic growth. For California and for Orange County this transition could play a role in preventing economic decline. However, this would not solve the declining labor force participation that is expected to decrease further in the coming years. On the contrary, the expansion of services and goods for the ageing population could generate more jobs, which would only further increase the demand for workers.

This means that even though the silver economy could offer opportunities for Irvine in the future, it will not solve issues surrounding the accessibility of the Irvine labor market for lower income classes. Consequently the problem of excessive car commutes to jobs in Irvine remains a problem to be solved.

2.6 Conceptual model

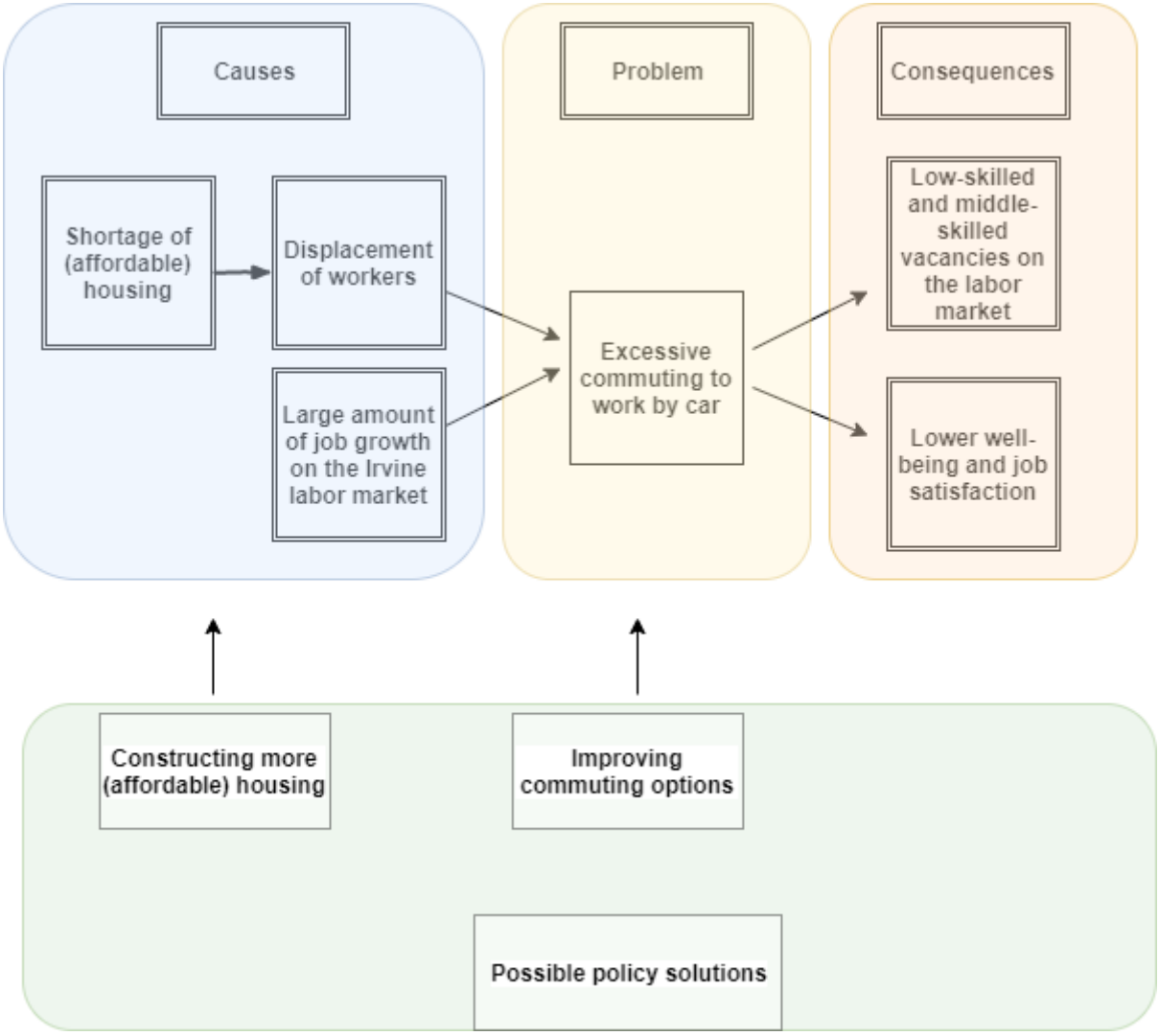

Figure 3: Conceptual model

In Figure 3 above the conceptual model that resulted from theoretical framework can be seen. The main problem at hand seems to be the excessive commutes to work in Irvine by car. As Irvine and its job market have seen a large amount of growth in recent years, this could be an explanation for the large amount of commuters. On the other hand there could also be people who work in Irvine who are not commuting by choice. Those workers could be displaced due to a lack of affordable housing in Irvine. Furthermore there are also consequences of the excessive commutes that workers in Irvine are tasked with. First of all companies in Orange County have reported a greater difficulty with filling low- and middle-skilled vacancies. Since salaries for those jobs are generally lower than higher-skilled jobs, it could be that the commuting circumstances are too dire and leave vacancies unfilled. Furthermore the excessive commutes also have negative and undesirable consequences for the well-being and job satisfaction of workers on the Irvine labor market. Consequently it seems like it would benefit Irvine if the amount of stressful commutes to jobs in Irvine would decrease. After more is known about the statistics of interactions mentioned above, interviews with experts could be used to

discuss possible policy solutions to the issues at hand. The construction of additional housing could help resolve the displacement of workers in Irvine and reduce the commuter flows going into the city. Additionally the improvement of commuting options could be discussed as a way of making the commutes into Irvine more bearable. Though wider contextual situations of the Californian economy and the ageing population of California are discussed, they have been left out of the conceptual model. This choice was made as they are merely contextual factors in California and are not necessarily part of the interaction discussed in the model.

3. Research design

3.1 Methods and research structure

This research will use both quantitative and qualitative data to help answer the research question and its sub-questions. The quantitative part allows us to see the magnitude of commutes going into Irvine and also give us a better idea of who those commuters are. After more information is known about commuter flows in Irvine this data will be shared with experts around Irvine in the form of semi-structured interviews. The addition of semi-structured interviews with experts also makes more sense as I will have the opportunity to conduct this particular research locally. Quantitative research could be done from virtually anywhere by gathering data online, but this is a lot harder to do for qualitative research. Conducting local research from a different location could make it harder to find suitable experts to interview and the quality of online interviews can also not be guaranteed to be of the desired standard. Additionally the nuance of a narrative can be lost when interviewing people of different backgrounds, which also adds value to conducting this type of research locally in person.

The method of semi-structured interviews is chosen since all of the experts that were contacted for an interview have a different background and a different story to tell. On the one hand by having no structure at all the narrative of the story and the bigger picture at hand might get lost. On the other hand too much structure would leave too little room for interesting insights that the different experts in the field may have to offer. During the interviews the experts can share to what extent the data presented to them is problematic and if there are possible solutions. Afterwards these interviews will be analyzed for similarities and differences, since the experts are from different backgrounds and do not necessarily agree with each other. These similarities and differences will then be summarized in the form of quotes and analyzed together with the quantitative data in the analysis section of this research.

3.2 Quantitative data

Since the aim of this research is to analyze if long commutes can be a threat to the labor market of Irvine, the next step is to find relevant data regarding the characteristics of people commuting to Irvine. Furthermore it's important to find out what these characteristics could tell us about the sustainability of Irvine's job market. U.S. census datasets are a good place to look for these types of data, as it has detailed information on this topic from a large part of the population and would thus help to paint an accurate picture of the data we want. However, U.S. census datasets are notorious for being a nuisance to navigate. There is a large amount of data sets spanning multiple time periods which all also contain a lot of data irrelevant to this research, which makes it difficult to filter out all the useful data from these sources. This is the reason that OnTheMap will be used for the local analysis instead. It uses U.S. census data and it allows one to select a city and make a selection based on specific criteria. This makes it easier to download datasets that contain information relevant to the question at hand. Another advantage to using this tool compared to the unfiltered U.S. census datasets is that these datasets provided by OnTheMap allow users to get all relevant information in one dataset from 2002 to 2017. This makes it a lot easier to combine all relevant data when

comparing to the unfiltered U.S. census datasets that would require the combination of many different datasets.

There are, however, also a couple of limitations to the use of this tool. OnTheMap has already categorized and grouped some of the data together that on one hand makes for an easier and more user-friendly analysis, but this also means that it won't be possible to use smaller data categorizations than the ones used by this tool. Certain age groups and income groups might have been interesting to analyze in slightly smaller groups than the ones currently available, but in the end it still makes sense to use the data provided by OnTheMap instead. This is because the data provided by this tool still makes it possible to paint the bigger picture and allows us to create graphs and images that can be shown to and discussed with experts during interviews, which is what this data analysis is ultimately for. For this the categorized data from OnTheMap will be sufficient to get an idea of the characteristics of people working in Irvine's job market.

Furthermore it would be interesting to have data on the house market trends in Irvine to better understand the struggle over lower income groups of finding affordable housing in Irvine. After assessing multiple sources Zillow seems like the best one for this type of data. Zillow is a real estate website that provides services for buyers and sellers on the housing market throughout the USA. Even though the individual listings are not of interest for this research, the home value index of the site is. The home value index of the city is shown for the past decade, as well as a forecast of the next year, which provides us with accurate data on housing trends in Irvine. A downside to using Zillow in combination with OnTheMap is that the time span of the data does not completely overlap. Still it makes most sense to use Zillow, as there does not seem to be a better alternative and it does allow us to see the trends of the housing market in Irvine, which will be helpful during the interviews.

Lastly a dataset needed to be found that tracks median household income in Irvine. For this purpose Civic Dashboards was chosen as it was the only reliable source that seemed to be available. It did come with a similar limitation as described in the previous section, as the measured years do not completely overlap with those of the other sources that were selected. However, since median household income does not differ greatly throughout the years the source is sufficient to serve its purpose.

3.3 Qualitative Data

For the interviews a wide array of experts was contacted for an interview. Understandably not all of the contacted experts responded or agreed to do an interview, which might impact the extent to which all different angles are covered. Nevertheless there were still three different and interesting respondents that agreed to an interview. The first respondent is a professor in urban economics at the University of California Irvine, the second respondent was a director of strategic planning at the Orange County Transportation Authority and the third and final respondents were two employees from the City of Irvine Department of Public Works and Transportation. Their full identities will remain anonymous for privacy reasons. Initially the goal was to interview more experts in Irvine that could represent the housing sector or the business council for example. Even though these people were contacted, their busy schedule did not allow for an interview for this research. Nevertheless the experts that did agree to an interview were very knowledgeable and had interesting things to share from different perspectives. It thus seems that the three in-depth interviews that were conducted are sufficient to get an understanding of the issues that were discussed with them.

For all of the interviews the initial idea was to prepare questions and graphics beforehand and show them to the interviewees at the interview. However, as the respondents were first and foremost representatives from their respective companies and institutions, they wanted to receive them

beforehand so they could prepare accordingly. This comes with advantages and disadvantages, both relating to their ability to prepare. The disadvantage is that it takes away the element of surprise and allows the respondent to prepare an alternative explanation if the data is in conflict with the interests of the party they represent. On the other hand the ability to prepare for the interview and see the data beforehand could also lead to better and more thorough explanations other interviews. The interview guide that was used can be seen in appendix A.

After the interviews are conducted and transcribed they can be analyzed for patterns or perhaps contradictions. It is possible that the thoughts and explanations given by experts are in line with what the collected data suggests and the theories looked at earlier, but experts could very well offer alternative explanations that might have not been taken into consideration beforehand. After all Irvine is still a very young and unusual city that does not always fit the narrative of most other American cities.

4. Data analysis

The quantitative data is going to be shown and analyzed in the same order as it has been discussed during the interviews. Consequently the insights offered by the experts during the interviews is then also shown alongside in the form of quantitative. This makes it easier for the reader to see the data in a similar order as the interview was structured.

4.1 The development of household income and house prices in Irvine

For the first illustration it is important to know that the graph is not entirely complete. This is because at the time it was made the required data could not be found in its entirety. It is still going to be included in the incomplete state as it was also shown to and discussed with experts during interviews in that way. In order to justify the analysis of their comments it makes sense to show the same illustration that they were shown.

figure 4 shows the trend lines for median household income in Irvine in dollars and the average house price in Irvine. Housing price is a stock variable used to measure housing price at a given time and household income is a flow variable used to measure income over time. Due to this difference it is ordinarily not ideal to combine them as displayed in figure 4. However, it does show in a clear way how these two trend lines have drifted apart over the years, making it a suitable method in this case. Though the starting point and end point of the data do not align due to insufficient data points being available from their respective data sources, they do give a general idea of how those trends have developed in recent history. The trend line for median household income seems to be fairly constant through the years, while the average house price in Irvine seems to be growing very rapidly. Important to note is that due to the incomplete data the average house prices right before the economic crisis cannot be seen. This makes it harder to judge how much prices have actually gone up when compared to before the crisis. What is visible though is that after the crisis the house prices have gone up, while household income remained fairly stable.

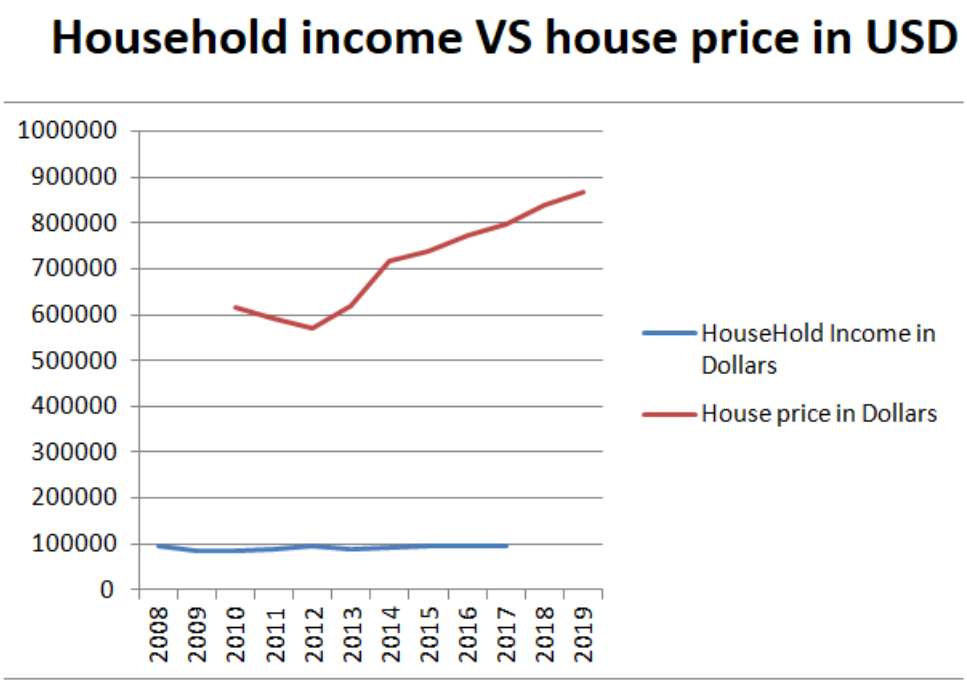

figure 4: Household income versus house price in USD in Irvine. (Civic Dashboards, 2019; Zillow, 2019).

During the interviews the respondents were asked if they saw the above trend as an issue and how this could impact the people that are getting priced out of the city, to which the people at OCTA said the following: "Based on other data, we are seeing outmigration of lower income families out of orange county, either to other states or to more affordable areas. And in term of the inflow of households we're seeing higher income households flow into orange county, at least when it relates to migration. So yes, it is a major issue. And we believe that is also having an effect on transportation here, because that travel market tends to be a lower income population as well, so, we've seen a ridership decline as well, and we think that is one of the factors that has led to a public transportation ridership decline at least in this county."

The people at the City of Irvine: "Obviously in general, if that cost of housing goes up and the income does not, then that gap becomes bigger and it becomes more difficult to purchase a home. So you might end up with either people relocating, or renting and then having those that can afford it but don't necessarily live here owning the homes." Furthermore they said: " it's more sensitive here. For whatever reasons the housing prices tend to go up and down greater here than many places in the country. So I think yeah, it is helpful to realize that there might be an overall average. And there's times it gets higher than it probably can sustain and then it drops. Different factors come into play, so it's, you know, it's not unusual that you kind of see that going on. It's not a guarantee that we'll go on at the kind of rate like shown in the graph." later they added to this: "Well it's interesting too, because the housing market is driven by demand as well, so if people aren't able to afford the houses then at some point the houses are going to have to stop growing. but I guess if there's enough of a demand of higher income households, then they can continue to keep the prices high."

Professor in Urban Economics: "When you're buying a property in Irvine, you're not just buying the property but also all the things that come with living within Irvine. In particular, there's the amenities factor that is natural. but Irvine also has an extremely good school district, which drives a lot of that price growth. So there's increased demand for good public education, so lots of families are moving here to take advantage of that. It's not just that it's unaffordable, it's that it comes tied with other

things that are in high demand." He later continued: "It's a problem of the master planned nature that we have that kind of job growth. so people want to live near their jobs of course and that also drives a lot of the traffic and the high housing prices. A lot of people think that one of the reasons for high housing prices is the lack of response in housing supply to increases in housing demand. There's a lot of truth in that, but it's less true for Irvine than other places. The Irvine government has recognized this is an issue and has permitted lots and lots of lots of new construction for new housing, and it doesn't drive down the price of housing. Irvine can build all the property it wants and it's not going to budge housing prices. It's elastic demand." When talking about the master planned nature of the city he also mentioned the following:" So, my pet peeve, and this is going to sound stupid, my pet peeve is that there's not enough gas stations in Irvine. so the ones that are here are overcrowded and expensive... there's not enough- they clog up."

Interestingly all three parties acknowledged the existence of the problem of housing affordability in Irvine, but they did not share the same opinion regarding a solution. While the people at OCTA stated that it is indeed an issue that needs to be resolved, the other two respondents said that the issue might not be as simple as that. Both the respondents at the University and at the City of Irvine said that the high demand goes beyond a lack in supply. The high quality of amenities and the nature found in the area are things people are willing to pay for and according to them a larger supply in housing might not decrease the housing price. It could slow down the rate at which housing prices are rising, but that is not a solution for the lower- and middle class that cannot afford to buy housing in Irvine at current prices.

4.2 Job growth in Irvine

For the second graph the total amount of jobs were taken for the period 2002 to 2017. Additionally the commuting direction, inward or outward, was also available and taken into consideration for each year. This resulted in the following graph.

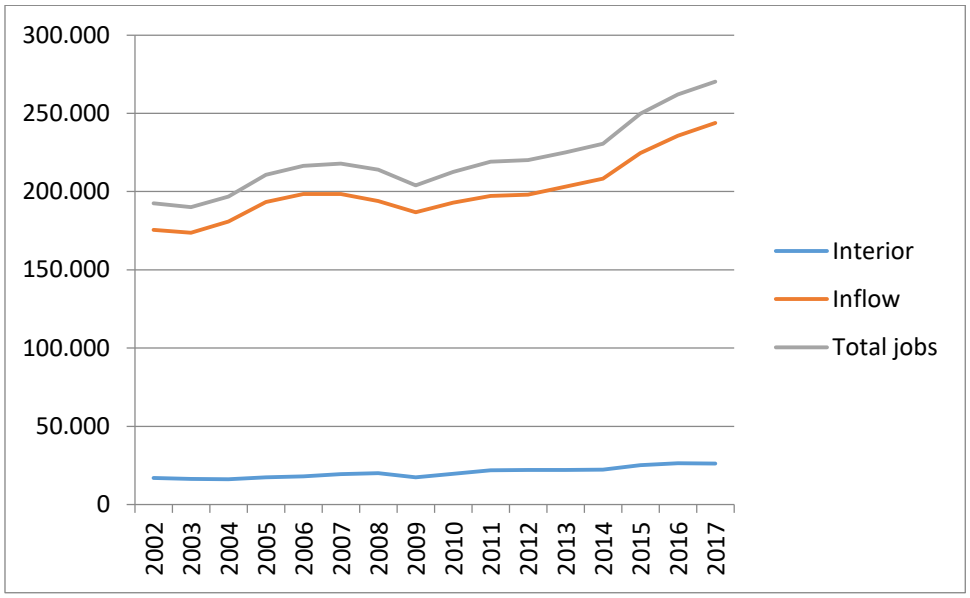

Figure 5: Interior jobs and inflow of jobs in Irvine compared to the total amount of jobs (OnTheMap, 2019).

Important to note for the graph above is that interior jobs refer to the amount of jobs within Irvine that are occupied by people living in Irvine. Inflow here refers to the amount of jobs in Irvine going to people who commute from outside of the city. Interestingly the total amount of jobs has grown by a

large amount over the years while the interior job growth has only grown by a small amount. This indicates that most newly generated jobs are going to people who live outside of Irvine. This can also be seen by looking at the graph lines of inflow jobs and total jobs, which seem to almost run parallel to each other. The complementary table below shows the actual numbers per year, as exact numbers can be hard to read from the graph itself. Interestingly the interior jobs seem to grow at a slow and steady pace while years that see large amount of additional jobs are usually favorable to commuters from outside of the city.

Upon seeing graph 4 the professor in Urban Economics from UCI said: " I believe the graph and I'm surprised it's not worse. Irvine has a tremendous amount of jobs compared to the geographical size of the city. It has the biggest jobs/residents ratio." Additionally he said:" So you have the problem here that the people who get the jobs can't live in Irvine. So what they do, they move to or live in a place far away from Irvine that they can afford and they commute in."

At OCTA they said the following:" Based on our projections we see higher employment growth in Irvine than housing growth. So, you know, just that alone shows the issue that Irvine is importing nearly all their labor at this point. Unless there is a major change in terms of housing development in Irvine, those trends will continue."

At the City of Irvine they said that:" I think part of the reason people are here, and these are people I know that rent here in the city and want to live here. They've chosen to get places smaller than they can get in other locations for the price. And the people I think that commute in have chosen that they want a bigger place, but they're going to pay for it with their commute. Because it's closer to work."

Interestingly the graph above and the implied high amount of imported labor from outside of Irvine does not come as much of a surprise to any of the three interviewed parties. Of the three parties, OCTA, still seems optimistic that housing developments in Irvine could be a viable option to reduce the large amount of commuters from outside of Irvine. Both the professor in Urban Economics and the interviewees at the City of Irvine said that people who can't afford to buy a home in Irvine do not have much of a choice. One could rent in Irvine and experience the benefits of living close to work. The other option is to purchase a house further away and have the benefits of owning a house due to lower land prices.

4.3 Working in the same city that you live in: a cross-Californian comparison

For the third graph we'll be looking at the inflow information gathered through US census data. The data takes the collective of all people who either work in Irvine or live in Irvine and checks if these match or not. This then gives three categories. The first category is people who are working in Irvine, but living outside of it. The second category is people living in Irvine but working outside of it. Thirdly we have the category of people who both live and work in Irvine. Figure 6 is focused on the third of those categories. This data is available for the years 2002 to 2017 and since a longer time interval can help show a more complete trend line it would make sense to use all years in this analysis. After this analysis we can see how the trend of people living and working in Irvine has developed over the past fifteen years. However, it could be more interesting to add a couple of other cities in order to see how Irvine compares to those cities. For this I have chosen the cities of Santa Ana, Anaheim, San José and San Diego. The reason that these cities were chosen is to control for a couple of other factors that could be playing a role in why Irvine is operating the way that it is. Santa Ana and Anaheim are two other cities located within Orange County and are more comparable to Irvine in population size, with a population of 332.318 and 350.365 respectively (US Census, 2019). The cities of San José and San Diego were chosen to also incorporate two larger cities that are located elsewhere in the state of

California, with 1.021.795 and 1.423.851 inhabitants respectively (US Census, 2019). Additionally, San José was also selected because it is part of Silicon Valley and quite an expensive place to live. This makes it interesting to compare to Irvine as they are both expensive and desirable cities to work and live in. San José, however, has been around for a longer amount of time and has been lucrative for businesses for a longer amount of time as well, which has also allowed it to grow for a longer amount of time.

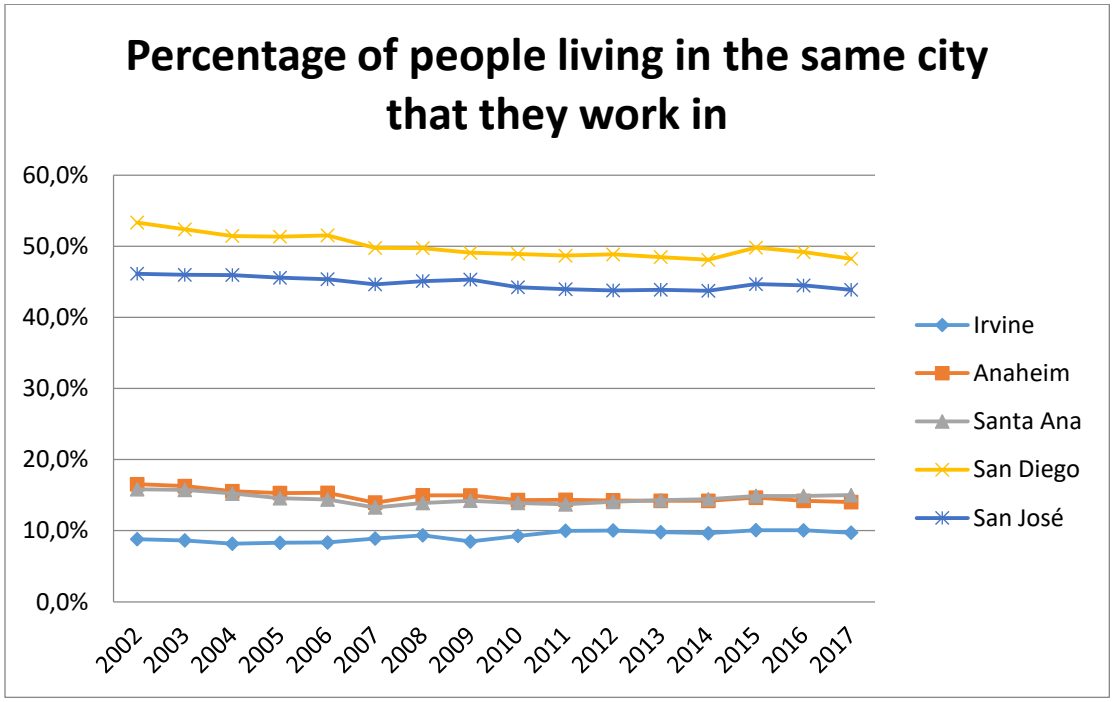

Figure 6: Percentage of people who live in the city that they work in, a comparison of Californian cities (OnTheMap, 2019)

Figure 6 shows that the percentage of all people living in the same city that they work in has been quite steadily around 10% for the past fifteen years in Irvine. Notable is that the two other cities in Orange County are a lot closer to this percentage than the cities of San José and San Diego. Based on this graph alone it is not possible to know exactly why this is the case. Possible reasons are the size of the city or local influences of Orange County. Interviews with experts could shed some more light on this matter later.

After having just seen commuting statistics for jobs in Irvine alone, the interviewees were presented with graph 5 above to also see the inflow statistics of the aforementioned cities. The professor in Urban Economics commented on the graph and said: "Irvine kind of voiced its problems on other cities. So basically the graph is a little bit misleading, because Orange County is 20-30 small municipalities and so it's very hard to live in the same city that you work in, because even a 5 mile commute will take you outside of the city. San Diego has a huge size 300 sq miles, where Irvine is maybe only 80. So it's very easy to live and work in San Diego and also San José.

At the city of Irvine someone said: "You could commute in San Diego, what would probably be like going through 10 cities around here, you know what I mean? So that's something to consider. You might have residential areas and manufacturing areas in San Diego that are far apart. farther apart than Orange County cities, and you're still commuting within your city."

Someone at OCTA said the following regarding the matter: " So the trends that you're observing for Irvine are probably true for most places in Orange County. I mean we've seen similar inflow/outflow balances in other cities." To which he later added: "And it's all about local policy, because a lot of places don't want density. And a lot of places in Orange County are already built out, which means you'd have to replace what's there with something else and people can be resistant about that."

Both the professor in Urban Economics and the interviewees at the City of Irvine pointed out that San Diego and San José are noticeably larger in geographical size, which probably plays a role in the higher percentages for those cities when compared to the cities in Orange County. However, at OCTA someone mentioned that within Orange County most cities do not want to build a lot of high density, which means that the geographical size of the city probably is only part of the explanation.

4.4 Development of commuting distance to jobs in Irvine

Development of commuting distance over the past fifteen years is another interesting type of data to analyze, as it shows how commuting patterns have developed alongside the large amount of job growth over the same time span, which resulted in the figure 7.

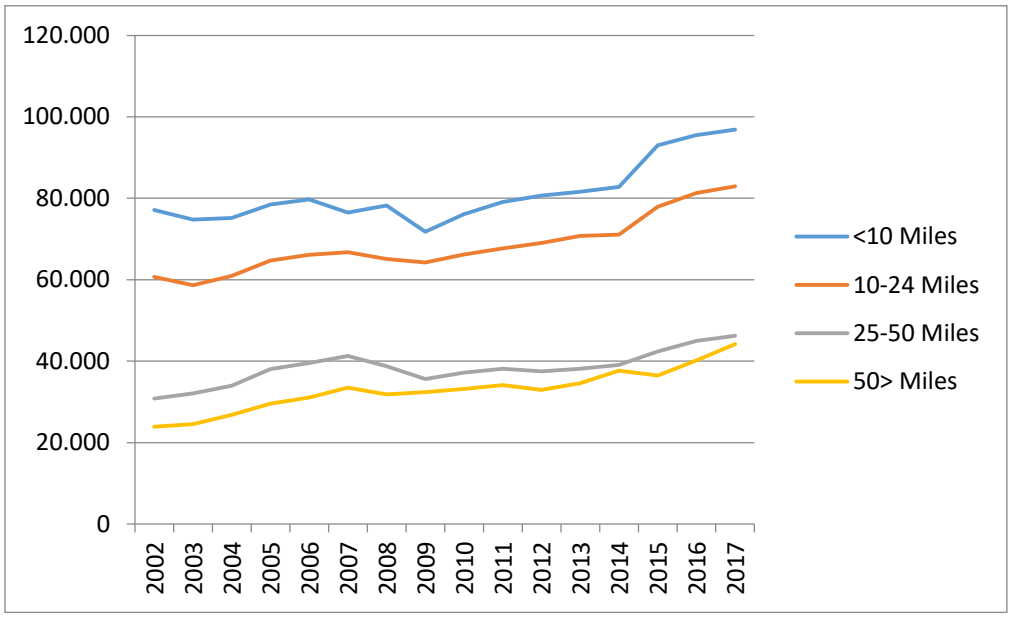

Figure 7: Commuting distance to jobs in Irvine (OnTheMap, 2019).

The largest absolute increase during this time is just barely the 10-24 miles category, with an increase of 22.220 commuters. Even though in absolute terms it is a larger increase than the 20.289 of the 50 miles and higher category, the relative increase is more interesting to look at. Since this category of 50 miles and higher nearly doubled, it'll be interesting to hear what the experts have to say about it.

The professor in Urban Economics commented the following: " The people with less than 10 miles commutes has increased by about 25% and the people with 50+ miles commutes has almost doubled. Yeah, that's not surprising. It's because people who want to find affordable housing have to go further and further out, kind of what I said before. Especially if they want to own their own house, then they have to drive out to riverside or somewhere in the desert. to be able to commute into Orange county. Not surprising at all, very common story."

At OCTA they also commented on the graph: "50 miles plus would put you in another county. I think when we looked at Irvine last year that there were quite a number, a large number,

commuting in from Los Angeles County. So again, Irvine is a magnet for higher income jobs. Higher income folks will generally travel further for those jobs."

At the city of Irvine someone said: " So it's like, for every 10 jobs added 2 are less than 10 miles, 2 are 10-24 miles, 2 are more than 50 miles.. or.. whatever the percentages are. You see what I mean? I don't know if it's necessarily heavy on the 50 miles or more. It seems to be sort of, the new jobs are just evenly distributed more or less between each of the distance categories."

None of the three interviewed parties seemed particularly surprised to see the increase in the size of the 50 miles and larger category. The professor at UCI and the people of OCTA both took a very economic approach to the issue. People who want to earn more or who want a large house are willing to travel further for it and accept the consequences. Interestingly at the City of Irvine the growth of the 50 miles and larger category was not regarded as worrying or standing out from the other categories.

4.5 Demographic development of workers in Irvine

In this last section of the data analysis the demographic development of workers in Irvine will be analyzed. Graph 8 shows the age of the people working in Irvine divided into three categories. This is due to the predetermined age categories made by OnTheMap. In all three categories the percentage of people both living and working in Irvine has seemingly not changed a lot, as the commuting counterpart is the main explanatory variable for the visible changes. Primarily the 55 and older category has seen the most growth, while the percentage of both the 29 and under and 30 to 54 shrunk. In absolute numbers all categories have seen growth with the biggest growth visible in the category of 30 to 54. The category of 29 and under has only seen an increase of 7.682 over a span of fifteen years. All of these absolute numbers have been included in appendix b.

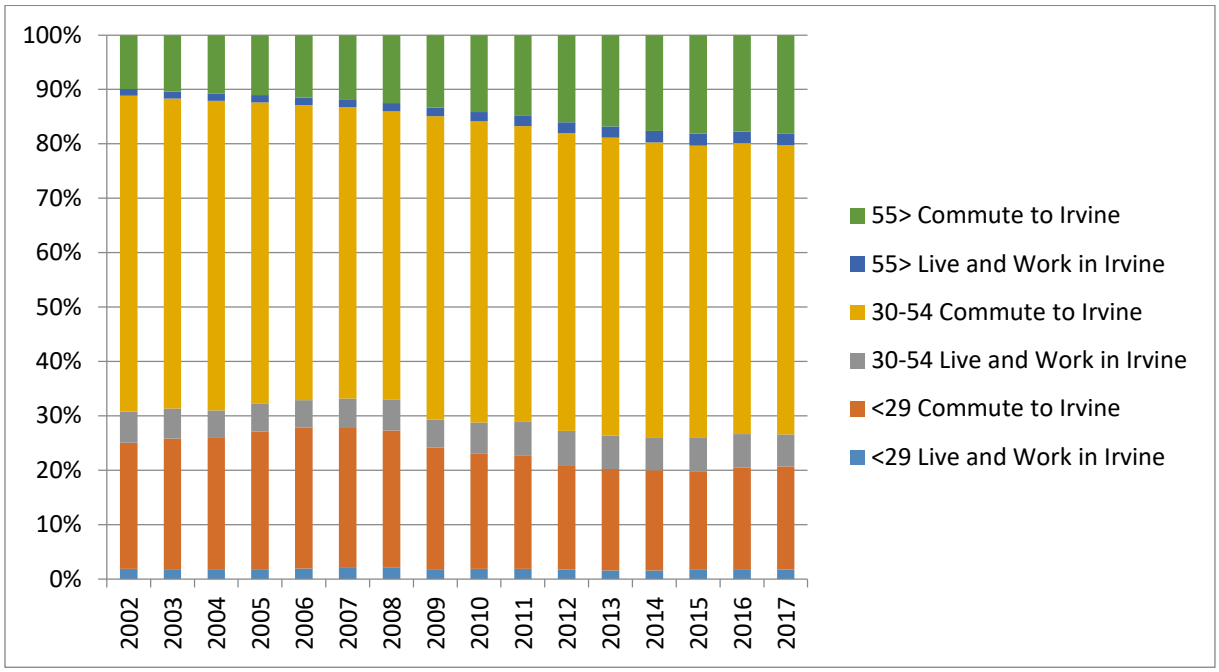

Figure 8: Demographic composition of people living and working in Irvine in three categories (OnTheMap, 2019).Professor in urban economics: "What's missing in Irvine, is the amenity factor that people without children would like to have. I mean cool stuff, clubs and restaurants and theater, stuff like that. there's some of that in Irvine, but there's bigger concentrations of that in other places. So the exodus is into downtown LA, which of course has thousands of neighborhoods which have more

appeal in that than Irvine. Irvine is kind of viewed as kind of middle-class suburban, vanilla, very plain."

Interviewee at OCTA:"So I think that this is back to the housing affordability, and therefore you're seeing higher income folks moving in that tend to be in that older-managerial bracket, and therefore you're also seeing a corresponding drop in younger workers there too. So I think it's more, again, I traced it back to the housing issue as a first mover on this. And then obviously a lack of supply in this case."

City of Irvine: "I would imagine that the high cost of living hits the younger workers harder, because they are earlier in their career. So they're not making as much money. I'm wondering if, because it's kind of increasing right? From 2002 to 2007-2008, which is also when the economy was growing very rapidly and then the recession hit, and that dropped."

Both the interviewees at the City of Irvine and at OCTA mentioned affordability as an explanatory factor for the small percentage of young people living and working in Irvine. The professor in Urban Economics focused more on the desirability aspect, mentioning that younger people are more interested in amenities that surrounding cities offer.

In this section of the research all relevant graphs and figures that were made to help answer the research question and its sub-questions have been shown with some first impressions. Additionally some relevant quotes from the interviewed experts were added as well. This approach was chosen as it offers a quick insight in what the experts had to say about the discussed matters. The full interview transcripts can be found in appendix A. In the next section of this research these figures will be analyzed more in-depth and linked to theory. The interviews from the experts will also be taken into consideration with this analysis, as they could offer alternative explanations to local phenomenon. However, it is still important to be critical of their explanations, as some of them are affiliated to organizations or institutions that have a different agenda.

5. Discussion

In this research the characteristics of people currently living and working in Irvine have been analyzed. The aim of that analysis is to see if those characteristics seems worrying for the sustainability of Irvine's job market and economy. The analysis of that data and the accompanying interviews on that data can be found in the results section of this thesis.

5.1 Household income versus house prices

The first data that was discussed with experts during interviews was regarding to household income and house prices and can be found in figure 4. As mentioned in the results section the data used for the figure was incomplete, but it is still possible to see an upward house price trend since 2012. It could be that this is related to the housing market recovering after the economic crisis of 2008, but this cannot be said for sure. What can, however, be said for sure is that median income has remained more or less stable from the start till the end of the available data, indicating that houses in Irvine have become increasingly unaffordable for people working in Irvine. This is in line with earlier findings, which showed that even though Californians on average have a 22% higher household income than other Americans, they simultaneously have 44% higher costs than other Americans (PPIC, 2020). It also matches more general trends discussed earlier which show that working class residents are increasingly getting priced out of cities (Stein, 2019). When this data was shown during the interviews, all interviewed parties acknowledged that this issue was taking place in Irvine and Orange county, but only the interviewees at OCTA saw more housing as a solution. The

Professor in Urban Economics and interviewees at the city of Irvine agreed that increasing housing supply would not drive down the house prices as a result of elastic demand. They argued that living in Irvine and having access to its high quality amenities makes it very desirable and is factored in to the price that people are willing to pay. A solution could be to increase social housing and high density housing to offer more affordable alternatives in Irvine. According to Goldsworth (2017) there has already been a shift in the land use categories in Irvine since the creation of the Irvine master plan in 1973. High density used to be only 0.25% of all residential land use in 1973. In 2017 this had been increased to 12.1%, which at first glance seems like a positive development. However, in this same amount of time medium-high density reduced from 5.9% to 0.9% and medium density from 32.6% to 4.4%. According to Goldsworth (2017) most of this land got converted to open space and room for recreational activities, which help to make the homes feel more exclusive. This then begs the question if homes in Irvine are coincidentally desirable or if they are made to be desirable to attract certain types of people to the city. The professor in Urban Economics who said that building additional homes would not drive down the price also mentioned that gas stations and accompanying fast food restaurants in Irvine clogged up and became overcrowded. This seems interesting, since those services rely heavily on workers who don't get paid large salaries, while the city seems to cater towards the higher income segments of the population. Another reason could be that the city of Irvine is zoning too much towards making the city attractive and too little on the unattractive services that people in the city rely on. Whichever reason is more true, the fact remains that successful cities also need lesser skilled professions to thrive.

5.2 Commuters in Irvine

Another type of data that was looked at for this research was the total amount of jobs in Irvine and whether those jobs were occupied by people living in Irvine or people who commute in. This inflow rate of commuters as a percentage of total jobs in a city was then also compared to a couple of other cities in California, which can be seen in figure 5 and 6 When looking at graph 4 that shows the data just for Irvine it looks like job growth is almost running parallel to the commuter inflow. The interviewees at OCTA confirmed this trend and mentioned that in their projections they also see job growth outpacing housing growth, which results in large amounts of imported labor. The professor in Urban Economics and the interviewees at the City of Irvine were not as concerned. They argued that people make a logical conclusion based on their desires. On one hand living in Irvine will be more costly and overall less spacious, but has the benefit of living close to work. On the other hand living outside of Irvine is cheaper and could offer a bit more space, but this would result in people paying with their lengthy daily commute. This is in line with literature that has been discussed earlier, which explains that people will try to maximize their own utility (Lorenz, 2018). When wages go up, people can make the decision to spend more time traveling to their job if that increases their utility (Ruppert et al., 2006). At OCTA this interaction was also mentioned, as they said that Irvine is a magnet for higher income jobs, which people are generally willing to travel further for. However, important to note is that people who work in low or middle-skill segments of the labor market do not benefit as much financially from longer commutes. This means that they also do not gain as much utility from longer commutes. As mentioned earlier in this research, companies are already experiencing difficulty finding enough qualified candidates to fill middle-skill job openings when compared to high-skill job openings (OCgov, 2018). One could imagine that this is also true for lower-skill jobs, like the gas station or fast food related jobs that were mentioned in the last paragraph. This could create a shortage, as the city is too expensive for them to live in and the benefits of commuting could be too low. A shortage for people in those skill segments could be problematic for the economy of Irvine in the future, as people in the city do depend on them. Furthermore it is important to remember that long and stressful commutes are associated with lower job satisfaction, decreased task motivation

and lower life satisfaction (Hilbrecht et al., 2014; Koslowsky et al., 1995; Schaeffer et al., 1988). These factors are not always taken into consideration when people choose for a longer commute to increase their utility. Though they do decrease the well-being of people who work in Irvine and could negatively impact their productivity and efficiency. Consequently it also seems to be in the interest of the city to decrease the amount and the length of commutes of workers in Irvine.

The analysis of people commuting to jobs in Irvine did raise a question about the population of Irvine itself. Since the share of people that both lives and works in Irvine is relatively low, one could ask how many people in Irvine have a job and where they work. For that purpose graph 8 was made, which is shown below. Just like the commuter data of jobs in Irvine it uses data from OnTheMap and is also shown for the years 2002 till 2017.

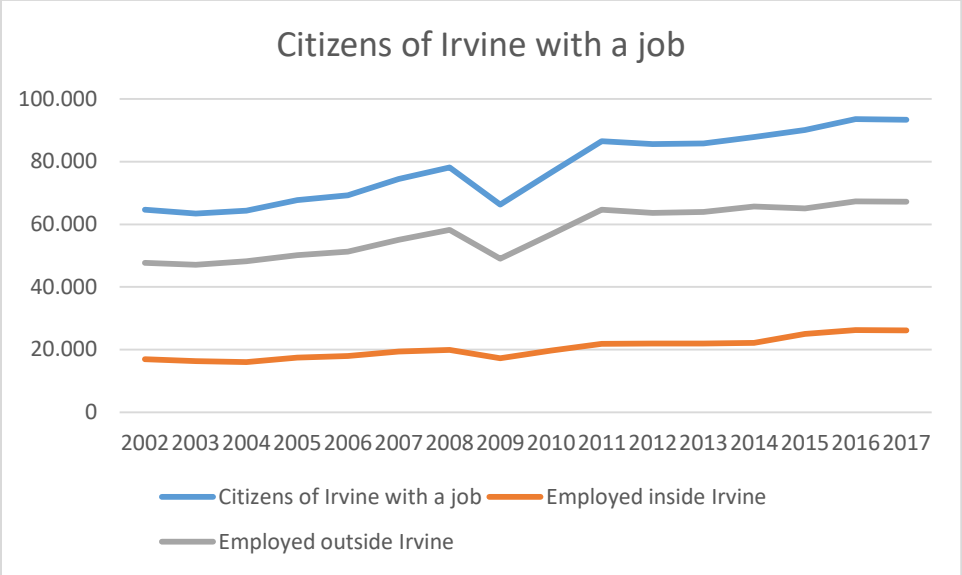

Figure 9: Citizens of Irvine with a job: where do they work? (OnTheMap, 2021)

Since the total population of Irvine is around 270.000 people, the first noticeable statistic is that in no year the amount of citizens living in Irvine with a job exceeded 100.000. This is interesting considering that Irvine has the highest jobs to population ratio in the entire nation at 94.8% (Greater Irvine Chamber, 2021). Additionally in none of the years included in figure 9 the in-area labor force efficiency was higher than 28%. The in-area labor force efficiency is the share of people employed inside Irvine taken from the total amount of citizens in Irvine with a job (OnTheMap, 2021). This shows that aside from improving commuting options or building additional housing the city of Irvine also has another option it could explore, which would be to increase the in-area labor force efficiency.

5.3 Working in the same city that you live in: a cross-Californian comparison

As briefly mentioned at the start of the previous paragraph the percentage of workers who live in the same city was also calculated for a couple of other Californian cities. In figure 6 the percentages are shown, and it can be seen that Irvine is the lowest out of all cities that were also included in the analysis. San Diego and San José were originally included to compare other successful cities in the state of California for a comparison, while Anaheim and Santa Ana were included to have some cities from the same county as Irvine. As can be seen in figure 6, the percentages for the cities of San Diego and San José are larger than the cities located in Orange County by quite a large margin. However, As pointed out during the interviews with the professor in Urban economics and the City of Irvine the former two cities are significantly larger in land area. This means that it is easier for those working in San Diego and San José to also live in the same city when compared to the cities in Orange County.

There is more to the story, though, as the interviewees at OCTA mentioned that cities in Orange County do not like building a lot of high density. The professor in Urban Economics also touched upon this, by saying that Irvine has voiced its problems on other cities. By this he referred to the high demand for housing in Irvine which is not matched by the city.

5.4 Development of commuting distance to jobs in Irvine

The development of commuting distance from people who work in Irvine to their jobs is another interesting statistic that relates to this and can be seen in figure 7. In the previous paragraph the argument was given that more people who work in San Diego and San José were also living there, due to the larger land area of these cities when compared to Orange County. The professor in Urban Economics said that even a 5 mile commute would already take you outside of the city in Orange County. While this could be true in some cases, the problem is not so much about the 5 mile commutes. During the 15 year time span that was analyzed for figure 7, the amount of 50 miles+ commutes grew by a larger amount than the amount of commutes under 10 miles. Additionally the 50 miles+ category nearly doubled in size from the first to the last year of observation. Such lengthy commutes could also put you in a different city if you were to work in San Diego or San José. There is thus a reason to believe that the amount of commuters in Irvine and the length that they commute to work is bigger than the experts in the interviews made it seem. None of the three interviewed parties seemed very surprised by the data presented to them regarding commuter patterns, although at OCTA they did mention it was concerning. An interviewee at the City of Irvine looked at the data and said that in absolute numbers all distance categories grew in comparable numbers. For this reason they argued the relative increase of the 50 miles and higher category was thus expected and not worrying. However, it makes a lot more sense that shorter commute distances increase more than the longer distances. Earlier discussed theory has shown that incentives like higher wages are necessary to attract people who would have to commute longer (Lorenz, 2018). It thus seems unlikely that it is normal and expected for all commute distance categories to increase at similar rates. An explanatory factor could be that the interviewees at the city of Irvine were also simultaneously representing the governmental institution that they work for. Even if they thought that the commuting trends were worrying, it would be unlikely that they would address this during a recorded interview. One could imagine that government officials could get in trouble for criticizing the local policies that they represent.

5.5 Demographic development of workers in Irvine

The last topic that was analyzed revolves around demographic developments of people working and living in Irvine. The topic of ageing societies has been getting increasingly important in the developed world as their workforce is continuing to get older. Irvine is no exception to this trend as can be seen in figure 8. Around the years 2007 and 2008 the amount of workers aged 29 and younger hit its peak, after which it started to decline. As pointed out by an interviewee of the City of Irvine this was also around the time of the economic crisis, which may have hit younger people harder. Furthermore the development of house prices in figure 4 shows a recovery of the housing market after 2012. One could imagine that younger people who were already struggling after the economic crisis would also struggle to buy a house during the blooming real estate market of Irvine. As said before, these issues are not unique to Irvine, but that does not change the fact that Irvine's population is ageing and that this can impact its economy. An interviewee at the city of Irvine mentioned the growing tech sector of Irvine and that it is trying to compete with Silicon Valley, which helps to attract younger people. However, the data shows that the share of younger people has declined for multiple years in a row. One could ask the question if the creation of jobs alone is enough to attract younger people to Irvine. At OCTA an interviewee mentioned that housing affordability as a first mover was an issue in the

city and that the lack of supply is a reason for that. Another way to look at it, is that Irvine is trying to compete with other tech hubs like Silicon Valley, while struggling to attract young skilled talent. The professor in Urban Economics also briefly touched upon this issue. According to him Irvine is not providing the amenities that young people without children desire and has led to Irvine being more middle-class suburban. With the high house prices of Irvine, however, one could wonder if Irvine is middle-class suburban or upper-class suburban. As discussed before, the silver economy could partly be used to tackle this issue of an ageing society. The silver economy plays into the economic opportunities to be gained from products and services for the ageing population (Leśna-Wierszolowicz, 2018). However, this would not solve problems of declining labor force in other sectors of the economy. It thus seems useful for the city of Irvine to look into ways to increase accessibility for lower income groups going forward.

6. Conclusion

6.1 Answering research question and sub-questions

After the analysis in the previous sections it is now time to take a step back and look at the sub questions that were formulated at the start of this research in order to help answer the main research question: Are long commutes a threat to the labor market of Irvine? The first sub question that was asked to help answer that question was: to what extent does housing affordability in Irvine influence commuting patterns into the city? To answer this question it is important to first look at the jobs to population ratio of Irvine again, which was 94,8% in Irvine. Due to inevitable inactive shares of the population it becomes clear that the housing market of Irvine is tight, which also plays a role in the high house prices in the city. It thus seems like the high amount of commuters is not only a result of housing affordability, but also housing availability. The second sub question was: are there particular demographic/age groups that most experience commuting stress? The low in-area labor force efficiency that was discussed in section 5.2 of this paper combined with the large amount of jobs in Irvine shows that this issue is prevalent among all age groups. Even though the group of workers aged 30-54 had the most commuters, they also occupied more jobs, which makes it unlikely that a certain age category is experiencing significantly more commuting stress than the others. The third sub-question was: To what extent is Irvine's job growth impacting commuting patterns into the city? The high jobs to population ratio mentioned above combined with the rapid job growth that Irvine has experienced in recent years indicate that this did play a role in the growing amount of commuters in Irvine. However, the low in-area labor force efficiency of Irvine that was mentioned above does show that increased commuting is not only a result of an increase in jobs. If more people who live in Irvine would also fill vacancies in Irvine, then that would lead to a lower amount of commuters heading into Irvine to fill vacancies. Job growth in Irvine is consequently only part of the explanation for the increase in commuter traffic in Irvine. The fourth sub-question is if the city of Irvine is building sufficient housing to accommodate for job growth in the city. The aforementioned issue of the low in-area labor force efficiency indicates that housing supply is not the entire issue, as many houses are occupied by people who do not work in Irvine. However, house prices have surged in recent years and Irvine has seen years where yearly job growth exceeded yearly population growth. This indicates that even if the in-area labor force efficiency was higher, Irvine would still have a housing shortage issue. Furthermore the Irvine master plan shows that zoning for residential use has also decreased over the years. There is thus a reason to believe that the City of Irvine is not building sufficient housing to keep up with demand. The fifth and last sub-question was: are there particular employment sectors that most experience commuting stress? It seems as if it is not so much a certain employment sector, but more about income categories. Of course sectors like hospitality where income is generally lower are an example of a sector that is likely affected worse

than others, but it is more an issue among lower income groups in general. House prices in Irvine seem to grow further apart from the salaries that people earn who work in the city. Even though Irvine is expensive for everyone, it will generally be easier for people of higher income segments to afford a house there.

The main research question of this paper was: Are long commutes a threat to the labor market of Irvine? Based on the questions we have just answered this could be a possibility, but it remains difficult to say this with absolute certainty. What can be said, however, is that the amount of commuters and the distance that they traveled has continued to increase in recent years. What is also known is that lengthy and stressful commutes are generally associated with negative consequences. Furthermore Irvine is also getting increasingly expensive and inaccessible for people with a lower income. It is possible that Irvine is going to notice consequences of that in its labor market in the future, but more research is necessary to say this with certainty.

6.2 Recommendations for future research

A recommendation for future research could be centered around the in-area labor force efficiency. Since Irvine has such a high jobs to population ratio and such a low in-area labor force efficiency it could be interesting look into opportunities for Irvine by increasing their in-area labor force efficiency. Since there is a large university located in the city, research could look into possibilities for the university to work closer together with the job market of Irvine. This would be a way to retain local talent while simultaneously attracting younger workers in the city. Attracting younger workers would then also slow down the ageing of Irvine's society.

Another recommendation for future research could focus on covid-19 and the effects on working from home as an option to reduce commuter flows. In the introduction it was mentioned that for 2018 a total of 6% among workers in Irvine was working from home. Before covid-19 it was hard for some people to imagine working from home as a legitimate alternative to commuting. During the pandemic, however, companies were forced to innovate. It would be interesting to see to what extent working from home became a viable option for people working in Irvine and if this then also offers opportunities in the future.

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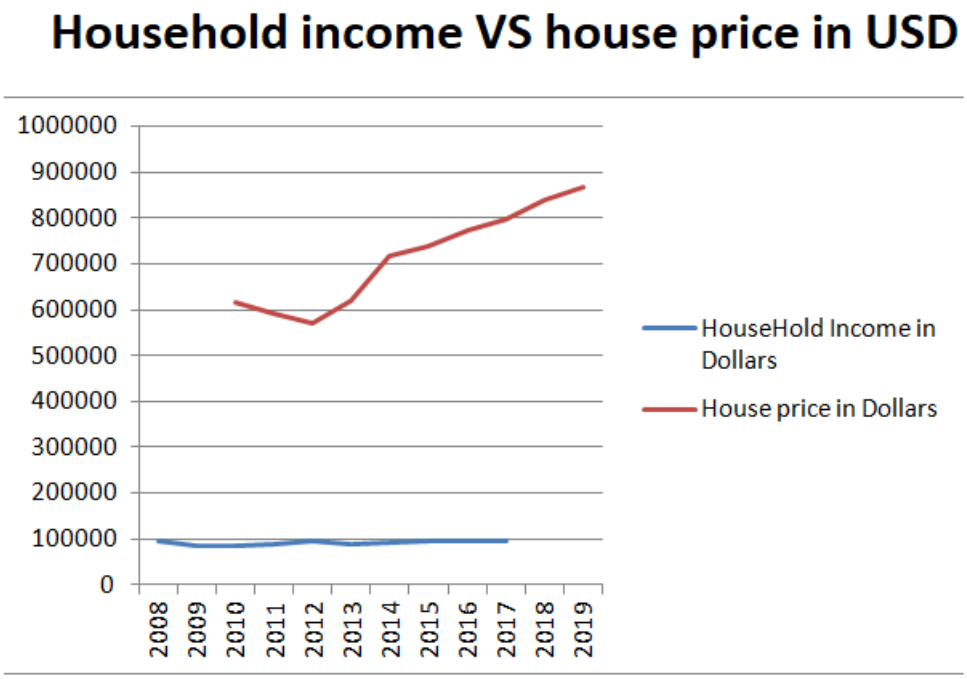
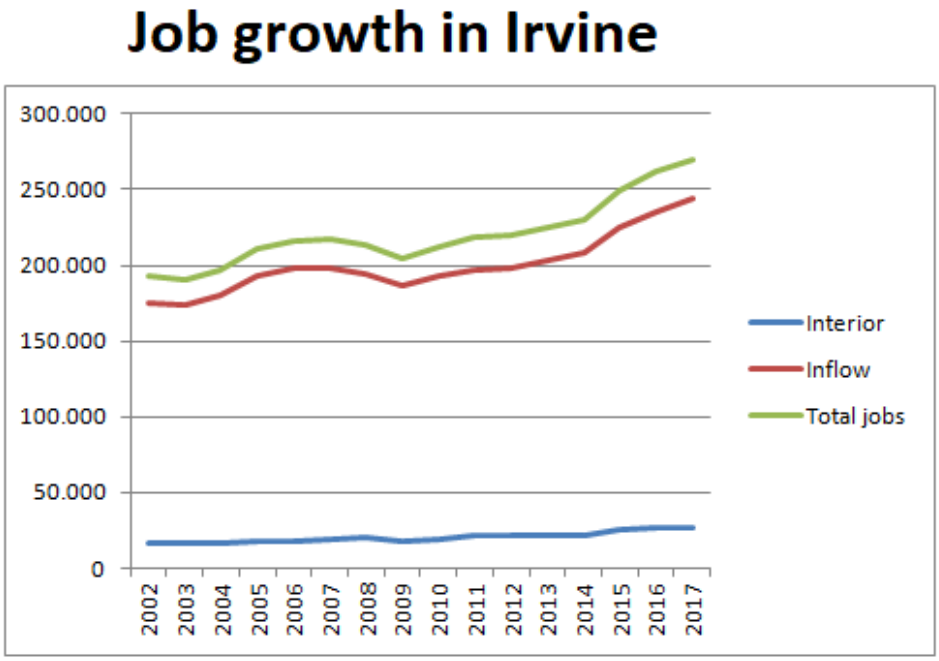
Appendix A - Interview Guide

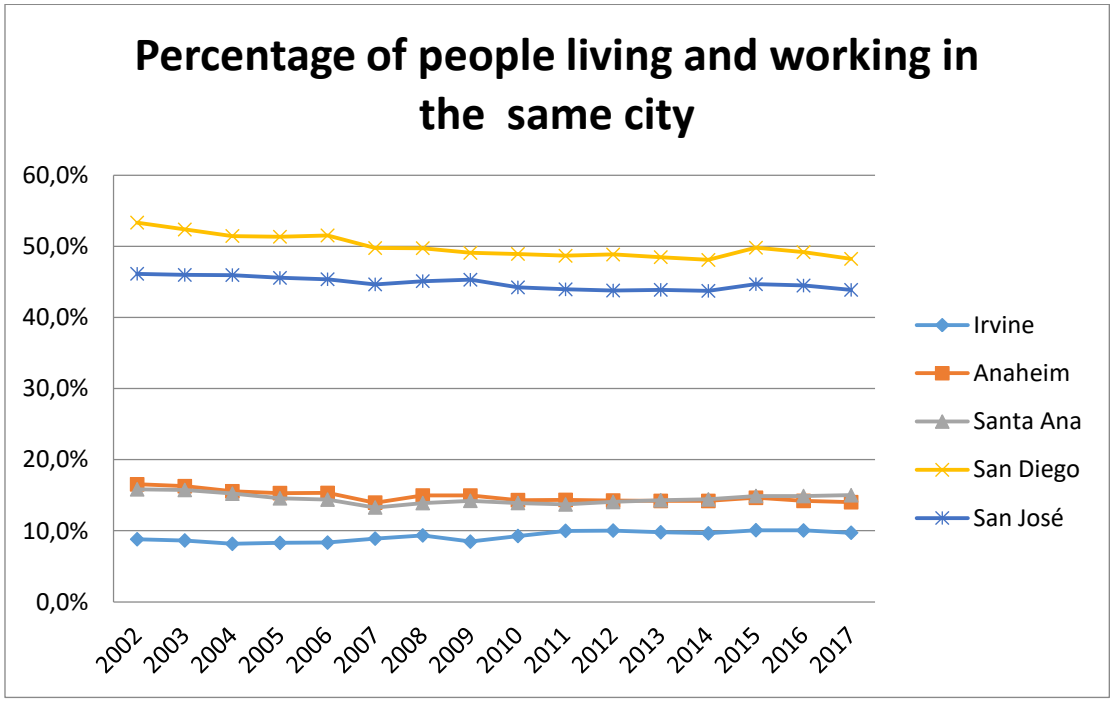
First of all I'd like to say that everything said during this interview is confidential. This means that when I'll refer to this interview in the report that I'm writing that I would never refer directly to your name but that I'll keep that anonymous. I would like to ask you if it's okay if I record the interview. The recording will of course also be confidential and will only be used by me so I can listen to it again later to make sure I recall everything that was said during the interview correctly.

Something about me and my research: I'm visiting UCI right now from the University of Groningen in the Netherlands to do research. My research is supervised by dr. Venhorst at the University of Groningen and Professor Bollens at UCI. For any questions I can provide you with their contact information. The main question that I'm concerned with is the following: To what extent is Irvine's job growth impacting commuting patterns into the city. In order to answer this question I've looked at all sorts of statistics relating to job growth, available housing units and their pricing, household income, etc.

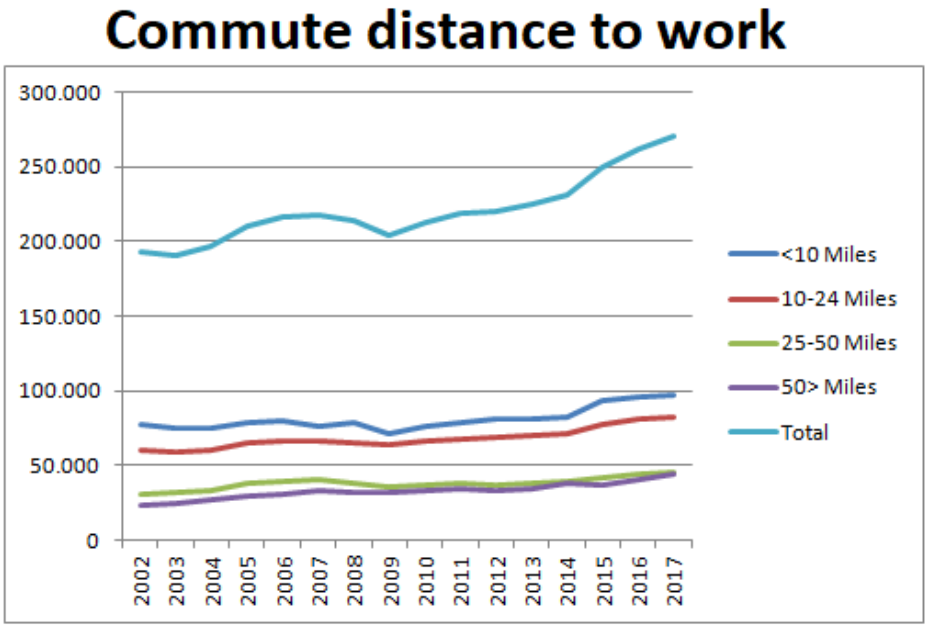


For the first graph I want to add a disclaimer that the data I've found does not have the same start and end date for the categories included, which makes it meaningless to calculate index numbers. However, it still illustrates a problem where median household income remains stable while house prices are increasing quite rapidly. How do you think that this will impact people who can't afford to live in the city anymore?



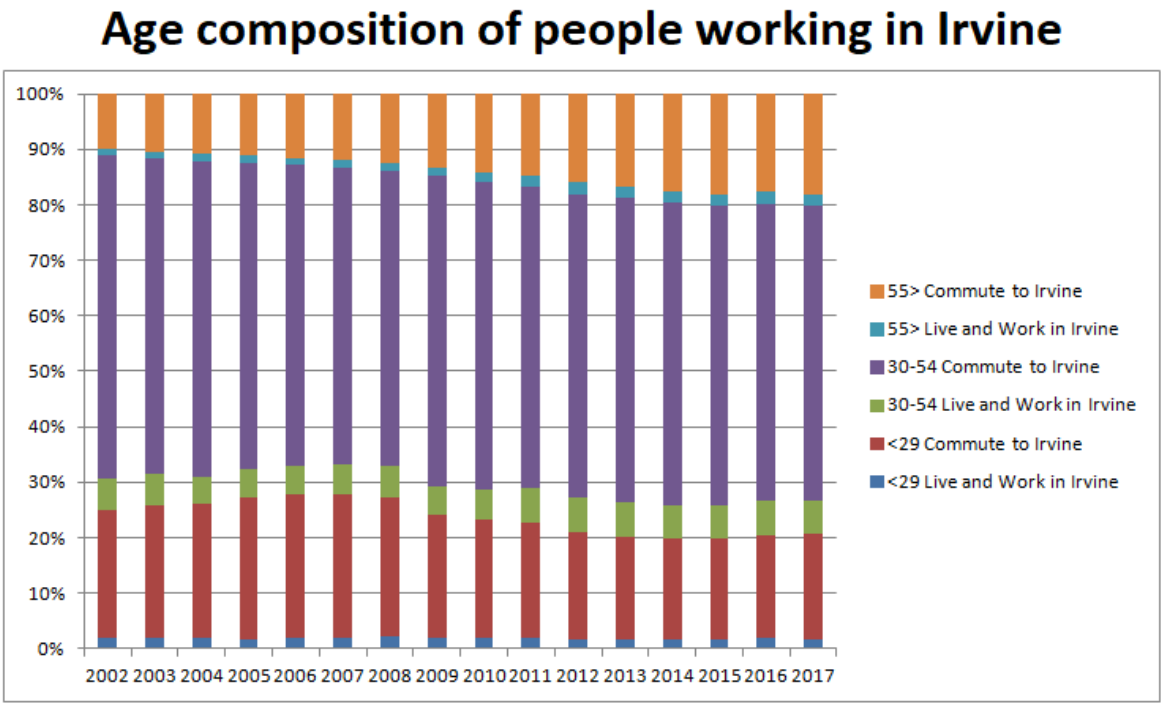


In these graphs you can see the percentage of people working and living in the same city, for which Irvine seems to be the most extreme case as only about 10% of the jobs available in Irvine are going to people who work in Irvine. This can be observed while the amount of jobs in Irvine is growing rapidly. Do you think that this is a problem that needs to be solved? If yes, where would you seek the solution to this issue? (e.g. transportation, housing)
Furthermore, what are the implications for the sustainability of Irvine's economy?



	<10 Miles	10-24 Miles	25-50 Miles	50> Miles
2002	77.121	60.712	30.794	23.914
2003	74.774	58.652	32.037	24.529
2004	75.187	60.938	33.926	26.822
2005	78.436	64.701	38.080	29.548
2006	79.732	66.097	39.530	31.043
2007	76.471	66.707	41.236	33.461
2008	78.254	65.060	38.748	31.867
2009	71.776	64.253	35.596	32.376
2010	76.092	66.188	37.169	33.199
2011	79.107	67.716	38.148	34.133
2012	80.672	68.984	37.500	32.958
2013	81.633	70.735	38.137	34.586
2014	82.759	71.077	39.029	37.649
2015	93.027	77.874	42.330	36.476
2016	95.495	81.297	44.977	40.206
2017	96.832	82.932	46.207	44.203

The graph above shows the amount of people commuting to work in 4 categories for which all groups are growing. When looking at the absolute numbers the group of 25-50 miles has increased by about 50% and the 50miles+ group has nearly doubled. Do you think that this could be a worrying trend for the well-being of these people as a result of commuting stress? Do you think that commuting trends are reaching their limits?



Lastly I want to share a quote from the Orange County workforce indicators rapport that I've read. "The lack of housing will have severe impacts on Orange County's economic competitiveness and an increased exodus of young professionals and talent from the region. "

I looked at the age composition of people who work in Irvine and the graph above illustrates this based on 3 categories. Do you believe that something has to be done to attract more young people to work in Irvine. If so, what do you think needs to be done to achieve this?.

What do you see as a likely future scenario for Irvine?
- Restricted capacity for economic growth in Irvine?
- Ability for housing market to catch up with jobs?
- Transportation improvements to improve commuter accessibility?
- Other?

This is it for the part of the interview that I've prepared beforehand. For the remaining time I'd like to ask you if there's anything you'd like to talk about regarding this issue that has not been discussed yet?

Thank you for your time. Is it okay to contact you later by email if any follow up question may arise?

Appendix B – Absolute numbers of demographic commuter data

	<29 Live and Work in Irvine	<29 Commute to Irvine	30-54 Live and Work in Irvine	30-54 Commute to Irvine	55> Live and Work in Irvine	55> Commute to Irvine
2002	3.548	44.665	10.996	111.824	2.415	19.093
2003	3.463	45.616	10.490	108.220	2.457	19.746
2004	3.563	47.535	9.930	112.024	2.580	21.241
2005	3.766	53.406	10.866	116.613	2.843	23.271
2006	4.137	56.072	10.952	117.364	2.955	24.922
2007	4.419	56.075	11.769	116.661	3.195	25.756
2008	4.671	53.723	12.029	113.436	3.297	26.773
2009	3.703	45.657	10.347	113.906	3.233	27.155
2010	4.011	45.151	12.029	117.680	3.666	30.111
2011	4.133	45.433	13.640	119.259	4.119	32.520
2012	3.792	42.322	13.826	120.411	4.458	35.305
2013	3.544	41.914	13.864	123.260	4.628	37.881
2014	3.634	42.384	13.749	125.296	4.836	40.615
2015	4.247	45.155	15.385	134.212	5.542	45.166
2016	4.757	49.004	16.099	140.124	5.466	46.525
2017	4.791	51.104	15.922	143.684	5.559	49.114

Appendix C - Interview Transcripts

Interview 1: Professor Urban Economics UCI

how do you think this will impact people who cannot afford to live in the city anymore

it makes it harder, there's tremendous demand for residents in Irvine, that comes from a lot of factors. you have to remember that amenities play a role in this, so when you're buying a property in Irvine, you're not just buying the property but also all the things that come with living within Irvine. in particular, there's the amenities factor that is natural. but Irvine also has an extremely good school district, which drives a lot of that price growth. so there's increased demand for good public education, so lots of families are moving here to take advantage of that. it's not just that it's unaffordable, it's that it comes tied with other things that are in high demand. So it's a bit misleading to say that house price growth is outpacing income growth, it's certainly true and there are other things we could talk about with respect to that, but it's because it's a thing that people want to have.

it's a bit of a prestigious place to be?

Prestigious is probably the wrong word, if you want prestige you move to Newport beach, Laguna beach, those are prestigious. I think Irvine is largely driven by its proximity to the university. maybe the best school system in southern California (in terms of public schools). and as you've pointed out, the tremendous number of jobs that are here, and I think it's still true, it was at least 4 years ago and I suspect it's still true that the jobs to population ratio in Irvine is maybe the highest in the country. it's a problem of the master planned nature that we have that kind of job growth. so people want to live near their jobs of course and that also drives a lot of the traffic and the high housing prices.

a lot of people think that one of the reasons for high housing prices is the lack of response in housing supply to increases in housing demand. there's a lot of truth in that, but it's less true for Irvine than other places. The Irvine government has recognized this is an issue and has permitted lots and lots of lots of new construction for new housing, and it doesn't drive down the price of housing. Irvine can build all the property it wants and it's not going to budge housing prices. It's elastic demand, which means there's basically an infinite amount of people- let me give you an example: what does it cost to buy a 3bed/2bath house in Irvine? 800k. I don't have kids, so i don't care about the quality of the schooling district, so I don't live in Irvine. But de demand is so high- so people say okay, how do you make housing affordable in Irvine? when the price of a 3bed/2bath house (standard American detached house) is 800k. Some people will say that you have to build more 3bed/2bath houses. But the problem is that that won't budge the price, because as soon as you build houses like that, people in Kansas and china and Latin America and Florida etc, are going to come in here and buy those houses for 800k. it won't budge the price at all, that's what I mean with elastic demand. there's basically an infinite amount of interested people. so what does Irvine do? it recognizes this issue, they don't permit as many houses anymore. they permit high density, multi family, multi unit structures. their permitting has actually been off the charts the last couple years. if you're a builder and you want to go build something you go to the city hall, and around here it's a very lengthy process. they are very protective of land here. and so it's at least 2 years from stage 1 to just get a permit, then another many months/years to build the property itself. so that's how to fix this problem. so you have the problem here that the people who get the jobs can't live in Irvine, so what they do, they move/live far away from Irvine to a place they can afford, and they commute in, which is terrible, because it's bad for the environment and also bad for the people themselves because we don't have public transportation here (unlike most civilized countries) and so we make them drive 50

miles to get to their jobs and then we tax gas at European levels. So that makes life hard. people do manage, but it is hard.

I believe the graph and I'm surprised it's not worse. Irvine has a tremendous amount of jobs compared to the geographical size of the city. it has the biggest jobs/residents ratio. so in a sense it makes planning- you know, Irvine kind of voiced it's problems on other cities. so basically the graph is a little bit misleading, because Orange County is 20-30 small municipalities and so it's very hard to live in the same city that you work in, because even a 5 mile commute will take you outside of the city, whereas san Diego has a huge size 300 sq miles. where Irvine is maybe only 80. So it's very easy to live and work in San Diego and also San José, those are geographically very good cities. So that's a little bit misleading, but This is not misleading, is that for Irvine? (graph 4).

So it shows that the commuting distance to work is increasing. Let's take a look here. The people with less than 10 miles commutes has increased by about 25% and the people with 50+ miles commutes has almost doubled. Yeah, that's not surprising. It's because people who want to find affordable housing have to go further and further out, kind of what i said before. Especially if they want to own their own house, then they have to drive out to riverside or somewhere in the desert. to be able to commute into Orange county. Not surprising at all, very common story. It's terrible, of course, but it's because this is the center of job growth. And Irvine in particular has a lot of job growth, not only Irvine but the whole north-county area has enough job growth that it can't be accommodated by the people who live there.

what I'm also curious about is the consequences of long and stressful commutes, limits that there are to commuting. So what do you believe that limits here can be? is it getting to a peak where people will not be pushed any further. when is it going to stop?

so we've reached the limits of lengths in commutes, (60-70, etc). Because the housing stock has very few impediments to growth. When you get to 50 miles away you're looking at the desert. and it's easy to build out there, regulatory constraints aren't as bad, so there won't be any need for people to travel unless they really want to. family reasons. still crazy of course, and not something that we want. And if they're doing it by car, which they almost surely are, the consequences for the environment are not great, to say the least. so there's 3 answers to that. 1) better mass transit, but in a city as spread out as los Angeles and orange county it's a little bit hard to do that right. read a story about someone who lived in san Bernardino, about 50 miles from here, and he took the train into downtown LA every day, but once they got off- and so they had to drive to the train station, 5 miles, get on the train, come into downtown la, then get on a bus, so it was a 2h commute. (talking about last mile issue)

It's too spread out. it's a car culture. no doubt about that. so other solutions 2) technology is going to make a difference, to telecommute and reduce your commuting to 3 days a week, that's going to help. 3) the other thing that's going to help is the decentralization of jobs. the obvious thing there is, you know, firms like Amazon. they need a million square feet for distribution centers. they're not going to put it in orange county, there's no way, so they put them out where we're talking about. if that's a continuing trend that is something that'll help. you know, in the old days we would have said the suburbanization of manufacturing. So there is a psychological burden. there is studies, i think by Dutch guys, that talk about productivity as the function on the length of commutes.

this has been an issue for a long time. i can remember even when i was in college 30y ago, or more than that, people were commuting to downtown LA, from into the valley. that's 50 miles. so that's going on since even then. but it's time we're actually worrying about that, because obviously 4h in

your car everyday is hard. it's an issue, even within Irvine, to get back to Irvine. one thing we haven't said is that it's a master planned community, meaning they laid everything out in advance, and try to account for future growth, but they missed the mark and are kind of a victim of their own success.

So in which way do you think that they missed the mark?

So, it's as well planned as any American city. if you're going to do that sort of thing kind of ahead of time- So, my pet peeve, and this is going to sound stupid, my pet peeve is that there's not enough gas stations in Irvine. so the ones that are here are overcrowded and expensive. and there's a general dislike of what are called outparcels, meaning we have these shopping centers, strip malls sometimes they're called, Grocery stores, some other things and then on the outparcels McDonalds, gas stations, that sort of thing. and there seems to have been a dislike of outparcels. so there's not enough- they clock up, the parking lot. so the parking lots can get overcrowded. but in Irvine they are overcrowded anyway, because there's not enough gas stations, and McDonalds. McDonalds is very popular, and to not have enough of them is a drag. but the gas station thing makes me crazy. and there's no auto repair. because they are unsightly, they are ugly and they kind of wanted Irvine to be beautiful and perfect, so there's no car repair place. there's just one. there's one car repair facility in Irvine. Because it takes away from the attractiveness, so that's a pet peeve of mine. So i think they didn't think about market forces enough.

and when you say there's not enough McDonalds, gas stations, etc. that kind of stuff. If you look at all the kind of people that would be working there, they would not make a lot of money, so, where do you get those people from. Ah yes, there's actually plenty of affordable housing by California standards fairly close-by. In Santa Anna, Anaheim, so they, you know, there's a lot of traveling from those kinds of places. but I'm not trying to say they have it easy. but they don't live in Newport beach and Irvine, but they do live in Placentia? Fullerton, and Santa Ana, those lower income places. and, you know, again, I'm not trying to say they have it easy, but, it's possible to do. but what they're not doing is owning their own home. they're renters. and the people that we're talking about with the 50 miles commutes, they are doing that because they want to be an owner. they're not renting and living 50 miles away. that's not- at least i doubt that that's happening. the reason for having the long commutes is that you want to have your own house.

What do you think the implications are for the sustainability of Irvine? and maintaining the current growth.

It's going to be hard to grow the number of workers within Irvine. that's going to be hard. I mean I think that the industries that Irvine has are growth industries. a lot of tech, finance, insurance, media, stuff like that, which I think- you know. who can predict the economy, but those are relatively robust industries. So I think incomes will continue to rise, within Irvine. but it's maybe hard to predict that there's going to be lots of growth in the numbers. maybe. there's still some developable land, not that much anymore, but there's a little bit and they're trying to grow it, so maybe. Unless you're talking about environmental sustainability, but that's too broad an issue for Irvine itself

outside of their reach?

yes. you can do all you want in a small community, but it's one community amongst 30 others. it's a very weird metropolitan area, because it's so fragmented. it's almost impossible to get anything done, if it requires cooperation. for example the homelessness problem. it's not as bad as it is in los Angeles itself, but it's an issue, and they can't get an agreement on what to do. It's clearly a multi-city problem and it's just not solvable by itself.

So the last illustration I have is just showing 3 categories of age and their percentage in the city, I guess it's a trend you'll see in more places, not just Irvine, but in general, places are worrying about ageing populations and a smaller amount of young people that live in a city. and i also read in a report of the orange county workforce indicators, that the lack of housing can have severe impact on orange counties economic competitiveness and an increased exodus of young talents and professionals from the region. do you believe that this is a big issue here?

Sure. It's helped by the fact that Irvine is building multi-unit buildings. we know that younger people are delaying this movement to buy their own detached house, so that occurs later in life. it still occurs, it's still going to occur, but it's going to occur later in people's lives. It used to be that you do this in your mid to late 20s and now your mid to late 30s is more the norm. so the fact that Irvine is building the kind of housing that people who are of that age would want to live in- what's missing in Irvine, is the amenity factor that people without children would like to have. I mean cool stuff, clubs and restaurants and theater, stuff like that. there's some of that in Irvine, but there's bigger concentrations of that in other places. so the exodus is into downtown LA, which of course has thousands of neighborhoods, which have more appeal in that than Irvine. Irvine is kind of viewed as kind of middle-class suburban, vanilla, very plain. you can get some of that nearby. you can get it in the beach communities, but those are extreme- you think Irvine is expensive? these are even more expensive. You can get it a little bit in Santa Ana and Irvine, they are trying to make moves in that direction, but there's just nothing like that in Irvine, because Irvine is so planned, that it doesn't have that organic growth in cool stuff. that older neighborhoods generally have. Irvine is not like that. Irvine is a Disney community. of course Disneyland is in another area, but it's very clean, very scrubbed

kind of artificial?

no, that's a cruel word. But it's just vanilla, plain. you know, that was the idea. we're just going to have this nice peaceful suburban community, which catered to people with families. middle-income middle-class families with kids. that's what they wanted. and they got that. but the world is changing. so they responded, they have. the permits are out there for multi-unit structures. but you don't create coolness, you don't create vibe, just like that. it's nothing- it can't be artificial. and so in fact, there's minor trends of moving to the older neighborhoods of Santa Ana, Santa Ana is kind of a prime location for this, as there's some money flowing in to there, some investment. into the older neighborhoods, and that may become the cool center in orange county.

Do you think that that's maybe then worrying that this is going on? or just a fact of how it's set up?

No.. It's a fact of life. I don't know. It's hard to know. I think Irvine will always grow, because people will always want to come, at some point in your life, you're going to have kids, you're going to want good schools, a yard for kids to play, you're going to want to have parks. so you're going to want to have the things that Irvine offers. I don't think Irvine's growth is going to slow down, but i think that the vibrancy of its industry, might suffer. we'll see. predicting the future is so difficult.

So what do you think is the most likely future scenario? Do you think it's just a restricted capacity for the growth of Irvine? ability for housing to catch up with jobs? transportation developments to improve for commuter accessibility?

I think the second I've already responded to, Irvine has already responded to the housing crisis and it's a crisis particularly because the job to person ratio is so high here. and i think they've responded, i mean my reading of the data is that they've responded in that way. but they're going to run out of nearby land at some point. and they're going to have to have other communities, again, it's a

regional problem. if Irvine was in charge of all the surrounding communities it wouldn't even be an issue. there'd be enough land to- but other places are maybe not going to respond to Irvine's request to permit more places,

because they have other issues?

they have other issues. there's a lot of nimbyism. In Irvine too, it's remarkable that they have been able to build as much as they have, because there's a lot of that. I mean, I know where i live- there's mixed use retail condo's going up a few blocks from my house. and if I've been living there at the time that this has been permitted, I'd be like don't do this, don't ruin my neighborhood, but i can't do that now. so people don't like change, because, you build more housing, there's going to be more traffic by definition. so you're going to make my life more difficult. but we're going to have to overcome that.

do you think that the traffic would be worse if there'd be more housing?

well it's hard for it to get worse.. but yeah of course. they have-.. there are.. i don't know actually. i should look this up. I don't know what they think about..so.. there's a big housing development that's finishing up now. It's called the great park. have you seen the balloon in the sky?

I've seen it in the distance yeah,

yeah, so that's the great park. it was an old air force base, and they've shut it down 20 years ago. have you seen the movie independence day? where the aliens invade? they've filmed part of it there. anyway, doesn't matter. so they shut it down 20 years ago and it was bought and they turned it into housing and commercial development. the worry that everybody had was that it would increase traffic by a lot, and so far it's not that visible. the one thing that they could do and don't ever consider is staggered work hours. have some come in at 8 o'clock, some at 9, some at 10, then leave at different times too. we don't even consider that. it's such a simple solution and we don't even consider that, i don't know why.

yeah, you're going to have to change people's habits and they are so used to their 9-5 workday..

right.. right..

interview OCTA - Orange County Transportation Authority.

(illustration 1) How is this going to impact the people with lower/middle incomes that work in Irvine? Do you think they'll commute or maybe look for jobs elsewhere?

Based on other data, we are seeing outmigration of lower income families out of orange counties, either to other states or to more affordable areas. And in term of the inflow of households we're seeing higher income households flow into orange county, at least when it relates to migration. So yes, it is a major issue. And we believe that is also having an effect on transportation here, because that travel market tends to be a lower income population as well, so, we've seen a ridership decline as well, and we think that is one of the factors that has led to a public transportation ridership decline at least in this county.

I know it can be pretty tricky to get from a to b, especially with the issue of the last mile that is quite big around here, for example getting here by bus was pretty tricky, which meant taking Uber or Lyft was the only option

well, there's a pretty good grid system of bus routes north of the 55, state route 55, but you go south of the 55 and you get a lot more meandering roads and the grid gets very different. So it's harder to provide transit services, along with the development that's occurring in those areas too. this type of the county typically has pretty good transit. right out on the street busses run every 10 minutes. So it depends on where you're at. (Before going to illustration 2 he gives a comment on the first illustration, perhaps placing income as y axis and housing price on x axis makes it more clear, 2 vertical scales)

(second illustration about job growth) as you can see the total amount of jobs and the inflow of people working in Irvine are running pretty much parallel to each other, which makes me believe most job growth is going to residents of outside of Irvine instead of people living in Irvine. Do you think that this is going to be a continuing trend where people with higher skill jobs are going to be occupying houses in Irvine, further pricing out more lower/middle class income households?

So, I don't know the answer to that, you might be in a better position to answer that, but based on our projections we see higher employment growth in Irvine, than higher housing growth in Irvine, in terms of projections. So, you know, just that alone shows the issue, that Irvine is importing nearly all their labor at this point. So, unless there is a major change in terms of housing development in Irvine, those trends will continue. I think, also, it's sometimes the way the land use zoning has worked in Irvine. A lot of it is just really ready for new commercial building constructions, especially in the spectrum area. I think some of the financial incentives may change, and that's , you know, something to consider is that there'll be pressure with so much demand for housing, at some point there could be some zoning changes that result in more housing in Irvine just because of the economics involved. And I think uh, as recent study we've been doing in Fullerton tended to underscore that, when we talked to developers, rather than build commercial building they're going to build apartments. So the economics probably changing as a result of the supply issue that you have here.

I can imagine that there's also, I mean, there's only so much space that you have. So do you think that maybe at some point they're going to increase the higher density housing?

I think there'll be more market forces that push that along, because of the issue, so I would say yes. But again there's policy decisions behind that from the city, and obviously the development committee. I have to say that there's money in that type of development projects, so i mean, if current projects continue, yes.. but will they continue? that's hard to say.

(answer man 2 at table) So the trends that you're observing for Irvine are probably true for most places in Orange County. I mean we've seen similar inflow/outflow balances in other cities. One in South county, lake forest, well, they are both in south county. So I mean the question you're asking is can you increase density everywhere? is it happening everywhere? And the answer is probably not in the immediate short term, maybe over the long term. And it's all about local policy, because a lot of places don't want density. And a lot of places in Orange County are already built out, which means you'd have to replace what's there with something else and people can be resistant about that.

(man 1) So another factor, and this is a subject of maybe not what you're doing. So, you can have a perfect balance between the number of working residents and the number of jobs in that community and you can step back from that and say this is a perfectly balanced city. but if you look at the inflow and outflow, the one city we're thinking of right now- there's probably a couple of different ones- is

that the residents, actually 90% of them outflow and they go to higher income jobs in adjacent communities. And then the inflow of workers is again, mostly it's an inflow of workers, but they're for lower income/wage jobs in that community. So, the inflow and outflow is also affected by the job type, and, so
(man 2) and your income from the job. you're not making a lot, you're not going to travel far
(man 1) right. so. you know it isn't just kind of market forces at work, but also the people that are living there and their income levels.
(man 2) and our transportation network is geared towards movement. Not short trips, but longer trips. cars.

So I also looked at that, I looked at the commuting distance and how that developed over time. So here you can see the total numbers of people commuting in certain categories and over here the percentages.

(man 1) So this is very interesting. So this is for how many cities? just Irvine? So the number has nearly doubled for greater than 50 miles. Whereas the short trips have only increased by maybe 30%. Interesting.

So I'm really seeing as you said almost a doubling in commuters of 50+ miles and 25-50 miles also grows by about 50%. So it's kind of amazing to see these numbers.
(man 3) this is commuters into Irvine?
it's commuting to jobs in Irvine. If you look at the percentages over here, it's not changing too much, probably because these groups are already so big to begin with, but still you can see that the trends are not really getting any better at 25 miles or more. But even in absolute terms I think it's a bit worrying. What do you think when you see these numbers.

well, just the statement. I mean 50 miles plus would put you in another county.
I think when we looked at Irvine last year, this kind of data, i think that there were quite a number, a large number commuting in from Los Angeles County. So again, Irvine is a magnet for higher income jobs. Higher income folks will generally travel further for those jobs

(man 2) and we have a train from Riverside to Irvine.
(man 1) We do, so we do facilitate that with commuter rail. So Riverside to Irvine is a pretty good service.
(man 2) and the 91 freeway is always jam-packed. Morning commutes, people from the south, from the inland.
(man 1) So I agree from a transportation point of view that this is a concern. Just from a vehicle miles traveled point of view.

Do you think that maybe there's also a limit to the commutes? So obviously I don't think there's going to be an additional category of 100 miles plus traveled, you know, it's probably going to be a bit like this, but where do you think the limits are going to be? because it's going to impact the sort of growth of Irvine, because all the lower and middle skill jobs are necessary for the growth of the economy overall, so how do you think that this is going to change in the next couple of years? is this going to maybe halt the economy and it's growth?

(man 1) Well, I think your question is, is there a maximum to this? And I would say that I've never encountered a maximum for any travel demand, ever. It just continues to grow. But what does tend to happen is that as places become less accessible because of congestion, then you start to see, like i said earlier, the development community starts to shift and push for housing in that area, brute force housing at that point, and then the employers will also push to have new facilities built, closer to

where there are residents. So that does happen and does happen even now, if you look at the development projects that are happening in the county, there are many, many, residential now. and then in terms of things that are kind of moving out of orange county, you're seeing that happen too. so, there probably is a limit, i don't think we've ever observed that.

(man 3) I mean, we also mitigate that, with the 91. We do a lot of work on that.

(man 1) right, right, we do have alternate modes available. Commuter rail in particular for the long distance trip.

(man 2) you may also want to see what's happening to persons per household. Because one way to solve the problem of expensive land is to have more people live in your house. So we know that certain areas of the county have maybe twice the persons per household. especially in the poorer areas. not that they're not expensive to live in, but the people their relative income is lower, there's a lot more people living there per house for sure.

(man 1) So the other thing that we do as an agency to help mitigate things like these, is that we have a pretty extensive van-pool program. We have over 500 van-pools that we subsidize

and a van pool is?

(man 1) Shared ride in a van, 7 or more passengers. And then we provide a subsidy to buy down the lease on the van. So, that's proven a very popular program, especially for people coming in from Riverside and San Berdino county into Irvine and other parts of Orange County.

and how do those people find the other people to carpool with?

(man 1) Generally through their employer. There's other ways that can be done, but generally through the employer. I think the other thing that will happen is that ride-sharing will become more popular as a result and that because of some of these issues, people will start carpooling. We would expect that to increase as well

A question about more of a theoretical thing about what commuting effects can have on your well-being. Do you believe that if these long-distance commutes are going to continue, these trends, that people are going to experience more and more commuting stress. Do you think that that is going to impact a lot of these people their well-being?

(man 1) certainly.

another thing I've looked into, and I'm sure that's a trend you can see in more places, is an analysis of age categories of people living and working in Irvine. The trend you can see is that there is a bit of a decrease of people that are 29 or younger, so young professionals that want to live and work in Irvine. Do you think that this is worrying or that something should be done to attract more young professionals to work in Irvine?

(man 1) So i think that this is back to the housing affordability, and therefore you're seeing higher income folks moving in that tend to be in that older-managerial bracket, and therefore you're also seeing a corresponding drop in younger workers there too. So i think it's more, again, i traced it back to the housing issue, as a first mover on this. And then obviously a lack of supply in this case

(man 2) What's happening to that demographic in general, when you forget about who's commuting where in orange county, what's happening to that demographic?

It was quite an extensive analysis, so I haven't been able to do this yet for a couple of other places as well, but I can imagine it's going to be a similar trend

(Man 1) What you could do, if you want to do that, because I think man 2 raises a good point, is just an overall demographic trend in California. In that OnTheMap tool that you used, you can select the whole county, or multiple counties, and do the same thing, that's much simpler.

Just compare the county to Irvine and see if Irvine stands out?

(man 1) right right. So, and, with LHD(??) you can pick other areas in the nation if you wanted to, because it's a nationwide dataset.

right, I think it's definitely in the context of orange county, you'll probably see if it's going to stand out very quickly.

(man 1) my gut says yes, as man 2 said, there's some co-mingeling of the overall demographic, the ageing trend in this, but, it is pretty pronounced. It's almost a doubling of that age bracket since 2002. You're going from what, 10 % to almost 20%.

(man 3) You know, it's a lot of opportunity right. Things will change, that's the other thing, isn't it.

(man 1) Right. It's also the age cohort behind that group. That in 5 to.. you know, 10 years, maybe won't be there. Then what, right?

I don't know..

(man 1) I don't know either..

It's hard to predict the future

(man 1) Well, we're trying to do that

So what do you think would be a very likely future scenario. Do you think that transportation improvements are going to make commuter accessibility better and facilitate the growth of Irvine in that way? Is there an ability for the housing to catch up with jobs? Or do you think that altogether there is going to be a restricted economic growth potential for Irvine?

(man 1) Well, I think it's all a bit of an educated guess at this point, but I think there'll be pressure on more housing development in Irvine, and to have zoning changes to support that, as a result of the congestion. I also think that, and that is more on the developer side in particular, but on the employer side, there'll also be pressure to, you know, kind of build satellite facilities closer to where their workers live, because like what you said, it is a quality of life issue. and employers have a choice in some cases if it would make economic sense to them. And then the third thing is, you'll see increasing pressure for transportation demand management strategies. Get people in the carpool, once, twice a week. get people in the train. put new express bus service out, emphasize the van pool programs, work at home, which is also a growing mode if you'd look at that in other census data. I call it a mode, it's not a mode, it's non-travel, but again, that seems to be growing at a higher rate than even biking and some of the other modes, because people are just opting to work at home if they have that opportunity. So I think ultimately these things balance out, will they be the limiting factors on the economic growth? I personally don't think so. I think you'll just see change happen. And it'll either be reflected in the pricing related to travel. that is, people won't travel, or you'll see the housing supply increase, or you'll see employers essentially make other location decisions. So you know, accessibility to jobs is always an issue, but, you know, again, I think that it'll balance out in

time. I mean, downtown LA hasn't stopped developing due to congestion in downtown. they have a lot- you can take the train and subway around, takes you an hour to get anywhere you know. and things continue to develop. I'm not aware, at least in the US, where we've hit some sort of capacity where it affects the economy at this point. I think there are cities in Asia where that's happened, but I haven't really seen that here. I don't know what your observations are at this point, I mean, you are the expert, you tell us!

I'm not an expert, I'm just going to all of the experts. But I think it's definitely something that is interesting to observe in the US. Because in Europe, or at least in the Netherlands if you say I'm going to commute for an hour, they look at you like huh? what are you going to do?

(man 1) It's crazy. The commutes in the Netherlands are probably like 15-20 minutes?

I think so yeah. It's a lot better

(man 2) and I think you guys have like 15% bike mode share or not? maybe more?

I think so, it's pretty high.

(man 2) here it's like 1%.

(man 1) We were in the Netherlands this year and I think that what amazed me is just how fast you could travel to get out of the city and into the countryside. Just 10 to 15 minutes by train and it's completely, nearly congested free. And then getting around the city in Amsterdam and Haarlem, it's very easy by train or by bike.

Yeah, it's all very high density, it's shocking how you can be in the middle of the madness, and then as you say, you don't travel for long and then it's just nothing around you, very suddenly.

(man 2) Irvine is a little different, because, there has been a lot of vacant land to be developed. And some of the newer developments seem like they are higher density, more multi family. And even the single family residences in Irvine are kind of compact. If you look at some of the surrounding cities, there's way bigger lots and less vacant land. So i think Irvine is probably a little different than other cities in Orange county. So they have the ability to increase their density and maybe make it more affordable that way. Can't get a big house with a big lot, but you can get a reasonably sized house and still be somewhat affordable. A lot of apartments, multi story apartments are going up. Probably not a lot, but some.

So not bigger than they need to be, people will have what they need and live in the spot where they want to work.

(man 2) Right. That's the trade off.

So that is all that I had prepared, is there anything that you'd want to add to this?

(man 1) Well, I think that maybe looking at the demographic trends for other counties might be helpful. Especially that age and income related one. It's pretty easy to do in the datasets you have available to you, otherwise no. This is great. Also very insightful for us. I hadn't looked at the age issue before, but that was interesting. And I don't think we had ever- I think we've done like time-series on travel distances using the OnTheMap datasets, so that was also very good, thank you very much.

interview 3 city of Irvine

first illustration uitleg. How do you think this will impact people who can't afford to live in the city anymore? so primarily probably the lower and middle class.

woman) I think to your point, just real quick, i think it would be beneficial. Maybe this data source doesn't provide it, but maybe there are other data sources that can provide you with that houseprice. because I know just from my personal experience, I purchased a home in 2005. Not in southern california, but in Northern california and the value of it, in 5 years, dropped to less than half of the purchase price. So you might- it would be interesting to see if you were to pull this back, you know, how far is it from where you're landing today. And then sort of extrapolate it in that manner. I think the differential won't be quite as significant with the lack of growth in the household income. but, i think to your point, obviously in general, if that cost of housing goes up, but the income does not, then that gap becomes bigger and it becomes more difficult to purchase a home and so you might end up with either people relocating, or renting and then having those that can afford it but don't necessarily live here owning the homes and then more people renting or relocating. I think those are the 2 options right. If you can't afford to buy where you..

man) you tend to rent or move. And I do think she has a very good point, because. Well i've been very lucky. I bought a house in 1998. There was kind of a little economic decline in southern california. At the time the aerospace industry was kind of going down and there were big earthquakes. People were leaving, there was a big decline and I bought a house for $146.000 in Pasadina (In LA) and in 2006, 8 years later I sold it for $600.000, which is quite amazing. But then it went back down. So there is, at least it seems to me compared to the rest of the country- Well I'm from Idaho- You don't see those kinds of variations

woman) It's more sensitive here

man) Yeah, it's more sensitive here. For whatever reasons the housing prices tend to go up and down greater here than many places in the country. So I think yeah, it is helpful to realize that there might be an overall average that- and there's times it gets higher than it probably can sustain and then it drops. Different factors come into play, so it's, you know, it's not unusual that you kind of see that going on. It's not a guarantee that we'll go on at the kind of rate like this (points at housing price increase per year).

Right. That's also definitely a point, it's a bit of a short moment that you're seeing there, so probably if you would drag it out a bit, it would look a bit different.

man) The other thing that would be of interest too, is, I think Irvine is an usual city in the sense that we have a greater median income than most places, and that might be less fluctuating than most places as well. It would be an interesting question.

Yeah. I think definitely because it's so high income in general, It's definitely going to be the more well off and the wealthier people that can pay these prices. Do you think that'll lead to the middle class getting priced out of the city in a way?

woman) I think that's more a question of economics than transportation. I would.. yeah i don't know. I'm just trying to think of anyone that I know that has left. I don't know of anyone who's left because of housing cost, or changed their mind about living here. I don't live in the city personally, but I know we do have employees that do. So yeah, I don't know

man) But I think that's a different question to study when you're looking at it, that is, Over time has there kind of been a change of income or how people are classified, Because I'm not sure. Because

Irvine is such a young city, and such a planned city, I don't know that there's been a drop in middle class, you know, it's kind of designed for a certain slice.

woman) Oh.. Like how many.. yeah. If you could get a breakdown year by year of the residents, if they are in middle income, high income, low income... and if that's changing. I would think that it would sort of trend with the average.

yeah.. that's the problem with the data that I've found. They have 3 income classes and you can see those over the years, but I feel that it makes no sense what they've used as the categories, because I think that if you're part of the highest category, like if you're only barely over the minimum line for it, then you're still gonna be considered really poor in Irvine. So it makes sense that almost everyone will be in that category then, because over here in general inomes are just a bit higher. That's why that data wasn't too useful.

woman) Oh.. because it had like, was it like a poverty level? a poverty line?

I think the problem is that they used the income categories based on maybe what's more traditional to do in other places in america. Because you can type in whatever placename you want and it uses the same category. So you could live in a rural village in the middle of the country and it'll use the same categories as over here

man) not taking into account cost of living, transportation etc..

yeah, so I can see if maybe I can find other data

woman) to see, if yeah, if over time..

man) has there been a change

woman) yeah.. that would answer your- because you're asking will the middle class be pushed out of the city?

yeah. kind of forcing them to commute more and more, or maybe relocate and look for a job elsewhere.

woman) well it's interesting too, because the housing market is driven by demand as well, so, if they're, if people aren't able to afford the houses then at some point the houses are going to have to stop growing. but I guess if there's enough of a demand of a higher income households, then they can continue to keep the prices high.

right. I believe that there's just a couple of professions, like in maybe software, aerospace, or biomedical I think, a lot of those people might be able to afford the higher prices for a longer time. probably eventually they'll also think that the prices are getting too insane, I don't know, maybe

woman) Right, Eventually right? If it continues like this upward trend..

man) and this is anecdotal, but I think part of the reason people are here, and these are people I know that rent here in the city and want to live here. They've chosen to get places smaller than they can get in other locations for the price, because it's closer to work.

woman) So they're choosing to rent, easy to have a smaller home or dwelling, so they can stay here.

man) to be a little closer to work and not commute as much. So that's another factor. And the people I think that commute in, have chosen that they want a bigger place, but they're gonna pay for it with their commute. you know, in a sense.. if you're into that crunch. So people have to make a choice. So

I think there's a lot of people who choose to live in Irvine, just because it's.. the weather is very nice. It's a very safe city.

woman) Yeah.. are you familiar with all the awards the city's won? One of the best places to live

man) very well planned,

woman) very nice parks,

man) people pay for that

woman) it's desirable. yeah. So maybe you just change your style of living in order to stay here. yeah.

man) I think that is kind of true.

yeah. It was definitely shocking when I got here. Because sometimes you hear about stuff that's going on in the States and then you come in Irvine and you don't notice anything of it. Sometimes it feels a bit like you're living in a bubble here.

woman) yeah possibly, I don't live here though (laughs).

man) yeah. I think in a sense Irvine works very intentionally to be a very safe city, to be very economically strong, so they're very careful with their planning. So I think it appeals- there are folks who desire that lifestyle.

Okay. And then for the second graph it shows job growth, what I think was interesting there is that the line for inflow and total job growth look almost parallel to each other, which kind of is an indicator that most jobs that are created are going to people that do not live in Irvine. and in the third graph you can see the amount of people living and working in the same city and Irvine has a very low number there. [....]

woman) Okay, so of all the jobs in Irvine, 10% of those jobs are occupied by people that live in Irvine

Yeah, that's about how to read it, I should have probably phrased the line above the graph a bit different, but that's what it boils down to. While I saw that in orange county in general you can see that trend..

woman) Yeah, true, it's all the orange county ones that are lower, and I would argue maybe San Diego and San José are bigger cities?

man) Bigger geographically. San Diego's got a huge area

woman) yeah, so I wonder if that comes into play, where..

man) You could commute in San Diego, what would probably be like going through 10 cities around here, you know what i mean?

woman) right

man) So that's something to consider. You might have residential areas and manufacturing areas in San Diego that are far apart. farther apart than Orange County cities, and you're still commuting within your city. But you're going 40 miles. Not maybe that much, but it's a big city.

woman) maybe 20 miles?

man) they have a much bigger boundary

woman) whereas people here may come from outside of the county and work in Irvine, but their trip might actually be shorter. and then San José is pretty big too. But I don't know how big they are, it might be the same. While Santa Ana and Anaheim are ballpark the same city as Irvine. Maybe a little bigger, but that could be a factor with that.

Right, I talked to my professor and we just came up with these quite randomly, i guess, just to see for comparison with other places to see what the interaction is there. But I do think that especially for San Diego it's maybe a bit harder to make a comparison with the Orange County examples. We chose San José because it's very rich as well, so maybe we could see a different interaction with people commuting from outside because it's expensive, but you can see that that's not really true at all.

man) I think it's very interesting to me, because I've never really studied a lot of this. Maybe you have as an economist, or geographical economist, but the stability on these. You'd think that with dips in the economy, ups and downs, you might see more people changing jobs, but it's amazingly steady. If anything, something that almost could be argued, it's very slight, but out of these the only one of these that seems to be moving up in the population is Irvine.

woman) Hmm.. it's trending upward. Yeah. You're right, the others are all slightly down. You know the other thing too, I'm just thinking through this, Irvine is still developing, so if, you know. In the Spectrum area we have the towers. One of them just opened in the last year and so those are jobs that are created and that have to be filled and so.. people from out of town may be taking these jobs. If it turns out to be a stable job, then over time they might then move to Irvine. So there could be a lower percentage in a city that is developing. Because these are new jobs that are being created that have to be filled. Whereas maybe in San José, I don't know, I used to live in the bay area, but I don't remember how much San José or maybe San Diego are developing and if they are more stable, then people will have had time to find their job, be happy and then live close to it. So that might be an explanation?

man) that could be part of it.

yeah. that's also part of the reason I'm looking into Irvine since it's a bit newer and it's increasingly important to do things right, now. to prevent things from happening later that the city wouldn't want to happen.

man) Did you find in your studies overall what- so, there's 10% saying that they live and work in Irvine. For the other 90%, do we know where they're coming from?

right.. so where they're coming from, I believe a lot are coming from the LA area, I'm not sure exactly. I don't know why this data source is showing the data in this way, but it's kind of showing a compass and then in size of rings where the traffic is coming from

woman) so it's kind of a graphic or picture, as opposed to data

Right. and it shows that a large portion is kind of coming out of that area. So kind of Los Angeles. And I think I've seen another dataset that also showed that more commuters are coming out of LA to go to Irvine than the other way around. I think also around the riverside area had more commuters going here.

man) Well yeah, and that's this is one data point I do know. As a transit administrator I'm overseeing directly the Irvine shuttle, which is a subset of shuttling, but it's a distinct thing, so in some ways it shows something but it's also inadequate, because we have an Irvine shuttle which carries people the last mile from train stations into more of the employment centers of the city, which tend to be

near the spectrum area, there's a lot of businesses out there, and near what is called the Business Complex. At least it has been, it's changing. It's becoming more residential, but that was a big work center. So the majority of people, like 95% using that service, are coming from outside. Both from the north, from LA and the North East, which would be the inland empire, which would be Riverside. and I think there's more coming from there to work in Irvine to work of those 2, than from LA. And it kind of makes sense since it has some of the cheapest housing, but it's a terrible place to live. This is my opinion, forgive me if you live out there. There's a lot of smog out there, it's hot, it's a tough commute coming in because everyone is doing that. It's one of the worst impacted... But people are living there because they can have a bigger house. A newer, bigger house, for cheaper. But then they still work in the LA greater area or in the middle of Orange County.. So a lot of our riders are doing that. But that is not everywhere. OCTA will have to tell you other places, and it's because we're going, you know, where we target is the employment centers. We're not really going to the residential centers to pick up the other direction, so, it's hard to say. Is there more coming in than going out? I don't know. But we're kind of servicing those who are coming to work in Irvine with the IShuttle. It's kind of a select service, it doesn't represent everything.

It's definitely hard with the last mile issue to accommodate to everyone, but I think it's the best way to at least go to the biggest centers, you can't reach every place. You'd be busy all day, all night and you'd still be missing people.

man) and frankly a lot of our job, and a lot of our goal in what our positions are, is to try to help reduce congestion in whatever ways we can. And it does do that, it does allow people to keep cars at home who are working in Irvine, hopefully. Take the train, take the shuttle, you don't have to take your car in, we'll help you with the shuttle. So that's the whole purpose of that.

Okay. So then for illustration 5 and 6, they show commuting distance to work. It's basically the same data but shown in a different way.. [.....]
They're all growing, but if you look percentagewise that 50 miles+ is almost doubled in 15 years and that the 25-50 miles one is also growing by almost 50%. Do you think that this could be a worrying trend for the wellbeing of these commuters?

woman) Well, I think the percentage is a subjective metric, because yes, it's more than doubling, but that's because it's also the smallest number to begin with. So looking more at it as a delta, like looking at the purple line, is it growing... they almost seem to be tracking similarly. almost. I'm not seeing huge differences. It's not like one of the lines is really starting to take off compared to the other lines. So as a percentage yes, it doubles, but the actual delta is like.. 21 percentage points. Whereas the less than 10 miles and the 10-25 miles are both increasing by 22 percentage points.

man) and would these be the number of people on the left, total? Is that what it's trying to say? the number of commuters?

yes

man) Okay. To consider then too would be..

woman) So these are thousands? these are..? the period(.) is a comma(,)?

man) We're so American right? Because in Europe you do that right? with periods instead of comma's?

woman) with the period? Oh..

man) That's why I said we're so American. We always use comma's

really? ohh.. okay..

woman) yeah.. 50.000 would be 50,000

Ahh.. then I see where the confusion is coming from now.

woman) because otherwise it looks like 50 with a decimal. How do you guys do decimals?

we use comma's for those.

woman) oh really?

Yeah.. so we flipped it..

man) yeah.. we reversed it. That's why we're confused. I've lived in China and they do it the way you do it in Europe too. So I was kind of thinking it was thousands. So anyway. My thought is. If these really do reflect number of commuters then another thing you'd have to look at is the population growth. Because Irvine is an unusual place. We're a very young city. We're one of the few cities here in southern California with still open land. And so anything north of us is built out. we're getting there, we're starting to build up. But since 2002 our population has grown tremendously, so some of that might just be to population growth? is that true?

woman) I would think, because this is total number of commuters, right? So we have 275.000 commuters

man) so you would have to distinguish, are people commuting longer now or are there just more people commuting that distance? Do you see what I mean?

right, I mean, so even if it's true that Irvine is a bit unusual and it's still growing and developing. I think if you look at the 50 miles+... I mean, I guess if you're commuting 50 miles+ you're commuting quite a long distance across counties. And of course I agree that percentages might be inflated a bit if you're starting with a lower number to begin with, but if you look at under 10 miles and 50+ miles by absolute number by which they have grown in the last 15 years, then they're very comparable numbers. So then I think it's quite striking that for every commuters that's traveling for less than 10 miles there's another one traveling for more than 50 miles.

woman) Right. And another one that's 10-24. the 25-50 seems not to be growing that much. So it's like, for every 10 jobs added 2 are less than 10 miles 2 are 10-24 2 are more than 50 miles.. or.. whatever the percentages are, you see what I mean? I don't know if it's necessarily heavy on the 50 miles or more. It seems to be sort of, the new jobs are just evenly distributed more or less between each of the distance categories.

man) Interesting. Interesting to see if it would follow a bell curve.

So I looked a little bit into what results of long commutes can be for well-being of people, and it shows there can be quite a lot of undesirable effects, like the constrains on mental health and that kind of thing. So what do you think of this when you take that into consideration? do you think that transportation and infrastructure development is a sustainable solution to the problem where people are commuting into Irvine every day? Or are there any limits that you foresee, or?

man) One thing to clarify for me too, is because I realize when I was looking at other data in the past, are these Irvine residents saying what they are doing? or workers coming into Irvine?

This is workers coming into Irvine. This is like all the jobs together

man) This is reflecting people who work here

Right. So it can be people living in Irvine and coming out of Irvine, as long as they're working here.

man) Right. Because that would make a difference, if- which way it's going.

woman) Yeah, I think your question really is just so much broader than transportation. I mean it's a question of human behavior. What limits we're willing to push ourselves to for that house that we want, that job that we want, and also, something I think a lot about too is I think the percentage of dual income households where the husband and the wife work, you know, because traditionally, if you want to go back several decades then the man would work and the woman would stay home, but I can imagine that over time that's trended significantly upward to now that you have both. I think it's really hard for both parents, or husband-wife, to find jobs close to each other, where they can live in one place that is close to both jobs. So it probably becomes increasingly difficult in modern era of being able to, you know, maybe one of them works close to where they live, but then the other one of commuting, or the other way around. Or maybe they try to live in the middle and they're both commuting. So it kind of becomes like this quality of life, you know, balancing the needs of your family, the house you want, the job you want, and pushing the limits of what we're willing to endure, to try and maximize all of those. And.. Yeah.. But I think you're right, there's definitely some medical data that would substantiate the idea that the longer commutes do put a strain on our well-being. physically, mentally.. You know, having commuted myself, longer commutes during periods of my life, I know that that can be very taxing.

man) I used to commute a lot too, from Passadina, close to downtown LA. So when I came to Orange County I was able to live closer to work ever since I moved here. I've lived in woodbridge and worked at UCI for years, and now I live right over here, four miles away and commute to work by bike. It really is- I mean, you just have more time.

It's more pleasant.

man) It's more pleasant. But I do think that the wildcard is the human behavior factor. Because I think even if we were- well, this goes outside of our country, for me. I've lived in China for.. years ago. 1987-89. And I lived in China at a time, I mean, China is very centrally controlled, obviously. But it was even more so then, I'd say, than now. I lived at a university, and the way it worked in China, always, was that they built a community around an industry. And you live where you work. by force. That's how it was when I lived there. So we lived, we had housing, on the campus. We taught there and every worker lived on campus. every student lived on campus. Everybody had bikes. there was one car for the whole university that was owned jointly. And I loved it, in a sense that it was very convenient. And there was a little store, you know. But interestingly, I've heard from friends who are still there, that since kind of opening up the economy and freedom of movement, people have chosen to drive further, because it's like- well, I took that job because spouses, they both would work there and they would take whatever was there, because it was their only option. And once you start opening options, people will choose sometimes to drive far, or.. Yeah. I guess that's the wildcard. So even planning and providing- I'm not.. Well. I guess what I'm trying to say is that even if we were to provide all the housing I don't know if it would guarantee that people would live and work in Irvine. Like my son, he's an animator. He lives near here. He's going to be moving to Burbank, because he's been working in Burbank, because that's where the animation jobs are. And it's a very specialized job and he's been willing to commute for the past 1.5 year, because.. cheaper rent. Living with mom and dad. But, in the end, even if the housing..- He just wants that job there. And they're

just not here. So that's part of it. You know, some of it would be that you'd need different kinds of jobs here. I mean, Ideally you'd want the jobs that people want, to match where people live, but that doesn't always happen. that would be the ideal world. The job is right near where you want to live, whatever job that is. And maybe particularly in the American experience, different than Europe, is that we tend to have particularly in younger western cities. Residential areas removed from job areas so people get used to commuting, a lot of freeways.. Where I think you (referring to Europe/netherlands) are more unified. A lot more dense, and there's a mix of industry, residential and restaurants all together, ours are a little more separated

Yeah. It's a lot more mixed use. Also around here everything is kind of built for the cars.

man) that's part of it

woman) it's easy right? it's easy enough to drive.

man) It's easier to drive here than in many places. getting tougher. As it gets more condensed it takes longer. And I think all the evidence proves that it takes longer to go then it did 20-30 years ago.

Yeah. I mean there's definitely a lot of sprawl and that kind of stuff. I think it already says enough that the word suburbanization wasn't enough for the USA that the word sprawl had to be created.

man) that's right, that's true. We had more land to sprawl out into than some places. There is an extreme I think in the West. And probably more in the West than in the Eastern part of the USA if you were to go there. I think that Eastern cities would feel a lot more like Europe than out here. Because we just had more land to keep expanding, it's kind of what it is.

the wild wild west.

man) the good and the bad of it. it comes with good and challenges.

Definitely. So for the last illustration, it's just the age composition of people working in Irvine. Of course this is probably a trend that is not unique to Irvine. An aging population is just something that you see in most western countries and probably in other cities. But still I read for example in the Orange County workforce indicators, that there was a quote where they said that the lack of housing will have severe impacts on Orange counties economic competitiveness and an increased exodus of young professionals and talent from the region. So based on that I've looked at the age composition of people working in Irvine and I saw indeed that there was a trend, that once again might not just be because of the housing issue, but you can see that the 29 and younger category is getting smaller. What do you think about this? Do you think that something has to be done to attract more young people to work in Irvine or do you have any way in which you see that could be achieved?

woman) well, yeah, I would imagine that the high cost of living hits the younger workers harder, because they are earlier in their career. So they're not making as much money. I'm wondering if, because it's kind of increasing right? from 2002 to 2007-2008, which is also when the economy was growing very rapidly and then the recession hit, and that dropped. So i'm wondering if there's any connection to, like, tech jobs. Where now it looks like it's starting to trend back up.. slightly. So I wonder if that has to do with the type of jobs that the younger workers have and then them having been impacted by the recession harder than other, maybe more traditional jobs, the ones the older aged categories are working in.

That's possible

man) that's true. I mean part of it is probably an economic..- I sold my house in 2006, near the peak of the economy. Bought it near the low, sold it by the peak. Then I bought another one in 2009 after there was another dip.

woman) well done!

man) My second house, the house I have now, is twice as large as my first house and was $40.000 less.

woman) wow

Yeah.. you played it right..

man) By luck! I'd like to see it was genius, but it wasn't. But it is interesting if you look here. The peak of the economy was kind of like 2005-6-7. and then 2009 was when there was a real hit to the economy here. So that might be part of it. You see the drop there. And then the other thing is like you said, I kind of think you have to be cautious about the aging population in the US. We're probably going to see a larger percentage of older people for a while. Then there'll be these big openings of jobs.

woman) And I wonder if there is also just, like I hear about this, I don't have any data to back it up, but I feel like that generation, they tend to do more travel before working (the newer generation). I'm not sure what I want to do, I just went to college, but I'm not sure..- I'm not sure if any of this is factual, but "I got my degree, but I'm not sure what I want to do, so I'm going to stay home with mom and dad and kind of just live my life, explore different options.."

man) So there might be a delay

woman) yeah. Is that sort of a cultural trend as well? Is that age group not working right away? I guess it would be interesting to compare this to the county as a whole, the state as a whole, or the nation as a whole to see if these are like global trends, or unique to Irvine.

man) Yeah, I think that would be helpful.

Yeah. I'd definitely make a comparison to make sure I'm not throwing anything out there that actually...-

man) that actually isn't distinct to Irvine yeah.. That would be helpful to know. Because the other thing that I wonder, and I really don't know. Because I haven't studied this in depth, but is Irvine unique, is another question to ask. Is Irvine unique in its categories of job percentage. You know, are there more manager jobs here, you know. By industry, or even by role. I don't know if it's different enough. If it is, then that might be part of the reason for differences.

Yeah, I think you definitely have like a couple of industry clusters that are bigger in Irvine

man) Than the average?

Right. I know that for example in California as a whole certain industries are bigger than in other states in the US. But I think there's definitely a couple of clusters in a couple of locations in California, So I think Irvine definitely has more of the aerospace and the biomedical industries.

man) there is a lot of biomedical. and I think Irvine is trying to become a little bit more of a tech center, it's growing in that direction

kind of like silicon valley

man) trying to compete with, yeah. Trying to become the Southern California Silicon Valley. That's the goal anyway. And I think there is some large tech companies that have been moving in here, which may make a difference. Because I would guess that you'd start getting younger folks. Because Silicon valley probably, at least from what I understand, the demographics, it's... The tech world is peopled by younger people, because it's such a new industry.

Right. Do you think that the city would have to do something to attract those people? Even if you do see those trends? Because I think the city is kind of more, you know, since it's like the safest city and the safest city is usually not something that is appealing to young people, because they want to go out and do things.

man) It depends, yeah. Those lifestyle questions, I don't know. That's a good point. And I think it's very mixed. I think some people want more nightlife. More.. you know, the urban feel. And we're just not land-use built to be an urban feel place. So I think for those who really want that, some of them probably will choose to live in LA and commute, you know. I think young families probably, who'd start having kids, if you have kids, I think that's a lot of the appeal to Irvine. It's a great place to have kids. The schools are considered very strong, so I think a lot of people choose to be in Irvine for the schools, frankly. So there's all those factors that come into play. And some may even choose to live here for the schools, even if it costs more. Even if they're working outside of Irvine and hoping to work here. So it appeals to different segments. It would be tough to appeal to all segments. Even if we were to have more of an urban center, it would just be a percentage vs.. I mean LA is just a bigger urban field. And you know, they've been trying to attract, because I used to- Well, I lived in Passadina and I worked at USC. There was talk forever about: Let's make this more residential. And it's slowly happening in LA. They're attracting people. Because it was kind of like, no one wanted to be in downtown LA after 5pm. And now they're creating a lot more residential units. And people are buying them. And wanting to live in more of an urban field experience. It's just a different land use. Planning different. It attracts different people, wanting different things. So yeah, some of those are kind of like.. you become what you are. We're a suburban community, so I think who we attract reflects that? Reinforces it probably?

woman) So to answer your question of whether the city would, could or should do anything.. I don't know the answer to that. I don't think we officially have a target audience of resident types or age of residents, I don't know that we would proactively..- Well I've not heard of any policy discussions on proactively targeting a certain age group of residents.

man) I do know, and this is, you know, you can look at some of the developments that are being made. I do think that over the years that I've been in the area, which has only been since 2006, so 13 years. I do think that there is more apartments being built than before, at least percentagewise. And some of those, if you look at even the ads, and you look at how they're being promoted. I think they're being targeted at younger people who want a little urban feel. Like near the spectrum.

woman) all the amenities..

man) yeah, all the amenities.. and you can walk to restaurants.. It's more of a dense apartment dwelling feel. So there's elements of that in Irvine.

woman) But I think that's driven by the market as opposed to the city

man) Yeah.. Irvine company and some of the larger developers, they're looking at trends probably and they're trying to see who wants to buy what. So I think there is a growing desire that, among some..- and developers in Irvine are responding to that in some degree.

Alright. Then a last question, which kind of is connected to this. What do you then see as a likely future scenario for the city? Do you think it's going to transition in anything else, or that the current phase is what it's going to be maintaining? or..?

man) Good question.

woman) I think that ultimately depends on the market and policy decisions that are made, that is difficult to project from my perspective.

man) I do think there's a general trend in the US, and I think probably in Irvine, or Orange County. I'm speaking of my own sons. I have 4 sons who are college age and a little beyond. There's an increasing desire to use public transit, I would say, amongst the younger generation than there was in mine. I mean, a lot of parents have seen this. When I was.. Of course I grew up in Idaho. But I think that people who grew up in California who were near my age or a little younger, as soon as they could have a car they wanted one. None of my boys wanted a car. They wanted to push it off. And people of my age were like: You don't want a car? you don't want to drive? And that was for all my boys. I kind of had to push them, because I was getting tired of driving them. But I wanted to drive.

woman) The day you'd turn 16..

man) I wanted the license. We had to press our boys like: you need to go get your license! But they wanted to put it off as long as they could. So none of mine got it until they were.. I think 18. They waited 2 years beyond when they could and it was because I was pressing them. And I heard that from a lot of parents. And all of them have told me that if they could that they would use public transit everywhere. Now I could be an anomaly, because it's part of my job. I love to talk about that and they kind of grew up around that, but I've heard that from others and I've read some studies that there seems to be a self-reported desire among young folks. So potentially you could see people..- They are decisions made by the individual, not necessarily by the city. People could carpool, there may not be public transit everywhere, but the more people desire it, the more the market responds to it too. So I think there could be more OCTA services if there would be more demand. Because the way that it is funded is based on boarding, so it becomes a bit of a catch 22. You know, there's the service that sometimes is not as frequent as you'd want, or as frequent as you'd experience it in Europe, but to get there you'd need to have proven demand and people ready to ride it. Because if you fall below that you lose the funding. That's just the way the formula's work. So it's a catch 22. But I think as demand increases, and I think that could happen, and as an active transportation guy that's my goal, I'd love to see that happen! More public transit and carpool options.

But I think the tricky thing is that a lot of people would want to use it, but they don't, because they say it's not reliable, not frequent..

man) Right. And that's the catch 22.

one has to start and then the other will..

man) It's the chicken and the egg. So I think that's the reality where we are right now. And because particularly California and Southern California is built around the car. But it's changing. Little by little. I think just as it gets developed and built up population wise, I think there's more interest in other options. Because the more expensive it is to drive, the more time it takes you to drive, you start thinking, well, maybe I should live near..

woman) Yeah.. at some point transit then becomes a viable option.

man) yeah. You kind of need enough people interested in it. And I don't think most of Southern California has hit that tipping point where we can really make a big service point, but I think that'll come. If we keep growing in terms of population like we are. There comes a point where you just can't keep building roads. It's just not viable.

Yeah. I've also seen theories on that, where it's like a paradox where if you widen the road, more people start using the road, and it'll become congested again.

woman) Right. And then you've just lost all your benefit. Yeah.

man) And this is just me, I'm not speaking for the city, but I do think that the answer is that ultimately you need more people pooling. That is whether it is carpooling, vanpooling, transit.. or just more people traveling together, is really the answer if a city grows. And that's what you get more naturally in urban areas that are dense. Because it makes sense. There's frequency. There's enough people clustered together where it really makes sense and it is economically viable to do that. I think in Southern California that is not really the case in many places. There are some corridors where it does work better than others, and those are the ones we have going right now. They're really well used, because you have a good number from the train station to work areas. Not so much everywhere else, necessarily. You don't have the same volumes you would need to have the frequency that makes it viable. I think that just coming from your perspective, the city is much more dense right? the cities in Holland. I mean that's why it works, It's an old city with small streets. Built a long time ago. People densely packed in there.

Yeah. Like the town where I live, where my university is located. I think population-wise it's very comparable to Irvine. But then from the city center, if I cycle from the city center in either direction for 15 minutes I can make it to anywhere in the city.

man) Yeah, it's not spread out right?

Right. It's very dense[...] (after this the interview wraps up and nothing more that's relevant to the interview is said)