**What determines housing prices in Egypt?**

**Sarah El-Khishin[[1]](#footnote-2) and Mohamed Rashwan[[2]](#footnote-3)**

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# Abstract

The Egyptian housing market is a very dynamic market and has many interactions with monetary and financial markets in the economy. In this paper, we investigate the macro-financial fundamentals, institutional as well as specific behavioural and cultural factors that are argued to play a role in housing demand and prices in Egypt. We design a field survey for a representative sample of household homebuyers and sellers as well as real estate developers and brokers. We then run an Ordinal Logistic Regression Model (OLM) based on the results of the field survey and a constructed housing price index. Analysis reveal many important findings, firstly, land construction and licensing costs, government real estate and housing policies are all perceived as main determinants of housing prices in the Egyptian market. On the contrary, macro-financial variables, namely inflation and interest rates were not significant indicating a possibly weak monetary transmission mechanism through the theoretically explained asset-price channel. Results also affirm that housing investment is perceived by Egyptians as the safest form of investment during uncertainty shocks and good hedge against inflation and other financial turbulence. Finally, findings reveal a huge discrepancy in information and data on housing dynamics and expectations across the sampled groups, households and Developers & Brokers. Lack of information makes market actors more vulnerable to principal-agent problems and result into asymmetric information moral hazard outcomes. The above results altogether reinforce the importance of constructing a micro dataset on housing prices in Egypt and constructing a housing price index for the Egyptian market as was initiated in this research and planned to be further developed in future research.

**Keywords:** Housing Demand – House Price Index - Mortgage Finance – Expectations – Household Behaviour

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# Introduction

Housing markets are evolving quickly in emerging markets as part of the natural urban development as well as the evolution of financial instruments and global financial integration. However, limited research and lack of data constitute a challenge to addressing the above theoretical interrelationships and dynamics in these markets. It is argued in literature that housing demand in is affected by many determinants in theory and literature and follow many patterns; either a normal cyclical pattern or a bubble-bust behaviour that is mainly driven by expectations about the future. Main macro-financial fundamentals mainly affect cyclical housing prices. They include interest rates, real per-capita income, access to finance and sectoral developments. This is in addition to institutional variables such as mortgage laws, banking regulations and other financial instruments (Lambertini et al., 2010).

Behavioural factors also affect home buying decisions and thus impact housing demand and prices during normal cycles. Case and Shiller (2003) referred to the importance of behavioural factors in influencing household home buying economic decisions; either for occupation or for investment and can be a core cause of housing bubbles with increased uncertainty. People’s perceptions about the risks associated with investment in the housing sector affect their expectations about the future.

Regarding the factors affecting the so-called housing bubbles, as argued in Stiglitz (1990), an excessive increase in demand and prices that results solely from expectations about a future increase in selling prices will cause a housing bubble. A housing bubble occurs in the case when prices are high today *only* because investors believe that the future selling price will be higher which will result in higher yields compared to alternative assets while fundamental variables do not seem to play a role in this price rise. This bubble phenomenon usually gets reversed when expectations about the future are altered as a result of sudden uncertainty shocks, expected changes in monetary policy stance and/or reaching the fourth stage of the-so-called Minsky’s cycle – known as Minsky’s moment. According to this theory, housing markets would suddenly collapse as a result of a fall in business sentiment and elevated debt following an era of persisting speculative behaviour that accompanied loose access to credit that gets quickly transmitted from the housing sector to other sectors in the economy (Vercelli, 2009).

In Egypt, the housing sector is a very important sector for many reasons. First, it has established backward and forward domestic linkages with other sectors in the economy and contributes to more than 20% of real growth rate according to the Egyptian Ministry of Planning and Economic Development official data (MPED, 2018). There is a lack of evidence-based data on the housing prices in Egypt in official sources, surveys, national accounts, etc. we argue that this results in a problem of asymmetric information affects market equilibrium and decisions of all stakeholders. It also constitutes a challenge for researchers to understand the interactions between the housing market dynamics and the macroeconomic fundamentals in the Egyptian economy. Second, it has strong interactions with financial and monetary dynamics in the economy where monetary policy, access to credit, changes in per-capita income as well as overall macroeconomic and financial performance affect housing prices on the macro level. Third, the housing and construction sector in Egypt runs within a sophisticated system of institutions and regulations that has to do with land ownership, access to finance and other laws and regulations altogether adding to the specific nature of the Egyptian housing market. Fourth, home buying decisions in Egypt are also governed with many *cultural and behavioural* factors that add to the specific nature of the Egyptian housing market. For example, religious beliefs where people would resort to housing investment as a religiously safer option to comply with Islamic Sharia compared to fixed-interest banking schemes.

To our knowledge, despite the above significance, studying the housing market and demand in Egypt from this perspective has not yet received good attention in academic literature and/or relevant policy works. We also believe that studying the recent COVID19 crisis shall also have important implications on housing prices and demand in Egypt as per the reviewed literature of sudden uncertainty shocks. While it is too early to anticipate the impact, we argue that the housing demand in Egypt might follow either the overall recessionary wave in the economy and hence would witness deflating prices or oppositely the housing prices might surge; being a safe form of domestic investment in times of high economic uncertainty compared to other investment assets. The paper intends to answer three main questions: (1) What are the main determinants of housing prices in Egypt?, (2) How do macroeconomic and financial, legal, and institutional variables affect housing demand for occupation and investment in the Egyptian market? And (3) How do behavioural factors influence public choices and expectations in the Egyptian housing market?

Based on the above, this paper employs statistical and empirical methods to analyse field experiment in the sector. We start by designing two field surveys that are implemented on a sample of household homebuyers and sellers as well as a sample of real-estate developers and brokers. We then construct an Egyptian Housing Price Index (EHPI) in an attempt to capture the recent trends in the Egyptian housing price and to establish for building a future micro dataset on housing prices. The outcomes of the field suvey and the EHPI are integrated into an Ordinal Logistic Regression Model (OLM) to examine the significance of different hypothesized determinants of housing prices in the Egyptian housing market represented by the surveyed sample.

The paper is structured as follows: section one reviews relevant theory and literature on housing prices determinants and interactions with macro-financial variables. Section two briefs the methodology. Section three presents and discuss the results of the field surveys. Section four presents the constructed Egyptian housing price index and section five presents the results of the empirical models. Results are discussed in section six. Finally, section seven concludes, provides some policy implications and sheds the light on the research limitations.

# Determinants of Housing Prices: Theory and Literature

The interactions among macroeconomic policies, the housing market, and overall economic performance are well-established in the literature. Macro-financial fundamentals and socioeconomic factors are believed to strongly impact the behaviour in housing prices and demand. Also, institutional, behavioural, and cultural factors are also examined in literature using different methods. In this section, we review the relevant literature on the determinants of housing prices and demand on housing.

## Macro-Financial and Socioeconomic Fundamentals

Asset price channel is considered one of the core theoretical foundations that explain of the interactions between the housing market and the macro-financial fundamentals. As originally established in Mishkin (1995) where it is argued that the housing price channel is a key component of the asset price channel that affects the *monetary transmission mechanism*. Monetary policy interacts with the housing market and housing prices and thus households’ consumption, investments, and real output levels.

A contractionary monetary policy by raising interest-rates, downward pressures will be exerted on housing prices due to the resulting higher mortgage rates, amplified costs of housing debt-financing[[3]](#footnote-4), and user cost of capital (Andersen & Kennedy, 1994; Apergis, 2003; Adams & Füss, 2010; Agnello & Schuknecht, 2011; Simo-Kengne et al., 2014) This will eventually lead to a contraction of economy-wide aggregate demand. When real interest rates rise, fixed-income assets like bonds are more attractive compared to real-estate causing capital switching – investments shift from the housing sector to other assets (Cohen & Karpaviciute, 2017). Similarly, a contraction in the money supply will lead to excess money and credit demand by households and firms, higher interest rates, reduction in spending – including housing spending, and ultimately downward pressures on prices (Baffoe-Bonnie, 1998). Hence, monetary policy is not neutral for the real-estate market because of its indirect effect on housing prices though money supply and its direct effects through interest rate on the demand and supply of housing[[4]](#footnote-5) (Lastrapes, 2002). To add, if the nation’s currency devaluates, foreign investment in the domestic real-estate market will increase creating a surge in housing prices (Alkali et al., 2018)

These direct effects of monetary tightening on housing prices will indirectly transmit to the real economy through Modigliani’s & Brumberg’s (1954) *life-cycle hypothesis* which maintains that consumers seek to maximise their total lifetime utility by smoothing consumption throughout one’s lifetime (Erdogan et al. 2018; Milcheva & Sebastian, 2010). Modigliani (1986) concluded that life-cycle savings tend to follow a “hump-shaped” curve where young individuals will have very low-income levels and will thus spend rather than save. However, as age increases, wealth holdings rise leading to continuous savings until the retirement age is reached where savings and investments halt and spending (dissaving) upsurges (Modigliani, 1986).

Mishkin (2007) illustrates that fluctuations in interest rates have a directimpact on user cost of capital of housing, expectations of future housing prices patterns, and the supply of housing. This will then have an indirect impact on real economic conditions through housing prices’ wealth effects, bank lending channel and balance sheet effects on consumption as well as on housing demand. Milcheva & Sebastian (2010) assert that the strength of these indirect effects on the real economy ultimately depend on the nation’s institutional setup where more developed economies with developed mortgage and financial markets tend to experience a stronger housing monetary transmission channel. (Mishkin, 1995; Bernanke & Gertler, 1995; Kosfeld, 2002; Milcheva & Sebastian, 2010; Erdogan et al., 2019).

Applications of the life-cycle hypothesis maintain that a rise in wealth, either from property, stocks, or any other asset, will boost aggregate consumption due to the high marginal propensity to consume in the long-run. It is argued, however, that whether the increase in housing prices boosts aggregate consumption depends on the distributional effects as well as on the underlying reason of the higher prices. If housing prices increase only because of supply-related constraints rather than higher future productivity, the expansion of household wealth will likely have a reduced effect on consumption (Mishkin, 2007). On the other hand, if households expect an expansion of future incomes (due to boosted productivity or expectations of reductions in taxes) the wealth effecton consumption is likely to be larger (Milcheva & Sebastian, 2010).

Bernanke’s & Gertler’s (1995) financial accelerator framework also provides another angle with regards to how higher prices transmit to the real economy by determining the extent to which financial institutions are willing to offer loans and individuals are willing to finance their housing purchases though mortgages. In this bank-lending channel – also referred to as *collateral effect* – if housing prices increase, individuals have additional collateral to secure their loans. These loosening credit constraints will ultimately stimulate aggregate spending. Nevertheless, Milcheva & Sebastian (2010) argue that the savings and rent effects might entirely offset the wealth and balance-sheet effects. This occurs when households are relatively poor and have been saving to purchase a house in the future; however, the increase in housing prices made the real value of their savings diminish. The rent effects also entail that if these relatively poor households are currently renting, disposable income will fall thereby reducing aggregate demand (Milcheva & Sebastian, 2010).

Furthermore, demographic determinants including population growth due to both natural forces and migration will create upward pressures on housing prices. Housing market dynamics are closely intertwined with fertility rates[[5]](#footnote-6) and the population’s age structure through Modigliani and Brumber’s life-cycle hypothesis as explained above (Andersen & Kennedy, 1994; Bakshi & Chen, 1994; Takáts, 2012). Nevertheless, Bakshi & Chen (1994) assert that this life-cycle hypothesis does not focus on the composition of an individuals’ savings portfolio and thus examine the *life-cycle investment hypothesis*focusing on the decision to save either through investing in housing or financial assets over the life cycle. Bakshi & Chen (1994) maintain that individuals devote most of their bounded savings on housing when they are relatively young and in the age of building a family[[6]](#footnote-7). However, sufficient housing is probably obtained as individuals grow older and the uncertainty associated with future income is amplified. This intensifies the need for retirement investments and thus an aging individual will dedicate a growing portion of savings to financial assets. This, in turn, diminishes the demand for housing and reduces housing prices. This was evident in the “baby-boom” after WWII during the period 1945 – 1980s. As the baby boomers grew in age during 1965 – 1980, investments shifted from financial assets to housing leading to depressed stock prices and heightened housing prices. However, baby boomers began to invest in educating their children and in planning for retirement in their late 30s and early 40s ultimately shifting demand away from housing and towards financial assets in the 1980s and creating downward pressures on housing prices (Bakshi & Chen, 1994).

Moreover, one macroeconomic determinant that has generated noteworthy controversy with regards to its impact on housing prices is inflation. In the presence of fixed-payment mortgage contracts, inflation has an impact on initial outlays, maturity, and the mortgage’s risk attributes. These repercussions of inflation will ultimately heighten the real cost of housing capital and reduce economic agents’ purchasing power causing a diminution in housing demand and housing prices, ceteris paribus (Kearl, 1979; Andersen & Kennedy, 1994; Alkali et al., 2018). One strand of the literature asserts that, in response to inflationary pressures, the central bank will tend to heighten interest rates thereby decreasing housing demand and prices through the mechanism discussed above (Demary, 2010). Feldstein (1992) highlights that lower inflation rates shift incentives towards owning rather than renting houses due to the nature of substitution between housing rentals and housing ownership – higher market rents[[7]](#footnote-8) incentivise individuals to purchase their own house, boosting the demand for owner-occupied dwellings (Hlaváček & Komárek, 2011; Zhang et al., 2012).

On the other hand, Kearl (1979) and Gholipour et al. (2014) maintain that anticipated inflation alters perceptions of real housing costs and will cause an upward pressure on housing prices transmitted through supply-side channels namely amplified construction costs. If individuals perceive that investment in real-estate is a good hedge against inflation, they are likely to increase their investment in housing in the presence of inflationary pressures to safeguard their wealth. The resulting higher demand will create an upward pressure on housing prices (Demary, 2010; Zhang et al., 2012; Alkali et al., 2018). It is important to note that individuals’ expectations of higher inflation can also increase the current demand and prices of owner-occupied dwellings (Summers, 1980; Baffoe-Bonnie, 1998).

Another key determinant of housing prices is households’ disposable income and, in turn, wealth accumulation and savings. Interrelated factors that will affect households’ disposable income include the rate of unemployment and the population’s economic activity level. Other things equal, higher employment rates and real per-capita income will spur housing demand since individuals have higher purchasing power and are better able to service a mortgage thereby creating an upward pressure on the prices of owner-occupied dwellings (Hwang & Quigley, 2006; Adams & Füss, 2010; Demary, 2010; Simo-Kengne et al., 2014; Geng, 2018).

## Institutional Determinants

Institutional variables such as mortgage laws, banking regulations, macroprudential policies, and other financial instruments are also key determinants of housing demand and prices (Lambertini et al., 2013). A key factor affecting housing prices is the extent to which the financial market is developed. According to Andersen & Kennedy (1994), deregulation and liberalisation of the financial market will cause an upsurge in the prices of owner-occupied housing units since the reductions in liquidity constraints will facilitate access to finance and boost the demand for housing. Lecat & Mesonnier (2005) explain that changes in regulatory constraints – including a fall in transaction costs and less restrictive bank lending conditions – have contributed to the upsurge in housing prices in industrialised countries over the last 20 years. Macroprudential regulations – including loan-to-value (LTV) ratio, down payment requirements, and debt-to-income (DIT) ratio – represent key institutional forces that influence housing prices and are also closely interlinked with the macro-financial fundamentals and policies.

Chu (2014) argues that credit constrains, namely down payment requirements, can have a substantial impact on housing prices if it is costly to switch from owner-occupied to rental dwellings. Tsatsaronis & Zhu (2004) contend that if the LTV ratio is not anchored to historical values and is instead derived from the current value of the real-estate property, credit availability will expand leading to higher housing prices. Moreover, Milcheva & Sebastian (2010) and Crowe et al. (2013) assert that prudential ceilings on LTV ratio will shrink the pool of borrowers who will be able to finance their housing purchases leading to downward pressures on housing demand and prices. Likewise, ceilings on DIT ratio will restrain individuals’ purchasing powers creating similar downward pressures on housing prices (Crowe et al., 2013).

On the supply side, housing market dynamics are, to a great extent, driven by the construction industry’s profitability which tends to be sticky in the short run (Mayer, 2011; Geng, 2018). Adams & Füss (2010) assert that a spike in construction costs will decrease housing stock which, in turn, increases housing prices. Furthermore, the saturation of housing needs, cost components, and geographical limitations contribute to defining housing prices (Paciorek, 2013; Belke & Keil, 2018). It is important to note, however, that supply-side factors’ transmission to housing prices occurs with a lengthy lag given the time required to plan and implement housing projects (Mayer, 2011). Variation in housing prices in narrow areas can be explained by cross-sectional patterns where houses in relatively poor neighbourhoods that are located near a high-priced neighbourhood tend to experience higher house price volatility due to gentrification (Piazzesi & Schneider, 2016).

The supply-side of the housing market is also affected by institutional factors including building regulations, restrictions on land use, administrative processes, social housing supply, and access to credit (Milcheva & Sebastian, 2010; Belke & Keil, 2018). Mishkin (2007) highlights that land-use restrictions tend to make housing supply relatively more inelastic even if land is abundantly available in a certain nation. Following Tobin’s q approach, investing in housing is profitable when Tobin’s q exceeds 1 implying that housing prices increase at a faster rate compared to construction costs (Milcheva & Sebastian, 2010). Nevertheless, if institutional hurdles lead to a relatively inelastic housing supply, housing prices are likely to be more volatile. Inefficiencies in housing supply and housing market structure can also create upward pressures on housing prices. House prices will soar if the housing market is dominated by state-owned enterprises who can easily take loans from public banks to partake in the housing market (Zhang et al., 2012).

Furthermore, fiscal policy can also affect housing prices especially through tax policy. To illustrate, the United States government’s implementation of the Economic Recovery Tax Act in 1981 boosted investments in real-estate; however, as the taxation policy became more contractionary due to the Tax Reform Act in 1986, investments in real-estate decreased significantly (Baffoe-Bonnie, 1998). Favourable tax treatments for mortgage financing and real-estate investment decrease housing’s user cost of capital and thus increase housing demand and prices (Geng, 2018).

## Behavioural, Cultural, and Speculative-Driven Fundamentals

A new strand of literature also incorporates behavioural factors, speculative-driven fundamentals, and cultural values in examining housing prices and demand (Elsinga & Hoekstra, 2004; Stoykova & Chou, 2013; Whittle et al., 2014). Behavioural determinants, including how biases and cognitive errors can affect housing prices, have been greatly neglected until the Global Financial Crisis in 2007/08 (Whittle et al., 2014). Case and Shiller (2003) implicitly highlighted the significance of behavioural factors and *“how people think”* in making housing decisions. These behaviour-based determinants include investment motivations, expectations, risk perceptions, and widespread attitudes towards real-estate (Case and Shiller, 2003).

In addition to the *life-cycle investment hypothesis,* Bakshi & Chen (1994) propose the *life-cycle risk-aversion hypothesis*stating that as an individual ages, portfolio-selection behaviour tends to change with an increase in relative risk-aversion. With higher uncertainty associated with future earnings, an aging individual will likely be less willing to participate in a financially risky investment since it will be difficult to cover prospective losses and thus smooth consumption as suggested by Modigliani and Brumber’s life-cycle hypothesis.

Moreover, expectations of future prices are likely to cause inflated housing prices. The term *“animal spirits”* was used by Keynes to justify how individuals act as a *“herd”* leading to pessimism or irrational exuberance in an economy (Whittle et al., 2014). The resulting speculation can cause adverse repercussions on the housing market dynamics even if there are no changes in the macro-financial fundamentals[[8]](#footnote-9). This leads to what Stiglitz (1990) refers to as a *“bubble,”* if macro-financial fundamentals are unable to explain the changes in the price and instead it can *only* be explained by investors’ expectations of a future increase in prices. Shiller (2007) explains the bubble as a *feedback mechanism* where observations of current price increases and the resulting expectations of future price spikes lead to a speculative increase in housing demand and prices, reinforcing public expectations and this vicious feedback loop[[9]](#footnote-10).

Examining the U.S. housing market in boom and post-boom times in 1988, Case and Shiller (1988) emphasised that the market is chiefly driven by expectations stemming for past price patterns regardless of the macro-financial fundamentals. This behaviour is likely to reinforce booms in housing prices as buyers become “destabilising speculators” (Case and Shiller, 1988). During a housing price bubble, individuals believe that if they do not purchase the house now, they will not be able to afford it in the future and are thus willing to buy a house at a relatively expensive price with the perception that they will be recompensed with an even greater future increase in the price that will increase the value of the house and thus their wealth (Case and Shiller, 2003). Whether such price rises are continuous or temporary play the most vital role in creating the housing bubble. Expectations are likely to have a more substantial impact on housing demand if individuals believe that (i) the spike in prices is not temporary and is likely to continue and thus purchasing a house is perceived as a safe rather than risky investment; as well as (ii) the housing market is perceived to be inelastic (Case and Shiller, 2003). Furthermore, the housing bubble is likely to be exacerbated due to the “endowment bias” as individuals place higher value owner-occupied dwellings rather rental dwellings (Kahneman, Knetsch, & Thaler, 1990; Whittle et al., 2014).

This bubble phenomenon usually gets reversed when expectations about the future are altered as a result of sudden uncertainty shocks, expected changes in monetary policy stance and/or reaching the fourth stage of Minsky’s cycle – known as Minsky’s moment. According to this theory, housing markets would suddenly collapse as a result of a fall in business sentiment and elevated debt following an era of persisting speculative behaviour that accompanied loose access to credit that gets quickly transmitted from the housing sector to other sectors in the economy (Vercelli, 2009). Both cyclical and bubble-bust behaviour of housing prices are worth investigation in emerging markets in general and in Egypt in specific.

Once the bubble bursts, *loss-aversion* serves as a chief factor that influences housing prices where owners, influenced by a reference point like the purchase price, find it difficult to sell their house at a loss stemming from Kahneman’s & Tversky’s (1979) *“prospect theory”* (Whittle et al., 2014). A similar explanation is offered by the *disposition effect* where individuals tend to be risk-averse if they are enjoying profit and risk-loving when they are at loss (DeWeaver & Shannon, 2010). The loss-aversion and/or disposition effects lead to sticky housing prices. Furthermore, Akerlof & Shiller (2009) and Ackert et al. (2011) argue that *money illusion* will substantially affect housing prices since individuals might be unwilling to sell their house at a nominal loss yet are willing to sell it at *only* nominal gain even if it means real losses. This behavioural bias often occurs because owning a house offers a sense of security (Ackert et al., 2011).

Moving on, the conventional neoclassical school also tends to neglect the key role that cultural forces play in determining housing prices (Stoykova & Chou, 2013). Elsinga & Hoekstra (2004) refer to three core cultural values that influence housing prices: (i) effective systems of social security boost housing rentals, (ii) pressure associated with gaining economic independence leads to an increase in the price of owner-occupied dwellings, and (iii) extended households in need of more space. Survival and self-expression cultural values can also influence long-run housing prices where survival cultures focus on the crucialness of economic security and costs when making housing purchasing decisions; meanwhile, self-expression cultures stress on the quality of life and individual preferences (Harris & Young,1983). Stoykova & Chou (2013) conclude that the more the country is driven by survival cultural values, the greater the growth in long-run property prices.

## Empirical Literature

In this section we present some of the reviewed empirical studies investigating the interactions between housing prices and macro-financial fundamentals. Some employed time-series models, others were cross-sectional studies while some were panel studies.

### Time Series Models

Applying a Vector Error Correction Model (VECM) on quarterly data from 1981 to 1999, Apergis & Rezitis (2003) found that the variation of housing prices in Greece is mostly explained by the alterations in the housing loan rate followed by employment and inflation. However, alterations in the money supply had no significant impact on prices (Apergis & Rezitis, 2003). Likewise, Toome (2018) utilised an Error Correction Model (ECM) for the period 1989Q4 to 2017Q4 in Germany and found similar insignificant effects of money supply on housing prices. Nevertheless, Toome (2018) found that long-run housing prices in Germany are adversely affected by construction costs, disposable income, unemployment rate, interest rate yet positively affected by housing permits and population growth. To add, Mallick (2011) applied an Autoregressive Distributed Lag Model (ARDL) for the period 1999Q2 – 2008Q1 and found that inflation exerts upward pressures on Indian housing prices while money supply exerts downward pressures.

Zhang et al. (2012) also employed a VECM accompanied by a Nonlinear Auto Regressive Moving Average with Exogenous inputs (NARMAX) for monthly data during the period 1999 – 2010 in China. Unlike Apergis & Rezitis (2003), Zhang et al. (2012) concluded that money supply has a significant impact on housing prices. Zhang et al. (2012) maintained that monetary and price variables including the mortgage rate, real effective exchange rate, and producer prices have a substantial impact on housing prices; meanwhile, real economic variables including income do not have a significant effect. Simo-Kengne et al. (2014) utilised a Structural Vector Autoregressive model (SVAR) for the period 1974Q1 – 2011Q4 and reached similar conclusions of the substantial impacts of portfolio and monetary policy shocks on housing prices in South Africa while aggregate supply and aggregate demand shocks tend to have a lesser impact.

### Cross-Sectional Studies

Investigating tenure choice[[10]](#footnote-11) in the Washington D.C. in 1987 using a logit model, Iwarere (1991) found that key factors influencing the decision to purchase owner-occupied dwellings are employment-related and spatial factors. Relying on a household survey collected during 1987 and 1988, Arimah (1997) also used a logit model to examine tenure choice in Ibadan, Nigeria and concluded that income, investment motive, the head of the family’s gender, life-cycle stage, and access to land positively contribute to the probability of homeownership; however, access to institutional housing finance failed to contribute to home-ownership.

Xhignesse et al. (2014) also applied a logit model using data in 2010 and revealed that housing tenure in Belgium is determined by household’s income and housing prices followed by life-cycle variables and location. Examining housing demand, Oktay et al. (2014) employed a logit model on a questionnaire-based cross-sectional survey carried out in the province Erzurum, Turkey in 2019 and discovered that household head and spouse’s job, monthly salary, number of family members, and ownership of a car are the key determinants of housing demand. Furthermore, Głuszak (2015) modelled tenure choice in Poland using a multinomial logit model for each selected year (2007 – 2010) and concluded that older age and greater disposable income increase the individuals’ tendency to purchase owner-occupied dwellings.

### Panel Studies

Utilising a linear and log-linear reduced-form regressions over the period 1985Q1 to 2002Q3 in 8 states in the United States, Case and Shiller (2003) revealed that income had a positive and significant effect on housing prices while unemployment had an adverse effect. Similarly, Adams & Füss (2010) applied a panel cointegration analysis for 15 countries during 1975Q1 to 2007Q2 and concluded that long-run housing prices increase in response to higher economic activity and construction costs. Meanwhile, a rise in long-run interest rates reduces long-run housing prices (Adams & Füss, 2010).

Investigating a panel of 18 industrialised economies during 1980 – 2007, Agnello & Schuknecht (2011) employed a multinomial probit model and revealed that house prices surge in response to a rise in personal income and private credit and a fall in interest rates. Utilising a VAR for 17 industrialised economies during 1970 – 2003, Tsatsaronis & Zhu (2004) emphasised that inflation and a decline in policy rates will boost housing prices. Tsatsaronis & Zhu (2004) also highlighted the strength of the bank credit channel that leads to affirmative feedback between credit and real-estate cycles. Furthermore, Iacoviello (2000) used a SVAR for 6 countries over a 25-year period concluding that negative monetary and demand shocks tend to reduce housing prices. Iacoviello (2000) revealed that the magnitude of the response can be explained – to a certain extent – by the distinct housing and financial market institutional setups.

A summary of theory and literature findings will be written here to link to the following analysis

# Methodology

To investigate the relation between housing prices and the variables identified in the literature, primary data on housing prices is essential. In the reviewed works, such as Case and Shiller (2003), data on housing prices were generally obtained from countries official censuses, statistical bureaus and/or other sources of primary data. Hence, the construction of housing prices indices was doable. However, some research, such as Bricongne et al. (2019) highlighted the unavailability of such primary data, where they resorted to other sources such as websites, social media, and housing advertisement to construct primary datasets on housing prices. In our research, we do face a problem of the unavailability of housing prices data in Egypt, which constructs a main obstacle towards investigating the aforementioned research questions. We also believe that providing primary data for the housing market in Egypt is not only essential for research reasons, but it will also support the operation of the sector with proper information, decrease malpractices and principal-agent problems and most importantly will support the design of proper housing-related financial, institutional and social policies.

Accordingly, we start our analysis by designing a method to construct a dataset on housing prices in the Egyptian market upon which we can start investigating the interactions between housing prices and the previously identified determinants. Our analysis is three-fold. We construct an Egyptian Housing Price Index (EHPI) that calculates prices of different housing units according to a set of predetermined characteristics. Housing characteristics are obtained from a primary field survey that will be explained more thoroughly in the next section. Finally, we interact the Egyptian Housing Price Index (EHPI) with the hypothesized housing determinants in an empirical model that will be illustrated in section IV.

## Field Survey on the Determinants of Housing Prices in Egypt

Based on Dillman et al. (2009), Gentry & Good (2008), and other literature, we implement self-administered mixed-mode surveys. The *population* of the study will be divided into target groups: (1) Households/homebuyers (estimated around 25 million)[[11]](#footnote-12) and (2) Real Estate Developers and Brokers (estimated around 36,000)[[12]](#footnote-13). We applied a *simple stratified random sample* where the population will be categorised according to socioeconomic status. A simple random sample were selected from each category. Results are then [aggregated](https://www.merriam-webster.com/dictionary/aggregated) to make inferences about the population and hence inferences about the subpopulation of each category.

In addition to the socioeconomic characteristics of the sample, the survey collected primary data on the previously identified factors that are argued in the literature to influence housing prices from the households’ perspectives as well as the real-estate developers’ and brokers’ perspectives.

The survey is conducted in four geographical areas (cities): Cairo, Damietta, Alexandria, and Suhag since they are characterized by having new urban development zones as well as mega housing projects. This will be helpful in obtaining data and information about recent price trends. A pilot study was conducted to test the reliability of the survey; furthermore, different stakeholders were interviewed before and after the survey’s implementation to complement the survey with more specific data and information. The results of the survey were incorporated to design the price index and the empirical model. We employ two surveys; one targets a sample of household homebuyers and home-sellers in Egypt, while the other survey developers and brokers sample.

Based on the surveyed population and using the sample size (ss) in equation (1), the selected random sample is 398 for the Household survey and 380 for the Developers and Brokers survey.

$ss=\frac{\frac{z^{2}⋅p\left(1-p\right)}{ⅇ^{2}}}{1+\frac{z^{2}⋅p\left(1-p\right)}{ⅇ^{2}N}}$ (1)

Where, ***z***: z-score, ***p***: Population proportion, ***e***: Margin of Error (5%), and ***N***: Population size.

We approached 800 respondents since the non-response rate was found to be around 50%. The final respondents were 401 households and 421 developers and brokers. Accordingly, the targeted group were around 400 real-estate developers and brokers and 400 household buyers and sellers. The study tried to reach 750 real-estate developers and brokers; however, only 412 responded. With regards to household buyers and sellers, 401 out of 850 households responded. Thus, the non-response rate was around 50% on average. The final sample of respondents were 401 households and 412 real-estate developers and brokers. More on the survey design is presented in Annex (1).

## Constructing a Housing Price Index for Egypt (Constructing the Base Year)

Literature identified different methods of constructing housing prices indices, such as changes in median sales, hedonic methods, as well as weighted repeat sales methods (Case and Shiller, 1987). Each method has its advantages and disadvantages. Despite the advantages of these methods, they generally depend on the availability of primary data on housing sales obtained from census bureaus and other databases. However, in the Egyptian context, accurate data on the housing market sales and resales are not available.

Some literature tried to overcome this problem through using other ways such as the *Fall-Back Method* identified inBricongne et al. (2019) which mainly depends on gathering primary data and information from the field market in the absence of national accounts. In this method, data can be collected from property advertisements, real estate agents’ websites, and surveys applied to a baseline approach of indexing housing prices.

Calculating a house price index using the Fall-Back Method is a two-stepped approach. First, the average price per square metre across several housing units is computed for a given geographical location. Second, an aggregate national-level price is calculated from the average price of housing units in each geographical location. As per Bricongne et al. (2019), the *Fall-Back Method* depends on the area of the housing units and their price retrieved from property agents’ websites. Nevertheless, this method cannot be applied in our research for several reasons. Firstly, prices published on distinct real-estate websites are considerably different and full of outliers. Although some websites – such as Aqarmap – provide some price information and data, they cannot be considered as reliable sources of information. Secondly, precise disaggregated data are not available on these websites or any other sources. Based on all the above and, after reviewing the available methods in the related literature, we conduct a survey to collect all the needed data and information from their primary sources. These survey results are then used to construct an Egyptian Housing Price Index (EHPI) as explained in the following section.

1. Empirical Model to Examine the Micro Determinants of Housing Prices in Egypt (Logit Model)

To further investigate the determinants of housing prices in Egypt, an Ordinal Logistic Regression Model (OLM) was estimated based on the results of the field survey and the constructed housing price index. We use the *Proportional Odds Model* which is a form of the Ordinal Logistic Regression Model that we believe is the most relevant to the nature of the variables. This is particularly because most of the included variables are categorical in nature (Harrell, 2015; Warner, 2008; Parsons et al. 2009). More on the details, steps and results of the empirical model are presented in section VI.

# Survey Results and Descriptive Analysis

In this section, we present the results of the two surveys done on a sample of household homebuyers and sellers as well as a sample of surveyed Developers and Brokers. Results are presented and analysed as compared to literature. This descriptive analysis lays a foundation for the empirical model results that will be presented in the next section. The sample socio-demographic and socioeconomic characteristics are presented in Annex.

## Macroeconomic Fundamentals

As shown in the table (2), respondents from both the household and developers & brokers surveys perceive inflation as a key factor that has significantly affected housing prices in Egypt over the past five years. Findings also indicate that the cost of living, also influenced by inflation, represented a key challenge for housing sales in Egypt during 2020 (table 3). Furthermore, respondents from the real-estate developers’ and brokers’ survey affirmed the negative impact of both the exchange rate misalignments that followed the 2016 IMF-supported reform programme and the resulting devaluation of the EGP as well as the COVID-19 crisis (table 4). This supports Zhang et al. (2012) findings that monetary and price variables, including the real effective exchange rate, have a substantial impact on housing prices.

|  |  |  |  |
| --- | --- | --- | --- |
|   | Land Costs, Construction, and Licenses | Inflation | State Projects and New Cities |
|   | **Household Survey** | **Real-Estate Developers Survey** | **Household Survey** | **Real-Estate Developers Survey** | **Household Survey** | **Real-Estate Developers Survey** |
| No Effect | 10.9 | 2.9 | 3.7 | 5.1 | 17.1 | 13.8 |
| Simple Effect | 4.4 | 6.8 | 5.6 | 12.6 | 12.1 | 22.3 |
| Large Effect | 84.7 | 90.3 | 90.7 | 82.3 | 70.7 | 63.8 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

 **Table (2): Factors Affecting Housing Prices in Egypt over the Past five Years**

**Table (3): Challenges Facing Housing Sales in the Egypt Market in 2020**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | Cost of Living | Liquidity Preferences (Cash) | Competition and Excess Supply | High Construction and Licensing Costs and New Public Housing Projects |
| Important  | 64.5 | 27.8 | 69.7 | 82.1 |
| Neutral | 16.2 | 19.2 | 7.3 | 11.5 |
| Not important | 19.2 | 53 | 23 | 6.4 |

 **Table (4): Implications of Recent Economic Dynamics on the Housing Prices Trends**

|  |  |
| --- | --- |
| How did the following factors impact the housing market? | Negative Impact |
| Exchange Rate Misalignments | 84 |
| COVID-19 Crisis | 85 |
| Suspending Housing Construction Permits | 64.3 |

## Institutions and Procedures

 Respondents from both surveys perceive land costs, construction, and licenses as factors that have significantly affected housing prices in Egypt in the past five years (table 2) and served as a key challenge for housing sales in 2020 (table 3) supporting the literature strand, maintaining that housing market dynamics are, to a great extent, driven by the construction industry’s profitability (Mayer, 2011; Geng, 2018). It also upholds that the housing market is affected by institutional fundamentals including building regulations and restrictions on land use (Milcheva & Sebastian, 2010; Belke & Keil, 2018).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| To what degree do you believe the following factors affect your homebuying decision? | Location | Infrastructure | Real-Estate Taxes and Fees | Ease of Resale | Finishing |
| No effect | 2.8 | 0.3 | 4.7 | 7.5 | 8.7 |
| Moderate Effect | 9.3 | 1.2 | 6.5 | 3.7 | 6.5 |
| Strong Effect | 87.9 | 98.4 | 88.8 | 88.8 | 84.7 |
| Total | 100 | 100 | 100 | 100 | 100 |

 **Table (5): Factors Affecting Homebuying Decisions**

Respondents perceived infrastructure, real-estate taxes and fees, ease of resale, location, as well as finishing level as significantly important determinants of their homebuying decisions (table 5). The fact that 88.8% of the surveyed sample believe that real-estate taxes and fees have a strong effect on homebuying decisions emphasises that they are key institutional determinants of housing prices and is also supported by literature such as Baffoe-Bonnie (1998) and Geng (2018).

## Government Real-Estate and Housing Policies

Respondents from both surveys affirmed that state projects and new cities were key determinants of housing prices in Egypt over the past five years (table 2). Findings from the developers and brokers survey also emphasised that new public housing projects was a chief challenge facing housing sales in Egypt during 2020, affirming Milcheva & Sebastian (2010) and Belke & Keil (2018) earlier results that the supply-side of the housing market is influenced by the government real-estate decisions including the provision of social housing. It is important to note, however, that around one third of the surveyed developers and brokers believe that government social housing projects do impact the demand on housing demand (table 6). The majority of those who believe that the government’s social housing projects have an impact argue that they tend to decrease the demand on housing in the private sector.

**Table (6): Social Housing Impact on Housing Demand in Egypt**

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| In your opinion, did social housing projects affect demand on housing in the Egyptian market? | 28.9 | 71 |
| In which direction was the effect? | **Increase in demand** | **Decrease in demand** |
| 30.3 | 69.7 |

 Around 40% of the surveyed developers and brokers responded that the housing market is overpriced (table 7). When asked about the possible reasons behind this assumed overpricing, a good majority indicated that government policies and regulations are important reasons behind the overpricing in the housing sector, followed by easy access to finance then the exaggeration in advertising and marketing campaigns. As indicated earlier in table (4), respondents from the real-estate survey affirmed that the recent government decisions on suspending housing construction permits had significant negative implications on the Egyptian housing market[[13]](#footnote-14).

|  |  |
| --- | --- |
| In your opinion, are housing prices in Egypt overpriced? | Responses |
| Yes | 39.2 |
| No | 60.8 |
| I don’t know | 0.1 |
| Total | 100 |
| If you believe that the housing market in Egypt is overpriced, in your opinion, what is the relative importance of the following factors in this overpricing? | **Important** | **Neutral** | **Not Important** |
| Government Policies and Regulations in the Housing and Real-Estate Sector | 64.1 | 13.4 | 22.5 |
| Easy Access to Finance  | 56.3 | 16.2 | 27.5 |
| Exaggeration in Advertising and Marketing Campaigns  | 53.5 | 16.2 | 30.3 |

**Table (7): Is Housing in Egypt Overpriced?**

## Access to Mortgage Finance

Around half of the surveyed sample believe that unfamiliarity and insufficient information on mortgage finance is also an important reason behind favouring direct instalments to banking services and mortgage finance (table 8). Interestingly, interest rates, difficulty of banking procedures, and required guarantees are perceived as not important by most of the surveyed sample of developers and brokers.

|  |  |  |  |
| --- | --- | --- | --- |
| Determine the importance of the following reasons for the homebuyer's choice of direct instalment instead of banks/mortgage finance | Important | Neutral | Not important |
| Dealing with banks is not Shariah-compliant | 71.9% | 16.9% | 11.3% |
| Interest rates | 15.0% | 8.1% | 76.9% |
| Difficulty of banking procedures and guarantees  | 9.7% | 8.2% | 82.2% |
| Unfamiliarity and insufficient information on mortgage finance services | 55.6% | 18.1% | 26.3% |

**Table (8): Mortgage Finance versus Direct Instalments in the Egyptian Housing Market**

## Uncertainty, Expectations, and Shocks

As Case and Shiller (2003) maintain, investment motivations also serve as a key behavioural determinant of housing prices. 35% of the respondents buy a new housing unit for investment motives while around 65% buy it for occupation motives. Investment preferences change significantly during uncertainty periods as compared to normal times. According to the surveyed sample, while 64% of the respondents would invest their savings in bank deposits and certificates during normal times, only one third of respondents would prefer this form of investment during uncertainty periods (figure 1). Housing investments appear to be the safest form of investment during uncertainty episodes as perceived by almost half of the respondents although in normal times this form of investment is not as preferred (around 20% of the surveyed sample). This emphasises Case’s and Shiller’s (2003) focus on the significance of behaviour-based determinants and *“how people think,”* especially with regards to risk perceptions and expectations,in making housing decisions. This might also support the literature strand maintaining that individuals perceive investment in real-estate as a good hedge against inflation and thus increase housing investments in the presence of inflationary pressures to safeguard their wealth (Demary, 2010; Zhang et al., 2012; Alkali et al., 2018).

***Figure (1): Investment Preferences Among the Sample Respondents During Normal Times Versus Uncertainty Periods***

Investment in gold, foreign exchange, and land altogether account for 10% of the respondents’ investments in normal times while this form of investment would increase to around 25.8% during uncertainty periods (figure 1). It is worth noting that around 62-64% of the respondents – both households and real estate developers – prefer to take no investment decision during a crisis time and less than 30% of both surveyed samples have a tendency towards buying (table 9). This again re-affirms the previous finding that housing is believed to be a safe form of investment during uncertainty times. Results are interesting from a behavioural perspective as indicated in the literature section where public could prefer housing investment since if individuals believe that purchasing a house is a safe rather than risky investment.

**Table (9): Housing Preferences During a Crisis**

|  |  |  |
| --- | --- | --- |
|  | *If you invest in housing, what is your preference with regards to housing investment during a crisis?* | *During a crisis, how do you perceive the investment behaviour in the housing market?* |
| **Household Survey** | **Real-Estate Developers and Brokers Survey** |
| More preferences to sell | 9.3 | 10.9 |
| More preferences to buy | 29.3 | 22.0 |
| More preferences to wait | 61.4 | 63.8 |

Table (10) below shows that, according to the surveyed sample, housing prices are expected to witness future increase, constitute a good and safe opportunity for future investment, and hence housing investment will remain to be a preferred option for safe investment by Egyptians.

**Table (10): To what extent do you agree with the following statements?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *It is very likely that housing prices will sharply increase and thus, if I do not buy now, I will not be able to buy anytime soon* | *Economic conditions are mostly stable that make investing in housing a good opportunity* | *The high cost of living makes keeping cash better than investing it in housing market* | *Housing prices are very high and are expected to decrease in the near future* |
| Do not agree | 40.8 | 33.3 | 42.1 | 56.7 |
| I don't know | 8.1 | 9.7 | 6.9 | 7.8 |
| Agree | 51.1 | 57 | 51.1 | 35.5 |
| Total | 100.0 | 100 | 100 | 100 |

A good majority of household respondents – both as homebuyers and home-sellers – perceive that price trends in the housing markets witnessed significant increases that exceeded 10% during the past five years and are expected to follow the same trend of price rise in the near future (table 11). On the other hand, around two-thirds of surveyed real-estate developers and brokers indicate that housing prices have witnessed a significant increase in the past five years and expect that it will increase by more than 10% during the coming five years (figure 2). Around one-third of the surveyed sample indicate that housing demand in Egypt witnessed a decrease in the past five years and expect that the market will witness a normal increase that does not exceed 10%. This reflects a discrepancy in the perceptions of both groups about housing prices and trends, possibly resulting from many reasons; most importantly is the lack of accurate price databases on the housing market which leaves both historical prices and future expectations to a great extent to perceptions rather than facts. Tracking public expectations of future housing prices since, as proven in literature such as Stiglitz (1990) and Shiller (2007), they have a role in influencing housing prices under the bubble-bust behaviour theory.

**Table (11): Housing Prices Perceptions and Expectations**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | Homebuyer | Home-Seller | Homebuyer | Home-Seller |
|   | ***From your point of view, how did housing prices change in the past five years?***  | ***Your expectation in the near future (one year) for housing prices?***  |
| Normal increase around 10% | 21.8 | 18.6 | 32.4 | 26.7 |
| Over increase more than 10% | 69.8 | 73.3 | 44.5 | 48.4 |
| Constant price | 5 | 6.8 | 14.3 | 17.4 |
| Decrease in price | 0.6 | 0.6 | 5.3 | 6.2 |
| I don't know | 2.8 | 0.6 | 3.4 | 1.2 |
| Total | 100 | 100 | 100 | 100 |

***Figure (2) Real-Estate Developers’ and Brokers’ Perceptions of Housing Demand and Expectations on Future Housing Prices***

## Cultural and Religious Beliefs

Survey results reveal that households opt for instalments rather than cash in general. Around 40% of the surveyed real-estate developers and brokers believe that homebuyers prefer direct instalments through developers while around 30% believe that homebuyers prefer banking and 30% believe that cash is the optimum financing method for households (figure 3). Around 72% of the surveyed real-estate developers and brokers believe that the most important reason that makes homebuyers prefer direct instalments rather than mortgage finance is that the latter is non-sharia compliant (table 8).

***Figure (3) What is the commonly used financing method by the buyer in your opinion?***

Almost half of the surveyed real-estate developers and brokers indicated that they do not deal with banks; mostly for financial reasons while religious and cultural reasons came of a less importance (table 12). On the other side, those who deal with banks generally prefer commercial banks compared to state-owned or Islamic banks.

|  |  |
| --- | --- |
| Do you deal with banks to finance your housing projects? | Responses (%) |
| **Yes** | **No** |
| 53.6 | 46.4 |
| If yes, what are the types of banks you prefer dealing with?  | **Responses (%)** |
| Commercial Banks  | 79.6 |
| State-owned banks | 19 |
| Islamic banks | 1.4 |
| If no, specify the reason | **Responses (%)** |
| Financial reasons  | 67 |
| Religious and cultural reasons  | 33 |

 **Table (12): Banking Preferences and Housing Finance**

## Information and Housing Characteristics

Regarding the source of information in the Egyptian housing markets, household sample identified social media as the top source of information followed by friends and acquaintances and website platforms (table 13 and figure 4). The three marketing tools were also perceived as the most effective tools by the surveyed real-estate developers. Interestingly, while real-estate developers and brokers believe that the developers’ reputation is the most important marketing tool, it was not recognised at the same level by the surveyed household sample. Real-estate marketing exhibitions was also perceived as a very effective tool by almost half of the surveyed real-estate developers and brokers while it was not perceived as important source of information by the surveyed households.

|  |  |  |
| --- | --- | --- |
|     | Real-Estate Developers and Brokers Survey | Household Survey  |
| ***What is the relative importance of the below marketing tools in the housing market in your opinion?*** | ***To what extent you believe the following factors an important source of information in your homebuying decision?*** |
| **Very Effective** | **Effective** | **Not Effective** | **Important** |
| Social Media | 81.1 | 15.3 | 3.6 | 71.7 |
| Acquaintances and Friends | 63.1 | 23.8 | 13.1 | 60.1 |
| Website Platforms | 74 | 21.1 | 4.9 | 45.2 |
| Developer Reputation | 95 | 3.4 | 0.7 | 24.9 |
| Real-Estate Marketing Exhibitions  | 39.3 | 30.3 | 30.3 | 10.9 |
| T.V Advertisements | 30.1 | 43.9 | 26 | 6.2 |
| Newspaper and Magazine Advertisements | 4.4 | 20.6 | 75 | 0.6 |
| Returned Client | 86.7 | 11.9 | 1.5 | NA |

**Table (13): Information on housing opportunities and prices**

***Figure (4): How do you search for a new house? (%)***

When respondents were asked about the relative importance of different housing characteristics they responded as shown in figure (5). Infrastructure came as the most important factor followed by facilities and welfare services. Resale easiness, distance from work and tendency to move to new and better communities *were of equal importance.*

**Figure (5) Housing Characteristics in Egypt**

# Constructing the Egyptian Housing Price Index (EHPI)

 The process of constructing the Egyptian Housing Price Index (EHPI) begins with identifying the components of the model. The main components are the average price per square meter for an apartment in a compound (P1) and the average price per square meter for an apartment outside a compound (P2). Since it is well-established that today’s prices are a function of historical prices as well as expected future prices, we include the following as components of our index: change of the price compared to 2016 (P3), the change of the price compared to 2019 (P4), the forecasted price for 2022 compared to 2021 (P5) and the forecasted price for 2023 compared to 2021 (P6). Primarily, a correlation matrix using Pearson Correlation test was constructed to check the significance of the index components (table 14). We checked for missing data and outliers to ensure date reliability. Missing values were estimated using the Single Imputation Method (Zhang, 2016).

**Table (14): Correlation Matrix: Current Prices, Previous Prices, and Future Price Expectations**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Pearson Correlation** | **P1\*** | **P2**\*\* |
| 1. **The Change of the Price Compared to 2016 (P3)**
 | Pearson Correlation | .377\*\* | .361\*\* |
| Sig. (2-tailed) | .000 | .000 |
| N | 412 | 412 |
| 1. **The Change of the Price Compared to 2019 (P4)**
 | Pearson Correlation | .451\*\* | .283\*\* |
| Sig. (2-tailed) | .000 | .000 |
| N | 412 | 412 |
| 1. **The Forecasted Price for 2022 Compared to 2021 (P5)**
 | Pearson Correlation | .368\*\* | .251\*\* |
| Sig. (2-tailed) | .000 | .000 |
| N | 412 | 412 |
| 1. **The Forecasted Price for 2023 Compared to 2021 (P6)**
 | Pearson Correlation | .607\*\* | .392\*\* |
| Sig. (2-tailed) | .000 | .000 |
| N | 412 | 412 |

\*P1 is the average price per square meter for an apartment in a compound in three categories: without finishing, half finishing, and full finishing.

\*\*P2 is the average price per square meter for an apartment outside a compound in three categories: without finishing, half finishing, and full finishing.

Table (14) above shows the significance of the proposed index components and affirms the strong correlation between the components. We compose the index through three main steps: (1) weighing, (2) normalization, and (3) aggregation. To estimate the index weights, Principal Components Analysis was used (PCA) as indicated in (Filmer and Pritchett 2010). This approach standardizes the sub-indicators by calculating z-scores using the following formula:

$I=\frac{x-\overbar{x}}{σ}$, (2)

Where,

* $x$ is the sub-indicator value,
* $\overbar{x}$ is the mean value,
* $σ$ is the standard deviation value.

After applying the normalization and aggregation steps, the index scores are then divided into three quintiles: low, moderate, and high. The adequacy of the data to employing Factor Analysis is measured by Kaiser-Meyer-Olkin (KMO) test. As indicated in table (15), KMO is equal to 0.8 which affirms the robustness of designed index.

|  |
| --- |
| **Table (15): KMO and Bartlett's Test** |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .802 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 939.480 |
| Df | 15 |
| Sig. | .000 |

The constructed index is then employed in the empirical model to examine the determinants of housing prices in Egypt, as illustrated in the next section.

# Determinants of Housing Prices in Egypt: Empirical Model

As explained in the previous section, the EHPI is the dependent variable and it is ordinal in nature; divided into three levels: low, moderate, and high, where the high is the reference point for future comparisons. The ordinal logistic regression model takes the following form:

$log\left[\frac{P\left(Y\leq j\right)}{1-P\left(Y\leq j\right)}\right]=α\_{j}-(β\_{1}X\_{1}+β\_{2}X\_{2}+…+β\_{k}X\_{k}), j=1,…,J-1$ (1)

Where,

* X is the set of k predictors/independent variables with J-1 levels response/dependent variable,
* $α\_{j}$ is called the threshold,
* $β$ is the parameter for each predictor variable.
* The cumulative logit probability model (e.g., $P\left(Y\leq j\right)$) Takes the form as:

$P\left(Y\leq j\right)=\frac{e^{α\_{j}-(β\_{1}X\_{1}+β\_{2}X\_{2}+…+β\_{k}X\_{k})}}{1+e^{α\_{j}-(β\_{1}X\_{1}+β\_{2}X\_{2}+…+β\_{k}X\_{k})}}$ . (2)

## Model Variables

The dependent variable is the Egyptian Housing Price Index (EHPI). Three housing price levels are distinguished in the study as the dependent variable of the ordinal logit model: Low (low prices), Moderate (moderate prices), High (high prices), as shown in table (16).

**Table (16): The Dependent variable: EHPI**

|  |  |
| --- | --- |
| Categories | Code |
| Low | 1 |
| Moderate | 2 |
| High | 3 |

The study employs two models: a model for the household survey and another for the real-estate developers and brokers survey. The independent variables for both models are summarized in tables (17) and (18) respectively.

**Table (17): Explanatory variables for model (1): The Developers and Brokers Survey**

|  |  |  |
| --- | --- | --- |
| Variable | Description | Value labels |
|  Macro Fundamentals |
| X1 (Inflation) | From your point of view to what extent has inflation affected real estate prices during the last five years | Not important, Neutral, Important |
|  |
| X2 (economic reform program and flotation) | How did the following factors affect the direction of the real estate market: The economic reform program and the flotation (negative/positive) | Positive, Negative |
| Institutions and procedures  |
| X3 (cost of land, construction and licenses) | From your point of view to what extent did the cost of land, construction, and licenses affect property prices during the last five years | Not important, Neutral, Important |
|  |
| Government Housing Policies |
| X4 (State Projects and new cities) | From your point of view to what extent have state projects and new cities affected real estate prices during the last five years | Not important, Neutral, Important |
|  |
| X5 (Suspending housing permits policies) | How did the following factors affect the trend of the real estate market: suspending housing permits policies | Positive, Negative |
| Cultural and Religious Beliefs  |
| X6 (Cultural and religious reasons) | Why don’t you deal with banks? Religious and cultural reasons | Administrative and financial reasons, Cultural and religious reasons |
| Uncertainty and Shocks |
| X7 (COVID-19) | How did the following factors affect the trend of the real estate market: COVID-19 Crisis (negative/positive) | Positive, Negative |
| X8 (Pound Flotation) | How did the following factors affect the direction of the real estate market: The pound flotation crisis  | Positive, Negative |

**Table (18): Explanatory variables for model (2): The Households Survey**

|  |  |  |
| --- | --- | --- |
| Variable | Description | Value labels |
| Socio-economic |
| X1 (Income) | Buyer income\* | Less than 6000, Less than 10000, Less than 20000, 2000 and above |
|  Macro Fundamentals |
| X2 (Inflation) | From your point of view to what extent has inflation affected real estate prices during the last five years | Not effective, Simple Effect, very effective |
|  Access to mortgage Finance |
| X3 (Ease of contracting procedures) | Determine the importance of the following reasons in choosing your financing method? Ease of contracting procedures | Yes, No |
| Institutions and procedures  |
| X4 (Taxes and fees) | To what extent do real estate taxes and fees affect your real estate purchase decision? | Not effective, Moderate effect, Effective |
| X5 (cost of land, construction and licenses) | From your point of view to what extent did the cost of land, construction, and licenses affect property prices during the last five years | Not effective, Simple Effect, very effective |
|  |
| Government Housing Policies |
| X6 (State Projects and new cities) | From your point of view, to what extent have state projects and new cities affected real estate prices during the last five years | Not effective, effective, Very effective |
|  |
| Cultural and Religious Beliefs  |
| X7 (Types of banks preferences) | Which type of banks do you prefer?  | Governmental, Commercial, Islamic, Don’t prefer banks |
| Uncertainty and Shocks |
| X8 (I will be able to buy any time soon) | To what extent do you agree with the following statement: It is very likely that housing will sharply increase and thus, if I do not buy now, I will not be able to buy anytime soon | Agree, I don’t know/Neutral, Not agree |
| X9 (cash better than housing investment) | To what extent do you agree with the following statement: The high cost of living makes keeping cash better than housing investment | Agree, I don’t know/Neutral, Not agree |

## Empirical Findings

 As previously indicated, we apply Ordinal Logistic Regression model (Logit). To make sure that our results are reliable, Ordinal Logistic Regression model (OLM) assumptions were checked and verified for both models[[14]](#footnote-15). As established in literature (e.g. Akın & Şentürk (2012) and Garson (2012) parameter interpretation of the Ordinal Logistic regressions is different and more complex than Binary and Multinomial Logistic regression analysis. It requires both the identification of a reference category as well as deriving and interpreting exponential of estimated. In the below models, we define a reference category for each variable and interpret according to the known ‘interpretation Odds Ratio’ method as explained in Field (2009)[[15]](#footnote-16).

To interpret the empirical models, it is worth noting that the reference category is the ‘important’/ ‘effective’ category. This means that, the smaller the value of exponential ß, the higher the effect of the independent variable on dependent variable. In other words, small values of the exponential coefficients indicate that they are less likely to be ‘not important’, hence implying a strong perceived impact on the housing prices.

Empirical findings presented in table (19) show that COVID-19 shock, Land Costs, Changing Housing Permits and Banking Preferences are significant. On the contrary, other variables, such as Inflation, Economic Reform, State Projects and Exchange Rate Devaluation were insignificant.

**Model (1): The Developers and Brokers Survey-LOGIT Equation**

$logit\left(Low prices\right)=-0.534-1.297$\*Cost of Land is not important – 0.260 \*Cost of land is neutral

$-0.655$\*Changing housing permits policies has positive effect+ 0.353\*Administrative and Financial reasons – 0.502\*COVID-19 has positive effect

$logit\left(Medium prices\right)=1.121-1.297$\*Cost of Land is not important – 0.260 \*Cost of Land is neutral

$-0.655$\*Changing housing permits policies has positive effect+ 0.353\*administrative and financial reasons – 0.502\*COVID-19 has positive effect

**Table 19: Ordinal logit model estimation results for developers (dependent variable is housing price index)**

|  |  |
| --- | --- |
| **Variable** | **Parameter Estimates** |
| **Variable Option** | **B** | **Exp(B) / Odds Ratio** |
| $$α\_{1}(\leq Low prices)$$ | -.534\*\*\* |  |
| $$α\_{2}(\leq Medium prices)$$ | 1.121\*\*\* |  |
| **X1 (Inflation)** |
| Not important | .374 | 1.454 |
| Neutral | .199 | 1.22 |
| Important (Ref) | - | - |
| **X2 (Economic reform program and flotation)** |
| Positive  | -.079 | 0.924 |
| Negative (Ref) | - | - |
| **X3 (Cost of land, constructions and licenses)** |
| Not important | -1.297\*\*\* | 0.273\*\*\* |
| Neutral | -0.260\* | 0.771\* |
| Important/ (Ref) | - | - |
| **X4 (State projects and new cities)** |
| Not important/Not effective | .062 | 1.064 |
| Moderate effective | -.098 | 0.907 |
| Important/Very effective (Ref) | - | - |
| **X5 (Suspending housing permits policies)** |
| Positive  | 0.655\*\*\* | 1.925\*\*\* |
| Negative (Ref) | - | - |
| **X6 (Cultural and religious reasons)** |
| Administrative and financial reasons | .353\* | 1.423 |
| Cultural and religious Reasons (Ref) | - | - |
| **X7 (COVID-19)** |
| Positive  | -.502\*\* | 0.605\*\* |
| Negative (Ref) | - | - |
| **X8 (Pound Floatation)** |
| Positive  | -.043 | 0.958 |
| Negative (Ref) | - | - |
| Psedudo R2 (Nagelkerke) | 0.171 |

*Source*: own study, \* significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01

-2loglikelihood= 439.969, $χ²\_{(11)}=$26.934, p-value= 0.005

**Model (1): The Households Survey-Logit Equation**

$logit\left(Low prices\right)=-1.517-1.637$\*Cost of land is not effective – 0.846 \*Cost of Land is moderate effect

$+0.971$\*Bank preferences are commercial

$logit\left(Medium prices\right)=-1.517-1.637$\*Cost of land is not effective – 0.846 \*Cost of land is moderate effect$+0.971$\*Bank preferences are commercial

**Table (20): Ordinal logit model estimation results for buyers (dependent variable is housing price index)**

|  |  |
| --- | --- |
| **Variable** | **Parameter Estimates****Buyer** |
| **Variable Option** | **B** | **Exp(B) / odds ratio** |
| $$α\_{1}(\leq Low prices)$$ | -1.517\*\*\* |  |
| $$α\_{2}(\leq Medium prices)$$ | 0.288\* |  |
| **X1 (Income)** |
| Less than 6000 | -0.116 | 0.890 |
| Less than 10,000 | -0.059 | 0.943 |
| Less 20,000 | 0.080 | 1.083 |
| 20,000 and above | - | - |
| **X2 (Inflation)** |
| Not effective | -.422 | 0.656 |
| effective | -.553 | 0.575 |
| Very effective (Ref) | - | - |
| **X3(Ease of contracting procedures)** |
| No | -.400 | 0.67 |
| Yes | - | - |
| **X4 (Taxes and fees)** |
| Not effective | -.359 | 0.698 |
| Moderate effective | -.299 | 0.742 |
| Very effective (Ref) | - | - |
| **X5 (Cost of land, constructions and licenses)** |
| Not effective | -1.637\*\*\* | 0.195\*\*\* |
| Moderate effective | -0.846\*\* | 0.429\*\* |
| Very effective (Ref) | - | - |
| **X6 (State projects and new cities)** |
| Not effective | -0.364 | 0.965 |
| Moderate effective | 0.313 | 1.37 |
| Very effective (Ref) | - | - |
| **X7 (Types of banks preferences)** |
| Governmental  | .466 | 1.594 |
| Commercial  |  .971\*\*\* |  2.64\*\*\* |
| Islamic | -.039 | 0.962 |
| Don’t prefer to deal with banks (Ref) | - | - |
| **X8 (I will be able to buy any time soon)** |
| Agree | -0.139 | 0.870 |
| I don’t know | -0.563 | 0.569 |
| Not Agree (Ref) | - | - |
| **X9 (Cash better than housing investment)** |
| Agree | -0.013 | 0.987 |
| I don’t know | 0.358 | 1.43 |
| Not Agree (Ref) | - | - |
|  Psedudo R2 (Nagelkerke) | 0.154 |

*Source*: own study, \* significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01

-2loglikelihood= 515.612,$ χ²\_{(19)}=$47.312, p-value= 0.000

Primarily, the two intercepts are used to differentiate the category of price index for comparison. These are also called the cut points of comparison -0.534 is used for comparison of lowest to Moderate and highest, 1.121 is used to compare category lowest, moderate to highest.

*Cost of Land, Construction and Licensing*. Regarding the Developers and Brokers model, the small exponential ß of the Cost of land, Construction and Licenses (0.273) indicate that this variable is significantly perceived as important. This means that the odds ratio for being not important is less likely to be in the highest quintile compared with the reference category ‘important’. Cost of land ‘neutral’ is 0.771 time less odd of being in the highest category of price index quantile compared to land cost being ‘important’. This result is reinforced by the results of the Household model (table 20). The odds ratio for Cost of land, Constructions and licenses for being not effective is 0.195 time less likely to be in the highest category of price index quintile as compared to cost of land is effective.

*Government housing policies* are considered through two variables 1) *state projects and new cities 2) suspending housing permits*. The results show that *state projects and new cities* don’t have a significant effect on housing prices, whereas *suspending of housing permits policies* had a significant effect on the housing price index. Parameter estimate for suspending housing permits policies having positive effect of 1.925 times more odds of being in the highest category of price index as compared to negative effect.

*Cultural & Religious beliefs*. Results of the Developers and Brokers model show that the odds ratio for Administrative and Financial Reasons are 1.423 times more likely to be in the highest category of the price index as compared to Cultural & Religious reasons. This implies that the Administrative and Financial Reasons are more significant in affecting the housing prices as compared to the reference ‘Cultural and Religious Reasons’ when to comes to access to finance.

*Banking Preferences*. The Household model results revealed that the odds ratio for preferring Commercial Banks’ is 2.64 times more likely to be in the highest category of price index as compared to the reference of ‘Don’t prefer to deal with banks. The result indicates that, amongst the respondents that generally preferred dealing with banks, commercial banks were generally preferred compared to the governmental banks.

*Uncertainty and Shocks*. The parameter estimates for ‘COVID-19 Positive Effect’ has 0.605 times less likely of being in the highest category of price index as compared to reference category ‘Negative Effect’. This implies that the shock is believed to have a significant negative effect on the housing prices in Egypt

## Statistical Checks

Model Fitting Information, Goodness-of-Fit, Pseudo R-Square, Parameter Estimates and Test of parallel lines are checked. Tables (19) and (20) illustrate the results of the Developers and Brokers and the Household models respectively. Results in table (21) suggest that the two models fit very well (p>0.05) which indicates that we fail to reject the null hypothesis depending on the observed data with adequate fitness. Pseudo-R- Square show that approximately 17.1% and 15% of the variation in the EHPI can be attributed to the independent variables included in the model (1) and model (2) respectively.

**Table 21: Goodness of fit for Model (1) and Model (2)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Model | -2 Log Likelihood | df | Sig. |
| Developer Model  | Pearson | 266.595 | 261 | .393 |
| Deviance | 293.540 | 261 | .181 |
| Buyer Model | Pearson | 420.860 | 401 | .238 |
| Deviance | 447.929 | 401 | .153 |

Model fitting information for Model (1), -2loglikelihood for the estimated model is 439.969 and the value for Chi-square (26.934, df = 11, p-value> 0.05(. The statistically significant Chi-square statistic (p<0.05) indicates the statistically significance of the model. The is for Model (2) where the P-value is less than 0.05, which indicates that the model is significant.

**Table 22: Test of Parallel Lines for both models**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Model | -2 Log Likelihood | Chi-Square | df | Sig. |
| Developer Model  | Null Hypothesis | 439.969427.999 |  |  |  |
| General | 11.970 | 11 | .366 |
| Buyer Model | Null Hypothesis | 515.612 |  |  |  |
| General | 491.032 | 24.580 | 19 | .175 |

Now, it is important to make the test of parallel lines. The null hypothesis in the test of parallel lines states that the location parameters (slope coefficients) are the same across response categories.

Parallel Lines: One of the assumptions underlying Ordinal Logistic Regression is that the relationship between each pair of outcome groups is the same. This is commonly referred to as the test of Parallel Lines because the null hypothesis states that the slope coefficients in the model are the same across response categories (and lines of the same slope are parallel). If we fail to reject the null hypothesis, we conclude that the assumption holds.

As shown in table 22 for Model (2), the Parallel Line test for the model is 427.999 with Chi square value 11.970 and p-value= 0.366 which is greater than the 5% level of significance. This indicates a failure to reject the null hypothesis. Thus, the proportional odds assumption appears to hold for the general model. Also, the same result is obtained for Model (2) model as P-value = 0.175, which is greater than 0.05.

# Discussion

Reflecting on the above results of the descriptive analysis as well as the empirical model that examined the interaction between the EHPI and the hypothesized determinants, several results can be concluded.

*Determinants of housing prices in Egypt*. Primarily, according to the statistical and empirical results, Land construction and licensing costs are perceived as main determinants of housing prices in the Egyptian market. Government real estate and housing policies (such as the recent decision on suspending housing permits) also constitute a significant factor affecting housing prices. Shocks and crises -represented in the recent COVID19 shock- is also proven to be significant factor impacting housing prices and expectations in the Egyptian market. On the contrary, some macro financial fundamentals such as inflation and interest rates were not perceived as significant. This result is interesting as it might reflect weakness in the monetary transmission mechanism in the Egyptian market through the theoretically explained asset-price mechanism. Some variables were perceived as important in the survey results however, when empirically examined they are found to be insignificant. These variables are real-estate taxes and fees, social housing and the 2016 exchange rate devaluation; all perceived to have a strong effect by respondents, however they were insignificant in the model.

*Investment motivations in normal times and during uncertainty*. During normal times, Egyptians perceive investment in housing as a good source of safe investment following savings in bank deposits and certificates. Nevertheless, investment preferences change significantly during uncertainty periods where Egyptians would tend to prefer investment in housing as the prime safe investment compared to other investment schemes. Housing investment is perceived by Egyptians as a good a good hedge against inflation and other financial shocks.

From a behavioural perspective, Egyptians tend to have buying/ investing in the housing market during crisis compared to other investment forms. This would be interpreted as a risk-aversion behaviour and would also reflect trust in the market and that housing is believed to be a safe form of investment during uncertainty times. We plan to propose these findings for an experimental research design in the future. More on the link with the behavioural assumptions and findings from recent literature.

*Perceptions on Banking and mortgage Finance*. A remarkable finding indicated by most of the surveyed developers and brokers is that important reason that makes homebuyers prefer direct instalments rather than mortgage finance is that the latter is perceived as non-sharia compliant. This result requires deeper analysis and investigation into the Egyptian cultural and religious beliefs towards finance tools on the one side and on the other side raise interest in the new governmental strategic directions to include sharia-compliant investment tools such as the recently announced Sukuk law. More on Sukuk law here and proposed policy implications

*Data and information on housing market dynamics and opportunities.* Our analysis reveal a discrepancy in knowledge about housing historical price trends and expectations across the sampled groups, households and Developers & Brokers. This discrepancy could possibly be due to several reasons among which is the lack of accurate housing prices databases. This leaves both historical prices and future expectations subject to speculations rather than facts. Lack of information about housing prices makes the market actors more vulnerable to principal-agent problems and result into asymmetric information moral hazard outcomes. This again reaffirms the importance of building a micro dataset on housing prices in Egypt and constructing a housing price index for the Egyptian market.

Regarding marketing and advertisement in the housing sector, results show the importance of social media platforms as the homebuyers’ top source of information. Developers and brokers identified the broker reputation as the most important marketing; not being recognised at the same level by the surveyed household sample. This also adds to the unavailability of reliable sources of information and reaffirms the abovementioned conclusion.

# Conclusion and Policy Recommendations

Demand on housing in Emerging Markets and Developing Economies (EMDEs) is affected by many economic, financial, behavioural and institutional factors. Such factors not only affect the cyclical trends of housing prices but also influence future price expectations in the housing sector. Likewise, the housing sector, with all its forward and backward linkages, is a key player in both economic and financial cycles in economies. In this paper, we investigate the determinants of housing prices in the Egyptian market. We design our hypotheses and analysis based on literature findings as well as observations on the Egyptian market. Although, the Egyptian housing market is one of the very important and dynamic markets, lack of accurate information on the sector dynamics and prices constitutes serious challenge for all actors.

We design two field surveys to investigate the determinants of housing prices in the Egyptian market both for household homebuyers and sellers as well as a representative sample of real estate developers and brokers. To establish a dataset on Egyptian housing prices, we attempt to construct the first Price Housing Index for the Egyptian market based on acknowledged methods in theory and literature. We then integrate the housing price index with the findings of the survey through an Ordinal Logistic Regression model to investigate the main determinants of housing prices in Egypt.

 Results show that land construction and licensing costs, ggovernment real estate and housing policies are perceived as main determinants of housing prices in the Egyptian market. Shocks and crises -represented in the recent COVID19 shock- is also proven to be significant factor impacting housing prices and expectations in the Egyptian market. On the contrary, macro-financial variables, namely inflation and interest rates were not significant indicating a possibly weak monetary transmission mechanism through the theoretically explained asset-price channel.

Results also affirm that housing investment is perceived by Egyptians as the safest form of investment during uncertainty shocks and good hedge against inflation and other financial turbulence. Finally, findings reveal a huge discrepancy in information and data on housing dynamics and expectations across the sampled groups, households and Developers & Brokers. Lack of information makes market actors more vulnerable to principal-agent problems and result into asymmetric information moral hazard outcomes. The above results altogether reinforce the importance of constructing a micro dataset on housing prices in Egypt and constructing a housing price index for the Egyptian market as was initiated in this research and planned to be further developed in future research. In addition to the likely contribution to literature, the findings of this research some policy implications that could support the future development of the sector in Egypt amongst all actors.

* ***Housing data availability and disclosure***: it is highly recommended to construct a sustainable dataset of housing prices in Egypt with wide geographical coverage and replicate and further develop the Egyptian Housing Price Index designed in this paper. In addition to its importance for research, data availability and disclosure will help design proper monetary and financial policies, support a proper operation of supply and demand mechanisms and most importantly minimize moral hazards and asymmetric information problems.
* ***Institutional measures***: since government policies were proven to highly impact housing prices and expectations, it is essential to study more deeply the implications of recent housing policies on the Egyptian housing market dynamics. Initiatives such as the recent mortgage finance initiative is expected to influence this market significantly through many channels top of which is the asset price channel.
* ***Cultural and religious variables***: Cultural and religious variables that affect investment behaviour in general and housing investment is worth more investigation. Housing investment could reflect an alternative to banking investment -perceived as non-sharia compliant- by some Egyptians. Housing investment could also be perceived as an alternative to the weak non-banking financial sector in Egypt.

More elaboration about the policy implications after adding some information on the institutional setup governing the sector and after elaborating on the behavioural factors

# Limitations and Future Research

The main limitation of our study is the absence of housing prices datasets or references through which we can compare our results to. Also, due to funding constraints, the field study was limited to four geographical areas. For future research and due to the significant discrepancy between households and developers & brokers perception, we plan to conduct a lab experiment to better investigate and illustrate the behavioural assumptions highlighted in literature such as the life-cycle risk-aversion hypothesis, the loss aversion hypothesis and the endowment bias. Finally, we hope to widen the geographical scope of this analysis in future research and, ultimately, we plan to construct an applied “Egyptian Housing Price Index” that would be periodically calculated based on consequent future waves of the field surveys implemented in this paper.

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### **Annex (1)**

### **Survey design**

Two questionnaires are conducted which are, developer questionnaire and buyer and seller questionnaire. The study is conducted on a sample of developer questionnaire/ buyer and seller in the following governorates: (Cairo - Alexandria - Damietta - Suhag). A pre-test was conducted for the two study tools by contacting about 25 individual sellers and buyers and about 25 developers. Based on the pretest the survey of sellers and buyers has been rearranged better. The questionnaire was written in Arabic since Arabic is the official language in Egypt. Demographic data was collected on age, gender, education and marital status.

### **3.2 Sampling**

As mentioned above, the sample for this study was drawn from both developer/ buyer and seller. So, we determine the relevant sample size from both of them. Sample size determination is the act of choosing the number of observations or replicates to include in a statistical sample. It depends on a number of factors including the purpose of the study, population size, sampling error permitted etc. The appropriate sample size is determined based on the following formula:

n0 =$ \frac{(Z\_{\frac{α}{2}})^{2} p(1-p) }{e^{2}}$

where:

Zα/2is the critical value of the Normal distribution at α/2 (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96)

 e is the margin of error and it is approximated to be 0.05

p is the sample proportion and we used 50%, that is conservative and gives the largest sample size.

So, n0= (1.69) 2 (0.5)(1-0.5) / 0.052 = 385

So, we targeted to reach to around 400 for developers and 400 for buyer and seller as well. For developers, 412 are respondent after asking 750. For buyer and seller, 401 are respondent after asking 850. Non response occurs based on some reasons and shown in table 3.1.

**Table 3.1: Non Respondents number across the four governorates for developer /buyer and seller questionnaire**

|  |  |  |
| --- | --- | --- |
| Governorates | Non Respondents Developers | Non RespondentsBuyer and seller |
| Reject to respond | 110 | 145 |
| phone number removed from the service | 55 | 45 |
| wrong number | 35 | 35 |
| not answered (after several attempts) | 64 | 60 |
| closed / busy all the time and difficulty of access. | 74 | 64 |
| Total | 338 | 349 |

Respondents number across the four governorates in our sample for developer /buyer and seller are shown in table 3.2.

**Table 3.2: Respondents number across the four governorates for developer /buyer and seller questionnaire**

|  |  |  |
| --- | --- | --- |
| Governorates | Developer Respondents | Buyer and seller Respondents |
| Cairo | 322 | 337 |
| Alexandria | 54 | 39 |
| Damietta | 23 | 10 |
| Suhag | 13 | 15 |
| Total | 412 | 401 |

The following table shows the classification for buyer and seller, which included in our sample.

|  |  |
| --- | --- |
| Classification | Number |
| Buy & sell | 103 |
| want to buy & sell | 35 |
| Sell only | 23 |
| Buy only | 38 |
| want to buy only | 145 |
| Not Buy & Not sell | 57 |
| Total | 401 |

**3.3 Data Collection Method**

The data necessary for this study is collected through a mobile phone and a smart computer at the company’s headquarters. Seven highly experienced researchers, a general supervisor (quality controllers), supervision and maintenance engineers participated in the phase of data collection to solve the technical problems facing researchers in the form system and its transfer from one department to another. The data collection system was built using Survey solutions which an advanced electronic data collection system, and the database was saved on the Microsoft azure database.

To assure the quality of the data, work was done on two levels of quality as follows:

1- Direct listening from the call center supervisor of the call while it is being made to ensure the safety of the method of asking questions

2- Post review through the data collection system and approval of the consistent forms and return of the inconsistent ones through the quality monitors.

**Annex (2)**

**Survey Socio-demographic and Socioeconomic Characteristics**

|  |  |
| --- | --- |
| Variable | *Percent* |
| Gender |   |
| Male  | 79.1% |
| Female | 20.9% |
| Age Group |
| 20-25 | 8.5% |
| 25-30 | 24.3% |
| 30-35 | 18.4% |
| 35-40 | 19.9% |
| 40-45 | 12.9% |
| 45-50 | 7% |
| 50-55 | 5.3% |
| 55-60 | 1.9% |
| 60-65 | 0.7% |
| 65 and above  | 1% |
| Governorate |
| Cairo | 78.2% |
| Alexandria | 13.1% |
| Damietta | 5.6% |
| Suhag | 3.2% |
| Marital Status |
| Single | 38.3% |
| Married | 58.7% |
| Divorced | 2.9% |
| Widow | 0% |
| Nature of real estate activity  |
| Real estate developer | 10.2% |
| Broker | 88.3% |
| contractor | 1.2% |
| Other | 0.2% |

1. Economics Department, The British University in Egypt. [↑](#footnote-ref-2)
2. Bsusiness Department, The British University in Egypt. [↑](#footnote-ref-3)
3. It is important to note that higher real interest rates will have an adverse impact on both housing supply and demand due to the higher cost of debt-financing. Thus, if the adverse impact of real interest rate on housing supply exceeds that of demand, housing stock will fall to an extent that creates upward pressures on prices. Meanwhile, if adverse repercussions on housing demand is greater, housing prices will fall (Zhang et al., 2016). [↑](#footnote-ref-4)
4. Using a Vector Autoregression (VAR) on U.S. monthly data during the period 1963 – 1999, Lastrapes (2002) Concluded that monetary shocks have real effects on the housing market where an expansionary shock to the money supply creates an upward pressure on real housing prices and sales. [↑](#footnote-ref-5)
5. Hlaváček & Komárek (2011) also argues that divorce and marriage rates will affect housing prices since both generate a need for more dwellings. [↑](#footnote-ref-6)
6. Supporting the life-cycle investment hypothesis, Mankiw & Weil (1989) utilised cross-sectional data and found that housing prices dramatically increased in the United States between 1970 and 1980 because baby boomers aged. [↑](#footnote-ref-7)
7. Zhang et al. (2012) refers to this as a *“user cost push”* since market rents are simply the opportunity cost of owner-occupied dwellings. [↑](#footnote-ref-8)
8. To a certain extent, this speculation is inherent in the housing market because of the construction lag (Toome, 2018). [↑](#footnote-ref-9)
9. In his book *“Irrational Exuberance”*, Shiller (2000) provides a basis of this feedback mechanism of speculative bubbles from several principles of sociology and psychology including framing, heuristics, and myopic loss-aversion – among other things. [↑](#footnote-ref-10)
10. A dummy variable that takes the value of 1 if an individual chooses to own the house and 0 if s/he chooses to rent the house (Iwarere, 1991). [↑](#footnote-ref-11)
11. [CAPMAS](https://sis.gov.eg/Story/156142/CAPMAS-Egypt%27s-population-at-home-reached-102-million?lang=en-us) [↑](#footnote-ref-12)
12. <http://www.tasheed.org/ar/Default.aspx> [↑](#footnote-ref-13)
13. Refer to the decision. [↑](#footnote-ref-14)
14. Assumptions of the Ordinal Logistic Model are: (1) The dependent variable should be measured at an ordinal level, (2) Ordinal independent variables must be either continuous or categorical, (3) there is no multicollinearity between independent variables and (4) he effects of any explanatory variables are consistent or proportional across the different thresholds. [↑](#footnote-ref-15)
15. The odds ratio indicates how many times more or less is the likelihood of one event being investigated with respect to another event being investigated and is calculated by getting the exponential for β (Salmi et. al. 2015). [↑](#footnote-ref-16)