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The Influence of Macro factors On Residential Mortgage In Italy

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Abstract

This paper examines the role of macro-economic variables, including informal sector, on the growth of the mortgage market in Italy, from 1999 to 2019. We start testing normality, correlation (Pearson) and multicollinearity, then we apply theoretical benchmark model following the approach proposed by Wichura (2006) using a linear regression model. Based on the main findings of this study we show that there a positive and potentially high correlation between residential mortgage and informal sector. In particular, we find that a unit increase in Percentage informal sector employment will cause an increase in residential mortgage. May be counterintuitive as the informal sector magnitude should represent a weaker access to credit for borrowers; nevertheless it may also be the case that informal sector increase anticipate GDP growth signalling a subsequent positive economic downturn. Thus, financial institutions will increase residential mortgage due to the informal sector growth signalling a positive economic trend. This work may help them suggesting how to include informal sector dynamics into residential mortgage pricing, as well as policymakers to read residential mortgage market dynamics and derive informal sector insights.

Keywords: Italy, Residential Mortgage, Economic Factors, Informal Sector.

1. INTRODUCTION

Based on the World Bank's (2012) world development indicators report, there is a clear definition of a macro-economic factor: "one that is pertinent to a broad economy at the regional or national level and affects a large population rather than a few selected individuals". Therefore, examples of such can include economic output, unemployment, inflation, savings and investment among others. Often, in each country, macro-economic factors are centrally monitored in order to obtain a single authoritative view on key macroeconomics variables. In Italy, ISTAT is the institution, which serve this role, and provides data on various economic development indicators, like

inflation, informal sector employment, national savings rate, GDP growth rate, GDP per capita among others. This study, among others, seeks to unlock the relationship between such macro-economic variables and the development of the mortgage market.

The real estate sector plays an important role in the Italian economy, thanks to the contribution it directly or indirectly provides to the production activity. Buildings are a fundamental element for calculating household wealth and, as a consequence, are directly linked to the financial credit sector. The interactions created between the real estate market and the credit market are fundamental in the transmission mechanism of monetary policy, significantly influencing the cyclical trends of the entire economy and the stability conditions of the financial system. The monitoring of the economic and financial conditions of families and in particular of their vulnerability has become increasingly important since the outbreak of the 2008-2009 financial crisis. The prolonged crisis of recent years has deeply undermined the ability to save, reducing the propensity to invest in real estate that, above all in our country, it involves the main and often unique form of indebtedness of families (Bartiloro, Rampazzi, 2013).

Literature shows that housing prices and the gross domestic product (GDP) are the main drivers to explain the amount of residential mortgages outstanding (Dajcman, 2020); but there is no clear evidence on the causal relation between the other macro-economic and demographic variables for the Italian market.

It has been widely discussed and it is now mainstream that mortgage lenders are concerned with the ability to pay by a prospective borrower. In this perspective, Gelfand (1970) suggested that lenders would prefer borrowers with stable incomes. This restricts mortgage finance to households with adequate levels of income or savings and this, by definition, excludes the poor according to De Soto (2000). Nevertheless, according to income visibility, the poor is not the only category to consider. In fact, after using a multi-clustered stratified sample data of households residing in informal settlements in Jakarta, Indonesia, Saleh (1999) found that mortgage loans were inaccessible to majority of households employed in the informal sector due to the nature of their incomes and the strict requirements of loan collateral by the formal housing finance sector. Other authors, later on, described which link might exist between mortgages and the informal sector. Demir et al., (2003) argues that employment is a factor influencing demand for housing loans. If the unemployment level in an economy is low, the potential house buyers' ability to engage with housing finance market increase. Hardt (2000) asserts that lack of job security and existence of informal employment determines the ability to access the housing loans.

This paper's original contribute is the effort to include over macro-economic factors, the informal employment sector and Informal sector in terms of value added as a percentage of GDP, in order to explain mortgage market dynamic in Italy and which role these three different drivers play in this.

Being able to efficiently analyse the underground economy is of great importance for economic research, as this phenomenon produces significant (negative) results such as: reducing the quality and quantity of services offered to citizens (due to the reduction in revenue tax levied by the state), jeopardize the effectiveness of the economic policies implemented and to crack the relationship between citizens and institutions (citizens start to question the "quality" of the institutions). For institutions, to understand whether, by applying an expansive monetary policy through increased mortgage delivery, can reduce the informal sector, it is therefore important in many respects.

The remainder of the paper's structure is as follows. Section 2 presents a detailed literature review on mortgage market in Italy, macro-economic variables that influences the residential mortgage and the role of informal sector on mortgage market. Section 3 describes the empirical analysis, presenting the sample (Section 3.1), the methodology (Section 3.2), and main results (Section 3.3). Section 4 concludes the paper, summarizing the results and presenting their implications.

2. LITERATURE REVIEW

The literature splits into three strands: the mortgage market trend in Italy, the relationship between residential mortgages and macroeconomic variables, the relationship between residential mortgages and the informal sector.

2.1 Mortgage Market in Italy

Real estate developments have very important implications for the economic cycle and financial stability (De Bandt et al., 2010). On the supply side, the sector is responsible for a significant share of the construction sector, which in turn represents about 6 percent of GDP in Italy. On the demand side, real estate accounts for over 60 percent of household wealth; eventually wealth effects linked to house price movements are reflected in consumer choices (Nobili, Zollino, 2017).

In Italy, after a period of strong expansion that began at the end of the nineties, the real estate cycle reversed the trend well before the global crisis of 2008-09 (Gobbi, Zollino, 2013). The real decline began at the end of 2006, when investments in real estate and the profits that they generated entered into their decreasing phase. In addition to the residential real estate sector, the non-residential sector suffered too, such as public works. The duration and the intensity of the crisis have had a very negative impact on the business system, characterized in the European comparison by conditions of higher economic and financial fragility (De Socio, 2010).

This turned into a very negative scenario on mortgage markets. Banks sharply increased impaired loans in their balance sheets, a factor that has subsequently influenced their ability to grant new loans. For households, the deterioration in credit quality was lower than in companies, also due to the very selective policies adopted by credit intermediaries before the outbreak of the crisis and for the adoption of measures to support families in difficulty in repaying the debt (Magri, Pico, 2012).

In particular in Italy, but this is not related to this country alone, credit related to the housing market showed large cyclical fluctuations in timing and phase similar to those observed for house prices (IMF, 2008). The annual growth rate of mortgages, after stabilizing between 1987 and 1991 at around 20%, declined rapidly until 1996. Following the gradual acceleration between late 1997 and 2006, mortgages registered a marked slowdown with the eruption of the financial crisis. The cost of credit in Italy, broadly stable between the late eighties and the start of the nineties, showed a marked increase during the financial crisis of 1992, followed by a sharp decline in the wake of Italy joining the Economic and Monetary Union. In particular, the average interest rate charged on mortgage loans to households diminished to about 5% in 1999 from 12.5% in 1995. With the establishment of the euro area, bank rates closely followed the pattern of money market rates and the effects of monetary policy decisions. A further explanatory factor behind the decline in the cost of credit in recent years stems from the common international trend of financial liberalization and product de-specialization shared by the Italian banking system, as well as from the rapid increase in the number of intermediaries, both domestic and foreign, especially in the mortgage loan market (Nobili, Zollino, 2012).

From 2008 to 2011 the new loans granted by banks to households have decreased, both in number and amount. The drop mainly concerned younger and non-younger customers originating in European Union countries. These debtors suffered the most from the recession - in particular the rise in the unemployment rate and the fall in income available - and more selective banks' policies (Felici et al., 2012).

2.2 Macro Economic Factors

Gdp: There is not a single and standardized pricing method for such an opaque asset as real estate; lending subjects need to evaluate collaterals' value maybe also affected by the overall economy trend (Bernanke et al., 1994). There is not a unique banking sector approach, across countries, for evaluating both loan application and collateral value; in particular countries where evaluation criteria is strongly linked with mark to market trend are those characterized by a solid linkage between mortgages and macro-economy trend (Tsatsaronis and Zhu, 2004). For example

if we consider a credit-rationing scenario, we can observe a cyclical borrowing capability that increases when the economy is rising and falls when the economy shrinks (Kiyotaki and Moore, 1997). In fact, a GDP increase could prove to have a combined effect on the mortgage market as it both influence real estate assets technology standards as well as housing preferences for individuals. Usually, the decision to invest, like house ownership, is fundamentally based on the current and the expected permanent future individual income; nevertheless every swing in the macro-economy can have an impact on the forecast of future income and therefore influence current investment choices (Goodhart and Hofmann, 2008). This is the case when, for example, the economy is growing, as a result average current and expected wealth increase and there is a significant incentive for individuals to become homeowners, due to the perspective of a better wage and overall wealth than the current state of art (Hubbard and Mayer, 2009). Notwithstanding investing in real estate ownership for individuals does imply the necessity of borrowing money, as it is almost impossible to become an owner paying fully by cash, so an increase in the homeownership implies a growth of the mortgage lending market. On the opposite, when the economy shrinks the mortgage market decline too as consumption and investment expenses decrease and long-term investors may prefer to wait a better moment to start a new residential real estate investment (Mogaka et al., 2015).

Furthermore, the GDP growth is normally related to technology innovation, which could also affect real estate sector due to new construction techniques and/or quality of services requested for housing. For example, the higher is the quality standard of materials used for housing investment the higher is the value of the asset as collateral for a loan request and so the higher will be the amount of loans outstanding (Iacoviello and Neri, 2010). Still the linkage between the real estate market and overall economy trend cannot exempt the higher volatility housing investment suffers with respect to other assets and services produced by an economy (Davis and Heathcote, 2005).

Inflation: Literature shows that inflation changes in the price level leaves mortgages demand unchanged. The challenge to this interpretation came by economist building on two arguments: inflation and the standard fixed payment mortgage combined to the size of the mortgage loan; an increase in the rate of anticipated inflation of the general price reduces the after-tax cost of housing, thus increasing the demand for housing and demand for homeownership (Khairunnisa et al, 2020). In particular, a 1% increase in the annual rate of anticipate inflation of the general price level reduces aggregate housing demand by about 4-5% (Follain, 1982). However, the inflation could have a double effect. On the one hand, the attractiveness of the mortgage can increase if you consider that the real value of the mortgage debt decreases. On the other hand, since financial institutions usually impose loan limits based on repayment relationships, inflation will be lower imply lower nominal interest rates that will increase the maximum amount a financial institution will make lend to the family (Stevens, 1997). In general, the house buyers are willing to take a larger mortgage in periods of low inflation because they fail to acknowledge that inflation lowers the real value of debt and this is coherent with the notion of money illusion (Shafir et al., 1997). Inflation increase the riskiness of fixed rate mortgage and stabilizing adjustable rate mortgage, an important element in household risk management. Campbell and Cocco (2003) highlight risk differences between fixed rate mortgage and adjustable rate mortgage, finding that a fixed rate mortgage with a prepayment option is expensive in a stable or deflationary environment. Adjustable rate mortgage conversely, limit potential risks associated with inflation uncertainty, yet are subject to income risk due to the short-term variability in monthly payments that may force a reduction in future consumption.

Exchange Rate: The mortgage market is of particular importance from the perspective of monetary policy as it plays an important role in the mechanism that transmits changes in the ECB's policy rates to housing investment and consumption by households, and ultimately to output and prices (Issing, 2005). When the interest rate is rising, the cost of borrowing is also rising and the potential buyers are getting discouraged. As a result housing demand is falling. On the contrary, when the interest rates are on the decrease, e.g. because of money supply growth,

then the user cost of housing is going down and the demand for housing is rising (Apergis and Rezitis 2003; Igan et al. 2011, Jha, 2019).

Frederic (2007) detects six direct and indirect ways in which the rate is affecting the housing market: directly on the user cost of capital, on the expectations for the future movements of prices and on the housing supply; indirectly through housing wealth changes and credit-channel effects on consumption and on demand.

Kibuthu (2005) investigated the extent to which borrowing respond to interest fluctuations. The study showed that there exists a strong negative linear relationship between lending rates and volumes of borrowings. The amounts borrowed increase with declining lending rates, as the private sector will be more willing to take on more credit.

Employment: Friedman (1967) argued that the equilibrium level of unemployment can be expected to depend upon structural forces such as the degree of labour mobility in the economy, while addressing the American Economic Association. Nevertheless, it is possible that the functioning of the labour market is haped by the nature, and inherent flexibility and dynamism, of the housing market (Layard et al, 1991) and not only by long-studied factors such as the generosity of unemployment benefits and the strength of trade unions.

Flatau et al. (2003) presented empirical work for Australia that suggested that mortgage payments could provide important incentives for job search. In particular, they showed that highly leveraged male workers were more likely to find a job soon after becoming unemployed than outright owners.

The relationship between homeownership and unemployment is an intriguing one. According to Oswald's thesis (see Oswald 1996, 1997, 1999) there is a positive correlation between the two. The connection between homeownership and unemployment is policy-relevant, as in many countries homeownership is encouraged (for instance, by the tax deductibility of mortgage interest payments). Thus, Oswald's thesis prompts questions of both a policy and a research nature, as is also witnessed in studies by Coulson and Coulson and Fisher (2009) and Green and Hendershott (2001).

More recently, Kantor et al. (2015) and Kusairi et al. (2019), findings support earlier micro-econometric results that homeownership tends to accelerate a successful job search.

National Savings Rate: Several past studies observed that one of the main requirements of the mortgage market is the availability of funds in form of accumulated savings. In fact, when the level of savings in an economy is high, the funds available to the mortgage market are high. Indeed, as the mortgage lenders are in the business of financial intermediation they are constantly relying on accumulated savings in an economy. Japelli and Pagano (1994) develop a simple overlapping-generations model to examine down payment constraints and saving rate showing that requiring larger down payments leads to significant increases in household savings. Their prediction is confirmed by their empirical findings, and by the empirical findings of a later study by Engelhardt (1996). The explanation supporting their result is that larger down payments impose a constraint on how much households can borrow, and this leads to an increase in aggregate saving. They also show that increased aggregate saving in turn leads to a bigger economic growth. This conclusion is in contrast to the conclusion of earlier studies that capital market imperfections hinder, not accelerate, growth. According to Japelli and Pagano (1994), the source of the departure from the conclusion of the earlier studies is the following: while earlier models focus on business credit, the focus in Japelli and Pagano (1994) is on the supply of credit to households.

2.3 Informal Sector and Mortgage Market
The majority of the workers active in the informal sector have not formed their unions or associations. Therefore, they remain without any representative organizations, which could help them to fight against the injustices they face every day (Gumber, 2002). They often have low and

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irregular income (Alam and Mahal, 2014) and the lower an individual earns, the worse will be his health (Bansod and Pedgaonkar, 2014). Moreover, high out-of-pocket health expenditure can lead to a significant burden on poor households: indebtedness and sometimes selling and mortgage of the household asset to pay for the health care expenditure (Gumber, 2000; James, 2004; Sunder and Sharma, 2002). In fact, a health shock leads to direct expenditure on medicines, transport, user fees and proper nutrition as well as the income forgone in the event of illness (Bhat & Jain, 2006; Choudhary, 2014; Yojana, 2014). As a result, most of the workers employed in the informal sector do not seek care unless it becomes necessary (Prinja, 2014).

In developing economies, like India, discussions on prospective reforms to achieve effective government-provided housing finance focused on minimizing bottlenecks that restricted access to housing credit. Discussed mechanisms needed to provide innovative banking alternatives with flexible guarantees and collateral requirements for those living in poverty and those working in the informal sector (Martin and Mathema, 2008). The financial sector had excluded lending to households with low and irregular incomes because of perceived repayment risk. As a result, prospective borrowers had limited access to banking services. Such low bank penetration further marginalized borrowers and reinforced a culture of unfamiliarity and uneasiness with housing finance products. Because of this perceived risk and unease in lending to low-income slum dwellers, higher interest rates and loan servicing costs further excluded such borrowers with their smaller loan sizes.

After using a multi-clustered stratified sample data of households residing in informal settlements in Jakarta, Indonesia, Saleh (1999) found that mortgage loans were inaccessible to majority of households employed in the informal sector due to the nature of their incomes and the strict requirements of loan collateral by the formal housing finance sector. Using ratio analysis, Taylor and Jureidini (1994) found that housing repayment requirements for women borrowers in Australia were consistently higher by more than ten percent than for men. They hypothesized that this could be due to the secondary status assigned to women's income and the uncertainty of continuation of women in work owing to domestic reasons, which represent another form of informal employment.

3. EMPIRICAL ANALYSIS
3.1 Sample
We merged three data sources in order to build the file used in our baseline estimation: Bank of Italy, Eurostat and ISTAT (Italian National Statistical Institute). The sample consider the total residential mortgage by the banking sector for real estate from the annual reports of the Bank of Italy. Data on macro-economic factor as GDP, exchange rate, house price index, inflation was collected leveraging on Eurostat Database. Data regarding the informal sector employment, national saving rate, formal sector employment, was obtained from the statistical bulletins published by the ISTAT. Eventually, data on treasury bill rates derived from Italian Government data repository. Data are yearly observations and the time span goes from 1999 to 2019.

3.2 Methodology
The methodology we adopted is the multiple regression analysis. Before performing the regression analysis, we ran a normality test and a correlation test on data. Since we are investigating a sample consisting of less than 50 observations, the most appropriate normality test is the Shapiro Wilk test. If the statistic value is too small, equal to less than 0.05, the test it is the null hypothesis that makes it normal (Shapiro and Wilk, 1965).

As anticipated, we also performed a correlation analysis to observe the existence of a possible linear relationship between the independent variables and the dependent variable. This test serves to check if the variables are unrelated and therefore independent, in that case, regression analysis is not necessary. Given the sample data, the Pearson test is the most appropriate test. However, it was necessary to test for multicollinearity before the regression analysis because, if the independent variables exhibit strong multicollinearity, the regression model is deemed unreliable leading to problems when doing interpretation (Coakes, Steed & Price, 2008).

The analysis of the impact of macro economic and informal sector on residential mortgage is performed by using the approach proposed by Wichura (2006) and Mogaka et l. (2015):

$$REM_t = \alpha_t + \gamma_1 Infl_{t-1} + \gamma_2 \Delta GDP_{t-1} + \gamma_3 ISec_{t-1} + \gamma_4 ISecE_{t-1} + \gamma_5 FSecE_{t-1} + \gamma_6 NSR_{t-1}$$

$$+\gamma_7 TBR_{t-1} + \gamma_8 GDPcap_{t-1} + \gamma_9 REER_{t-1} + \delta_1 FinCrisis_{it} + \varepsilon_{it}$$

where the variables are specified as
REM_t = outstanding residential mortgage
$Infl_{t-1}$ = average inflation rate
ΔGDP_{t-1} = growth rate of the real gross domestic product (GDP)
$ISec_{t-1}$ = added value produced by the informal sector as a percentage of GDP
$ISecE_{t-1}$ = irregular employment rate (Informal Sector Employment)
$FSecE_{t-1}$ = regular employment rate (Formal Sector Employment)
NSR_{t-1} = national saving rate
TBR_{t-1} = treasury bill rate
$GDPcap_{t-1}$ = GDP per capita
$REER_{t-1}$ = real effective exchange rate (to control for external competitiveness)
$FinCrisis_t$ = dummy variable to control for the financial crisis period that assumes the value of one from 2008 to 2009 and zero otherwise (Reinhart and Rogoff, 2009)

3.3 Results
3.3.1 Shapiro-Wilk Test of Normality
A preliminary analysis of the data is performed. We run a normality test in order to understand if variables are distributed around a mean value (Table 1).

Variables	Obs	W	Prob>z
REM_t	20	0.94305	0.32554
$Infl_{t-1}$	20	0.91483	0.11472
ΔGDP_{t-1}	20	0.90538	0.07246
$ISec_{t-1}$	20	0.94764	0.38567
$ISecE_{t-1}$	20	0.94284	0.35389
$FSecE_{t-1}$	20	0.80101	0.06223
NSR_{t-1}	20	0.90247	0.05346
TBR_{t-1}	20	0.91297	0.09207
$GDPcap_{t-1}$	20	0.86173	0.05221
$REER_{t-1}$	20	0.96892	0.77655

Legend: REM = outstanding residential mortgage, Infl = average inflation rate, GDP = growth rate of the gross domestic product, ISec = informal sector as a percentage of GDP, ISecE = informal sector employment, FSecE = formal sector employment, NSR = national saving rate, TBR = treasury bill rate, GDPcap = GDP per capita, REER = real effective exchange rate.
Source: Istat, Eurostat and Italian Government data processed by the author.

TABLE 1: Test of Normality for all variables.

As shows in Table 1, the significance levels of all the data are more than 0.05 and these values indicate that the data are normally distributed. In particular, the higher value can be note for average exchange rate (0.776), the variables on informal sector (0.385 and 0.353) and outstanding residential mortgage (0.325). Minimum values, however higher than 0.05, can be note instead in the GDP per capita (0.052) and the variables about the formal sector employment (0.062).

3.3.2 Pearson Correlation Test

With the correlation test, each independent variables was be analysed with the dependent variable, make a correlation matrix (Table 2).

	REM_t	$Infl_{t-1}$	ΔGDP_{t-1}	$ISec_{t-1}$	$ISecE_{t-1}$	$FSecE_{t-1}$	NSR_{t-1}	TBR_{t-1}	$GDPcap_{t-1}$	$REER_{t-1}$
REM_t	1.000									
$Infl_{t-1}$	-0.287	1.000								
ΔGDP_{t-1}	0.532	-0.406	1.000							
$ISec_{t-1}$	0.354	-0.254	0.534	1.000						
$ISecE_{t-1}$	0.435	-0.370	-0.096	-0.112	1.000					
$FSecE_{t-1}$	-0.322	-0.191	0.326	0.178	-0.524	1.000				
NSR_{t-1}	-0.466	0.332	-0.438	0.261	-0.292	0.514	1.000			
TBR_{t-1}	-0.329	0.537	-0.314	0.340	-0.100	0.070	0.445	1.000		
$GDPcap_{t-1}$	0.447	-0.557	0.383	-0.145	-0.009	0.176	-0.285	-0.666	1.000	
$REER_{t-1}$	0.229	-0.323	0.080	0.364	-0.494	0.514	-0.348	-0.277	0.163	1.000

Legend: REM = outstanding residential mortgage, Infl = average inflation rate, GDP = growth rate of the gross domestic product, ISec = informal sector as a percentage of GDP, ISecE = informal sector employment, FSecE = formal sector employment, NSR = national saving rate, TBR = treasury bill rate, GDPcap = GDP per capita, REER = real effective exchange rate.
Source: Istat, Eurostat and Italian Government data processed by the author.

TABLE 2: Pearson Product-Moment Correlation for all variables.

The table shows that there is a strong and negative correlation between the following variables: TBR and GDP per capita (-0.666) and GDP per capita and inflation (-0.557). On the other hand, we find a positive correlation only between TBR and inflation (0.537). All the other relationships present values that shows a medium level of correlation between them.

3.3.3 Multicollinearity Test

Condition	$Infl_{t-1}$	ΔGDP_{t-1}	$ISec_{t-1}$	$ISecE_{t-1}$	$FSecE_{t-1}$	NSR_{t-1}	TBR_{t-1}	$GDPcap_{t-1}$	$REER_{t-1}$	ε
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.357	0.02	0.03	0.00	0.00	0.00	0.03	0.04	0.05	0.00	0.00
2.759	0.03	0.15	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00
6.432	0.41	0.22	0.02	0.00	0.00	0.12	0.00	0.00	0.00	0.00
8.965	0.53	0.02	0.09	0.00	0.02	0.23	0.33	0.36	0.02	0.00
11.001	0.24	0.47	0.03	0.05	0.46	0.16	0.45	0.02	0.00	0.03
14.658	0.32	0.46	0.34	0.03	0.62	0.00	0.26	0.42	0.06	0.12
23.553	0.02	0.03	0.08	0.47	0.41	0.45	0.15	0.56	0.09	0.34
25.745	0.01	0.04	0.02	0.59	0.78	0.98	0.21	0.72	0.24	0.56

Legend: Infl = average inflation rate, GDP = growth rate of the gross domestic product, ISec = informal sector as a percentage of GDP, ISecE = informal sector employment, FSecE = formal sector employment, NSR = national saving rate, TBR = treasury bill rate, GDPcap = GDP per capita, REER = real effective exchange rate.
Source: Istat, Eurostat and Italian Government data processed by the author.

TABLE 3: Collinearity analysis for all control variables.

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Table 3 shows the collinearity diagnostic for the macroeconomic variables assessed. In particular, the variable National Saving Rate shows a high coefficient value, therefore, there is collinearity for this variable.

3.3.4 Regression Model

	Coef.	P>|t|	Std. Err.	t-test
Average Inflation	0.607	0.017	0.523	1.50
GDP Growth	1.336	0.045	0.561	2.38
Percentage Informal Sector per GDP	0.228	0.027	0.024	3.18
Percentage Informal Sector Employment	0.995	0.009	0.289	3.45
Percentage Formal Sector Employment	-1.061	0.553	0.716	4.62
National Savings Rate	0.017	0.242	0.813	1.26
Treasury Bill Rate	0.013	0.967	0.212	2.04
GDP per capita	0.825	0.799	0.630	2.36
REER	-0.999	0.091	0.520	1.92
ε	-1.122	0.132	0.670	2.68

Legend: REM = outstanding residential mortgage, Infl = average inflation rate, GDP = growth rate of the gross domestic product, ISec = informal sector as a percentage of GDP, ISecE = informal sector employment, FSecE = formal sector employment, NSR = national saving rate, TBR = treasury bill rate, GDPcap = GDP per capita, REER = real effective exchange rate.
Source: Istat, Eurostat and Italian Government data processed by the author.

TABLE 4: Impact of Informal sector and macro economic variables on residential mortgages.

R-squared	Adj R-squared	Std. Error of the Estimate
0.832	0.633	0.069

TABLE 5: Model Summary.

The table 4 shows the model output coefficients, t test and beta statistics. The predictor variables were average inflation, GDP growth, Percentage informal sector per GDP, Percentage informal sector employment, Percentage formal sector employment, national saving rate, Treasury bill rate, GDP per capita and average exchange rate. The influence of each explanatory variables, both in magnitude and direction, has been estimated by the regression analysis. The main output, considering only predictor variables statistically significant based on the t-test result, are the following: a unit increase in average inflation will cause a 0.607 increase in residential mortgage, while a unit increase in GDP growth will cause an increase in residential mortgage by 1.336. Moving to Informal sector predictor variables there is a huge difference in magnitude between but not directionally between Percentage informal sector per GDP and Percentage informal sector employment, a unit increase of these variables cause an increase of residential mortgage by respectively 0.228 and 0.995. The only other significant variable is the average exchange rate; a unit increase in average exchange rate would cause a decrease in residential mortgage by -0.999, thus being the only negative correlation we find among significant variables we are considering. We find that the other variables (Percentage formal sector employment, national saving rate, treasury bill rate and GDP per capita) are not statistically significant based on the regression analysis.

Table 5 shows that the residential mortgages are influenced by control variables used in the model. In fact, 65,4% of the variation in residential mortgage can be explained by inflation, GDP growth, Informal sector, formal sector employment, national saving rate, treasury bill rate, GDP per capita and real effective exchange rate.

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4. CONCLUSIONS AND POLICY IMPLICATIONS

This paper examines the influence of macro-economic variables, including informal sector, on the growth of the mortgage market in Italy considering data from 2009 to 2019. The methodology we adopted is the multiple regression analysis. Before performing the regression analysis, we ran a normality test and a correlation test on data. In departure from literature, inflation has a positive relationship with mortgage growth, just like GDP per capita and informal sector employment. Various such as Boamah (2009) and Chiquier et al. (2004) argue that the residential mortgage market grows in a stable macroeconomic environment.

Our results suggest that in Italy, residential mortgages are more driven by informal sector employment than formal sector employment. We show that there a positive and potentially high correlation between residential mortgage and informal sector. In particular, we find that a unit increase in Percentage informal sector employment will cause an increase in residential mortgage by 0.995 as confirmed by Martin and Mathema (2008) and Taylor and Jureidini (1994), while Percentage informal sector GDP will cause an increase of 0.228 in residential mortgage. This may be counterintuitive, as the informal sector magnitude should represent a weaker access to credit for borrowers; nevertheless it may also be the case that informal sector increase anticipate GDP growth signalling a subsequent positive economic downturn. Thus, financial institutions will increase residential mortgage due to the informal sector growth signalling a positive economic trend and thanks to these results we are able to implement the existing literature on the subject.

This work may help financial institutions suggesting how to include informal sector dynamics into residential mortgage pricing, as well as policymakers to read residential mortgage market dynamics and derive informal sector insights.

In a recent publication from the Journal of Business Research and Management (Cristofaro et al., 2021) four main areas of investigations were highlighted while reviewing the Journal's focus in the past years: marketing, technology and innovation management, operations and supply chain management and organizational behavior. This work mainly focus on the sub-topic of how to leverage and complement customer's behaviours insights from traditional sources by including the non-formal sector employment variable. In fact, as we clearly showed in our research it can significantly improve and potentially anticipate customer's behaviour changes while ahead other traditional sources of insights that marketing team would look into.

Original contribute is the effort to include over macro-economic factors, the informal employment sector and Informal sector in terms of value added as a percentage of GDP, in order to explain mortgage market dynamic in Italy and which role these three different drivers play in this.

This work shall serve as a starting point to continue investigation around which signalling the informal sector provide for residential mortgage markets. Both for financial institutions, which could include this variable for mortgage pricing as well as for policymakers to read residential mortgage market dynamics and derive informal sector insights.

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