27th Annual Conference of the European Real Estate Society (ERES)
2 – 5 June 2021, Kaiserslautern, Germany

The Causality between Mortgage Credit and House Prices: The Turkish Case

S. Belgin Akçay and Mert Akyüz (Ankara University)
Çağın Karul (Pamukkale University)

Motivation

The importance of the housing sector

- Contribution to the economy (e.g. employment, economic growth),
- Contribution to social order (e.g. social peace, happiness, and mental health of people),

The Importance of housing for households as a shelter

- *The highest share of household expenditures relates to the house itself; e.g., 30.5% for Turkish households (2019)*
- *The greatest financial commitment for households*

The importance of the mortgage credit

- The share of mortgage debt in total household debt (*70%*) (Cerutti et al, 2017)

Literature Review

Country Level	
Asian Countries	Gerlach and Peng, 2005; Liang and Cao, 2007; Park et al., 2010; Che et al. , 2011; Qi and Zheng, 2014; Addae-Dapaah and Anh, 2014; Ibrahim and Law, 2014; Su et al., 2019.
European Countries	Hofmann, 2004; Graber and Seizer, 2007; Fitzpatrick and Mcquinn.2007; Brissimis and Vlassopoulos, 2009; Oikarinen, 2009; Gimeno and Martinez-Carrascal, 2010; Hott, 2011; Stephanyan and Guo, 2011; Taltavull de La Paz and White, 2012, 2014; Anundsen and Jansen, 2013; Rebi, 2014; Basten and Koch 2015; Punzi, 2016; Nobli and Zolina, 2017; Öhman and Yazdanfar; 2018; Ryczkowski, 2019, Tunc, 2020.
Asian + OECD countries	Hofmann, 2003; Collyns and Senhadji, 2005; Favara and Imbs, 2015
Cross-Country Level	
Asian+OECD countries	Goodhart and Hofmann, 2008; Jordà, Schularick and Taylor, 2015.
Asian+countries	**Both Country and Cross-Country Levels** Collyns and Senhadji, 2005.

Literature Gap

- No study on the causality between credit and house prices for Turkey.
- Tunç, 2020

Aim of the study

- To investigate whether there is a causal relationship between credit and house prices in Turkey
- To test the theory for Turkey (financial accelaration mechanism, life-cycle approach of household consumption()

Methodology

- **Method:** The vector autoregressive (VAR) model by employing four causality tests;

  Granger causality test

  Toda-Yamamoto causality test

  Fourier Granger causality test

  Fourier Toda-Yamamoto causality test

- **Sample**: Turkey
- **Period**: 2010m1 and 2020m9
- **Source of data:** The Central Bank of the Republic of Turkey (TCMB) and the Organization for Economic Co-operation and Development (OECD)

Methodology

- To set up our VAR model, the approaches of Goodhart and Hofmann (2008) and Oikarinen (2009) are followed.
- **Differences**
- Mortgage credit divided by total credit is used as a measure of mortgage credit supply.
- Industrial production index is included as a measure of total output by following Sadorsky (1999), Papapetrou , (2001) and Huang, Hwang, and Peng (2005
- Application of three different causality tests in addition to the Granger causality test,

Model Specification

Our Var model is;

$$y_t = Z_t + A_1 y_{t-1} + \cdots + A_p y_{t-p} + \varepsilon_t$$

$\boldsymbol{y_t}$: : endogenous variables (house price, mortgage credit, mortgage interest rates and industrial production index

$\boldsymbol{Z_t}$: the deterministic term, which is $Z_t = \alpha_0$ for constant model and $Z_t = \alpha_0 + \alpha_1 t$ for constant and trend model

$\boldsymbol{A}$: the coefficient matrices

$\boldsymbol{p}$: the lag length

$\boldsymbol{\varepsilon_t}$: independent and identically distributed errors.

Results from Causality tests for Model with constant

Direction	Test	Wald	Asym. p-val.	Boot. p-val.	Lag	Frequency
credit ≠> hp	GC	12.974***	0.000	0.002	1	-
	TY	13.275***	0.000	0.001	1	-
	Single FGC	16.852***	0.000	0.000	2	3
	Single FTY	13.440***	0.001	0.004	2	3
	Cum. FGC	23.754***	0.001	0.005	7	3
	Cum. FTY	22.590***	0.002	0.007	7	3
hp ≠> credit	GC	0.134	0.714	0.738	1	-
	TY	0.216	0.642	0.648	1	-
	Single FGC	1.447	0.485	0.479	2	3
	Single FTY	0.502	0.778	0.779	2	3
	Cum. FGC	6.066	0.532	0.567	7	3
	Cum. FTY	6.264	0.509	0.517	7	3

Results from Causality tests for model with constant and trend

Direction	Test	Wald	Asym. p-val.	Boot. p-val.	Lag	Frequency
credit ≠> hp	GC	13.819***	0.000	0.001	1	-
	TY	14.589***	0.000	0.000	1	-
	Single FGC	16.729***	0.000	0.001	2	3
	Single FTY	13.359***	0.001	0.003	2	3
	Cum. FGC	23.020***	0.002	0.006	7	3
	Cum. FTY	21.913***	0.003	0.006	7	3
hp ≠> credit	GC	0.088	0.766	0.764	1	-
	TY	0.179	0.672	0.654	1	-
	Single FGC	1.435	0.488	0.499	2	3
	Single FTY	0.475	0.789	0.785	2	3
	Cum. FGC	6.015	0.538	0.560	7	3
	Cum. FTY	6.355	0.499	0.497	7	3

Findings

- The results of four tests are the identical, but with different size.

✓ *There is a one-way causality between mortgage credit and house prices in Turkey.*

✓ *The direction of the casuality is from credit to house prices.*

- The results do not support the theory for Turkey.
- The results are similar to those of the developments in both Turkish mortgage and housing markets at the beginning of 1990s and mid-2000s as well as the second quarter of 2020 during the Covid-19 pandemic.

Conclusion

- In Turkey, the credit markets, not the housing markets are decisive in the relationship between credit and house prices.
- One suggestion can be monetary policy alone may have a strong effect on controlling over rapid house price movements.

Policy Recommendations

- Understanding the existence of a causal relationship between mortgage credit and house prices may contribute to more efficiently using the tools of both macroeconomic policy and microeconomic policy to manage the Turkish mortgage credit and housing markets.
- Understanding importance of the direction of causality between mortgage credit and house prices is likely to prevent and/or mitigate the negative effects of sudden and rapid price movements on housing markets as well as on the vulnerability of credit markets and thus on the economy.

Thank you for your attention

Yamamoto (TYC) approach: $\boldsymbol{VAR(p+d)}$ model

$$y_t = Z_t + A_1 y_{t-1} + \cdots + A_p y_{t-p} + \cdots + A_{p+d} y_{t-\mathbf{(p+d)}} + \varepsilon_t$$

VAR model (p) with Fourier approach
(Enders and Jones, 2016)

$$y_t = Z_t + A_1 y_{t-1} + \cdots + A_p y_{t-p} + \varepsilon_t$$

Deterministic term:

$$Z_t \cong \alpha_0 + \sum_{k=1}^{n} \gamma_{1k} sin\left(\frac{2\pi kt}{T}\right) + \sum_{k=1}^{n} \gamma_{2k} cos\left(\frac{2\pi kt}{T}\right)$$

VAR model (p+d) with Fourier approach
(Nazlioglu et al., 2016)

Toda and Yamamoto Model:

$$y_t = Z_t + A_1 y_{t-1} + \cdots + A_p y_{t-p} + \cdots + A_{p+d} y_{t-(\mathbf{p+d})} + \varepsilon_t$$

Toda and Yamamoto with Fourier approach :

$$y_t = \alpha_0 + \sum_{k=1}^{n} \gamma_{1k} sin\left(\frac{2\pi kt}{T}\right) + \sum_{k=1}^{n} \gamma_{2k} cos\left(\frac{2\pi kt}{T}\right) + A_1 y_{t-1}$$
$$+ \cdots + A_{p+d} y_{t-(p+d)} + \varepsilon_t$$

Table 2: Results from ADF unit root tests

Variables	Level				First Difference		
	ADF		Lag		ADF		Lag
	Constant						
hp	-1.637		1		-7.504	***	0
credit	-0.952		0		-11.125	***	0
int	-3.107	**	1		-6.886	***	1
ipi	-2.634	*	2		-10.979	***	1
	Constant and Trend						
hp	-0.939		1		-7.650	***	0
credit	-2.862		0		-11.082	***	0
int	-3.313	*	1		-6.882	***	1
ipi	-4.223	***	0		-11.411	***	1

Table 3: Results from Fourier ADF unit root tests

Variables	Level					First Difference			
	FADF		Lag	k		FADF		Lag	k
	Constant								
hp	-1.571		1	2		-8.149	***	0	1
credit	-0.602		0	3		-9.893	***	0	3
int	-3.495	**	1	3		-7.265	***	1	3
ipi	-3.724	*	2	1		-10.998	***	1	2
	Constant and Trend								
hp	-1.922		1	1		-8.200	***	0	1
credit	-3.431		0	3		-9.851	***	1	3
int	-4.091	**	1	3		-7.230	***	1	3
ipi	-5.389	***	0	1		-11.646	***	1	1

Notes