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Development Planning Unit

MSc Urban Economic Development 2013 – 2014

"The real estate sector and its relationship with the economic cycle, their impact upon the metropolitan area of Santiago de Chile"

A dissertation submitted in partial fulfilment of the requirements for the MSc Urban Economic Development

(10,966 words)

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Date: September 01, 2014

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I would like to thank Carolina, for her unconditional love and support during my odyssey in London; all my efforts are devoted to her and Vicente.

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1 Introduction

There is agreement that the real estate industry plays a relevant role in the economy, and their interrelationship can be seen in different episodes of the history and especially during the economic crisis; since the English default in the XIV Century (Reinhart & Rogoff, 2009).

More specifically, Laeven and Valencia (2008) argued that housing price cycles have been repeatedly related to the financial crisis at least since the 19th century in developed as well as in emerging countries.

According to Krugman (2008), the real estate industry represents a key factor of booms and recessions. Besides, it would be a trigger factor of the two greater economic crisis of the last 100 years, as there is evidence that it preceded the great depression of the year 1929 and most recently it also led to the subprime crisis starting in the second half of the decade of 2000s (Daher, 2013).

However, some studies during the last 3 decades have revealed that the link between the real estate cycle and the economic cycle at the metropolitan level, may have a non-linear pattern or at least there is a non-direct progression. For example, there is evidence that during the decade of 1980s, the real estate cycle in Massachusetts intensified significantly the effect of the national business cycle; even more, this amplifying effect can be seen not only in the way up of the cycle, but also in the way down (Case, 1991).

In addition to this, Ghent and Owyang (2010) established that in spite of the national scale relevance of the housing sector as a driver of the cyclical business fluctuations, being for example a trigger factor in the recession beginning in 2007 in the US; at the metropolitan-level, this linear connexion between the business cycle and housing (in terms of prices) lacks consistency; which “suggests that the relationship may be more complicated than simple causal stories wherein a rise in house prices raises wealth, leads households to consume more, and then leads to an economic expansion" (Ghent & Owyang, 2010, p. 348).

Despite this inconsistency regarding the expected direct link, between the whole economy and the effect in the metropolitan real estate sector, there is agreement that the real estate sector industry has a significant role in the economy at the metropolitan level; which is not only due to its relevant participation in the GDP and employment,

but also because this sector plays a crucial role, articulating the financial sector and the economy at different scales (Daher, 2013).

The reason of the stated above is because this sector actually comprises two markets, which are the property market and the financial capital market (Colwell, 2002). So, that is the main reason why the real estate sector is usually one of the most exposed and sensitive to monetary policies, to public and private fluxes of external investment; to investment funds, including pension and insurance; to the real estate credit offers and market values, among others (Daher, 2013).

Consequently, the real estate sector turns out to be crucial, quantitative as well as qualitatively, due to the complex relationship with different sectors and its substantial weighting in production and financial indicators. As a result, this sector represents a strategic factor for the Government, tending to use it to foster the economy and to reverse unemployment (Daher, 2013).

So, the unemployment is finally the key variable considered by several authors, including those used as reference of this paper, in order to address the effect of the relationship between the economy cycle and the real estate sector at the metropolitan level.

This is basically because, from a classic perspective the business cycle is a succession of periods of expansion and contraction experienced by the general level of activity in a country, in medium-term horizons, affecting the magnitudes of production, investment and credit, to finally have an effect on employment levels (Sánchez, 2006).

Thus, the motivation of this paper is to explore the relationship between the economy and the real estate. It specifically addresses the economic cycles and how they affect the real estate sector, attempting to ascertain their impact upon the city level, to finally attempt to identify the housing key variable, affecting the metropolitan economy of Santiago de Chile. So, the stated above will be considered from the viewpoint of the housing sector. It is addressed through three sections:

The first part will present a conceptual framework representing the functioning of the real estate sector. Also, the stages are identified with possibilities of intervention by the Government, in order to foster or reactivate the economy at local level; together with this, the economic role of the real estate industry is also outlined.

Then, in the second section the link between the real estate sector and the economic cycle is addressed, identifying the key variables allowing to understand this relationship. Together with this, the nature of this relationship and the stages of the real estate cycles are also outlined.

Finally, the last section will focus on the evidence of the connection between the economic cycle and the real estate sector in Santiago de Chile, by a comparison with the framework stated in the previous sections and considering a set of variables previously identified in the literature review, which a primary data include among other variables: unemployment rate, housing permits, Interest rate for housing, metropolitan housing price index, and some market turmoil indicator as the consumer price index value and the financial system loans.

The above is addressed through a time series analysis and based on the data available for 20 years between 1990 and 2010, in order to answer the question: what is the housing key variable affecting the unemployment rate in Santiago, and therefore the metropolitan economy?

2 Real estate market functioning (theoretical framework)

This first section focuses on the real estate market operating and the effect at the local level; which is developed through explaining first the real estate market operation and identifying the main stages in which is possible to intervene in order to foster the economy, to then attempt to outline the economic role of the real estate sector.

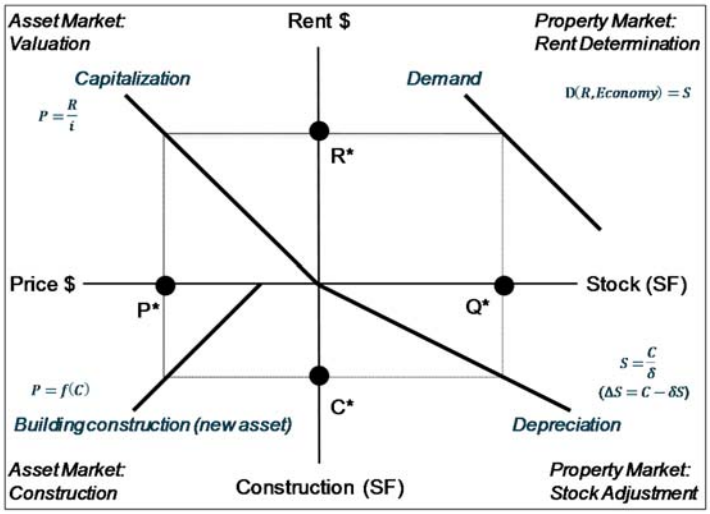
2.1 The real estate market functioning and the stages of interventions

There is agreement that analysing the real estate sector functioning may be a formidable challenge not only because the nature of the variables involved but also because how these variables are interrelated and how is the resulting effect on the system, for example as a result of changes in one factor.

So, to explain the real estate sector functioning, Colwell (2002) mentioned that it is important to consider that this comprises two markets which are supposed to be in equilibrium; on one side there is the market for the use of the real estate or property market; on the other side there is the market for the real estate as an asset, or financial capital market.

To understand how the balance is between these two markets DiPasquale and Wheaton (1992) proposed a framework, that is a scheme of four quadrants (see figure N°2.1), in which is possible to comprehend how the interrelationship is between the relevant variables of both markets.

Figure N° 2.1: The four quadrant framework proposed by DiPasquale and Wheaton



Source: prepared by the author based on DiPasquale and Wheaton (1992).

In this scheme, on one side the use of the real estate or property market is described in the northeast and southeast quadrants, on the other side the two quadrants located at the west of the graph represent the financial capital market or asset market functioning. Further, this four quadrants are divided by axes which represent: 1) the rent (linking the demand and the valuation of the real estate), 2) the prices (linking the creation of new assets or building construction and the valuation of the real estate), 3) construction (linking the creation of new assets and the change in the capital stock), and 4) the stock (which is the resulting of linking building construction, depreciation rate and initial demand) (DiPasquale & Wheaton, 1996).

This framework, which has been further enriched by Colwell (2002) who explained the equilibrium in long term, can be followed from the northeast quadrant in a counter clockwise rotation. So, on the side of the property market or market for the use of the real estate, the quadrant located at the northeast contains the curve of demand per unit of space; which depends on the economy situation that determines its position to

the east or westerly; as it expands or contracts, respectively (DiPasquale & Wheaton, 1996).

Regarding the drivers of the demand, according to Mourouzi-Sivitanidou (2011) they are four, which are: firstly the market size, which is mainly represented by the population size; secondly, the wealth or income level, which has a direct effect on affordability; thirdly, the prices of substitutes, which may generate a raise or a decline in demand for some particular product; for example, a westerly swing of the demand curve for single family-housing can be generated as a result of an apartment rents rising. Finally, there is the expectation of consumers or firms; for example, if they are expecting an increase in prices or rents in the future, this may generate a raise of number of units demanded.

Following the four quadrant scheme, the valuation of the real estate as an asset is represented by the northwest quadrant; in which the capitalization rate raises form the relation between the price and the rent (Colwell, 2002). Graphically, the capitalization curve starts on the centre of the graph running to the northwest, and rotates in a clockwise direction when the interest rate in the economy generates a capitalization rate increase; otherwise, an interest rate reduction is represented by rotation of the ray in a counter clockwise direction (DiPasquale & Wheaton, 1996).

It is important to noteworthy that the capitalization rate is equivalent to the economic efficiency that investors follow in order to embrace the assets in the real estate market. Here, it is interesting that the capitalization rate may be highly affected by some external force which explains the changes in the real estate market and its link with the economy (Colwell, 2002); which is one of the focus on next points.

Another important aspect refers to the relevance of the interest rate as it is commonly one of the most relevant elements of the economy used by the Government in order to foster a reactivation of the economy through the real estate sector. However the resulting effect in long term can be unexpected. For example, the housing construction soaring, generated as a result of a decrease in interest rates preceded the three main financial crises in the last 100 years, which are: first the great recession of 1929; second, the Asian crisis in 1998, and more recently the subprime crisis in 2008 (Daher, 2013).

Also, this relationship can be seen in other economic cycles, for example after the recession in 1982 in The United States, which drove dire consequences at the local level, for example those occurred in the State of Massachusetts that were studied by (Case, 1991); which is matter in the next point of this paper.

Following the framework, in the southwest quadrant it is explained through the new assets creation or supply curve for building construction, which graphically runs diagonally to the southwest from some point in the price axis (DiPasquale & Wheaton, 1992).

This curve may shift to the west, for example in a period of profitability decline, as a result of some local regulation for building construction or due to a stricter local zoning (DiPasquale & Wheaton, 1996); or to the east, for example as a result of a cost decline of some specific factor of production (capital, labour, land and building materials); due to a positive expectations regarding future prices or real estate demand; or as a result of a low risk perceived due to a positive market situation (Mourouzi-Sivitanidou, 2011).

At this stage of the framework noteworthy, the possibility of interventions is not only by financiers trying to embrace the real estate assets, but also by the Government which can attempt to reactivate or foster the economy, for example by investing in social housing or in infrastructure; which in turn may generate a positive effect on employment levels (Tyler, Warnock, Provins, & Lanz, 2013). Additionally, the local government can promote some specific land uses or activities, by directing the land use plan or through applying urban regeneration policies (Tyler et al., 2013).

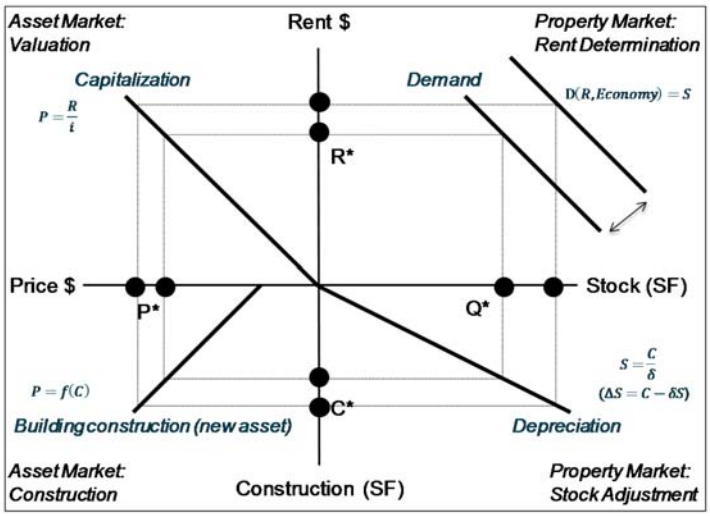
In the southeast quadrant the capital stock adjustment in a given period of time is represented, but this stock change depends on the creation of new asset or new building construction, less the depreciation rate (DiPasquale & Wheaton, 1996).

Graphically, this stock adjustment is represented through a diagonally curve which starts in the centre of the graph to run until the point at the east of the scheme in which all the described system reaches equilibrium (Colwell, 2002).

Finally, a relevant aspect of this framework is that the property market and the asset markets are balanced, when the final asset stock equals the starting levels. Otherwise, the four curves: rent, prices, construction and the stock, pursue the optimum balance, by rising or declining; in order to reach the whole system equilibrium (DiPasquale & Wheaton, 1992).

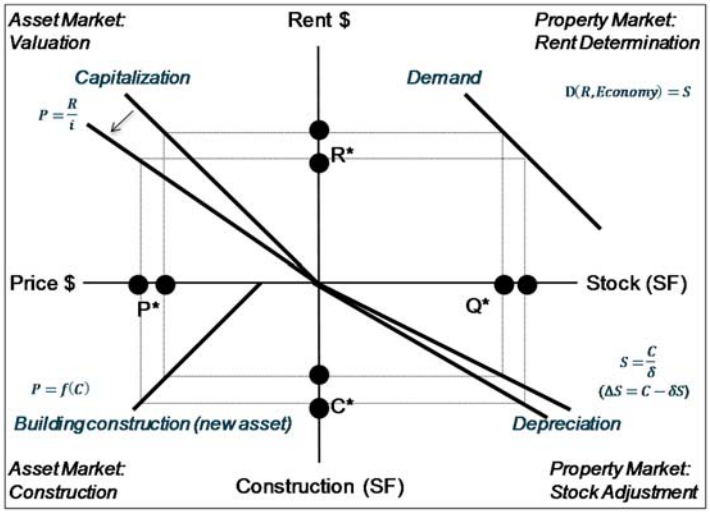
Graphically, this balance is represented by a rectangle which adapts according to the type of interventions in the different quadrants or stages of the scheme (see figure N° 2.2 and 2.3), to generate diverse possibilities of changes, some of which are reported in table N° 2.1 (DiPasquale & Wheaton, 1996).

Figure N° 2.2: Four quadrant framework, 2 equilibriums by changes in demand



Source: prepared by the author based on DiPasquale and Wheaton (1996).

Figure N° 2.3: Four quadrant framework, changes in interest rate



Source: prepared by the author based on DiPasquale and Wheaton (1996).

Table Nº 2.1: The four quadrant framework effect

	Quadrant	Price	Construction	Stock	Rent
Increase in capitalization rate	NW	decrease	decrease	decrease	increase
Decrease in capitalization rate	NW	increase	increase	increase	decrease
Increase in Costs	SW	increase	decrease	decrease	increase
Decrease in Costs	SW	decrease	increase	increase	decrease

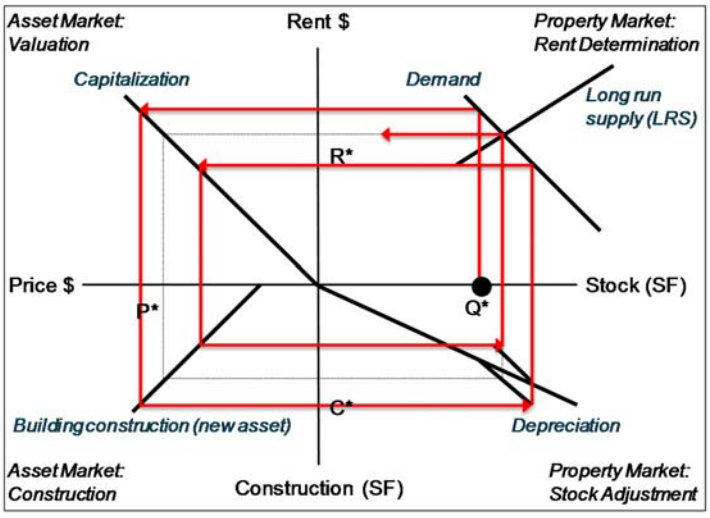
Source: DiPasquale and Wheaton (1996).

2.2 The long term functioning of the real estate market

It is relevant to stand out that the last aspect stated represents the short-run balance of the variables involved in the system, which refers to an equilibrium in the market's stock in a specific point in time. However, the equilibrium in a long term is actually a permanent process of regulation of all variables involved. To explain this, Colwell (2002) included a long-run supply ray (LRS), which is represented in the northeast quadrant (figure N° 2.4).

Here, the slope of this ray represents the ratio between the slope of the curve representing the short-run construction supply and the product between the capitalization rates and the depreciation (Colwell, 2002).

Figure N° 2.4: Adjustment of the four quadrant framework in a long run



Source: prepared by the author based on Colwell (2002).

Graphically, it is possible to see this continuous process of regulation in order to reach the system balance, by following the red line represented in figure N° 2.4; in which from

an initial asset stock, represented by a black point in the graph, the rent is further established according to the position of the curve of demand. Then, the price is established given the rent and the market valuation. After that, the level of construction is also determined, according to the price and the position of the construction supply curve.

Finally, the new capital stock level derived from the construction curve and the depreciation rate; in the case of figure N° 2.4, this capital stock is larger than the initial. So, the cycle is repeated again in order to converge toward the balance mentioned above.

The four quadrants framework above explained is a systematic approach to the functioning of the real estate market; and reveals numerous possibilities of intervention in each stage, generating changes in the whole system; some of which are reported in table N° 2.2.

For example, an increase in the demand curve generates an increase of the whole system. On the other hand, an interest rate drop, can have an effect on the decrease in the perceived risk of a real estate. If this is fuelled by a positive depreciation or other tax treatments by the Government, it will drive a decrease in capitalization rates, which in turn will soon lead to an increase in asset prices to finally generate an increase of construction and in stock.

Table Nº 2.2: Effects on the four quadrant framework in a long term

	Long run supply	Capital stock	Rent
Increase in demand	no change	increase	increase
Increase in construction supply	increase	increase	decrease
Increase in depreciation rate	decrease	decrease	increase
Increase in operating expense ratio	decrease	decrease	increase
increase in capitalization rate	decrease	decrease	increase

Source: Colwell (2002).

The long run equilibrium described above and the variables involved in the four quadrant framework, reveals the relationship among the real estate market with the functioning of the economy and its cycles; especially those variables strongly affected by external forces explaining changes in the real estate market, for example the capitalization rates (Colwell, 2002). This relationship between the real estate sector and the economic cycles is matter in the following chapter.

A relevant aspect of the framework explained above is that it reveals the economic role of the real estate sector, which in general terms includes the following four aspects: 1) It is the source for asset creation and providing living space, that was revealed in the southwest quadrant; 2) It is a source of employment, direct and indirect, as a result of the construction activity increase; 3) It is a target of investment (sometimes speculative) and opportunities for investors as well for the urban development; and 4) it is the source of direct revenue for the government, mainly through taxation.

This economic role of the real estate sector, which raised through analysing the four quadrant framework outlined above, are further evidenced through the examples described in the next point; which also reveal the complexity this framework takes in a long run, as a result of the effect of the cycles of the economy on the real estate sector.

3 The economic cycles and the real estate industry

Having explained how the functioning of the real estate market is and how the interaction among the two markets involved is, this section will now address the relationship between the real estate sector and the economy at the metropolitan level, and from a point of view of their cycles.

To address this, it will first focus on the relationship between the economic cycles and the real estate cycles to then outline the characteristics and the impacts of the real estate phases at the metropolitan-level, by associating the housing prices boom in Massachusetts in the 1980s and the four quadrant framework proposed by DiPasquale and Wheaton (1992). Then, it explores the nature of this relationship by considering the finding of Case (1991) and of Ghent and Owyang (2010); to finally outline the stages of the real estate cycles and the possibilities of taking advantage of these fluctuations.

3.1 The relationship between the economic cycle and the real estate sector

According to Daher (2013), the real estate sector is certainly a strategic articulator between the financial sector at macro level and the local economy; this role is given basically due to its two main components described in the previous point, which are: the market for the real estate as an asset or financial capital market and the market for the use of the real estate or property market

Further, the real estate trends have been historically linked to fundamental factors in the economy. Specifically, there is an extensive history of linkage between real estate prices and the conditions of the economy, represented for example by the unemployment levels (Quigley, 1999).

So, from a historical context the interrelationship between real estate industry and the economic cycles can be seen in different episodes of the history and especially during economic crisis; since the English default in the XIV Century (Reinhart & Rogoff, 2009). More specifically, Laeven and Valencia (2008) argued that housing price cycles have been repeatedly related to the financial crisis at least since the 19th century in developed and emerging countries.

Even, the real estate industry, specially housing, represents a key factor of booms and recessions, furthermore, it would play a trigger factor of the economic crisis (Krugman, 2008); as there are evidences that this sector would have preceded among others the great depression in the year 1929 and most recently the subprime crisis (Daher, 2013).

Specifically, in regards to the subprime crisis, there is evidence that housing prices preceded the recent process of widespread banking services and financing, which act as channels of propagation and contagion, raising the effects globally as a result of the increasing geographical mobility of capital (Krugman, 2008).

According to the mentioned above and to understand how the functioning between the real estate cycle and the economy is, it can be analyzed following the economic crisis (Daher, 2013). So, based on the research of Reinhart and Rogoff (2011) it is possible to establish the following empirical pattern:

Significant cycles of increases in international capital fluxes generate bank crisis. Also, the domestic indebtedness and the government debt would be a trigger factor on the national crisis. In turn, this indebtedness, derived from financial centres is transmitted in the form of shocks on interest rates and collapse in commodities prices. Subsequently, this produces a sovereign debt crisis from the central economies in other countries (Reinhart & Rogoff, 2011).

According to Daher (2013) one of the most remarkable findings of Reinhart and Rogoff (2011) in the process described above, is the generalized and persistent relationship between bank crisis and the cycles in stock prices and especially with housing prices.

So, at macro scale, it follows that housing prices cycle would be a key aspect on the link between the real estate sector and the economy. In regards to this, one of the first empirically studies was carried by Gottlieb (1976), who pointed out that tabulations of prices and economic conditions, suggest that the way of changes in construction and in prices, would long term synchronized with the aggregate economy.

However, despite that the real estate trends would be triggered by some fundamental economic factors like demographics, the interest rate; economic indicators (such as the GDP), the employment level, manufacturing activity, the prices of goods; and Government policies (including subsidies); these fundamentals would not explain most part of the short term property prices variations (Quigley, 1999); which may have a crucial effect at the local level.

Here, it is where the speculative factor can play a crucial role, aspect that it was described in the previous point; for example the effect generated in consumer and investor, resulted of a positive expectations regarding prices and real estate demand; or as a result of a low market risk perception (Mourouzi-Sivitanidou, 2011).

Overall, despite the inconsistency among the long term effect and short run effect of the economy factors on real estate prices, it is clear that housing would be a crucial forerunner of national business cycle (Leamer, 2007).

So, the question that arises here is if the macro level relationship patterns between real estate sector and the economy are also similar at the metropolitan-level; specially if it is considered that some studies reveal that cycles at regional scale would not been synchronized with the aggregate cycle (Ghent & Owyang, 2010). Thus, in regards to the effect at the metropolitan level, this essay refers to it in the next point.

3.2 The real estate sector and the economic cycles at the metropolitan-level

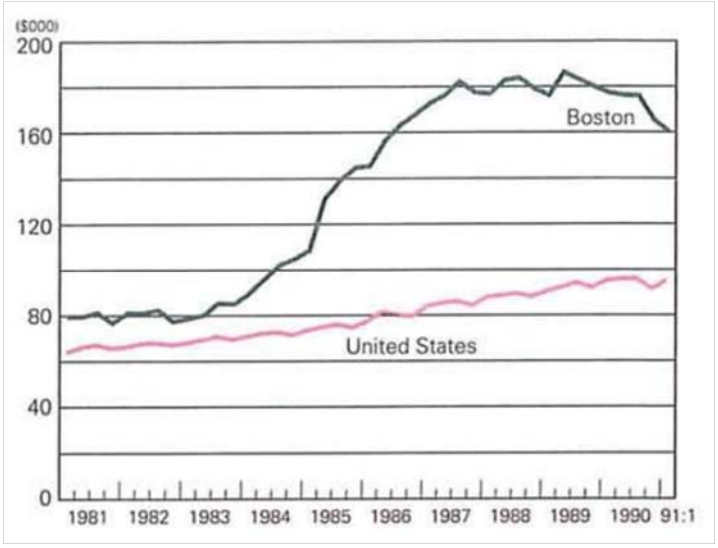
At the city-level, the link between real estate cycles and financial crisis is structurally based on the urbanization growing of the population and economy (Harvey, 2012). Following this, Daher (2013) mentioned that the growing process of urbanization of the economy, which in turn involve the double process of economic and territorial concentration of the real estate and finance sectors in metropolitan areas, underlying the relationship between the real estate cycles and the economic crisis generated by its bubbles, in which the high macroeconomic incidence of the real estate sector and

its role articulator among financial sector and the “real economy”, generates considerable effects at the local level.

One episode which allows to illustrate the relationship between the economy and the real estate sector, is the boom of the housing prices in Massachusetts occurred between 1984 and 1987, and the posterior decline (figure N° 3.1), which undoubtedly triggered serious consequences for the economy at the metropolitan scale (Case, 1991).

This cycle of price rising, began once the economy started a process of recovery from the recession of 1982 in the United States, which was caused among other variables by a high interest rate. Specifically, the cycle starting can be identified in the northwest quadrant of the four quadrant framework , when by the year 1984 a decline in interest rate generated by the favourable economy, triggered a property prices rising, which was also fuelled by a deregulated banking sector (Case, 1991).

Figure N° 3.1: Median price of single-family home in Boston and in US 1981 – 1991



Source: Case (1991).

Then, as a result of the positive expectancy generated by the favourable economy, people reacted to generate a demand soaring. So, since the year 1984 onward the process was characterized by overstated prices, which were paid by buyers due to an expectation of future possible increases in price and capital gains (Case, 1991).

This represents the expectations of consumers or firms regarding future prices or real estate demand; which in turn it is generated as a result of a low risk perceived due to a positive market situation described by (Mourouzi-Sivitanidou, 2011) which was explained in the first part of this paper.

Following the DiPasquale and Wheaton framework, the low interest rate and the demand increased were immediately followed by a boom in construction, which in turn affected positively the demand for employment, in building activity as well as in FIRE (which involve finance, insurance, and real estate industry), in trade and in service (Case, 1991).

Regarding the magnitude of the stated above, total annual sales raised from 60,000 units in 1984 to a peak over the 100,000 units in 1987, representing an annual increase over 30%; regarding the employment, during the same period it rose by 57.1% in construction activities, 27.1% in FIRE, 19.6% in service and 13.7% in trade (Case, 1991).

Besides the effects above described, as a result of the price soaring, this process also caused an increase in equity (Skinner, 1989). Which is relevant as this patrimonial value increasing had an effect on saving behaviours, generating an increase of consumption; affecting finally the entire metropolitan economy (Case, 1991).

In addition, Skinner (1989) studied this relationship between equity and consumption, demonstrating that a 23% rising of housing markets value, generates an increase of 1.4% in consumption.

This boom in housing also generated a regional migration of workers, during almost four years since 1984; however, despite the immigration the high increase in demand for labour finally resulted in a severe labour shortage by 1987; as a result of this, a further sharp increase of wages above national average was generated, causing then a negative effect on competitiveness (Case, 1991).

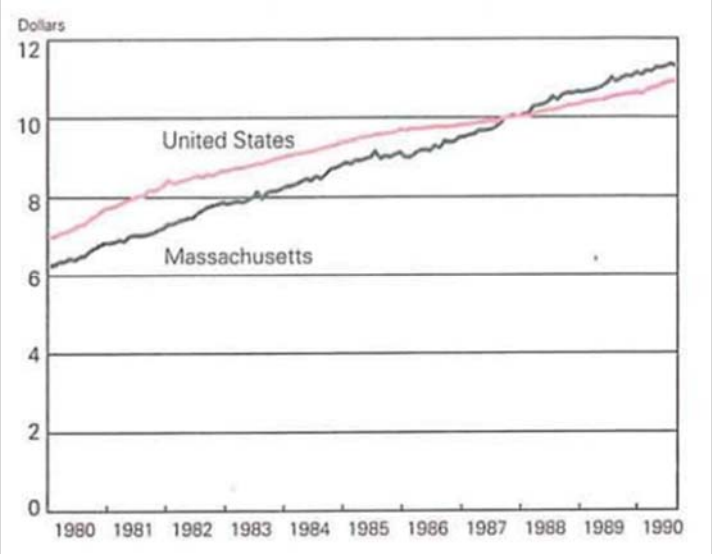
This increase in costs of factors of production, represented in the southwest quadrant of the framework explained above, produced a considerable deceleration in construction activity, which can be observed by the end of the year 1987. Once the construction activity started to decline, the housing pricing raising also stopped. Then, it generated a prolonged decline in home sales as well as in houses started, causing a general turn down of the cycle (Case, 1991).

Finally, the dramatic consequence of this turn down of the cycle was reflected in employment drop in the four sectors above mentioned; which produced a widespread economic damage, to finally make the State of Massachusetts less attractive to investment (Case, 1991).

3.3 The nature of the relationship between real estate cycle and economic cycle

On base on the contrast between the home price cycle studied by Case (1991) and the economic cycle at the country level, represented for example by the data of manufacturing (figure N° 3.2) it is possible to evidence that the real estate cycle of Massachusetts intensified meaningfully the effect of the US business cycle. Further, the amplified effect was not only in the way up of the cycle, but also in the way down; this reveals a non-linear pattern or at least a non-direct linking.

Figure N° 3.2: Average hourly earnings in manufacturing, in Massachusetts and in US, 1980 - 1990



Source: Case (1991)

This non-direct connection between the economic cycle and the home price cycle has been studied by Ghent and Owyang (2010) by analysing the forcefulness of this relationship at the metropolitan level, considering 51 US cities and by assessing the link between housing and employment.

So, on the basis of previous researches done by Del Negro and Otrok (2007); Owyang, Piger, and Wall (2005) and Owyang, Piger, Wall and Wheeler (2008); and based on

correlations for the band-pass filtered data, they proved that at the national scale, the housing sector is crucial in driving cyclical business fluctuations; in which housing investment certainly leads the business cycle in the way up while the investment drops in this sector may be a reliable forerunner of a recession. Even more, housing would have played a trigger role in the recession commenced by the year 2007 in the US (Ghent & Owyang, 2010).

However, Ghent and Owyang (2010) also argued that at the metropolitan-level, the finding for the 51 cities analyzed demonstrates that this direct cause-effect between house prices and the business cycle is not consistent; which “suggests that the relationship may be more complicated than simple causal stories wherein a rise in house prices raises wealth, leads households to consume more, and then leads to an economic expansion" (Ghent & Owyang, 2010, p. 348).

In their research Ghent and Owyang (2010) verified how national housing variables have an effect at the local level. Specifically, they found that in spite of what really matters for business cycle are the permits at national and local level, this relationship is not direct (for example the effect of local permits to local employment); instead of that, the national housing data are better leading indicators for the employment at the metropolitan level, and of a subsequent expansion or contraction of the economy at the local level.

Methodologically, a relevant aspect in the work of Ghent and Owyang (2010) is that they focus on the relationship between housing and the economy activity by analysing a considerable amount of cities as a sample data; allowing to ensure a high level of robustness in their findings.

More precisely, their results were obtained through performing first a time series analysis by using a VAR model (Vector Autoregressive model); and then, by isolating the relationship of the economic cycle by filtering the data using an optimal band-pass filter, which is a technique suggested previously by Corbae, Ouliaris and Phillips (2002).

Regarding the data used, they considered residential permits as a housing investment proxy, due to they observed statistically significant correlation among the band-pass filtered data of each series. So, these residential permits (seasonally-adjusted permits) were analysed in relationship with the employment series. Additionally, they also

included prices data, as a secondary measure of the housing market (Ghent & Owyang, 2010).

Furthermore, they also considered some national level variables that may have an effect in both housing and in employment, which are: consumer price index (CPI), inflation, conventional mortgage rate for 30 years; a credit market turmoil indicator (in this case, the spread between 3-month commercial paper and 90-day Treasury bills); and the federal funds rate in order to control the stance of the monetary policy (Ghent & Owyang, 2010).

Through the above technique mentioned and considering the data between 1982 and 2008, Ghent and Owyang (2010) examined if there is a linear relationship between housing and employment; if housing variables affect the employment at metropolitan level; if housing variables at national level may have an effect on employment at metropolitan level; to finally attempt to demonstrate if housing drives recessions.

They found that correlations between housing market and the employment levels are suggestive of the relationship among these variables. They also found that there is a differentiated impact that housing prices produce in short term in comparison with the effect in the long term, but definitely they are not a good leading indicator for employment either at national or at the metropolitan level; instead of that, what really matters for business cycles are volumes.

Further, they demonstrated that in the cities analyzed, national permits rather than local permits are better anticipated indicators for the metropolitan employment (Ghent & Owyang, 2010).

Regarding to the relationship between housing and recessions, they found that at the national-level, housing acts as a crucial driver of cyclical fluctuations; however this causality is not preserved at the metropolitan level. Specifically their findings refute the idea of a direct channel from local housing markets into local employment. Furthermore, this lack in consistency suggested that at the metropolitan level there is also a non-linear causality between a rise in house prices, followed by a raise wealth, which in turn leads to a raise in households' consumption; to finally boost economic expansion (Ghent & Owyang, 2010).

In spite of the mentioned above it may show a certain lack of consistency with the DiPasquale & Wheaton framework; for example, when it is supposed that an increase

in the demand curve, may generate an increase of the whole system; it is possible to establish that in the stage of creation of new asset in the south west quadrant (but represented by new permits at national level), is likely to identify the lead indicator of business cycle; which in turn may trigger an amplified effect at the local level, that is consistent with the case of Massachusetts in the 1980s described above (Case, 1991).

Although the nature of relationship between economic fluctuations and the real estate cycle and the resulting effect at the local level appear to be more complex than a simply causal effect; and on the base on the findings of Ghent and Owyang (2010), DiPasquale and Wheaton (1996), Case (1991) and Gottlieb (1976), which has been outlined previously; it is possible to establish that residential permits, unemployment rate, house prices, some national level variables that may have an effect in housing and in employment (for example the interest rate for housing and consumer price index value), beside the index of building activity, housing selling, building cost index, the economic activity index for services related to housing and some market turmoil indicator; may be an appropriate set of variables to consider to analyse the relationship between the economic cycle and the real estate cycle. So these variables are considered in the analysis for the case of the Metropolitan Area of Santiago de Chile, which is presented in point 4.

Another relevant aspect of the research of Ghent and Owyang (2010) refers to despite the housing sector was a crucial factor in the recession beginning in 2007, further considerations should have been cautioned in assuming the same pattern, as there is significant diversity in the relationship between housing sector and employment level across the 51 cities analyzed; for example a rise in permits and in house prices may generate a dissimilar impact in the short term in comparison with the effect in the long term.

However which is clear is that maybe prices but definitely the permits appears to be linked with a following decline in employment; raising the question regarding an optimal modelling of the monetary policy in the presence of housing (Ghent & Owyang, 2010).

3.4 The possibilities of taking advantage of the real estate fluctuations

The above mentioned is crucial if it is considered that a relevant aspect of the housing cycles refers to the possibilities of taking advantage of the cycle, regarding of which

Lee (2011) argued that this is the key instead of try to control the oscillation in the real estate industry.

So, considering that a cycle is “an interval of time during which characteristics, are often regularly repeated events or a sequence of events occurs” (Lee, 2011, p. 5), which typically last less than eight years (Baxter & King, 1999). Then, it is also possible to identify periods and a pattern in the real estate cycles, and especially in housing as can be seen in the event of Massachusetts in the 1980s.

According to (Lee, 2011), the real estate cycles vary according to asset type (housing, commerce, services, among others), market factors and location. However they tend to follow a fairly consistent 10 years pattern, in which is possible to identify four periods or stages, which are: growing, plateau, crisis and transition (see table N° 3.1).

Table Nº 3.1: Periods of opportunity in the real estate cycle

Period	Phase	
	Growth Phase	
Period I	- Accelerated development activity	- Growth in “start-ups”
	- Increasing leasing activity	- Geographic expansion
	- Access to inexpensive credit	- Rising GDP
	- Rising rents and asset values	- Rapid job growth
	- Expanding risk profile	- New competitors entering the market
	Plateau Phase	
Period II	- Overly optimistic underwriting	- Supply/demand out of balance
	- Increase in capital raising	- Protracted closing period
	- Aggressive compensation for talent	- Increase in “guarantees”
	- Blind entrepreneurism	- High investment sales activity
	- Low cap rates	- Generous TIs and lease terms
	Crisis Phase	
Period III	- Declining asset values	- Workouts/restructurings
	- Entity downsizing	- Little to no development activity
	- Declining rents and occupancy	- Leasing concessions
	- Discounted asset/loan sales	- Limited access to credit
	- Cash is king	- Government intervention
	Transition Phase	
Period IV	- Focus on fundamentals	- Government incentives
	- Recapitalization	- Commitment to CRM
	- Industry consolidation	- Realistic underwriting
	- New business models emerge	- Diversification of risk
	- Reduced/restructured compensation	- Next-generation leaders emerge

Source: Lee (2011).

The first period which represents the growth phase, involves an accelerated development activity, which in the case of housing boom in Massachusetts in the 1980s above mentioned, can be seen especially between 1984 and 1987, when favourable economic conditions generated an increase not only in equity, but also in property prices and in the asset value, which also leads to raising GDP (Case, 1991).

This positive economic environment caused a demand increasing and an expanding risk profile, which in turn led to a building boom and a geographic expansion. Further, it also encouraged new competitors entering the market, having a positive effect on job creation finally (Lee, 2011).

Then, the second stage is called plateau phase, this is characterized by an overly optimistic underwriting increase in capital raising and an aggressive compensation for talent (Lee, 2011); which in the case of the boom prices in Massachusetts had an effect on demand for employment beyond the building activity, as finance, insurance, real estate industry (mainly sales activity), trade and service (Case, 1991)

After that, the crisis phase represents the third stage which is characterized by housing prices stop rising, generating a decline in asset value. So, home sales as well as houses start showing a prolonged decline, to cause a widespread turn down of the cycle (Lee, 2011).

In the case of the housing cycle in Massachusetts in the 1980s, this stage can be seen since the year 1987 onward (Case, 1991). This period of little housing development activity is also characterized for a limited access to credit, and typically by a government intervention, for example through taxation.

Finally, the fourth period corresponds to a transition stage in which the efforts are focused on fundamentals, where new business models emerge and in which the government should tend to focus on incentives, basically because this is a good investing period (specially near the end of the growth period), not only by the developers but also to foster the economy through reforms and incentives. Furthermore, this investment may be capitalized in the next growing phase of the cycle (Lee, 2011).

This is relevant as not always the government incentives generate a positive long-run effect, one example can be seen in Tax Reform Act of 1986 in US that removed many taxes housing-based, that probably contributed to the saving and loan crisis by late

1980, which can be explained among others by lack of consideration with many other fundamentals drivers of real estate cycles (Lee, 2011); like demographics; interest rate; the economic indicators (such as the GDP, employment, industrial activity, the prices of goods); and Government policies, including subsidies (Quigley, 1999); of which this essay refers to in previous points.

Beyond this whole effect that government policies can generate, in long or medium term period, and based on the arguments outlined in previous points, it is clear that the effect at the local level may deviate from those effects expected of a policy; which is basically because the relationship between the economy and the effect on real estate cycle at the metropolitan scale is more complex than a cause - effect (Case, 1991). At least on base on the variables analyzed by Gottlieb (1976), Case (1991), DiPasquale and Wheaton (1996) and tested by Ghent and Owyang (2010); which are considered in the analysis for the Metropolitan Area of Santiago de Chile that is presented in the next point.

4 The evidence in Santiago de Chile

Having explained the real estate market functioning and its relationship with the economic cycles; this paper will now consider the above to focus on the evidence for the Metropolitan Area of Santiago de Chile.

To address this, it will first consider the data available for the last 20 years in relation with the framework proposed by DiPasquale and Wheaton (1996); (Colwell, 2002) and with the evidence proved by Gottlieb (1976) and Case (1991); to then, focuses on a numerical approach regarding to the relationship between the real estate cycle and the economy, considering the variables studied by Ghent and Owyang (2010) and by applying a time series analysis method.

4.1 The real estate market functioning and the trends observed in Santiago

According to the explained in previous points, the strategic significance of the real estate economy can be observed in several circumstances; in relation to this, the Central Bank of Chile pointed out that this sector plays a relevant role in the Chilean economic cycle not only because its share in the product, but also due to its importance in the portfolio of different financial agents (Daher, 2013).

So, this market represents 10,5% of Metropolitan GDP, including construction and services related to housing sector (see appendix 1) (Central Bank of Chile, 2014); while in terms of employment account for 19% (see appendix 2) (Ministry of Social Development, 2014).

However; beyond this relative participation, and according to the explained in previous points, this market has enormous relevance in the economy at the metropolitan scale; to illustrate this, at the end of 2011 in Chile, commercial and mortgage loans amounted to 38.7% of the total stock of banking loans; while life insurance companies showed an exposure via mutual, letters and properties equal to 26.1% of its total assets (Central Bank of Chile, 2011).

So, the relevance described by Gottlieb (1976), Case (1991) and by Ghent and Owyang (2010) may have a similar pattern in the metropolitan area of Santiago; especially if it is considered that the Central Bank of Chile (2011) highlighted the importance of the economic cycles in the real estate sector, in relation to the propagation of its effects over the rest of the economy, making a contrast with the evidence of the subprime crisis in the US.

In addition, the relationship between the national economy and the metropolitan economy is particularly relevant in the case of Chile if it is considered that in terms of GDP, Santiago represents 44.4% of the Chilean economy size (see appendix 1) and the metropolitan market of 2.096 million of households represent 36.6% of the total country (National Institute of Statistics, 2014).

Thus, considering a set of variables of similar nature of those analysed by Gottlieb (1976), Case (1991) and by Ghent and Owyang (2010) it is possible to make a first approach on the base of correlations and the general trend patterns, observed in time series graphs.

Specifically, the data explored in this exercise as a first approach, correspond to a monthly observation for the following 18 variables: 1) national housing permits (units), 2) national housing permits (m2 built), 3) national total permits (m2 built), 4) metropolitan housing permits (units), 5) metropolitan housing permits (m2 built), 6) national unemployment rate, 7) metropolitan unemployment rate, 8) consumer price index value, 9) financial system loans 10) interest rate for housing, 11) interest rate interbank, 12) metropolitan housing price index, 13) index of building cost, 14) index

of building activity, 15) index of industrial activity, 16) metropolitan housing selling, 17) economic activity index for services related to housing, 18) economic activity index for construction (see appendix 3).

The data collected for all these variables are reported in appendix 12, and include 22 years of observation since 1991 in the case of the first nine variables; while for the rest, the data vary in length between 5 to 14 years. The last mentioned is relevant, as it represents a limitation for the time series analysis, which is presented in the following section.

So, the period covers the economic fluctuations generated by the Asian crisis and the subprime crisis which from the point of view of the real estate business did not generate the disastrous effects experienced in other parts of the globe; which perhaps is due to the strong reforms to the financial system applied in Chile in the following years of the banking disaster in 1981, generated after the implementation of free market economy, in the late 1970s (Shoemaker, 2009).

Leaving out of analysis the relationships between variables in which due to its nature might exist autocorrelation, the coefficient reported in appendix 4 denote a general fit with the pattern described by Case (1991) and with the finding of DiPasquale and Wheaton (1996).

So, at national level it is possible to observe a positive correlation between the interest rate and national employment; while at the metropolitan level, despite a lack of correlation between interest rate and unemployment, it is possible to observe consistency in the inverse sense, between the interest rate and the housing prices for Santiago.

Also, beside this general correspondence in the sense described by DiPasquale and Wheaton (1996), the consistency can also be seen between the unemployment rate in relation to the build cost index, the economic activity index for services related to housing, and with the economic activity index for construction. Furthermore, the correlations also match the relationship described by Case (1991) in regards to the link between interest rate, construction levels and direct and the non-direct activities.

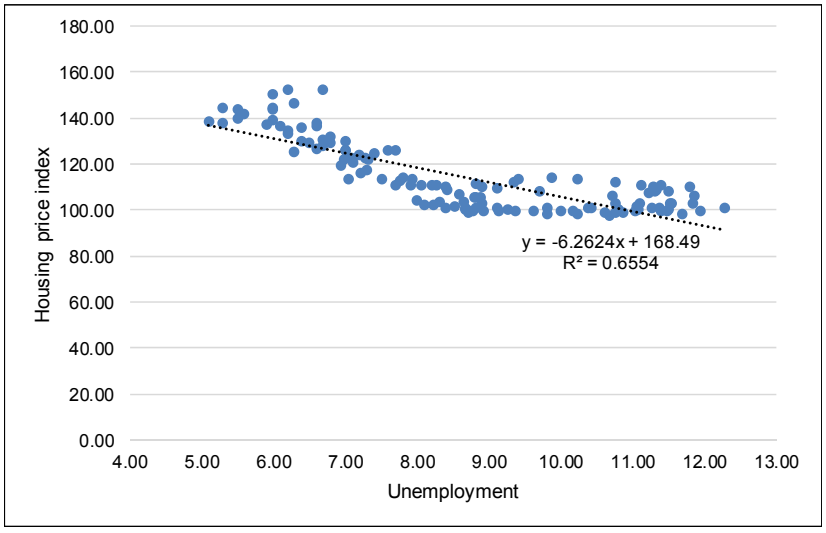
Beyond a description of the rest of the correlations observed in appendix 4, a relevant aspect is that, based on a time series of 10 years, it is possible to observe an inverse correlation and high coefficient of dependence between metropolitan house price and

metropolitan unemployment level (see figures 4.1 and 4.2); which in terms of trend, corresponds with the Massachusetts housing price cycle in the 1980s (Case, 1991).

Figure N° 4.1: Metropolitan housing price index and metropolitan unemployment rate

Source: prepared by the author based on Central Bank of Chile (2014) and Chilean Chamber of Construction (2014).

Figure N° 4.2: Relationship between housing price and unemployment in Santiago



Source: prepared by the author based on Central Bank of Chile (2014) and Chilean Chamber of Construction (2014).

In addition, the similar pattern with the study case mentioned before, can also be seen in terms of the relationship between housing selling and unemployment; however the observations here are available only for the last 5 years.

Beyond the general associations between the variables considered, an interesting analysis refers to identifying a pattern across a significant period of years, and particularly over a known economic crisis; especially if it is considered that the connexions between the economy and the real estate cycles highlighted during the first years of the process of bubbles, when the price of the asset (in this case housing) rises above its underlying base price, accompanied by an excessive level of debt, in order to join this prosperity (Daher, 2013).

Despite forecasting an economic bubble is not matter in this paper, it is difficult to argue that there is a process of a real estate bubble rising in Santiago, as a result of the housing prices increasing, which can be observed in figure 4.1. This process of price increasing might just be following the level of enrichment of Chileans, which in terms of income per capita moved from US$10,880 to US$21,030 in the last ten years (World Bank, 2014).

Additionally, in terms of percentage of total annual income, the household indebtedness slightly increased from only 19.2% in 2007 to 20.1% in 2012; while the real estate indebtedness as a total household indebtedness increased from just 18% to 19.9% in the same period (Central Bank of Chile, 2013). This trend also goes in line with the finding of Skinner (1989) regarding the relationship between equity raising and consumption increasing, which was mentioned in section 3.2.

Beyond the consistency between the data for Santiago and the four quadrant framework, and the apparent relevance of the housing prices in the metropolitan economy (in terms of the correlations with unemployment rate), it is necessary to move on to a numerical analysis in order to establish empirically if there is a relationship between the variables linked with the metropolitan economy in the sense of the finding of (Ghent & Owyang, 2010).

4.2 The housing key variable affecting the metropolitan economy of Santiago

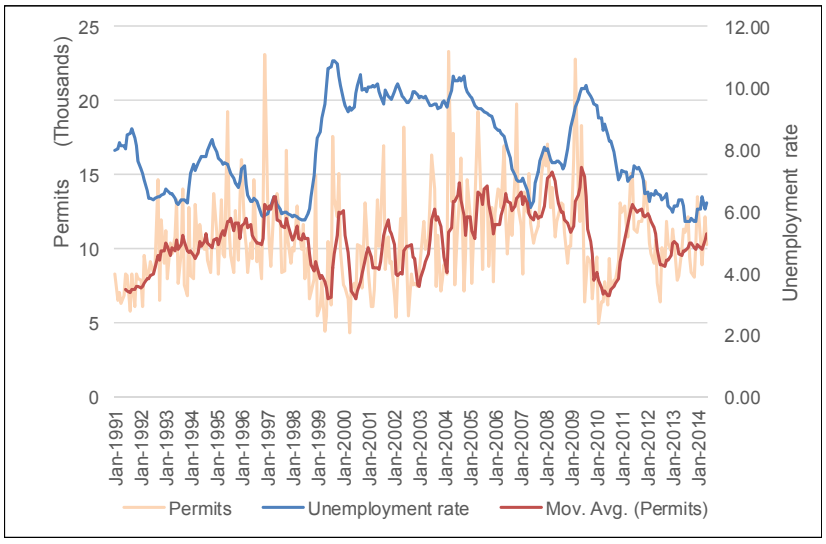
Assuming the existence of a relationship between variables similar to those considered by Ghent and Owyang (2010), which are: unemployment rate, residential permits (at metropolitan and national level) and house price index; beside some national level

variables that may have an effect in housing and in employment which are: the interest rate for housing, consumer price index value (CPI) and the financial system loans index as a credit market turmoil indicator; in this point the analysis moves toward a time series analysis.

So, the first stage considers applying a unit root test to identify the order of integration of the series, in order to verify if they can be used in a time series analysis, (see appendix 5). This is important because in economic series are only relevant: those without differentiating or I(0), commonly called "white noise"; and those integrated of order I(1), which after calculating the first difference becomes stationary and are commonly called "random walk" (Dickey, Hasza, & Fuller, 1984). Otherwise, it is necessary to consider another type of analysis of procedure instead of a time series technique.

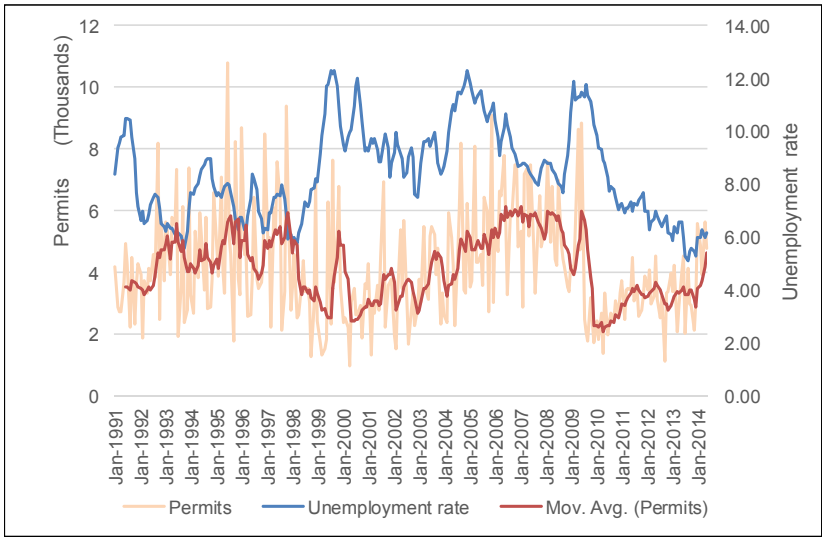
Once demonstrated the order of integration of the series, a first graphical approach toward the variables obtained as the main explanation of metropolitan unemployment by Ghent and Owyang (2010), allows to observe an inverse relationship between permits and employment, which is consistent with the pattern described by these authors, especially if a mobile average is included (see figures 4.3 and 4.4).

Figure N° 4.3: National permits and national unemployment rate



Source: prepared by the author based on Central Bank of Chile (2014) and National Institute of Statistics (2014).

Figure N° 4.4: Metropolitan permits and metropolitan unemployment rate



Source: prepared by the author based on Central Bank of Chile (2014) and (National Institute of Statistics (2014).

Despite the trend observed in the figures mentioned, a consistent relationship between permits and unemployment (in terms of coefficient of correlation) can only be observed at the national level; while at the metropolitan scale, these coefficients appear not to be consistent. Also, there is a lack of significant coefficients between national permits and metropolitan employment (see appendix 4).

Furthermore, assuming the existence of a relationship between the variables considered, in the way proposed by Ghent and Owyang (2010), and after obtaining the significance of the variables in relation with the metropolitan unemployment through a multiple regression, it is possible to observe that only housing price seems to be a significant variable, but only with 10% of confidence (see appendix 6).

However, two elements raised here are: on one side the endogeneity problem that might exist for example between prices and permits, or among national level variables that may have an effect in housing and in employment. The second element refers to the existence of a lag effect of the explanatory variable (permits or price) over the employment, especially if the lag time is considered between the approved permits and its construction, an aspect that is also mentioned by Ghent and Owyang (2010). Even more, in their study of 51 cities in the US this lag varies between 1 to 3 months, where however most of them take less than 2 months to start construction, which is similar to Chile (Chilean Chamber of Construction, 2014).

Beyond a deep analysis of the first problem raised above and given the scope of this work, this paper addresses the second one. So, considering the relationship outlined by Ghent and Owyang (2010), the focus here refers to the question raised at the beginning of this paper, which is: what is the housing key variable affecting the unemployment rate in Santiago, and therefore the metropolitan economy?

To determine this, a pertinent analysis includes applying the causality Wiener-Granger test, which consists of comparing and deducting if the present and past behaviour of a time series “X1” predicts the behaviour of “Y1”. If this occurs, it is possible to establish that the result of “X1” causes in the sense of Wiener-Granger the result of B. Further, the result can be unidirectional or bidirectional (Granger, 1969).

This test is usually performed by fitting a Vector Autoregressive estimation model (VAR), which is an econometric model that is used to obtain the linear interdependencies among multiple time series. All variables in the VAR model are treated symmetrically in a structural sense and each variable has an equation explaining its evolution, on the base on its own lags and the lags of the other model variables (Chorro Gascó, 2000).

The VAR modelling does not require as much acquaintance about the forces influencing a variable as the structural models with simultaneous equations. However, the only prior knowledge required is a list of variables that supposedly are supposedly affected each other intertemporally (Chorro Gascó, 2000).

Regarding the prediction errors which determine the number of lags to introduce in the models, they were obtained by using the criteria of Akaike (AIC), Hannan y Quinn (HQ), Schwartz (SC) and the Final Prediction Error (FPE) and using the R software (R Development Core Team, 2011); the result varies between 1 to 5 (see appendix 7), which goes in line with the above described regarding the timing to implement permits.

In terms of operation, the EViews software was used in this exercise to obtain the VAR model as well as the causality Wiener-Granger test.

So, by applying the mentioned test in a Vector Autoregressive estimation, for a multiple time series and considering up to 2 month lags (see appendix 8 and 9), the result is consistent with the regression above mentioned, in regards to the significance of prices, represented by a significant probability of 3.2% (see table N° 4.1).

However, if the set of variables is considered as a system, they appear not to be significant as explanatory variables of the unemployment rate, being the probability more than 18%.

Table Nº 4.1: Wiener-Granger test for multiple time series, in a VAR model

VAR Granger Causality/Block Exogeneity Wald Tests			
Included observations: 121			
Dependent variable: Metropolitan unemployment rate			
Excluded	Chi-sq	df	Prob.
Metropolitan housing permits	0.31648	2	0.8536
Metropolitan housing price index	6.86711	2	0.0323
Financial system loans	3.06412	2	0.2161
Interest rate for housing	1.406	2	0.4951
Consumer price index value	1.96665	2	0.3741
All	13.7238	10	0.1860

Source: own calculations, based on Granger (1969).

According to this, and considering that this test is also robust in data pairs; a second analysis considered applying the Wiener-Granger test based on the Vector Autoregressive estimation, but considering the data in a bivariate analysis.

After all possibilities have been tested (see appendix 10), and according to the result reported in table N° 4.2, it is possible to confirm that from a time series perspective, but considering a bivariate analysis, housing prices would be statistically significant as a key causal variable on unemployment rate, and therefore of the metropolitan economy of Santiago de Chile. Regarding the VAR model for housing prices in relation to metropolitan unemployment, it is reported in appendix 11.

Table Nº 4.2: Wiener-Granger test for housing prices and metropolitan unemployment, in a VAR model

VAR Granger Causality/Block Exogeneity Wald Tests			
Included observations: 121			
Dependent variable: Metropolitan unemployment rate			
Excluded	Chi-sq	df	Prob.
Metropolitan housing price index	9.59947	2	0.0082
All	9.59947	2	0.0082
Dependent variable: Metropolitan housing price index			
Excluded	Chi-sq	df	Prob.
Metropolitan unemployment rate	0.4553	2	0.7964
All	0.4553	2	0.7964

Source: own calculations, based on Granger (1969).

This result goes more in line with the explanation of Case (1991) than the finding of Ghent and Owyang (2010). However, despite the low level of significance of the causality by considering all the variables as a system, the result raises the need to advance towards further analysis about the relationship between the variables proposed by Gottlieb (1976), Case (1991) and by Ghent and Owyang (2010); and the crossed effect of the national variables in the real estate sector in Santiago and its economy.

This is important because a relevant element raised in this analysis refers to the endogeneity problem that might exist between, for example, prices and permits; which can be addressed in a later work, for example, by exploring Instrumental variables estimation, as the "two-stages least squares" method (Wooldridge, 2012), or by applying a technique of an optimal band-pass filter, following the work of Ghent and Owyang (2010).

However, this requires greater number of observations for all variables involved. In addition, this analysis also raises the needs of exploring other variables, beyond those considered by Gottlieb (1976), Case (1991) and by Ghent and Owyang (2010) that may have an effect on the real estate sector in Santiago de Chile.

5 Conclusion

This paper has focused on the relationship between the real estate sector and the economy, through exploring the economic cycles and how they affect the behaviour of real estate markets. This has been developed focusing first in how the real estate market works, to then explain how the relationship between the economic cycles and the real estate sector is, to finally examine their impact upon the metropolitan area of Santiago de Chile.

So, the four quadrant framework proposed by DiPasquale and Wheaton (1992) and further improved by Colwell (2002) is clearly a systematic approach to understand the functioning of the real estate market that reveals a number of possibilities of intervention and in different stages of the system, which may generate changes of different magnitude in the entire system.

Furthermore, through the framework analysed was possible to identify at least three main ways of interventions by the Government. They are: 1) through managing the interest rate, in order to promote or to reactivate investment levels not only in

construction sector, but also in the whole real estate industry, including finance, insurance, trade and service; 2) through investing in infrastructure and specially in social housing, which in turns may have a direct effect on employment; and 3) by planning, especially through an adequate land zoning management, in order to foster urban regeneration zones, or to provide new areas for urban development.

Together with this, it was possible to identify the economic role of the real estate sector, which in general terms includes the following four aspects: 1) It is a source for asset creation and providing living space, that was revealed in the southwest quadrant; 2) It is a source of employment, direct and indirect, as a result of the construction activity increase; 3) It is a target of investment (sometimes speculative) and opportunities for investors as well for the urban development; and 4) It is a source of direct revenue for the government, mainly through taxation.

In the second part of this essay, it has been possible to evidence the increased complexity of the real estate sector in a long run as a result of the effect of the economic cycles. Specifically it was possible to evidence that the nature of the relationship between the economic cycles and the real estate cycle is more complex than a simply linear cause - effect. So, based on the finding of Case (1991) and of Ghent and Owyang (2010) it has been possible to evidence that the real estate cycle may intensify the effect of the business cycle at the local level, or at least generates a considerable differential between the economic cycle and the local economy.

Together with this, it is possible to establish the variables at the national scale can be a better lead-indicator of local crisis; specifically, Ghent and Owyang (2010) demonstrated that in 51 US cities, national housing data are better leading indicators for the employment at the metropolitan level and of a subsequent expansion or contraction of the economy at the local level.

Also, the analysis of the stages of the real estate cycle allows to identify four periods, being the fourth or transition stage (especially near the end of the growth period), in which the efforts should tend to focus; as this is a good period to invest, not only by the developers but also by government to foster the economy through reforms and incentives; furthermore, this investment may be capitalized in the next growing phase of the cycle (Lee, 2011).

The last part of this paper has focused on the evidence of the connection between the economic cycle and the real estate sector in Santiago de Chile; where, beside its participation in the product, the relevance of the real estate sector is specially represented by the percentage of credit flows and insurance, which raise the importance of the real estate sector in relation to the propagation of its effects over the rest of the economy. So, in terms of relevance this matches the framework proposed by DiPasquale and Wheaton (1992) and the finding of (Case, 1991).

Considering a dataset of similar variables to those considered by Gottlieb (1976), Case (1991) and by Ghent and Owyang (2010) it is possible to confirm that in terms of correlations, there is a consistency between the real estate market in the Metropolitan area of Santiago and the four quadrant framework proposed by DiPasquale and Wheaton (1992).

Despite the general trend observed between permits and the metropolitan unemployment, in terms of statistical significance, prices seem to be more relevant instead of permits, which is more consistent with the episode of Massachusetts in the 1980s than the finding of Ghent and Owyang (2010). However, this is significant at 10% of confidence.

The previous analysis raised the complexity in relation to the existence of the lag effect among the variables. So, by applying a causality test in a Vector Autoregressive estimation model and considering up to 2 month lags it is possible to confirm that despite a better significance of prices, from a point of view of the system of variables, they lack consistency.

In a second test, it was possible to confirm that housing prices would be statistically significant as a causal variable on metropolitan unemployment rate, and therefore of the metropolitan economy of Santiago de Chile; which is more consistent with the explanation of Case (1991) than the finding of Ghent and Owyang (2010). However, the result here is significant by considering a bivariate analysis.

So, the stated above raises the need to advance toward further analysis about the relationship between the variables analyzed by Gottlieb (1976), Case (1991) and by Ghent and Owyang (2010), and the effect of national variables in the real estate sector in Santiago and finally in its economy.

Finally, given the scope of this work, and on the base of the variables analysed in the reference papers, an analysis has only been included to try to identify the variables that numerically show a better relationship with the metropolitan economy, in terms of impact on employment. In spite, the existing consistencies with the literature reviewed and with the framework presented in the first point; as a recommendation, it is important to move towards an analysis regarding to the causality among the variables and how the connection is among the different variables involved in the real estate market of Santiago.

This is relevant as one of the element raised in this analysis refers to the endogeneity problem that might exist between, for example, prices and permits; which can be addressed in a later work, for example, by exploring Instrumental variables estimation, as the "two-stages least squares" method (Wooldridge, 2012); or by applying a technique of an optimal band-pass filter, following the work of Ghent and Owyang (2010). However, this requires investing more time and it is also crucial to have a greater number of observations for all variables involved.

Lastly, this analysis also raises the need(s) of exploring other variables, beyond those considered by Gottlieb (1976), Case (1991) and by Ghent & Owyang (2010) that may have an effect on the real estate sector in Santiago de Chile.

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7 Appendices

Appendix 1 GDP by economic activity, Metropolitan Region of Santiago and total country (MM CL$), year 2012

	Metropolitan Santiago		Country		
Economic activity	**MM CL$**	**%**	**MM CL$**	**%**	**% Part.**
Agriculture	328,161	0.7%	2,819,033	2.6%	11.6%
Fishing	0	0.0%	442,337	0.4%	0.0%
Mining	327,922	0.7%	13,010,328	11.9%	2.5%
Manufacturing	5,516,463	11.3%	11,481,365	10.5%	48.0%
Energy (Electricity, gas & water)	798,308	1.6%	3,713,069	3.4%	21.5%
Construction	**2,272,974**	**4.7%**	**7,590,969**	**6.9%**	**29.9%**
Commerce, hotel & restaurants	7,849,211	16.1%	11,978,728	10.9%	65.5%
Transport & telecommunications	3,311,723	6.8%	7,438,142	6.8%	44.5%
Finance & business services	17,610,848	36.2%	20,694,879	18.9%	85.1%
Housing related services	**2,853,192**	**5.9%**	**5,063,825**	**4.6%**	**56.3%**
Personal services	6,182,908	12.7%	11,452,161	10.5%	54.0%
Public administration	1,700,728	3.5%	4,348,026	4.0%	39.1%
Total Metropolitan Santiago	48,624,775	100.0%	109,558,126	100.0%	44.4%

Source: Central Bank of Chile (2014).

Appendix 2 Occupied people by economic activity, Metropolitan Region of Santiago, year 2014

Economic activity	Number	%
Agriculture, hunting and forestry	79.03	2.4%
Fishing	1.4	0.0%
Mining and quarrying	27.6	0.8%
Manufacturing	449.06	13.7%
Electricity, gas and water	8.44	0.3%
Construction	**296.35**	**9.0%**
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	743.79	22.7%
Hotels and restaurants	107.18	3.3%
Transport, storage and communications	251.8	7.7%
Financial intermediary activities	115.36	3.5%
Real estate activities, business and renting activities	**328.99**	**10.0%**
Government and defence; plans of compulsory social security	139.28	4.2%
Education (Teaching)	226.33	6.9%
Health and social services	164.59	5.0%
Other community, social and personal services	106.16	3.2%
Private households with employed	234.84	7.2%
Extraterritorial organizations	2.9	0.1%
Total	3,283.10	100.0%

Source: Ministry of Social Development (2014).

Appendix 3 Variables considered and source of information

Variable	Name (alias)	Source
National housing permits (units)	CL_HPermits	National Institute of Statistics (2014)
National housing permits (m2 built)	CL_M2HPermits	National Institute of Statistics (2014)
National total permits (m2 built)	CL_M2TotPermits	National Institute of Statistics (2014)
Metropolitan housing permits (units)	RM_HPermits	National Institute of Statistics (2014)
Metropolitan housing permits (m2 built)	RM_M2HPermits	National Institute of Statistics (2014)
National unemployment rate	CL_Unemploy	Central Bank of Chile (2014)
Metropolitan unemployment rate	RM_Unemploy	Central Bank of Chile (2014)
Interest rate for housing	IntRate_House	Central Bank of Chile (2014)
Interest rate interbank	IntRate_IntBank	Central Bank of Chile (2014)
Metropolitan housing price index	RM_HPriceIndex	Chilean Chamber of Construction (2014)
Index of building cost	BuildCostIndex	Chilean Chamber of Construction (2014)
Index of building activity	CL_BuildIndex	Chilean Chamber of Construction (2014)
Index of Industrial activity	CL_IndustIndex	Central Bank of Chile (2014)
Metropolitan housing selling	RM_HSelling	Chilean Chamber of Construction (2014)
Economic activities index, for services related to housing	CL_ActEcHServ	Central Bank of Chile (2014)
Economic activities index, for construction activity	CL_ActEcConstr	Central Bank of Chile (2014)
Consumer price index value [Base 100 = Dec 2008)]	Value_CPI	Central Bank of Chile (2014)
Financial system loans	Financial_loans	Central Bank of Chile (2014)

Source: prepared by the author based on National Institute of Statistics (2014), Central Bank of Chile (2014) and Chilean Chamber of Construction (2014).

Appendix 4 Correlation coefficients matrix, for the 18 variables considered

	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
CL_HPermits	1.000	0.912	0.751	0.738	0.684	-0.046	0.054	-0.087	0.197	-0.268	0.009	-0.244	0.275	0.050	-0.262	-0.095	0.169	0.114
CL_M2HPermits	-	1.000	0.882	0.696	0.778	-0.203	-0.082	-0.210	0.303	-0.002	0.262	0.038	0.394	0.270	-0.033	0.125	0.345	0.340
CL_M2TotPermits	-	-	1.000	0.519	0.616	-0.192	-0.075	-0.329	0.444	0.090	0.413	0.181	0.543	0.377	0.061	0.266	0.581	0.558
RM_HPermits	-	-	-	1.000	0.912	-0.094	0.038	-0.030	0.142	-0.347	-0.092	-0.289	0.266	0.084	-0.391	-0.166	-0.090	-0.095
RM_M2HPermits	-	-	-	-	1.000	-0.166	-0.032	-0.076	0.151	-0.196	-0.016	-0.152	0.288	0.263	-0.175	0.010	-0.013	-0.003
CL_Unemploy	-	-	-	-	-	1.000	0.856	0.269	-0.237	-0.699	-0.807	-0.850	-0.539	-0.632	-0.709	-0.896	0.050	-0.170
RM_Unemploy	-	-	-	-	-	-	1.000	0.087	-0.196	-0.810	-0.704	-0.895	-0.323	-0.557	-0.712	-0.835	0.042	-0.161
IntRate_House	-	-	-	-	-	-	-	1.000	0.291	-0.214	-0.413	-0.083	-0.046	-0.193	-0.420	-0.229	-0.406	-0.398
IntRate_IntBank	-	-	-	-	-	-	-	-	1.000	0.156	0.320	0.375	0.519	0.571	0.028	0.421	0.589	0.541
RM_HPriceIndex	-	-	-	-	-	-	-	-	-	1.000	0.939	0.945	0.155	0.687	0.968	0.910	0.864	0.948
BuildCostIndex	-	-	-	-	-	-	-	-	-	-	1.000	0.932	0.275	0.668	0.970	0.858	0.982	0.996
CL_BuildIndex	-	-	-	-	-	-	-	-	-	-	-	1.000	0.295	0.742	0.865	0.951	0.882	0.953
CL_IndustIndex	-	-	-	-	-	-	-	-	-	-	-	-	1.000	0.499	0.189	0.532	0.269	0.310
RM_HSelling	-	-	-	-	-	-	-	-	-	-	-	-	-	1.000	0.742	0.659	0.707	0.710
CL_ActEcHServ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.000	0.824	0.954	0.980
CL_ActEcConstr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.000	0.829	0.883
Value_CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.000	0.940
Financial_loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.000

Critical values for Pearson's r, with df N-2 (N>=100) = 0.164

Source: own calculations.

Appendix 5 Unit root test for the series considered in VAR analysis

	Intercept and Trend								
	Order of Integration	Lag		Critic values			Probability	Durbin-	Unit
Variable	*I(d)*	(1)	t statistic	1%	5%	10%	H_0 (2)	Watson	root
CL_HPermits	*I(0)*	0	-8.13043	-4.03500	-3.44707	-3.14858	0.00000	2.03304	No(*)
CL_M2HPermits	*I(0)*	0	-8.40483	-4.03500	-3.44707	-3.14858	0.00000	2.07335	No(*)
CL_M2TotPermits	-	-	-	-	-	-	-	-	-
RM_HPermits	*I(0)*	1	-6.01121	-4.03565	-3.44738	-3.14876	0.00000	2.00416	No(*)
RM_M2HPermits	*I(0)*	1	-5.58925	-4.03565	-3.44738	-3.14876	0.00000	2.02968	No(*)
CL_Unemploy	*I(1)*	2	-5.42590	-4.03698	-3.44802	-3.14914	0.00010	1.95087	No(*)
RM_Unemploy	*I(1)*	0	-8.124234	-4.035648	-3.447383	-3.148761	0.00000	2.04817	No(*)
IntRate_House	*I(0)*	1	-3.977217	-4.035648	-3.447383	-3.148761	0.01190	1.80669	No(**)
IntRate_IntBank	-	-	-	-	-	-	-	-	-
RM_HPriceIndex	*I(1)*	3	-5.717278	-4.037668	-3.448348	-3.149326	0.00000	1.95696	No(*)
BuildCostIndex	*I(1)*	0	-13.19968	-4.035648	-3.447383	-3.148761	0.00000	1.92245	No(*)
CL_BuildIndex	*I(1)*	1	-3.504767	-4.03631	-3.447699	-3.148946	0.04340	1.98507	No(**)
CL_IndustIndex	*I(1)*	5	-6.327085	-4.039075	-3.44902	-3.14972	0.00000	2.09551	No(*)
RM_HSelling	-	-	-	-	-	-	-	-	-
CL_ActEcHServ	-	-	-	-	-	-	-	-	-
CL_ActEcConstr	-	-	-	-	-	-	-	-	-
Value_CPI	*I(1)*	0	-10.87707	-4.035648	-3.447383	-3.148761	0.00000	1.99462	No(*)
Financial_loans	*I(1)*	0	-6.940899	-4.035648	-3.447383	-3.148761	0.00000	2.03835	No(*)

(1) Lag according to Schwartz criteria (SC) (Schwarz, G. (1978), considering up to 5 lags

(2) Mackinnon (1996) one side p-values

(*) 1%

(**) 5%

The analysis considered those series used in the regression, in VAR models, and those with data longer than 7 years

Source: own calculations, based on Dickey, Hasza, and Fuller (1984), Schwarz (1978) and Mackinnon (1996).

Appendix 6 Significance of the variables in relation with the metropolitan unemployment, through a multiple regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Financial_loans, IntRate_House, RM_HPermits, RM_HPriceIndex, Value_CPI[b]		Enter

a. Dependent Variable: RM_Unemploy

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.832[a]	0.692	0.679	1.096

a. Predictors: (Constant), Financial_loans, IntRate_House, RM_HPermits, RM_HPriceIndex, Value_CPI

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	315.238	5	63.048	52.505	0.000[b]
	Residual	140.494	117	1.201		
	Total	455.731	122			

a. Dependent Variable: RM_Unemploy

b. Predictors: (Constant), Financial_loans, IntRate_House, RM_HPermits, RM_HPriceIndex, Value_CPI

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	17.574	5.559		3.161	0.002
	RM_HPermits	-4.868E-05	0.000	-0.044	-0.728	0.468
	IntRate_House	-0.217	0.254	-0.051	-0.856	0.394
	RM_HPriceIndex	-0.056	0.031	-0.405	-1.832	0.069
	Value_CPI	0.019	0.049	0.101	0.394	0.694
	Financial_loans	-5.844E-05	0.000	-0.554	-1.377	0.171

a. Dependent Variable: RM_Unemploy

Source: own calculations.

Appendix 7 Number of lags according to prediction errors

Criteria	Order of (p)	Prediction errors, with (p) =				
		1	2	3	4	5
AIC(n)	5	8.45E+01	8.50E+01	8.45E+01	8.38E+01	8.22E+01
HQ(n)	1	8.63E+01	8.85E+01	8.96E+01	9.05E+01	9.05E+01
SC(n)	1	8.90E+01	9.35E+01	9.70E+01	1.00E+02	1.03E+02
FPE(n)	5	4.88E+36	9.16E+36	7.45E+36	6.17E+36	3.77E+36

Source: own calculations, based on R Development Core Team (2011).

Appendix 8 Vector Autoregressive estimation, for a multiple time series

Estimation Proc:

LS 1 2 RM_UNEMPLOY RM_HPERMITS RM_HPRICEINDEX FINANCIAL_LOANS INTRATE_HOUSE VALUE_CPI @ C

Vector Autoregression Estimates
Date: 08/22/14 Time: 14:36
Sample (adjusted): 2004M03 2014M03
Included observations: 121 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	RM_UNEMPLOY	RM_HPERMITS	RM_HPRICEINDEX	FINANCIAL_LOANS	INTRATE_HOUSE	VALUE_CPI
RM_UNEMPLOY(-1)	1.201133	-402.6949	0.258217	-236.6509	-0.0324	-0.197654
	-0.09413	-386.72	-0.26457	-68.9991	-0.03634	-0.26689
	[12.7610]	[-1.04131]	[0.97599]	[-3.42977]	[-0.89168]	[-0.74059]
RM_UNEMPLOY(-2)	-0.285391	241.3869	-0.257366	88.59313	0.0367	-0.050717
	-0.09144	-375.682	-0.25702	-67.0296	-0.0353	-0.25927
	[-3.12112]	[0.64253]	[-1.00135]	[1.32170]	[1.03967]	[-0.19561]
RM_HPERMITS(-1)	3.67E-06	0.053491	-0.000103	0.037927	-4.64E-06	-1.32E-06
	-2.30E-05	-0.09361	-6.40E-05	-0.0167	-8.80E-06	-6.50E-05
	[0.16123]	[0.57141]	[-1.60463]	[2.27078]	[-0.52783]	[-0.02039]
RM_HPERMITS(-2)	1.22E-05	0.107956	2.28E-05	0.0177	2.68E-05	9.39E-05
	-2.30E-05	-0.09572	-6.50E-05	-0.01708	-9.00E-06	-6.60E-05
	[0.52152]	[1.12781]	[0.34842]	[1.03637]	[2.98433]	[1.42074]
RM_HPRICEINDEX(-1)	-0.062286	112.46	1.081493	32.18117	0.006573	0.053445
	-0.03307	-135.887	-0.09297	-24.2452	-0.01277	-0.09378
	[-1.88321]	[0.82760]	[11.6332]	[1.32732]	[0.51483]	[0.56989]
RM_HPRICEINDEX(-2)	0.076313	-115.4064	-0.193758	-23.69238	-0.009523	-0.100074
	-0.03203	-131.613	-0.09004	-23.4826	-0.01237	-0.09083
	[2.38225]	[-0.87686]	[-2.15187]	[-1.00893]	[-0.77011]	[-1.10177]
FINANCIAL_LOANS(-1)	-6.66E-05	0.203969	7.95E-06	1.072739	8.79E-05	-0.000975
	-0.00013	-0.54605	-0.00037	-0.09743	-5.10E-05	-0.00038
	[-0.50143]	[0.37354]	[0.02128]	[11.0108]	[1.71394]	[-2.58749]
FINANCIAL_LOANS(-2)	3.58E-05	-0.184607	0.000191	-0.114558	-8.97E-05	0.000986
	-0.00013	-0.5368	-0.00037	-0.09578	-5.00E-05	-0.00037
	[0.27416]	[-0.34390]	[0.52082]	[-1.19611]	[-1.77759]	[2.66266]
INTRATE_HOUSE(-1)	0.13027	163.2164	-0.257716	219.9074	1.387698	0.125157
	-0.20215	-830.553	-0.56821	-148.188	-0.07804	-0.57319
	[0.64442]	[0.19652]	[-0.45356]	[1.48397]	[17.7822]	[0.21835]
INTRATE_HOUSE(-2)	-0.031333	809.1365	-0.475596	-306.6983	-0.529648	-0.421861
	-0.20793	-854.31	-0.58447	-152.427	-0.08027	-0.58959
	[-0.15069]	[0.94712]	[-0.81373]	[-2.01210]	[-6.59825]	[-0.71552]
VALUE_CPI(-1)	0.020749	-183.3544	0.029453	-18.07976	-0.006661	0.987433
	-0.03502	-143.87	-0.09843	-25.6694	-0.01352	-0.09929
	[0.59254]	[-1.27445]	[0.29924]	[-0.70433]	[-0.49277]	[9.94504]

Estimation Proc:

LS 1 2 RM_UNEMPLOY RM_HPERMITS RM_HPRICEINDEX FINANCIAL_LOANS INTRATE_HOUSE VALUE_CPI @ C

Vector Autoregression Estimates
Date: 08/22/14 Time: 14:36
Sample (adjusted): 2004M03 2014M03
Included observations: 121 after adjustments
Standard errors in ( ) & t-statistics in [ ]

VALUE_CPI(-2)	0.00677	49.39875	-0.22538	68.7368	0.014634	0.010295
	-0.04067	-167.105	-0.11432	-29.815	-0.0157	-0.11532
	[0.16646]	[0.29562]	[-1.97143]	[2.30544]	[0.93206]	[0.08927]
C	-2.293819	12693.14	24.65957	-1644.45	0.115454	8.651701
	-2.24368	-9218.31	-6.3066	-1644.74	-0.86615	-6.36185
	[-1.02235]	[1.37695]	[3.91012]	[-0.99982]	[0.13330]	[1.35993]
R-squared	0.968966	0.36262	0.99527	0.999807	0.915108	0.990315
Adj. R-squared	0.965518	0.2918	0.994744	0.999786	0.905676	0.989239
Sum sq. resids	14.13438	2.39E+08	111.6725	7595400	2.106413	113.6376
S.E. equation	0.361765	1486.337	1.01686	265.1938	0.139656	1.025768
F-statistic	281.005	5.120313	1893.603	46628.17	97.01721	920.2802
Log likelihood	-41.78716	-1048.608	-166.8383	-840.051	73.38209	-167.8936
Akaike AIC	0.905573	17.54723	2.972533	14.10002	-0.998051	2.989977
Schwarz SC	1.205947	17.84761	3.272908	14.40039	-0.697677	3.290351
Mean dependent	8.726991	4303.405	113.4713	55211.9	4.480212	96.4388
S.D. dependent	1.948181	1766.198	14.02605	18110.46	0.454724	9.888319
Determinant resid covariance (dof adj.)		3.51E+08				
Determinant resid covariance		1.78E+08				
Log likelihood		-2179.383				
Akaike information criterion		37.31211				
Schwarz criterion		39.11435				

Source: own calculations, based on Chorro Gascó (2000).

Appendix 9 Causality Wiener-Granger test in a Vector Autoregressive estimation for a multiple time series

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 08/26/14 Time: 16:43
Sample: 2004M01 2014M03
Included observations: 121

Dependent variable: RM_UNEMPLOY

Excluded	Chi-sq	df	Prob.
RM_HPERMITS	0.316477	2	0.8536
RM_HPRICEINDEX	6.867111	2	0.0323
FINANCIAL_LOANS	3.064124	2	0.2161
INTRATE_HOUSE	1.406003	2	0.4951
VALUE_CPI	1.966648	2	0.3741
All	13.72377	10	0.186

Dependent variable: FINANCIAL_LOANS

Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	33.52089	2	0
RM_HPERMITS	6.729818	2	0.0346
RM_HPRICEINDEX	2.293994	2	0.3176
INTRATE_HOUSE	4.632124	2	0.0987
VALUE_CPI	10.98162	2	0.0041
All	49.16567	10	0

Dependent variable: RM_HPERMITS

Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	1.727605	2	0.4216
RM_HPRICEINDEX	0.768888	2	0.6808
FINANCIAL_LOANS	0.178777	2	0.9145
INTRATE_HOUSE	6.799909	2	0.0334
VALUE_CPI	3.855482	2	0.1455
All	26.37305	10	0.0033

Dependent variable: INTRATE_HOUSE

Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	1.107814	2	0.5747
RM_HPERMITS	8.968549	2	0.0113
RM_HPRICEINDEX	0.996666	2	0.6075
FINANCIAL_LOANS	3.289742	2	0.193
VALUE_CPI	1.191108	2	0.5513
All	20.18527	10	0.0275

Dependent variable: RM_HPRICEINDEX

Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	1.022404	2	0.5998
RM_HPERMITS	2.614488	2	0.2706
FINANCIAL_LOANS	16.63662	2	0.0002
INTRATE_HOUSE	8.201929	2	0.0166
VALUE_CPI	10.70118	2	0.0047
All	23.66562	10	0.0085

Dependent variable: VALUE_CPI

Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	5.528837	2	0.063
RM_HPERMITS	2.031271	2	0.3622
RM_HPRICEINDEX	3.201297	2	0.2018
FINANCIAL_LOANS	7.240343	2	0.0268
INTRATE_HOUSE	1.486399	2	0.4756
All	13.71124	10	0.1866

Source: own calculations, based on Granger (1969).

Appendix 10 Causality Wiener-Granger test in a bivariate analysis

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 08/26/14 Time: 17:43
Sample: 2004M01 2014M03
Included observations: 121

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
RM_HPERMITS	1.415709	2	0.4927
All	1.415709	2	0.4927

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
RM_HPRICEINDEX	9.59947	2	0.0082
All	9.59947	2	0.0082

Dependent	variable:	RM_HPERMITS	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	2.661468	2	0.2643
All	2.661468	2	0.2643

Dependent	variable:	RM_HPRICEINDEX	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	0.4553	2	0.7964
All	0.4553	2	0.7964

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
FINANCIAL_LOANS	4.758097	2	0.0926
All	4.758097	2	0.0926

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
INTRATE_HOUSE	1.328802	2	0.5146
All	1.328802	2	0.5146

Dependent	variable:	FINANCIAL_LOANS	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	24.45368	2	0
All	24.45368	2	0

Dependent	variable:	INTRATE_HOUSE	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	1.293433	2	0.5238
All	1.293433	2	0.5238

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
INTRATE_HOUSE	1.328802	2	0.5146
All	1.328802	2	0.5146

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
CL_HPERMITS	2.648759	2	0.266
All	2.648759	2	0.266

Dependent	variable:	INTRATE_HOUSE	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	1.293433	2	0.5238
All	1.293433	2	0.5238

Dependent	variable:	CL_HPERMITS	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	5.653343	2	0.0592
All	5.653343	2	0.0592

Source: own calculations, based on Granger (1969).

Appendix 11 Vector Autoregressive estimation in a bivariate analysis and causality Wiener-Granger test for metropolitan unemployment and housing prices

Estimation Proc:

LS 1 2 RM_UNEMPLOY RM_HPRICEINDEX @ C

VAR Model:

RM_UNEMPLOY = C(1,1) * RM_UNEMPLOY(-1) + C(1,2) * RM_UNEMPLOY(-2) + C(1,3) * RM_HPRICEINDEX(-1) + C(1,4) * RM_HPRICEINDEX(-2) + C(1,5)

RM_HPRICEINDEX = C(2,1) * RM_UNEMPLOY(-1) + C(2,2) * RM_UNEMPLOY(-2) + C(2,3) * RM_HPRICEINDEX(-1) + C(2,4) * RM_HPRICEINDEX(-2) + C(2,5)

VAR Model - Substituted Coefficients:

RM_UNEMPLOY = 1.22874119871 * RM_UNEMPLOY(-1) - 0.296402312115 * RM_UNEMPLOY(-2) - 0.0811916101809 * RM_HPRICEINDEX(-1) + 0.0748362855799 * RM_HPRICEINDEX(-2) + 1.31978692824

RM_HPRICEINDEX = - 0.016631289362 * RM_UNEMPLOY(-1) - 0.0435879331924 * RM_UNEMPLOY(-2) + 1.19448047525 * RM_HPRICEINDEX(-1) - 0.187846449916 * RM_HPRICEINDEX(-2) + 0.0957239113671

Vector Autoregression Estimates

Date: 08/28/14 Time: 19:27

Sample (adjusted): 2004M03 2014M03

Included observations: 121 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	RM_UNEMPLOY	RM_HPRICEINDEX
RM_UNEMPLOY(-1)	1.228741	-0.016631
	(0.08638)	(0.26226)
	[14.2241]	[-0.06341]
RM_UNEMPLOY(-2)	-0.296402	-0.043588
	(0.08609)	(0.26136)
	[-3.44297]	[-0.16677]
RM_HPRICEINDEX(-1)	-0.081192	1.194480
	(0.03072)	(0.09327)
	[-2.64274]	[12.8063]
RM_HPRICEINDEX(-2)	0.074836	-0.187846
	(0.03116)	(0.09459)
	[2.40193]	[-1.98588]
C	1.319787	0.095724
	(0.69841)	(2.12036)
	[1.88970]	[0.04515]
R-squared	0.967696	0.994256
Adj. R-squared	0.966582	0.994058
Sum sq. resids	14.71291	135.6106
S.E. equation	0.356140	1.081229
F-statistic	868.7163	5019.430
Log likelihood	-44.21414	-178.5884
Akaike AIC	0.813457	3.034519
Schwarz SC	0.928985	3.150047
Mean dependent	8.726991	113.4713
S.D. dependent	1.948181	14.02605
Determinant resid covariance (dof adj.)		0.147150
Determinant resid covariance		0.135240
Log likelihood		-222.3406
Akaike information criterion		3.840341
Schwarz criterion		4.071398

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 08/28/14 Time: 19:42

Sample: 2004M01 2014M03

Included observations: 121

Dependent	variable:	RM_UNEMPLOY	
Excluded	Chi-sq	df	Prob.
RM_HPRICEINDEX	9.59947	2	0.0082
All	9.59947	2	0.0082
Dependent	variable:	RM_HPRICEINDEX	
Excluded	Chi-sq	df	Prob.
RM_UNEMPLOY	0.4553	2	0.7964
All	0.4553	2	0.7964

Source: own calculations, based on Chorro Gascó (2000) and Granger (1969).

Appendix 12 Time series data collected

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
01-91	8,353	441,951	692,519	4,198	248,475	8.01	8.41	-	-	-	-	-	-	-	-	-	33.44	3,686.7
02-91	6,512	382,081	633,311	2,905	206,604	8.05	9.36	-	-	-	-	-	-	-	-	-	33.48	3,703.4
03-91	7,040	405,154	728,354	2,727	176,918	8.22	9.57	-	-	-	-	-	-	-	-	-	33.87	3,720.8
04-91	6,336	381,576	627,322	2,739	180,933	8.17	9.77	-	-	-	-	-	-	-	-	-	34.49	3,729.1
05-91	6,866	406,313	615,431	3,706	211,049	8.12	9.88	-	-	-	-	-	-	-	-	-	35.35	3,788.8
06-91	8,263	453,401	697,329	4,924	258,106	8.03	10.49	-	-	-	-	-	-	-	-	-	36.00	3,848.4
07-91	8,232	437,136	669,117	4,284	245,879	8.47	10.48	-	-	-	-	-	-	-	-	-	36.65	3,940.7
08-91	5,810	343,357	843,593	2,241	157,531	8.53	10.44	-	-	-	-	-	-	-	-	-	37.10	4,041.8
09-91	8,318	447,412	652,996	4,508	243,731	8.70	9.81	-	-	-	-	-	-	-	-	-	37.58	4,135.8
10-91	6,094	379,585	630,941	2,359	187,412	8.42	9.00	-	-	-	-	-	-	-	-	-	38.67	4,195.8
11-91	8,322	471,333	745,608	3,631	239,620	8.14	7.68	-	-	-	-	-	-	-	-	-	39.03	4,308.8
12-91	8,051	648,598	1,097,334	4,271	412,733	7.64	7.18	-	-	-	-	-	-	-	-	-	39.51	4,412.7
01-92	7,927	476,638	714,044	3,940	261,603	7.38	6.67	-	-	-	-	-	-	-	-	-	39.94	4,529.9
02-92	6,167	402,736	698,797	1,870	184,172	7.23	6.97	-	-	-	-	-	-	-	-	-	39.69	4,656.2
03-92	9,612	555,429	852,942	3,731	277,699	7.04	6.54	-	-	-	-	-	-	-	-	-	39.97	4,662.6
04-92	8,016	493,534	740,476	3,342	255,764	6.69	6.63	-	-	-	-	-	-	-	-	-	40.49	4,741.5
05-92	8,292	493,917	759,304	4,124	258,318	6.46	6.85	-	-	-	-	-	-	-	-	-	40.93	4,800.2
06-92	9,123	568,677	876,536	3,758	286,417	6.44	7.22	-	-	-	-	-	-	-	-	-	41.21	4,894.4
07-92	8,367	571,959	874,623	4,596	348,645	6.39	7.51	-	-	-	-	-	-	-	-	-	41.67	5,004.1
08-92	8,872	555,972	832,121	3,825	275,659	6.45	7.61	-	-	-	-	-	-	-	-	-	42.26	5,128.3
09-92	14,627	1,016,506	1,714,624	8,188	625,631	6.47	7.49	-	-	-	-	-	-	-	-	-	43.25	5,314.3
10-92	6,522	476,729	964,948	2,482	241,050	6.49	7.13	-	-	-	-	-	-	-	-	-	43.86	5,477.4
11-92	11,912	771,155	1,075,909	5,617	414,437	6.55	6.52	-	-	-	-	-	-	-	-	-	44.49	5,721.3
12-92	9,045	639,943	1,020,607	3,755	364,383	6.62	6.42	-	-	-	-	-	-	-	-	-	44.52	5,952.4
01-93	11,272	746,622	1,133,794	5,635	437,039	6.74	6.21	-	-	-	-	-	-	-	-	-	44.60	6,039.3
02-93	7,967	533,157	852,675	5,348	378,194	6.69	6.54	-	-	-	-	-	-	-	-	-	44.78	6,136.8
03-93	10,359	632,338	1,024,979	3,920	283,105	6.59	6.33	-	-	-	-	-	-	-	-	-	45.03	6,302.6
04-93	9,679	550,403	855,600	5,782	342,128	6.61	6.37	-	-	-	-	-	-	-	-	-	45.66	6,464.1
05-93	10,775	605,283	906,799	5,540	325,242	6.46	6.09	-	-	-	-	-	-	-	-	-	46.33	6,665.3
06-93	13,312	731,648	1,082,240	7,320	385,692	6.30	6.08	-	-	-	-	-	-	-	-	-	46.56	6,812.9
07-93	7,705	461,167	779,226	1,943	153,666	6.27	6.16	-	-	-	-	-	-	-	-	-	47.01	7,019.2
08-93	9,792	551,061	1,018,336	3,567	207,868	6.39	6.08	-	-	-	-	-	-	-	-	-	48.02	7,095.0
09-93	14,011	791,490	1,154,396	6,130	367,855	6.41	5.76	-	-	-	-	-	-	-	-	-	48.58	7,307.3

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
10-93	7,618	481,796	787,773	2,414	178,910	6.37	5.56	-	-	-	-	-	-	-	-	-	49.83	7,507.8
11-93	6,827	465,786	1,025,596	2,807	222,088	6.31	6.21	-	-	-	-	-	-	-	-	-	49.87	7,734.0
12-93	12,745	728,126	1,218,012	7,386	387,092	6.82	7.07	-	-	-	-	-	-	-	-	-	49.97	8,026.9
01-94	8,200	546,064	984,115	3,300	223,589	7.23	7.70	-	-	-	-	-	-	-	-	-	50.49	8,160.7
02-94	7,986	430,835	726,590	2,714	163,340	7.55	7.65	-	-	-	-	-	-	-	-	-	50.65	8,279.8
03-94	13,056	772,762	1,104,478	5,358	363,408	7.34	7.87	-	-	-	-	-	-	-	-	-	51.22	8,426.6
04-94	9,707	485,957	781,444	3,856	200,092	7.58	8.03	-	-	-	-	-	-	-	-	-	51.47	8,598.0
05-94	11,600	701,299	1,147,029	5,967	370,027	7.71	8.34	-	-	-	-	-	-	-	-	-	52.20	8,779.7
06-94	10,844	667,577	1,126,741	5,213	360,118	7.78	8.54	-	-	-	-	-	-	-	-	-	52.48	8,799.6
07-94	10,024	559,450	917,037	3,444	258,345	7.81	8.73	-	-	-	-	-	-	-	-	-	52.79	8,932.6
08-94	11,067	619,898	966,281	5,771	317,324	7.79	8.94	-	-	-	-	-	-	-	-	-	53.38	9,070.6
09-94	9,255	565,850	911,406	2,815	207,100	8.01	8.98	-	-	-	-	-	-	-	-	-	53.64	9,212.3
10-94	8,456	456,981	703,058	2,882	196,082	8.25	8.99	-	-	-	-	-	-	-	-	-	53.96	9,407.5
11-94	10,857	742,370	1,100,247	3,795	356,325	8.35	8.23	-	-	-	-	-	-	-	-	-	54.29	9,510.6
12-94	13,733	852,762	1,428,296	6,591	451,289	8.15	7.90	-	-	-	-	-	-	-	-	-	54.44	9,716.4
01-95	11,172	670,168	1,022,996	4,823	310,307	7.95	7.56	-	-	-	-	-	-	-	-	-	54.78	9,756.0
02-95	8,324	557,394	895,737	3,885	313,975	7.76	7.70	-	-	-	-	-	-	-	-	-	55.06	9,888.0
03-95	13,368	806,758	1,169,923	7,109	451,727	7.64	7.52	-	-	-	-	-	-	-	-	-	55.40	10,092.7
04-95	9,659	599,960	856,122	4,045	263,243	7.53	7.75	-	-	-	-	-	-	-	-	-	55.73	10,284.2
05-95	9,432	554,411	870,938	3,336	218,914	7.59	7.91	-	1.10	-	-	-	-	-	-	-	56.07	10,361.4
06-95	19,265	1,228,011	1,829,155	10,796	786,661	7.52	8.06	-	1.09	-	-	-	-	-	-	-	56.49	10,510.8
07-95	11,203	649,790	1,429,398	5,206	320,289	7.39	7.97	-	1.13	-	-	-	-	-	-	-	56.96	10,669.0
08-95	9,556	729,039	1,296,635	4,579	432,686	7.24	7.72	-	1.21	-	-	-	-	-	-	-	57.90	10,929.9
09-95	8,390	518,104	1,011,414	1,768	143,824	7.09	7.19	-	1.84	-	-	-	-	-	-	-	58.24	11,177.7
10-95	12,544	776,789	1,211,554	8,260	520,052	6.95	6.68	-	1.34	-	-	-	-	-	-	-	58.69	11,412.9
11-95	9,265	585,947	972,328	3,815	261,342	6.80	6.27	-	1.28	-	-	-	-	-	-	-	58.73	11,826.0
12-95	13,422	825,366	1,694,363	3,268	283,642	7.02	6.78	-	0.81	-	-	-	-	-	-	-	58.90	12,170.1
01-96	16,012	935,270	1,489,451	8,678	543,143	7.41	6.75	-	0.79	-	-	-	-	-	-	-	59.06	12,413.5
02-96	11,191	673,582	1,127,985	4,604	317,187	7.50	6.27	-	0.85	-	-	-	-	-	-	-	59.37	12,644.4
03-96	10,186	664,094	1,111,159	4,619	322,862	6.92	6.30	-	0.98	-	-	-	-	-	-	-	59.80	12,803.7
04-96	8,440	569,994	1,005,428	2,570	183,063	6.55	6.82	-	1.25	-	-	-	-	-	-	-	60.41	12,961.1
05-96	10,393	667,901	1,063,150	2,626	235,887	6.33	7.49	-	1.53	-	-	-	-	-	-	-	60.89	13,252.8
06-96	9,373	670,679	1,162,176	3,856	325,972	6.33	8.42	-	1.43	-	-	-	-	-	-	-	61.15	13,362.6
07-96	14,621	955,617	1,370,707	6,431	456,466	6.44	8.19	-	1.10	-	-	-	-	-	-	-	61.33	13,612.4
08-96	9,099	685,976	1,155,307	3,781	322,922	6.37	7.82	-	0.92	-	-	-	-	-	-	-	61.59	13,862.0

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
09-96	10,308	657,818	1,060,467	3,477	278,278	6.19	6.97	-	0.98	-	-	-	-	-	-	-	61.89	14,106.3
10-96	8,048	619,227	992,661	3,678	361,909	5.89	6.71	-	1.07	-	-	-	-	-	-	-	62.33	14,437.6
11-96	13,035	890,781	1,497,480	4,366	379,388	5.86	6.20	-	1.27	-	-	-	-	-	-	-	62.58	14,699.0
12-96	23,117	1,360,993	1,918,317	8,478	524,739	5.88	6.35	-	1.07	-	-	-	-	-	-	-	62.81	15,090.9
01-97	12,847	823,782	1,266,017	5,057	397,961	5.94	6.29	-	0.99	-	-	-	-	-	-	-	63.12	15,141.8
02-97	10,304	650,285	1,039,093	5,125	350,684	6.09	6.94	-	1.09	-	-	-	-	-	-	-	63.65	15,456.1
03-97	8,882	554,209	933,269	2,245	169,187	6.20	6.93	-	1.30	-	-	-	-	-	-	-	63.85	15,658.2
04-97	12,969	940,116	1,393,217	6,104	512,172	6.49	7.50	-	1.01	-	-	-	-	-	-	-	64.06	15,915.4
05-97	13,046	936,827	1,299,985	5,339	443,478	6.41	7.51	-	0.86	-	-	-	-	-	-	-	64.21	16,324.4
06-97	13,700	836,048	1,425,404	7,579	485,028	6.25	7.64	-	0.78	-	-	-	-	-	-	-	64.36	16,357.1
07-97	12,155	830,967	1,212,369	6,410	501,392	6.07	7.56	-	0.74	-	-	-	-	-	-	-	64.75	16,558.6
08-97	8,442	586,496	1,093,306	2,117	235,870	5.92	7.97	-	1.03	-	-	-	-	-	-	-	65.01	16,896.8
09-97	8,524	583,822	1,011,819	3,412	260,564	6.01	7.44	-	0.99	-	-	-	-	-	-	-	65.62	17,122.8
10-97	16,687	972,479	1,415,978	9,411	537,739	6.01	6.88	-	1.28	-	-	-	-	-	-	-	66.42	17,504.7
11-97	10,600	981,855	1,314,663	6,587	724,748	5.96	5.92	-	1.66	-	-	-	-	-	-	-	66.51	17,836.7
12-97	9,052	643,952	1,240,990	2,765	250,899	5.89	6.11	-	0.95	-	-	-	-	-	-	-	66.60	18,174.2
01-98	10,100	702,808	1,151,207	3,600	335,257	5.86	5.75	-	1.44	-	-	-	-	-	-	-	67.07	18,356.7
02-98	9,901	688,040	1,093,368	4,586	366,551	5.91	6.02	-	1.29	-	-	-	-	-	-	-	66.98	18,370.0
03-98	12,947	890,933	1,384,618	2,521	250,242	5.86	5.75	-	0.77	-	-	-	-	-	-	-	67.25	18,770.2
04-98	11,474	688,624	1,023,750	2,639	210,572	5.80	6.15	-	0.97	-	-	-	-	-	-	-	67.51	19,028.1
05-98	9,996	582,742	1,109,860	3,640	247,379	5.74	6.51	-	1.07	-	-	-	-	-	-	-	67.63	19,405.9
06-98	11,676	863,901	1,470,514	4,394	409,727	5.75	6.92	-	1.34	-	-	-	-	-	-	-	67.87	19,390.9
07-98	8,023	512,608	1,020,785	3,384	217,095	5.77	7.35	-	1.51	-	-	-	-	-	-	-	68.16	19,448.0
08-98	10,059	650,596	1,121,691	3,512	253,941	5.94	7.19	-	1.39	-	-	-	-	-	-	-	68.39	19,568.7
09-98	6,630	427,617	842,889	3,048	214,389	6.07	7.32	-	2.22	-	-	-	-	-	-	-	68.74	19,611.9
10-98	7,029	425,251	880,217	1,290	110,503	6.51	7.81	-	1.43	-	-	-	-	-	-	-	69.29	19,745.1
11-98	7,984	525,853	1,179,794	2,949	271,343	7.21	7.89	-	1.51	-	-	-	-	-	-	-	69.36	19,943.0
12-98	14,941	906,966	1,459,948	6,926	510,615	7.90	8.21	-	0.94	-	-	-	-	-	-	-	69.71	20,117.7
01-99	5,523	364,689	900,274	2,425	185,730	8.38	8.11	-	1.02	-	-	-	-	-	-	-	69.48	20,134.7
02-99	6,092	382,923	915,676	1,745	125,646	8.62	9.15	-	0.50	-	-	-	-	-	-	-	69.53	20,106.9
03-99	7,844	449,712	945,962	1,324	136,678	9.03	9.87	-	0.55	-	-	-	-	-	-	-	69.97	20,168.4
04-99	4,495	283,553	761,715	1,556	115,822	9.48	10.69	-	1.01	-	-	-	-	-	-	-	70.23	20,222.7
05-99	5,465	366,481	805,386	1,856	169,393	10.08	11.73	-	0.93	-	-	-	-	-	-	-	70.32	20,231.4
06-99	10,532	632,111	1,085,973	6,275	393,821	10.65	11.77	-	0.62	-	-	-	-	-	-	-	70.42	20,038.3
07-99	6,211	357,894	747,731	2,344	144,202	10.71	12.30	-	0.50	-	-	-	-	-	-	-	70.46	19,928.5

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
08-99	17,556	953,738	1,252,606	7,637	434,176	10.88	12.17	-	0.50	-	-	-	-	-	-	-	70.60	20,027.4
09-99	13,451	703,954	1,168,517	3,691	231,700	10.91	12.28	-	0.58	-	-	-	-	-	-	-	70.76	20,213.0
10-99	12,134	703,515	1,073,699	5,234	323,392	10.77	11.74	-	0.60	-	-	-	-	-	-	-	71.01	20,317.4
11-99	15,066	825,673	1,475,044	6,813	393,410	10.40	10.93	-	0.76	-	-	-	-	-	-	-	71.13	20,448.9
12-99	9,914	641,909	1,164,085	3,547	320,317	10.09	10.21	-	0.64	-	-	-	-	-	-	-	71.32	20,608.7
01-00	7,541	464,504	899,388	2,391	178,600	9.66	9.52	-	0.67	-	2,251.15	-	-	-	-	-	71.45	20,666.2
02-00	7,369	442,325	820,802	2,526	181,775	9.44	9.28	-	0.66	-	2,259.79	-	-	-	-	-	71.84	20,835.4
03-00	6,625	497,671	892,255	2,216	238,820	9.27	9.82	-	0.92	-	2,272.77	-	-	-	-	-	72.37	20,921.5
04-00	4,352	284,331	635,853	1,012	94,568	9.39	9.96	-	1.12	-	2,283.91	-	-	-	-	-	72.72	21,123.7
05-00	7,416	532,353	955,387	3,044	268,395	9.30	10.07	-	0.98	-	2,273.92	-	-	-	-	-	72.87	21,378.2
06-00	7,722	709,695	1,232,925	3,490	386,577	9.41	10.95	-	0.73	-	2,296.98	-	-	-	-	-	73.04	21,297.2
07-00	6,638	468,997	919,897	2,618	223,054	9.85	11.69	-	0.64	-	2,312.03	-	-	-	-	-	73.13	21,275.3
08-00	10,324	627,849	1,026,076	2,640	200,407	10.08	11.98	-	0.56	-	2,317.38	-	-	-	-	-	73.32	21,308.3
09-00	10,205	629,097	1,171,398	2,916	201,025	10.42	11.00	-	0.66	-	2,330.92	-	-	-	-	-	73.77	21,550.8
10-00	7,329	453,837	914,565	1,896	147,361	9.93	10.38	-	0.92	-	2,341.67	-	-	-	-	-	74.21	21,742.0
11-00	13,075	808,330	1,141,642	3,630	315,984	10.02	9.29	-	1.00	-	2,342.99	-	-	-	-	-	74.47	21,971.2
12-00	11,332	718,436	1,461,612	3,494	294,607	9.88	9.39	-	0.77	-	2,336.29	-	-	-	-	-	74.55	22,466.6
01-01	8,485	485,936	876,905	4,294	271,371	10.02	9.26	-	0.54	-	2,338.00	-	-	-	-	-	74.80	22,621.0
02-01	6,079	373,474	736,863	1,354	112,442	10.03	9.76	-	0.63	-	2,335.57	-	-	-	-	-	74.57	22,691.1
03-01	6,172	403,017	955,511	3,042	214,504	10.11	9.58	-	0.21	-	2,344.68	-	-	-	-	-	74.93	22,596.8
04-01	7,289	474,563	864,467	2,694	190,669	10.06	9.71	-	0.62	-	2,365.81	-	-	-	-	-	75.27	22,694.7
05-01	13,303	770,482	1,288,603	3,590	249,870	10.15	9.32	-	0.80	-	2,360.18	-	-	-	-	-	75.59	23,051.3
06-01	10,198	616,847	1,225,216	2,812	206,185	9.88	8.86	-	0.74	-	2,383.63	-	-	-	-	-	75.64	22,949.3
07-01	11,777	720,661	1,140,062	4,467	357,626	9.76	8.85	-	0.44	-	2,386.01	-	-	-	-	-	75.49	23,108.7
08-01	17,009	962,361	1,629,184	6,929	460,336	9.52	9.54	-	6.01	-	2,414.40	-	-	-	-	-	76.10	23,122.4
09-01	8,595	491,468	712,399	2,234	162,687	9.94	9.91	-	6.50	-	2,418.70	-	-	-	-	-	76.65	23,205.4
10-01	10,830	661,698	1,169,403	3,603	281,238	9.73	9.39	-	6.64	-	2,434.30	-	-	-	-	-	76.76	23,383.6
11-01	9,046	534,050	954,969	3,676	250,002	9.71	8.29	-	6.50	-	2,438.30	-	-	-	-	-	76.75	23,649.3
12-01	9,185	563,260	1,260,383	3,802	284,704	9.66	8.80	-	6.62	-	2,421.40	-	-	-	-	-	76.51	23,775.5
01-02	6,809	413,004	817,899	1,923	150,669	9.90	9.23	7.51	6.21	-	2,439.90	-	-	-	-	-	76.45	23,833.4
02-02	5,429	374,013	737,927	1,536	162,237	10.06	9.95	7.50	5.85	-	2,433.60	-	-	-	-	-	76.46	23,813.0
03-02	7,896	433,671	813,810	3,228	207,826	10.13	9.52	7.28	5.03	-	2,431.60	-	-	-	-	-	76.86	23,745.1
04-02	12,101	642,258	1,159,371	5,392	328,218	9.88	9.13	7.18	4.74	-	2,445.40	-	-	-	-	-	77.15	23,802.3
05-02	8,674	524,041	1,008,066	3,466	267,813	9.74	9.00	6.63	4.29	-	2,448.37	-	-	-	-	-	77.22	23,718.6
06-02	18,185	1,045,075	1,422,762	5,687	361,783	9.72	8.29	6.72	3.99	-	2,458.74	-	-	-	-	-	77.12	23,780.0

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
07-02	8,735	570,518	947,187	3,162	315,454	9.53	8.47	6.72	3.54	-	2,465.76	-	-	-	-	-	77.46	23,987.0
08-02	5,478	371,228	840,233	1,710	120,104	9.57	9.01	6.53	3.08	-	2,483.12	-	-	-	-	-	77.76	24,167.5
09-02	8,357	499,140	914,618	2,843	206,587	9.70	9.39	6.17	3.00	-	2,503.20	-	-	-	-	-	78.41	24,186.1
10-02	7,587	515,587	902,608	3,348	254,799	9.89	9.04	5.63	2.99	-	2,513.56	-	-	-	-	-	79.09	24,344.3
11-02	7,651	502,650	1,058,647	2,282	205,781	9.89	7.64	5.05	3.00	-	2,509.02	-	-	-	-	-	79.02	24,722.8
12-02	7,487	477,044	886,676	2,844	206,169	9.81	7.50	4.99	3.03	-	2,532.50	-	-	-	-	-	78.68	24,960.6
01-03	8,279	539,310	1,119,577	3,789	258,818	9.72	8.08	5.60	2.81	-	2,531.28	-	98.41	-	-	-	78.75	25,206.7
02-03	9,537	510,558	832,950	3,060	189,668	9.73	8.82	5.84	2.76	-	2,538.10	-	93.81	-	-	-	79.39	25,168.7
03-03	11,865	672,499	1,278,831	5,476	365,633	9.69	9.62	5.64	2.67	-	2,541.80	-	107.13	-	-	-	80.31	25,268.8
04-03	10,022	656,755	1,460,813	3,550	316,436	9.72	9.64	4.74	2.74	-	2,549.10	-	102.93	-	-	-	80.24	25,624.5
05-03	10,742	663,359	1,093,700	3,136	258,654	9.55	9.73	5.37	2.75	-	2,556.03	-	101.12	-	-	-	79.93	26,261.1
06-03	13,311	865,974	1,265,351	5,216	438,547	9.43	9.46	5.24	2.73	-	2,557.30	-	96.32	-	-	-	79.93	25,973.6
07-03	16,356	934,780	1,391,176	5,495	343,417	9.43	9.62	5.20	2.74	-	2,565.20	-	101.83	-	-	-	79.86	25,865.3
08-03	14,015	758,182	1,177,721	5,256	314,224	9.51	9.98	4.91	2.75	-	2,577.64	-	100.37	-	-	-	79.99	25,886.1
09-03	7,480	487,449	980,536	3,955	285,448	9.51	9.42	4.51	2.74	-	2,588.38	-	94.36	-	-	-	80.15	26,105.9
10-03	10,908	731,606	1,400,240	4,779	393,210	9.37	8.82	4.63	2.75	-	2,594.18	-	103.65	-	-	-	80.02	26,211.8
11-03	7,153	460,649	966,494	2,341	185,385	9.38	8.38	4.77	2.75	-	2,614.63	-	97.13	-	-	-	79.78	26,578.6
12-03	7,947	524,314	966,795	3,364	254,086	9.53	8.53	4.87	2.45	-	2,616.93	-	102.97	-	-	-	79.52	26,784.7
01-04	8,955	577,853	979,980	2,645	205,752	9.60	8.68	4.99	1.88	100.52	2,615.04	79.08	101.00	-	-	-	79.37	26,678.5
02-04	8,276	514,681	820,058	2,410	166,981	9.39	9.26	4.88	1.74	100.02	2,615.06	79.72	101.76	-	-	-	79.38	26,771.4
03-04	23,296	1,167,477	1,667,616	5,964	378,485	9.63	10.00	4.82	1.72	99.40	2,631.89	79.68	116.61	-	-	-	79.71	26,732.4
04-04	13,162	776,930	1,249,570	5,140	337,758	9.95	10.76	3.99	1.73	98.82	2,643.83	80.79	108.77	-	-	-	80.01	27,110.4
05-04	17,763	967,243	1,760,901	4,252	292,441	10.38	11.05	3.24	1.75	99.75	2,665.20	80.52	106.54	-	-	-	80.43	27,352.7
06-04	7,615	534,550	1,146,207	2,313	181,321	10.24	10.80	3.26	1.76	100.10	2,669.59	80.80	103.36	-	-	-	80.77	27,408.3
07-04	11,818	753,670	1,265,326	4,693	363,746	10.26	11.51	3.33	1.74	100.47	2,675.34	81.80	107.30	-	-	-	80.96	27,619.0
08-04	13,331	847,474	1,367,920	6,098	444,638	10.33	11.48	3.47	1.72	99.83	2,674.95	82.78	107.80	-	-	-	81.27	27,760.0
09-04	16,101	1,048,874	1,650,208	8,174	548,100	10.27	11.40	3.58	1.94	99.51	2,682.35	83.62	104.43	-	-	-	81.31	28,413.0
10-04	7,189	538,854	1,068,758	3,436	315,383	10.42	11.70	3.54	2.02	98.52	2,694.44	84.46	109.03	-	-	-	81.55	28,793.0
11-04	9,627	629,019	1,246,455	3,362	259,778	10.06	11.94	3.61	2.17	99.43	2,702.01	85.19	107.88	-	-	-	81.76	29,363.0
12-04	14,654	953,195	1,832,525	6,244	483,438	9.92	12.28	3.94	2.37	101.00	2,701.04	85.10	111.06	-	-	-	81.45	29,700.0
01-05	12,251	737,496	1,314,558	3,555	249,660	9.75	11.84	4.04	2.44	102.82	2,704.93	85.96	106.94	-	-	-	81.19	30,047.0
02-05	7,699	533,872	974,720	3,754	294,945	9.68	11.52	4.28	2.68	102.62	2,707.67	85.65	102.30	-	-	-	81.12	30,155.0
03-05	13,043	896,077	1,674,989	8,097	557,271	9.47	11.06	4.30	2.82	101.40	2,708.52	85.43	120.01	-	-	-	81.63	30,322.0
04-05	16,192	939,110	1,818,173	4,333	333,845	9.39	11.28	4.35	3.08	100.95	2,720.26	85.70	116.34	-	-	-	82.36	30,728.0
05-05	19,285	1,013,303	1,758,538	4,359	300,097	9.36	11.38	4.43	3.27	100.57	2,722.85	85.81	109.92	-	-	-	82.59	31,199.0

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
06-05	13,325	805,484	1,425,642	4,574	350,403	9.35	11.54	4.44	3.27	102.56	2,746.04	86.17	110.63	-	-	-	82.93	31,575.0
07-05	8,637	583,280	1,072,578	3,606	267,173	9.31	11.11	4.38	3.42	103.07	2,771.98	86.50	111.27	-	-	-	83.44	31,806.0
08-05	13,801	892,263	1,411,849	6,434	457,073	9.24	10.76	4.36	3.67	102.76	2,797.61	86.60	110.97	-	-	-	83.68	32,151.0
09-05	14,126	878,532	1,454,951	5,980	436,145	9.22	10.39	4.25	3.99	100.94	2,821.15	87.05	107.16	-	-	-	84.51	32,813.0
10-05	8,813	623,850	1,144,772	2,734	237,217	9.12	10.62	4.27	4.17	99.10	2,835.66	87.71	108.79	-	-	-	84.92	33,436.0
11-05	12,770	861,153	1,495,205	9,077	610,557	9.09	10.86	4.63	4.37	99.11	2,844.15	88.00	111.79	-	-	-	84.72	34,203.0
12-05	7,792	529,205	1,266,094	3,019	230,388	8.93	11.07	5.02	4.53	100.07	2,825.81	88.15	116.44	-	-	-	84.43	34,982.0
01-06	12,418	861,576	1,463,347	5,424	405,013	8.77	10.43	5.31	4.56	101.22	2,835.03	88.37	114.28	-	-	-	84.50	35,299.0
02-06	14,099	887,215	1,400,406	4,703	334,534	8.64	9.81	5.33	4.55	101.14	2,842.05	88.82	107.33	-	-	-	84.43	35,624.0
03-06	13,895	923,218	1,646,004	6,661	440,970	8.67	9.11	5.22	4.67	100.87	2,853.52	89.42	126.93	-	-	-	84.92	36,165.0
04-06	12,759	904,222	1,463,715	6,494	474,623	8.52	9.63	5.04	4.80	99.78	2,873.25	89.90	111.94	-	-	-	85.47	36,806.0
05-06	16,939	1,198,898	1,791,481	7,811	627,388	8.46	10.17	5.03	5.06	99.41	2,913.61	90.36	119.40	-	-	-	85.67	37,342.0
06-06	12,059	770,115	1,781,835	5,752	400,541	8.22	10.68	5.00	5.02	97.49	2,920.95	91.01	110.85	-	-	-	86.18	37,718.0
07-06	9,686	653,341	1,082,678	3,313	263,998	8.03	10.23	5.10	5.12	98.19	2,979.25	90.79	112.25	-	-	-	86.64	38,052.0
08-06	13,084	853,781	1,472,356	5,904	396,244	7.75	9.81	5.05	5.26	98.42	2,998.19	90.92	111.67	-	-	-	86.87	38,612.0
09-06	10,881	815,286	1,453,432	5,884	453,508	7.41	9.37	5.01	5.32	99.67	3,017.06	90.85	104.57	-	-	-	86.89	39,157.0
10-06	14,847	977,926	1,572,388	7,499	554,260	7.20	9.15	4.95	5.29	99.36	3,035.67	90.80	116.04	-	-	-	86.66	39,695.0
11-06	19,735	1,277,928	2,346,791	7,486	631,793	7.04	8.93	4.82	5.24	99.71	3,040.83	91.48	113.84	-	-	-	86.52	40,201.0
12-06	12,834	832,298	1,518,722	4,863	346,033	6.98	8.71	4.77	5.36	98.77	3,041.05	91.96	115.35	-	-	-	86.60	40,768.0
01-07	11,535	883,494	1,414,000	5,355	444,905	6.98	8.75	4.68	5.16	99.53	3,042.39	92.81	118.24	-	-	-	86.87	41,079.0
02-07	8,292	599,414	1,229,923	2,873	225,196	7.11	8.78	4.58	5.05	99.37	3,044.61	92.57	111.45	-	-	-	86.72	41,468.0
03-07	13,840	983,018	1,773,229	7,198	551,191	6.96	8.82	4.56	5.05	101.17	3,051.50	94.14	132.02	-	-	-	87.09	42,088.0
04-07	12,506	798,075	1,546,273	7,376	483,463	6.72	8.67	4.54	5.07	100.72	3,067.55	93.83	118.76	-	-	-	87.59	42,652.0
05-07	15,136	1,029,842	1,551,591	5,180	356,855	6.43	8.53	4.39	5.07	101.44	3,078.61	94.57	122.04	-	-	-	88.14	43,531.0
06-07	11,785	792,049	1,664,260	7,492	488,927	6.14	8.40	4.42	5.10	100.89	3,136.56	93.67	115.68	-	-	-	88.96	44,044.0
07-07	10,424	736,281	1,394,808	4,983	409,395	6.36	8.24	4.51	5.17	102.05	3,210.62	94.15	114.02	-	-	-	89.96	44,672.0
08-07	10,969	795,979	1,649,212	3,353	322,380	6.94	8.11	4.69	5.47	102.35	3,334.18	94.11	116.16	-	-	-	90.94	45,505.0
09-07	11,503	842,201	1,676,790	5,611	440,203	7.30	8.00	4.79	5.72	104.11	3,394.70	94.14	104.32	-	-	-	91.97	46,227.0
10-07	13,161	966,671	1,796,811	6,491	516,852	7.64	8.31	4.83	5.75	103.34	3,441.70	94.74	118.74	-	-	-	92.26	47,165.0
11-07	14,889	1,010,789	1,753,855	4,865	420,855	7.81	8.64	4.81	5.76	103.37	3,440.21	96.02	117.49	-	-	-	92.95	48,045.0
12-07	16,670	1,084,666	1,884,502	5,349	371,568	8.08	8.90	4.83	5.93	103.17	3,391.12	97.64	116.37	-	-	-	93.38	49,325.0
01-08	15,620	1,123,801	1,747,612	6,021	463,046	7.98	8.88	4.80	6.15	105.21	3,501.47	98.12	119.45	-	376,975.95	584,811.82	93.34	49,622.0
02-08	17,032	1,170,186	2,092,772	7,596	550,828	8.03	8.82	4.90	6.25	105.40	3,506.13	99.28	115.52	-	377,967.86	577,689.93	93.72	50,468.0
03-08	12,832	837,085	1,536,568	4,997	324,814	7.69	8.80	4.82	6.27	105.47	3,562.14	99.63	127.65	-	379,111.55	575,517.64	94.50	51,209.0
04-08	14,186	993,453	1,932,178	6,770	493,306	7.57	8.59	4.76	6.27	106.73	3,677.35	100.39	122.10	-	380,407.21	578,988.78	94.86	51,746.0

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
05-08	10,767	687,924	1,298,054	4,465	292,250	7.61	8.42	4.63	6.30	109.08	3,679.35	101.08	118.03	-	381,647.34	579,386.52	95.96	52,578.0
06-08	11,908	850,274	1,456,294	4,250	346,999	7.63	8.20	4.72	6.59	110.49	3,699.18	102.74	117.24	-	382,832.06	577,119.59	97.39	52,831.0
07-08	12,240	756,878	1,614,109	7,011	420,782	7.63	8.07	4.87	7.08	111.03	3,682.59	102.27	118.00	-	383,961.49	572,813.90	98.49	53,394.0
08-08	13,073	886,556	1,748,513	4,955	359,394	7.53	7.91	4.82	7.49	110.52	3,753.74	103.14	112.10	-	385,141.17	570,276.20	99.40	54,351.0
09-08	12,995	962,522	1,535,374	4,416	333,883	7.39	7.70	4.80	8.17	110.73	3,801.29	101.90	108.82	-	386,368.87	570,044.60	100.46	54,938.0
10-08	11,095	701,254	1,329,556	4,213	290,594	7.49	8.40	5.34	8.26	109.96	3,764.13	99.06	116.12	-	387,642.16	572,745.09	101.35	55,798.0
11-08	9,008	566,765	1,012,720	3,523	222,767	8.03	9.11	5.69	8.22	109.67	3,782.41	97.21	106.54	-	388,777.63	569,944.38	101.21	56,661.0
12-08	10,155	657,811	1,314,300	3,400	242,687	8.41	9.70	5.77	8.24	108.22	3,813.01	95.17	108.43	-	389,783.87	562,146.89	100.00	57,392.0
01-09	10,186	636,845	1,209,533	4,247	280,130	8.77	10.73	5.92	7.41	106.49	3,730.77	93.70	104.68	1,806.00	390,635.66	546,606.72	99.24	57,301.0
02-09	16,141	912,930	1,363,163	3,951	229,226	9.14	11.87	5.53	5.83	106.01	3,790.18	92.45	102.01	1,876.00	391,663.60	536,906.96	98.88	56,856.0
03-09	22,789	1,356,363	2,084,445	5,465	331,169	9.37	11.22	4.90	3.24	107.53	3,805.57	91.62	114.89	2,432.00	392,849.02	530,807.51	99.26	56,379.0
04-09	13,718	808,894	1,358,022	8,647	488,242	9.65	11.30	4.42	1.89	108.22	3,811.88	90.59	105.43	1,990.00	394,029.74	528,672.99	99.11	56,293.0
05-09	11,883	764,589	1,301,465	4,726	322,336	9.84	11.33	4.46	1.31	108.64	3,776.96	90.30	100.24	2,307.87	395,313.87	526,868.06	98.86	56,462.0
06-09	18,365	1,743,860	2,470,999	8,849	983,765	9.97	11.50	4.61	1.01	108.37	3,811.26	89.89	101.27	2,609.00	396,539.72	526,022.18	99.20	56,420.0
07-09	6,401	405,965	954,484	2,483	151,821	10.02	11.30	4.62	0.53	109.95	3,803.21	90.44	106.42	2,562.00	397,740.07	526,697.58	98.77	56,439.0
08-09	8,034	519,150	1,173,391	2,085	134,504	10.07	11.79	4.56	0.41	110.29	3,829.69	91.72	104.24	2,676.00	398,963.93	533,928.19	98.41	56,386.0
09-09	9,482	596,726	1,023,529	1,795	132,090	9.90	11.39	4.49	0.45	110.74	3,859.63	92.05	101.92	2,140.00	400,241.62	548,390.87	99.38	56,623.0
10-09	9,039	554,750	1,017,076	3,174	179,827	9.76	11.13	4.35	0.41	110.57	3,879.62	93.22	109.67	2,374.07	401,740.59	571,061.85	99.38	56,703.0
11-09	6,629	460,376	987,244	2,424	185,093	9.64	10.77	4.28	0.43	111.87	3,892.28	93.48	107.94	2,337.83	402,908.92	577,991.58	98.92	56,849.0
12-09	7,952	542,427	1,326,206	1,714	123,146	9.52	10.23	4.54	0.45	113.38	3,897.42	93.98	110.05	2,028.00	403,924.65	569,579.96	98.62	57,573.0
01-10	9,470	646,695	1,171,050	2,456	189,307	9.46	9.88	4.58	0.43	114.38	3,909.80	94.66	105.75	1,837.00	404,761.48	547,949.76	100.03	58,470.0
02-10	4,991	330,209	896,914	1,817	116,284	9.04	9.41	4.60	0.42	113.40	3,930.66	94.20	101.62	1,494.00	404,775.38	536,238.03	100.31	58,451.0
03-10	6,392	419,075	864,997	2,710	158,238	9.04	9.35	4.28	0.43	111.97	4,027.95	95.14	93.22	1,446.00	393,639.27	535,616.96	100.39	58,325.0
04-10	6,457	411,236	1,255,511	1,408	100,486	8.63	8.90	4.13	0.43	110.41	4,068.65	96.25	99.90	1,694.00	394,763.95	552,491.95	100.86	58,752.0
05-10	7,771	533,820	1,006,538	3,349	223,273	8.83	8.83	4.18	0.43	111.76	4,074.37	97.81	102.81	1,506.00	395,911.44	556,409.75	101.22	59,321.0
06-10	6,274	435,105	922,225	1,998	144,509	8.49	8.28	4.06	0.68	110.77	4,088.11	97.96	102.46	1,920.00	397,031.52	554,965.97	101.22	59,983.0
07-10	9,319	631,613	1,244,177	2,403	168,101	8.31	7.77	4.03	1.23	112.82	4,102.04	98.22	108.42	1,912.00	398,380.94	549,070.05	101.87	60,184.0
08-10	7,259	522,213	1,049,762	2,714	197,594	8.29	7.94	4.06	1.81	113.12	4,113.51	98.70	110.80	2,474.22	399,729.10	547,706.74	101.77	60,663.0
09-10	7,857	543,198	1,214,244	2,432	178,490	7.96	7.81	4.00	2.24	114.24	4,135.06	99.19	104.15	2,338.00	401,153.43	551,372.12	102.18	61,357.0
10-10	7,948	525,481	988,874	3,066	216,151	7.62	7.51	4.14	2.70	113.16	4,158.63	99.92	109.70	2,627.00	402,646.39	560,240.66	102.28	61,875.0
11-10	9,179	619,380	1,101,235	2,630	195,466	7.05	7.05	4.35	2.89	113.62	4,172.64	100.52	111.58	2,181.00	403,976.51	570,175.08	102.35	62,520.0
12-10	13,119	901,616	1,643,519	3,336	275,996	7.12	7.22	4.37	3.13	115.89	4,175.95	101.44	115.51	2,190.00	405,046.98	580,673.25	102.47	63,149.0
01-11	12,520	873,936	1,672,124	3,729	253,185	7.34	7.30	4.34	3.25	117.53	4,169.20	101.68	109.64	1,607.64	405,793.87	586,796.02	102.76	63,497.0
02-11	12,923	808,404	1,515,797	2,498	177,817	7.32	6.95	4.35	3.33	119.14	4,205.23	102.31	104.04	2,032.95	406,576.40	589,127.29	102.98	63,846.0
03-11	11,589	770,030	1,754,858	3,416	226,987	7.30	7.11	4.39	3.73	120.62	4,261.95	103.23	125.88	2,186.31	407,394.54	588,823.10	103.77	64,063.0

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
04-11	10,846	750,729	1,426,263	3,475	232,706	6.98	7.09	4.31	4.30	122.37	4,273.06	103.76	111.68	2,371.00	408,214.57	586,355.14	104.10	64,934.0
05-11	15,112	1,041,007	2,055,585	3,465	258,609	7.16	7.33	4.16	4.79	122.33	4,306.79	104.35	115.22	2,726.42	409,028.64	583,034.36	104.52	66,148.0
06-11	14,946	995,320	1,815,761	4,502	311,801	7.16	6.98	4.13	5.12	122.27	4,274.67	104.84	108.03	2,628.00	409,836.69	580,350.84	104.70	66,533.0
07-11	11,341	738,272	1,440,466	3,094	206,299	7.48	7.28	4.13	5.24	122.46	4,261.80	105.73	111.05	2,490.98	410,638.69	571,150.10	104.83	66,998.0
08-11	11,152	779,476	1,389,159	3,475	260,589	7.39	7.20	4.17	5.26	123.88	4,221.81	105.52	114.46	2,642.57	411,445.79	575,321.61	105.00	67,648.0
09-11	11,822	781,373	1,473,733	2,578	193,013	7.42	7.40	4.17	5.24	124.64	4,245.95	106.95	108.15	2,895.97	412,258.02	585,841.55	105.52	68,460.0
10-11	11,846	853,385	1,483,749	2,776	207,815	7.23	7.60	4.11	5.25	125.78	4,289.73	108.41	109.34	3,085.36	413,075.44	603,581.02	106.03	69,085.0
11-11	12,457	913,685	1,849,714	3,248	309,542	7.07	7.70	4.15	5.25	126.10	4,329.94	110.16	115.06	2,979.61	413,887.27	617,433.82	106.37	69,879.0
12-11	14,517	1,126,271	1,792,237	3,882	315,568	6.60	7.00	4.26	5.23	125.90	4,334.72	111.03	116.96	2,526.48	414,693.77	626,834.14	107.02	71,003.0
01-12	12,225	918,531	1,751,805	3,438	270,335	6.63	7.00	4.33	5.05	125.98	4,323.85	111.86	113.28	2,286.00	415,453.67	627,922.17	107.11	71,784.0
02-12	10,426	801,675	1,574,949	4,107	318,883	6.36	6.30	4.32	4.98	125.07	4,381.01	112.58	110.19	2,343.00	416,572.01	626,497.72	107.53	72,387.0
03-12	9,669	712,988	1,577,979	2,970	226,803	6.60	6.60	4.29	5.00	126.65	4,423.04	113.77	128.47	2,625.00	417,721.22	626,116.12	107.70	73,235.0
04-12	9,050	712,840	1,799,562	3,249	298,995	6.53	6.70	4.37	5.00	127.71	4,402.84	114.51	116.22	3,052.00	418,901.65	627,313.04	107.76	74,086.0
05-12	10,567	767,801	1,568,188	4,529	341,644	6.71	7.00	4.35	5.01	130.24	4,489.01	115.74	119.18	3,748.00	420,093.06	624,329.85	107.79	75,199.0
06-12	7,707	620,192	1,524,545	3,133	264,220	6.57	6.80	4.30	5.02	129.06	4,503.73	116.58	111.28	3,609.00	421,295.57	618,788.77	107.47	76,135.9
07-12	6,488	510,420	1,708,224	2,523	211,383	6.53	6.50	4.35	4.99	128.96	4,547.23	117.46	109.60	3,619.00	422,509.31	611,343.07	107.46	76,842.0
08-12	10,128	811,312	1,650,903	3,220	273,748	6.40	6.40	4.27	4.98	129.77	4,640.60	118.71	113.57	3,835.00	423,736.83	613,758.17	107.69	77,018.0
09-12	8,984	686,649	1,299,359	1,140	123,853	6.50	6.70	4.31	5.02	130.70	4,718.61	118.69	103.66	3,336.00	424,978.29	626,712.35	108.52	77,706.0
10-12	11,834	892,904	1,700,162	3,334	245,034	6.60	6.80	4.34	5.02	132.18	4,746.60	118.63	118.82	2,992.00	426,233.84	651,367.98	109.13	77,818.0
11-12	10,387	797,259	1,722,030	3,405	299,433	6.20	6.20	4.34	5.01	133.32	4,777.76	118.22	116.23	2,869.00	427,513.04	666,311.71	108.64	78,720.0
12-12	9,845	745,961	1,478,734	3,979	319,487	6.10	6.10	4.38	4.99	136.67	4,929.13	118.63	116.60	2,792.00	428,816.50	670,507.85	108.61	79,708.0
01-13	11,315	860,931	1,513,762	3,394	259,768	6.00	5.90	4.43	5.00	137.28	4,864.83	117.90	117.79	2,509.00	429,695.46	659,558.90	108.80	80,338.0
02-13	10,414	780,824	1,603,828	4,241	336,696	6.20	6.40	4.52	5.01	135.96	4,846.02	118.21	110.69	2,382.00	430,860.53	651,301.78	108.93	80,956.0
03-13	7,908	626,743	1,379,347	2,113	192,985	6.20	6.20	4.53	5.00	134.87	4,992.53	118.56	123.03	2,750.00	431,950.46	648,783.00	109.35	81,325.0
04-13	8,168	688,284	1,331,615	2,892	274,165	6.40	6.60	4.53	5.00	136.35	4,760.28	118.83	118.67	3,108.00	433,124.38	652,484.20	108.82	82,034.6
05-13	9,988	776,773	1,480,719	4,032	312,973	6.40	6.60	4.51	5.01	137.87	4,864.10	120.72	117.05	3,524.00	434,352.75	651,725.62	108.81	82,588.0
06-13	11,357	841,388	1,490,053	4,535	313,829	6.20	6.00	4.45	5.00	138.89	4,870.42	122.70	110.80	3,324.00	435,559.89	648,072.11	109.51	82,942.4
07-13	11,173	889,057	1,496,521	2,058	179,791	5.70	5.30	4.46	5.03	137.89	4,873.65	122.46	114.52	3,334.00	436,783.17	642,133.04	109.79	83,645.3
08-13	12,183	918,172	1,528,866	4,136	310,151	5.70	5.10	4.49	5.00	138.56	4,890.51	124.48	116.52	3,584.00	438,022.18	641,742.04	110.06	84,783.3
09-13	9,463	751,674	1,268,724	3,002	249,365	5.70	5.50	4.37	5.00	139.75	4,897.94	124.52	101.44	2,866.00	439,279.37	647,490.32	110.65	85,202.7
10-13	8,430	786,022	1,308,171	2,939	352,613	5.80	5.60	4.39	4.90	141.96	4,903.71	124.12	116.54	3,386.00	440,552.61	659,929.80	110.80	85,628.9
11-13	8,128	642,370	1,230,617	2,135	231,346	5.70	5.50	4.36	4.65	143.94	4,877.97	124.20	115.10	3,356.00	441,844.34	666,236.94	111.22	86,306.7
12-13	10,269	854,175	1,629,646	3,054	301,116	5.70	5.30	4.36	4.50	144.14	4,915.05	123.93	115.66	3,069.00	443,155.34	666,127.75	111.88	87,751.7
01-14	13,571	1,067,691	1,620,347	5,585	425,637	6.10	6.00	4.32	4.49	144.22	4,857.83	122.43	112.37	2,767.00	-	-	101.69	87,875.4
02-14	10,705	775,054	1,347,080	4,868	345,467	6.10	6.00	4.30	4.40	143.92	4,889.32	122.21	107.46	2,506.00	-	-	102.18	88,671.9

Date	CL_HPermits	CL_M2HPermits	CL_M2TotPermits	RM_HPermits	RM_M2HPermits	CL_Unemploy	RM_Unemploy	IntRate_House	IntRate_IntBank	RM_HPriceIndex	BuildCostIndex	CL_BuildIndex	CL_IndustIndex	RM_HSelling	CL_ActEcHServ	CL_ActEcConstr	Value_CPI	Financial_loans
03-14	8,938	749,974	1,625,621	3,949	371,265	6.50	6.30	4.30	4.11	146.65	5,056.08	121.25	125.32	2,873.00	-	-	103.04	88,626.9
04-14	12,187	1,021,376	1,660,467	5,653	512,164	6.10	6.00	4.25	4.00	150.43	5,152.94	121.03	-	2,932.00	-	-	103.68	89,484.6
05-14	10,286	892,003	1,461,091	4,800	439,005	6.30	6.20	4.14	4.00	152.59	5,172.49	122.09	-	3,068.00	-	-	-	90,134.7
06-14	12,922	1,142,284	1,756,685	5,743	569,129	6.50	6.70	3.94	4.00	152.58	5,200.30	121.50	-	3,348.00	-	-	-	90,984.0
07-14	-	-	-	-	-	-	-	3.86	3.88	-	-	-	-	-	-	-	-	91,531.4
08-14	-	-	-	-	-	-	-	-	3.75	-	-	-	-	-	-	-	-	-

Source: prepared by the author based on National Institute of Statistics (2014), Central Bank of Chile (2014) and Chilean Chamber of Construction (2014).