



Stabilizer or multiplier: The manifestation of theoretical policy effect on the house prices

Sunyub Kim*

Abstract

This paper employs Jorda's (2005) local projection (LP) methodology to assess the impact of macro-economic policies on apartment prices pre-and post-COVID-19. It contemplates the economic linkages to estimate the multiplier effects of the monetary and fiscal shocks as they are transmitted to the apartment prices through the so-called COVID proxies. This paper introduces a reduced number of economic proxies that substantially explain the impact of the COVID-19 pandemic on aggregate production in South Korea: unemployment; oil prices; uncertainties. I use these COVID proxies that are exogenously given, as a set of channels through which the transmission paths of the macroeconomic policies linked towards the apartment prices are misaligned with the desired paths. The LP model provides a reasonably good explanation to the varying effects of financial shocks pre-and post-COVID-19 by predicting the state-dependent impulse responses. The impulse responses suggest that the monetary multipliers on apartment prices are larger and more significant during the COVID-19 crisis than during normal times, while it is vice versa in terms of fiscal multipliers.

Key words: local projection, COVID-19 crisis, apartment price, monetary policy, fiscal policy

1. Introduction

Housing prices in Korea have gone through a sudden rise during the COVID-19 crisis while Korea's aggregate income and consumption were greatly dampened by the government's social

distancing policies. It is unexplainable by a standard neoclassical model which predicts that house prices and aggregate income grow at a constant ratio (Chen and Wen, 2017). The breakdown of the supply chain also increased unemployment rate and uncertainties during the pandemic (Auerbach et

* Ph. D. in Economics, The University of Chinese Academy of Social Sciences, E-mail: yuvbie87@gmail.com

al., 2021; Kinda et al., 2022).

Closely associated with the sudden formation of housing boom amid the severe economic recession is the conduct of expansionary monetary policies. In March 2020, the Bank of Korea (BOK) lowered the policy rate to 0.75% from 1.25%, and sequentially lowered it to 0.5% in May 2020. During the same period, the Korean government also provided the first round of emergency relief funds. Households were given 40 thousand to 1 million won accordingly to the number of house members. Consequently, the 2020:Q2 saw a rise of 1.5% in consumption from the previous quarter (김미루 · 오윤해, 2020). Likewise, 93.7% of the COVID-19 relief funds were estimated to have been spent on consumption expenditure (이태석, 2020).

The emerging strand of literature on the political measures during the COVID-19 crisis shed light on the roles of monetary and fiscal policies during the crisis. Auerbach et al. (2021) argue that the fiscal multipliers are larger during the peak of the pandemic crisis. Brzoza-Brzezina et al. (2021) empirically show that the conduct of expansionary monetary policy is recommended when the lock-down policy is optimal. However, Nwogugu (2021) points out to the adverse policy contagion of monetary and fiscal policies during the pandemic insisting that the monetary transmission of the cash stimulus was misdirected creating bubbles in the asset market. Fornaro and Wolf (2020) and

Lepetit and Fuentes-Albero (2022) argue that the monetary policy is less likely to be effective once the spread of the virus suppresses demand when the nominal rate is declined near to the zero lower bound (ZLB).

This paper contributes to this line of literature by investigating the role of monetary and fiscal shocks and the endogenous regime switching between two different regimes: non-COVID and COVID. I provide evidence for the impact of the pandemic on the transmission channels of political shocks linked to house prices by examining the state-dependent responses of Korean apartment prices and the policy multipliers on apartment prices. I extend the discussion by matching the pre-and post-COVID periods to the economies with and without the liquidity trap determined by low-interest rates and economic slack.

The empirical results suggest that apartment prices respond positively to the monetary shock, but negatively to the fiscal shock in the COVID regime. The monetary multipliers on apartment prices are larger in the COVID regime while the fiscal multipliers are smaller. The apartment prices respond positively to the monetary shock in the ZLB state and in the economic slack, while it is the opposite for fiscal shock. The estimation of cumulative multipliers also provides consistent results. The major contribution of this paper is that the inclusion of the COVID proxies, namely

unemployed, oil price, uncertainty in the local projection (LP) process evidence that the economic state with the pandemic intensifies the ineffectiveness of the monetary policy.

The rest of the paper is structured as follows. Section II discusses the stylized facts. Section III presents the model framework. Section IV provides the main results and Section V presents the results associated with the ZLB and economic slack. Section VI provides the robustness checks and Section VII summarizes the findings.

II. Stylized Facts

1. ZLB and Monetary Shocks

The effectiveness of monetary policy at ZLB is widely studied by many researchers (Gambacorta et al., 2014; Inoue and Rossi, 2021; Wu and Xia, 2016). The ZLB on nominal interest rates impedes the transmission channels of monetary policy, particularly when inflation is low (Borio and Hofmann, 2017; McCallum, 1999). There is another interest rate termed the ‘reversal interest rate’ which resembles the property of ZLB. A reversal interest rate is a rate at which the accommodative monetary policy reverses its expected effect and turns contractionary (Brunnermeier and Koby, 2018). Christiano and Eichenbaum (1992) point out that the strong liquidity effect of money shock

can drive the nominal rate down by oppressing the inflation premium. However, if the consumption channel is blocked owing to the ZLB, it is predicted that low inflation in a liquidity trap generate asset bubbles. The underlying notions of the ZLB and the liquidity trap are connected to each other as the ZLB is one of the monetary transmission channels inducing the liquidity trap (Ullersma, 2002).

2. Liquidity Trap and Fiscal Shocks

Mertens and Ravn (2014) discuss that the fiscal multiplier is larger at the ZLB state. Likewise, Christiano et al. (2011) and Eggertsson (2009) argue that fiscal multipliers are larger in liquidity traps than in the normal state. Lustenhouwer (2020) argues that fiscal stimulus with government spending is conducive to resolving the liquidity trap. Afonso and Sousa (2009) show that the effect of fiscal shock on house prices is positive and persistent. Ali al-Nowaihi and Dhimi (2016) argue that under the possibility of a liquidity trap, the monetary stimulus can soon be exhausted when the discretion on fiscal policy is retained. Woodford and Xie (2022) point out that welfare can be maximized when the monetary and fiscal policies are contemporaneously committed as the ZLB is dissipated. Coenen et al. (2012), Farhi and Werning (2016), and Dime et al. (2021) insist that fiscal multipliers are larger

when the government spending is accommodated by the monetary policy or when the nominal rate is near ZLB. (H1) These findings extract a hypothesize that the impact of monetary shock on house prices are more evident than the fiscal shock in the post-COVID with a nominal rate near ZLB.

3. Supply Bottleneck during the Pandemic

According to a publication issued by the Korea Institute for Industry Economics & Trade (여유진 외, 2021), the growth rates of household consumption and construction investment fell by 7.4% and 3.4%, respectively after the pandemic. The number of employed decreased by 457 on the basis of 1,000 persons along with a fall in GDP growth rate, 3.7%. The oil markets were severely damaged by COVID-19 and the failure of the oil negotiation between Russia and Saudi Arabia (2020:3-4) (Ma et al., 2021). Amid the heightened uncertainties, the desire to hold nominal liquid assets generates deflationary economic pressures (Haan et al., 2017). Heightened uncertainty raises the land prices while delaying land development (Cunningham, 2006). (P1) This leads to a prediction that the political effects on house prices are altered by the COVID channels as the downward pressures on the nominal rate and the presence of economy slack lead to the distortion of the desired political transmission paths.

III. Model Framework

1. Methodology

Jordà (2005)'s LP methodology is widely used in macroeconomic research to estimate impulse responses when the number of variables are limited and when the lag length is misspecified (Adamek et al., 2022; Auerbach and Gorodnichenko, 2013; Born et al., 2019; Jordà & Taylor, 2015). Though the reliability of the LP estimator has been questioned by a few researchers (Brugnolini, 2018; Kilian and Kim, 2011), there are several advantages to using LP (Lof and Nyberg, 2019). First, LP is advantageous when dealing with nonlinearities. Second, LP enables the incorporation of large sets of state variables and high-frequency data. The first step of LP presents ordinary least squares regressions for forecast horizons as specified in <Eq. 1>.

$$y_{t+h} = \alpha^h + B_1^h y_{t-1} + \dots + B_p^h y_{t-p} + u_{t+h}^h \quad \langle \text{Eq. 1} \rangle$$

Here, α^h are vector constants. B_p^h are parameter matrices with lag order of p and forecast period of h . The vectors of u_{t+h}^h are heteroscedastic disturbances. A set of regression coefficients are LPs. The slope matrix B_1^h is the response of y_{t+h} to a shock of reduced

form. The simplest approach to measure the state-dependent responses is to use a binary or dummy variable. I employ a logistic function to compute state probabilities as follows.

$$F(z_t) = \frac{e^{(-\gamma z_t)}}{(1 + e^{(-\gamma z_t)})} \quad \langle \text{Eq. 2} \rangle$$

$$\text{var}(z_t) = 1, \text{E}(z_t) = 0 \quad \langle \text{Eq. 3} \rangle$$

Here, z_t , the change in the endogenous variable at time t is standardized, whereas γ , threshold parameter given by the user is scale-invariant. Regime 1 (R_1) and Regime 2 (R_2) are determined by $F(z_t)$ as $R_1: y_{t-1} \cdot (1 - F(z_{t-1}))$ and $R_2: y_{t-1} \cdot F(z_{t-1})$. The variable z_t can be obtained by employing the Hodrick-Prescott (HP) method (Hodrick and Prescott, 1997). In this study, instead of using HP method, I allow a direct application of numeric vector into the logistic function. The coefficient matrices B_{p,R_1}^h and B_{p,R_2}^h are obtained from the following LPs in $\langle \text{Eq. 4} \rangle$.

$$y_{i,t+h} = \alpha^h + B_{1,R_1}^h(y_{1,t-1} \cdot (1 - F(z_{t-1})) + \dots + B_{p,R_1}^h(y_{t-p} \cdot (1 - F(z_{t-1})) + B_{1,R_2}^h(y_{1,t-1} \cdot F(z_{t-1})) + \dots + B_{p,R_2}^h(y_{t-p} \cdot F(z_{t-1})) + u_{t+h}^h \quad \langle \text{Eq. 4} \rangle$$

I modify $\langle \text{Eq. 4} \rangle$ to include a COVID dummy binary variable and the exogenous COVID proxies.

$$y_{i,t+h} = \alpha^h + B_{1,R_1}^h(y_{1,t-1} \cdot (1 - I_t)) + B_{p,R_1}^h(y_{t-p} \cdot I_t) + u_{t+h}^h,$$

$$\text{where, } y = [\text{apt, policy shock}] \quad \langle \text{Eq. 5} \rangle$$

Here, $\langle \text{Eq. 1} \rangle$ and $\langle \text{Eq. 5} \rangle$ indicate the linear form and state-dependent regimes, respectively. To calculate the cumulative multipliers of monetary and fiscal policies, I utilize the one-step IV methodology introduced by Ramey and Zubairy (2018).

$$\sum_{h=0}^i \text{apt}_{t+h} - \text{apt}_{t+h} = \alpha^h + \sum_{h=0}^i m_{1,R_1}^h \text{shock}_t + \theta_{1,R_1}^h \text{CO}_t + \theta_{1,R_1}^h \text{CO}_t \text{shock}_t + u_{t+h}^h$$

$$\text{where, } \text{shock}_t = \text{policy}_{t+h} - \text{policy}_{t-1} \quad \langle \text{Eq. 6} \rangle$$

$$\sum_{h=0}^i \text{apt}_{t+h} - \text{apt}_{t+h} = \alpha^h + (1 - I_t) \cdot \left(\sum_{h=0}^i m_{1,R_1}^h \text{shock}_t + \theta_{1,R_1}^h \text{CO}_t + \theta_{1,R_1}^h \text{CO}_t \text{shock}_t \right) +$$

$$I_t \cdot \left(\sum_{h=0}^i m_{1,R_2}^h \text{CO}_t + \theta_{1,R_2}^h \text{CO}_t + \theta_{1,R_2}^h \text{CO}_t \text{shock}_t \right) + u_{t+h}^h$$

$$\langle \text{Eq. 7} \rangle$$

Here, I_t is the COVID binary dummy variable, and CO_t represents a set of COVID proxies. I use the Newey-West correction for standard deviation (Jordà, 2005; Newey and West, 1987). The nominal interest rate, $nr_{t+h} - nr_{t-1}$ and government spending, $g_{\text{exp}_{t+h}} - g_{\text{exp}_{t-1}}$ are the identified shocks. I use the current nominal rate and government expenditure for political shocks. $\text{CO}_{t-1} \text{shock}_{t-1}$ indicates the interaction between political shock and the COVID proxies. m_{1,R_1}^h and m_{1,R_2}^h

indicate the political multipliers on apartment prices in non-COVID and COVID regimes, respectively. Following Kinda et al. (2022), I decompose the trend and cycle components of the COVID proxies to examine the effect of COVID-19 by employing HP-filter. Using trend components allows me to measure the permanent shock of the proxies while isolating the transitory shock of COVID-19.

$$e_{i,t} = CO_{i,t} + v_{i,t}$$

where, $CO_{i,t} = \rho^p CO_{i,t-1} + \epsilon_{i,t}$ <Eq. 8>

Here, $CO_{i,t}$ is the permanent component of the shock with a persistence parameter, ρ^p . $\epsilon_{i,t}$ is the permanent shock with $\epsilon \sim N(0, \sigma_\epsilon^2)$ and $v_{i,t}$ is the transitory shock with $v_{i,t} \sim N(0, \sigma_v^2)$. I set $\lambda = 14,400$ to smooth the parameters for monthly data. I use samples of 2015:1-2022:2 given that the last economic cycle of the pre-COVID begins in 2015 and the house prices begin to subside in early 2022 (Figure 1).

2. Data

I use the real apartment transaction price index (2017.11=100) for house prices. Apartment prices are seasonally adjusted and deflated by using consumer price index. The yields on 3-year maturity corporate bonds (AA-) and real general government expenditures are used for monetary and fiscal shocks, respectively. The annual data on government expenditures are only available until 2021, thereby I interpolate them into monthly data using the Denton method. The missing data for January, February, and March 2022 are interpolated with the forecast estimates obtained from the vector autoregressive prediction model. The government expenditures are seasonally adjusted and deflated by the GDP deflator. The number of the unemployed and the economic policy uncertainties (EPU) index reported by Korea Development Institute (KDI) are used for unemployment and uncertainty, respectively. The crude oil price denominated



Note: The real GDP in logarithm is smoothed by trend function.

<Figure 1> Economic cycles of South Korea

in the nominal dollar is used for the oil price. All the data except EPU are collected from the economic statistics system (Table 1). I estimate the persistence parameters of COVID proxies by regressing the permanent components on its lag. The variance of the permanent components is obtained by $\sigma_c^2 = \sigma_{CO}^h(1 - \rho^p)$ (Contreras and Nichols, 2010). In the COVID regime, the variations of both trend and cycle components are the highest in oil price at 0.04

and 0.129, while the trend component of uncertainty has the largest variation with a 0.022 standard deviation in the non-COVID regime (Table 2). The persistence parameter of the oil prices is the highest, 0.9 with a 4.4% standard deviation. The persistence parameters of the unemployed and uncertainty are 0.59 and 0.65 with standard deviations of 2.6% and 9.7%, respectively (Table 3).

<Table 1> Basic statistics

	Unit	Mean	S.D.	Min.	Max.	Obs.
Apt. price (log)	2017.11=100	1.932	0.033	1.888	2.016	87
CB yield (%)	%	2.149	0.303	1.645	2.048	87
Gov. spending (log)	Billion won	4.249	0.083	4.131	4.374	87
Unemployed (log)	Thousand	3.014	0.041	2.886	3.158	87
Oil price (log)	2015=100 (dollar basis)	2.04	0.118	1.583	2.318	87
Uncertainty (log)	2013:2=91.86	2.085	0.164	1.706	2.561	87
Production (log)	2015=100	2.034	0.007	2.014	2.048	87
Real GDP (log)	Billion won	4.980	0.022	4.939	5.018	87

<Table 2> HP filter decomposition of COVID proxies

	Trend ($CO_{i,t}$)		Cycle ($v_{i,t}$)		ρ -value (t)
	COVID (2015:1–2019:12)				
	Mean	S.D.	Mean	S.D.	
Unemployed	3.013	0.018	0.008	0.049	0.904
Oil price	2.074	0.040	-0.046	0.129	0.992
Uncertainty	2.100	0.011	-0.029	0.084	0.970
	Non-COVID (2020:1–2022:2)				ρ -value (c)
	Mean	S.D.	Mean	S.D.	
	Unemployed	3.013	0.019	-0.001	
Oil price	3.014	0.019	-0.001	0.022	0.022
Uncertainty	2.077	0.022	0.009	0.176	0.000

ρ -value indicates the result of T -test of difference in means of COVID proxies in COVID and non-COVID regimes.

〈Table 3〉 Persistence and variance of trend components

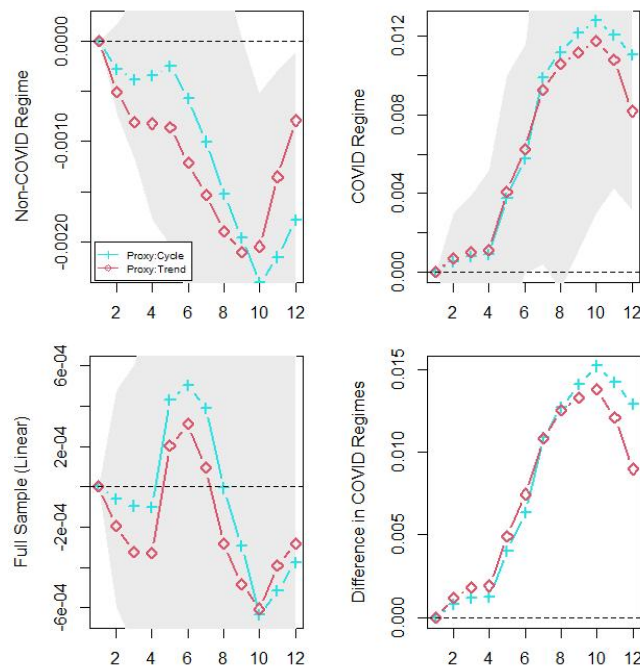
COVID proxies	Persistence (ρ)	S.D. (σ_ϵ)
Unemployed	0.589	0.026
Oil price	0.859	0.044
Uncertainty	0.646	0.097

IV. Main Results

This section provides the main results of the impulse responses matrices and cumulative political multipliers when there is a 1 standard deviation shock ($\mp 1\sigma$) of innovations. LP system in this study consists of two endogenous variables, namely apartment prices and policy shocks, and three exogenous variables, the number

of unemployed, oil prices, and uncertainties. The lag orders of 1 are selected for both endogenous and exogenous variables based on BIC. The COVID binary variable is used for switching data. The value ‘0’ is given to periods spanning from 2015:1-2019:12, whereas ‘1’ is given to 2020:1-2022:2. As the first COVID case was reported in January 2020 in Korea, I set 2020:1 as the period division.

〈Figure 2〉 presents the impulse responses of apartment prices to monetary shocks using cycle and trend components of the COVID proxies. In line with the literature, accommodative monetary policy has a positive and significant effect on apartment prices in the COVID regime,

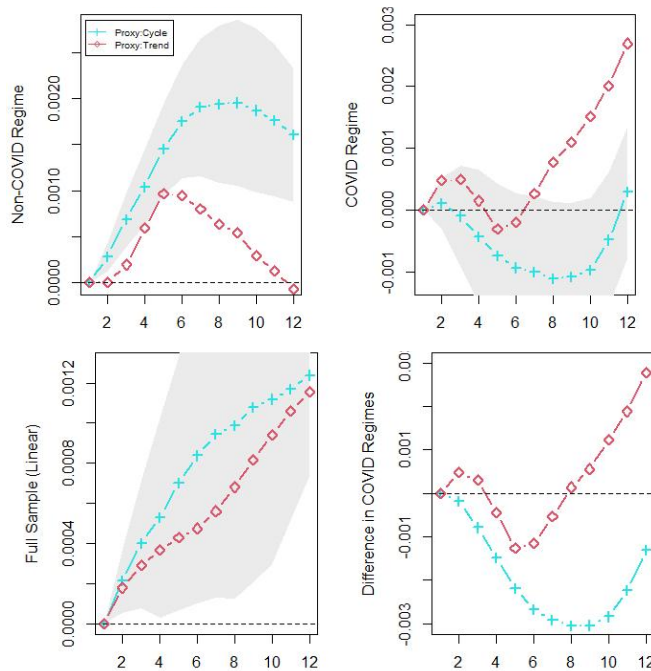


〈Figure 2〉 Response of apartment prices to 1 S.D. monetary shock

whereas the effect is negative in the non-COVID regime. Additionally, the cycle components of the COVID proxies affect more positively the apartment prices than the trend components in the COVID regime after 7 months. Considering the political implementation and transmission lags of the COVID effect, the results go align with the prediction. The responses of cycle and trend components in the COVID regime peak around 0.014 and 0.012, respectively. In the non-COVID regimes, the troughs of the cycle and trend components are around -0.004 and -0.0025, respectively. Contrary to the regime-dependent responses, 1 peak with 2 troughs are found in the full sample (linear)

suggesting that nonlinearity exists in the time-series data of nominal rates and apartment prices. Differences in the impulse responses of COVID and non-COVID regimes get larger between the cycle and trend components after 8 months implying that it takes approximately 8 months for the interaction of the monetary shock and COVID shock to transmit into the apartment prices. The differences are obtained by subtracting responses of non-COVID regime from the COVID regime.

(Figure 3) depicts the impulse responses of apartment prices to fiscal shocks using cycle and trend components of the COVID proxies. In line with literature, the apartment prices



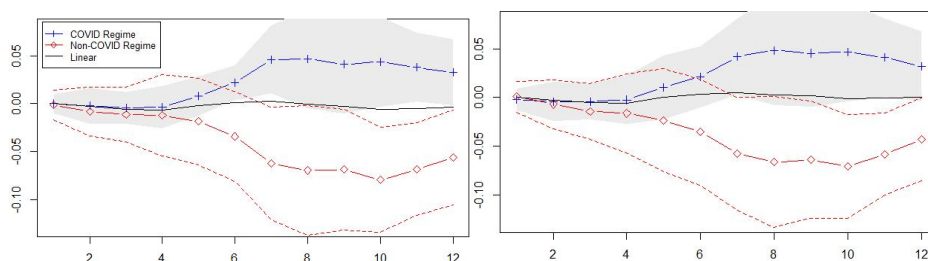
(Figure 3) Response of apartment prices to 1 S.D. fiscal shock

with cycle component channels react negatively to the fiscal shocks in the COVID regime, but positively in the non-COVID regime. Such a finding suggests that the liquidity offered by the conduct of fiscal policy flows more into the productive sector during the bad times than during the good times. The impulse responses with cycle components peak at 0.002 in the non-COVID, while hitting the trough of -0.001 in the COVID regime. Contrarily, the apartment prices with trend components react positively to the monetary shocks both in the COVID and the non-COVID regimes. The impulse responses with trend components peak around 0.001 and 0.003 in non-COVID and COVID regimes, respectively. The responses presented in the full sample panel suggest that the transitory effects of the unemployed, oil prices, and uncertainty accelerate the positive transmission of fiscal shocks to the apartment prices.

〈Figure 4〉 summarizes the cumulative monetary

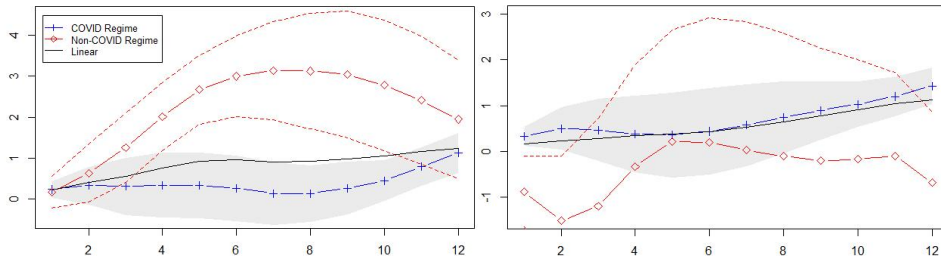
multipliers on apartment prices. Consistent with the response matrices, the monetary multipliers with both the cycle and trend components of the COVID proxies are positive in the COVID regime peaking 0.05, whereas those in the non-COVID regime are negative, troughs at -0.055 . These findings imply that the role of nominal interest rate became reinforced in the post-COVID as house prices react increasingly more sensitively to the changes in nominal rates.

〈Figure 5〉 summarizes the cumulative fiscal multipliers on apartment prices. Consistent with the impulse response matrices, the fiscal multipliers of COVID proxies are negative in the COVID regime but positive in the non-COVID regime. Contrarily, those with the trend components are positive in the COVID regime but negative in the non-COVID regime. Consistent with Afonso and Sousa (2009)'s finding, the cumulative fiscal multipliers of the linear function with full sample (2015:1-2022:2) evidence that the



Note: Monetary multipliers of cycle components (left) and trend components (right). The shaded regions and dashed lines are corresponding 95% confidence intervals.

〈Figure 4〉 Cumulative monetary multipliers on apartment prices



Note: Fiscal multipliers of cycle components (left) and trend components (right). The shaded regions and dashed lines are corresponding 95% confidence intervals.

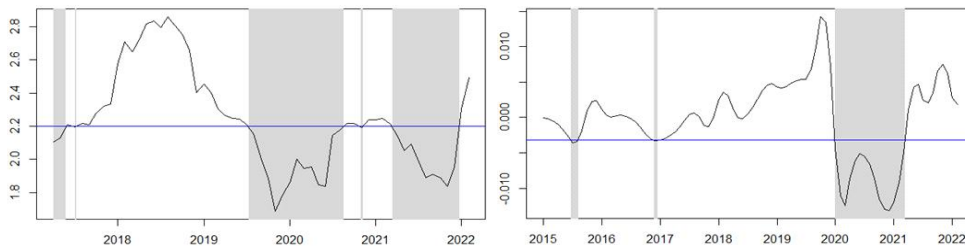
⟨Figure 5⟩ Cumulative fiscal multipliers on apartment prices

effect of government spending on apartment prices are positive and persistent.

V. Economic Regimes with Zero Lower Bound (ZLB) and Economic Slack

This section explores the effects of ZLB state and economic slack on the political transmission to the apartment prices using CB yields and real GDP as switching data. To

match the regime switching between the ZLB state and the normal state with the pre-and post-COVID periods, I use the sample spanning from 2017:4-2022:2. As shown in ⟨Figure 6⟩, regime 2 of ZLB state ($\gamma_r < 2.2$) almost corresponds to the post-COVID periods with a few negligible deviations. To match the economic regimes with the COVID regimes, I use the full sample spanning from 2015:1-2022:2. As depicted in ⟨Figure 6⟩, though the regime of economic slack does not perfectly corresponds to the COVID regime (2020:1-



Note: Thresholds of CB yield with first differentiation (left, $\gamma_r = 2.2$) and cycle components of real GDP (right, $\gamma_{gdp} = -0.0032$). The blue line is the threshold obtained by regressing production index on apartment prices. The $F(z)$ estimates are 0.047 and 0.5. The shaded areas indicate regime 2 where the estimates are below the thresholds.

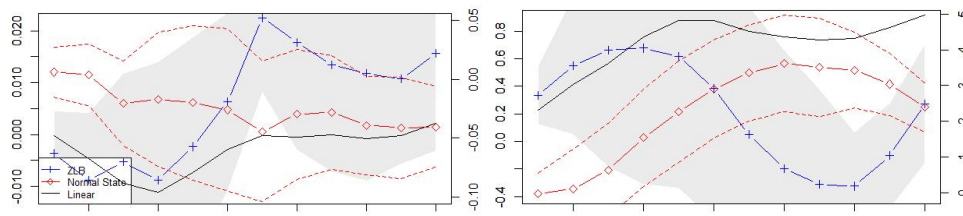
⟨Figure 6⟩ Thresholds of CB yield and real GDP

2022:2), the periods spanning from 2020:1-2021:2 fall into the regime 2 ($\gamma_{gdp} < -0.0032$) with economic recession. The threshold parameters are obtained by regressing the production index on the apartment prices using threshold regression.

〈Figure 7〉 illustrates the cumulative monetary and fiscal multipliers on apartment prices with cycle components of the COVID proxies in ZLB and normal states. In line with literature, the monetary multiplier on apartment prices is, in general, larger at ZLB than in the normal state as the monetary multiplier at ZLB (blue) is persistently located above the average (linear)

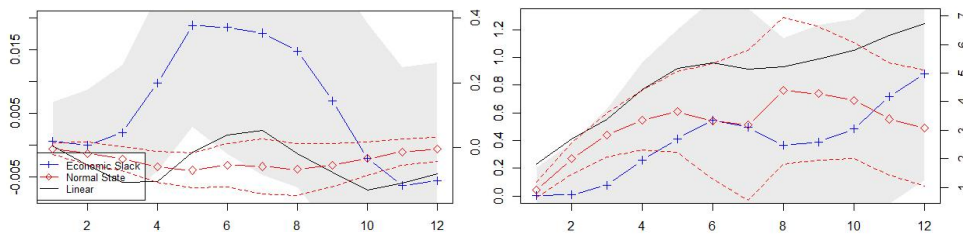
monetary multiplier (black) after 2 months ($h=2$). Also consistent with literature, the fiscal multiplier on apartment prices is, in general, smaller at ZLB than in the normal state as the fiscal multiplier of ZLB (blue) is persistently located beneath the average monetary multiplier (black) after 3 months ($h=3$).

Similarly, the movements of cumulative monetary multipliers depicted in 〈Figure 8〉 suggest that monetary multipliers on apartment prices are larger in the economic slack than in the normal state, whereas the fiscal multipliers are smaller in the economic slack than in the normal state. These findings are in parallel



Note: Monetary multipliers (left) and fiscal multipliers (right). The scale of zero lower bound and linear multipliers (left axis) and the scale of normal state multiplier (right axis).

〈Figure 7〉 Multipliers across nominal rate regimes



Note: Monetary multipliers (left) and fiscal multipliers (right). The scale of economic slack and linear multipliers (left axis) and the scale of normal state multiplier (right axis).

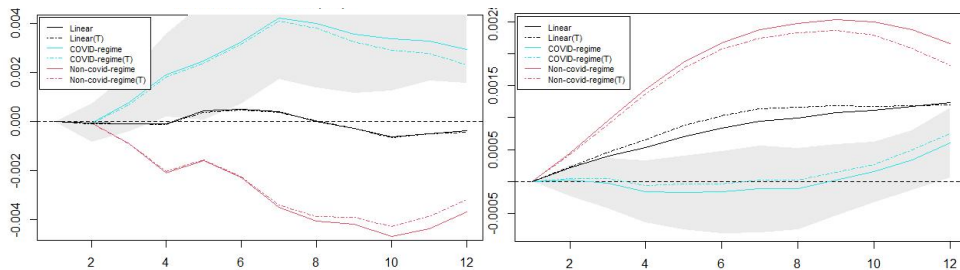
〈Figure 8〉 Multipliers across economic states

with the hypothetical prediction that the impact of monetary policy on apartment prices is larger than the fiscal policy during the economic recessions when the nominal rate is determined near ZLB generating a liquidity trap.

VI. Robustness Checks

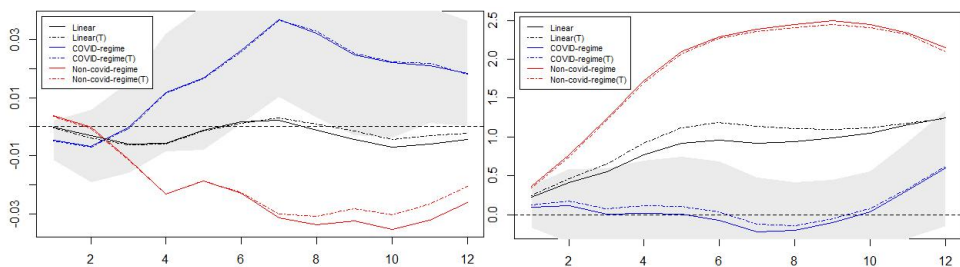
This section examines the sensitivity of impulse responses and the cumulative political multipliers by allowing some changes to the LP system. In the previous sections, I used

the direct logistic functions to switch the regimes with a specific threshold parameter determined at $\gamma_{covid} = 0.5$. In this section, I use the HP-filter to decompose the series of numeric vectors of the switching data (COVID dummy variables) by setting $\lambda = 129,600$ as suggested by Ravn and Uhlig (2002). I also compare the results when trend is considered (trend=1) and not considered (trend=0). <Figure 9> illustrates the impulse responses of apartment prices to political shocks with cycle components of COVID proxies. Consistent with the previous results, the apartment prices respond positively



Note: Impulse responses to monetary shock (left) and fiscal shock (right). The dashed lines indicate trend considered (trend=1).

<Figure 9> Impulse responses of apartment prices using HP-filter



Note: Monetary multipliers (left) and fiscal multipliers (right). The dashed lines indicate trend considered (trend=1).

<Figure 10> Political multipliers on apartment prices using HP-filter

to the nominal rate shock, but negatively to the government spending shock in the COVID-regime. The responses are opposite in the non-COVID regime. The apartment prices respond less sensitively to the unexpected external shocks when trend is considered indicating that the inclusion of trend factor renders prices to deviate less from the trend. The political multipliers depicted in <Figure 10> also suggest that the impact of monetary shock on apartment prices is positive, but fiscal shock on apartment prices is negative in the COVID regime. The opposite results are illustrated in the non-COVID regime.

VII. Conclusion

The Korean government sought to defend against a pandemic-driven recession by lowering nominal rate and allocating emergency relief funds. Nevertheless, as extensive literature on economic policies suggests, the monetary policy is less likely to be effective in directing liquidity into the productive sector during the crisis merely creating asset bubbles, while the assessment on the fiscal policy is readily positive. This paper explores the multiplier effects of monetary and fiscal policies on Korean house prices during pre-and post-COVID periods. I employ Jordà (2005)'s LP methodology to construct state-dependent impulse response models and include

the proxies explaining the impact of COVID-19 on the economy.

The empirical results suggest that in line with the literature, the impulse responses of apartment prices to 1 standard deviation (-1σ) monetary shock is positive (0.014) in the COVID regime (I_t), but negative (-0.0025) in the non-COVID regime ($1-I_t$). Contrarily, the effect of 1 standard deviation fiscal shock ($+1\sigma$) on apartment prices is negative (-0.001) in the COVID regime, but positive (0.002) in the non-COVID regime. Moreover, the transitory shock of exogenous COVID proxies, namely the unemployed, oil prices, and uncertainties intensifies the political effects on apartment prices. Consistent with the impulse responses, the cumulative monetary multipliers on apartment prices are positive (0.05) in the COVID regime, while negative (-0.055) in the non-COVID regime. The results of cumulative fiscal multipliers are the opposite, 0 and 3 in the COVID and non-COVID regimes, respectively (the values in the parentheses are either peaks or troughs).

Additional analysis on the political transmission in the economy with a liquidity trap suggests that monetary multiplier on apartment prices is higher when the nominal rate is near ZLB ($\gamma_r < 2.2$) and when there is economic slack ($\gamma_{gdp} < -0.0032$), while the fiscal multipliers on apartment prices are estimated to be higher in the normal states. The conduct of robustness checks using HP-filter decomposition as an instrument to switch the regimes present consistent findings with the main

results. Additionally, the inclusion of trend (trend=1) suggests that the responses in the non-COVID and COVID regimes deviate relatively less from the average (linear) responses compared to when the trend is not considered. These empirical findings highlight the importance of optimal discretion on monetary and fiscal policies in terms of minimizing the ineffectiveness of the political instrument, which may otherwise worsen the imbalance and decoupling of the real economy and the asset market during the bad times.

References

- 김미루, 오윤해. (2020). 1차 긴급재난지원금 정책의 효과와 시사점. *KDI 정책포럼*, 281.
- 여유진, 김상현, 김을식, 김양중, 남종석, 박희석, et al. (2021). 코로나19의 사회경제적 영향 분석 및 긴급재난지원금의 효과 평가 연구 (지역편) (Report No. 2021-08-02). 세종: 한국보건사회연구원.
- 이태석. (2020). 긴급재난지원금 지급효과 분석. Retrieved from https://www.kdi.re.kr/share/pressView?bd_no=4018
- Adamek, R., Smeekes, S., & Wilms, I. (2022). Local projection inference in high dimensions. Retrieved from <https://arxiv.org/abs/2209.03218>
- Afonso, A., & Sousa, R. M. (2009). Fiscal policy, housing and stock prices (Report No. 990). Frankfurt, Germany: European Central Bank.
- Ali al-Nowaihi, A., & Dhami, S. (2016). Strategic monetary and fiscal policy interaction in a liquidity trap. In E. Haven, P. Molyneux, J. O. S. Wilson, S. Fedotov, & M. Duygun (Eds.), *The handbook of post crisis financial modelling*. London, UK: Palgrave Macmillan.
- Auerbach, A. J., & Gorodnichenko, Y. (2013). Output spillovers from fiscal policy. *The American Economic Review*, 103(3), 141-146.
- Auerbach, A. J., Gorodnichenko, Y., & Murphy, D. (2021). Inequality, fiscal policy and COVID19 restrictions in a demand-determined economy. *European Economic Review*, 137, 103810.
- Borio, C. E., & Hofmann, B. (2017). Is monetary policy less effective when interest rates are persistently low? (Report No. 628). Sydney: Reserve Bank of Australia.
- Born, B., Müller, G. J., Schularick, M., & Sedláček, P. (2019). The costs of economic nationalism: Evidence from the Brexit experiment. *The Economic Journal*, 129(10).
- Brugnolini, L. (2018). About local projection impulse response function reliability (Report No. 440). Rome: Centre for Economic and International Studies.
- Brunnermeier, M. K., & Koby, Y. (2018). The reversal interest rate. Retrieved from https://scholar.princeton.edu/sites/default/files/markus/files/25b_reversalrate.pdf
- Brzoza-Brzezina, M., Kolasa, M., & Makarski, K. (2021). Monetary policy and COVID-19 (Report No. 2021/274). Washington, DC: International Monetary Fund.
- Chen, K., & Wen, Y. (2017). The great housing boom of China. *American Economic Journal: Macroeconomics*, 9(2), 73-114.
- Christiano, L., & Eichenbaum, M. (1992). Liquidity effects and the monetary transmission mechanism.

- American Economic Review*, 82(2), 346-353.
- Christiano, L., Eichenbaum, M., & Rebelo, S. (2011). When is the government spending multiplier large? *Journal of Political Economy*, 119(1), 78-121.
- Coenen, G., Erceg, C. J., Freedman, C., Furceri, D., Kumhof, M., & Lalonde, R., et al. (2012). Effects of fiscal stimulus in structural models. *American Economic Journal: Macroeconomics*, 4(1), 22-68.
- Contreras, J., & Nichols, J. (2010). Consumption responses to permanent and transitory shocks to house appreciation (Report No. 2010-32). Washington, DC: Board of Governors of the Federal Reserve System.
- Cunningham, C. R. (2006). House price uncertainty, timing of development, and vacant land prices: Evidence for real options in Seattle. *Journal of Urban Economics*, 59(1), 1-31.
- Dime, R., Ginting, E., & Zhuang, J. (2021). Estimating fiscal multipliers in selected Asian economies (Report No. 638). Mandaluyong City: Asian Development Bank.
- Eggertsson, G. B. (2009). What fiscal policy is effective at zero interest rates (Staff Report No. 402). New York: Federal Reserve Bank of New York.
- Farhi, E., & Werning, I. (2016). Fiscal multipliers: Liquidity traps and currency unions. *Handbook of Macroeconomics*, 2, 2417-2492.
- Fornaro, L., & Wolf, M. (2020). Covid-19 Coronavirus and macroeconomic policy (Report No. 1168). Barcelona: Barcelona Graduate School of Economics.
- Gambacorta, L., Hofmann, B., & Peersman, G. (2014). The effectiveness of unconventional monetary policy at the zero lower bound: A cross-country analysis. *Journal of Money, Credit and Banking*, 46(4), 615-642.
- Haan, W. J. D., Rendahl, P., & Riegler, M. (2017). Unemployment (fears) and deflationary spirals. *Journal of the European Economic Association*, 16(5), 1281-1349.
- Hodrick, R. J., & Prescott, E. C. (1997). Postwar U.S. business cycles: An empirical investigation. *Journal of Money, Credit and Banking*, 29(1), 1-16.
- Inoue, A., & Rossi, B. (2021). A new approach to measuring economic policy shocks, with an application to conventional and unconventional monetary policy. *Quantitative Economics*, 12(4), 1085-1138.
- Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *Economic Review*, 95(1), 161-182.
- Jordà, Ò., & Taylor, A. M. (2015). The time for austerity: Estimating the average treatment effect of fiscal policy. *The Economic Journal*, 126 (590), 219-255.
- Kilian, L., & Kim, Y. J. (2011). How reliable are local projection estimators of impulse responses. *The Review of Economics and Statistics*, 93(4), 1460-1466.
- Kinda, T., Lengyel, A., & Chahande, K. (2022). Fiscal multipliers during pandemics (Report No. 2022/149). Washington, DC: International Monetary Fund.
- Lepetit, A., & Fuentes-Albero, C. (2022). The limited power of monetary policy in a pandemic. *European Economic Review*, 147, 104168.

- Lof, M., & Nyberg, H. (2019). Discount rates and cash flows: A local projection approach. Retrieved from <https://ssrn.com/abstract=3372138>
- Lustenhouwer, J. (2020). Fiscal stimulus in expectations-driven liquidity traps. *Journal of Economic Behavior & Organization*, 177, 661-687.
- Ma, R. R., Xiong, T., & Bao, Y. (2021). The Russia-Saudi Arabia oil price war during the COVID-19 pandemic. *Energy Economics*, 102, 105517.
- McCallum, B. T. (1999). Theoretical analysis regarding a zero lower bound on nominal interest rates. *Proceedings of the Monetary Policy in a Low Inflation Environment*.
- Mertens, K., & Ravn, M. O. (2014). Fiscal policy in an expectations driven-liquidity trap. *The Review of Economic Studies*, 81(4), 1637-1667.
- Newey, W. K., & West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 55(3), 703-708.
- Nwogugu, M. C. I. (2021). COVID-19 pandemic in Asia, policy responses and multiplier effects. Retrieved from <https://ssrn.com/abstract=3843424>
- Ramey, V. A., & Zubairy, S. (2018). Government spending multipliers in good times and in bad: Evidence from US historical data. *Journal of Political Economy*, 126(2), 850-901.
- Ravn, M. O., & Uhlig, H. (2002). On adjusting the Hodrick-Prescott filter for the frequency of observations. *The Review of Economics and Statistics*, 84(2), 371-376.
- Ullersma, C. A. (2002). The zero lower bound on nominal interest rates and monetary policy effectiveness: A survey. *De Economist*, 150(3), 273-297.
- Woodford, M., & Xie, Y. (2022). Fiscal and monetary stabilization policy at the zero lower bound: Consequences of limited foresight. *Journal of Monetary Economics*, 125, 18-35.
- Wu, J. C., & Xia, F. D. (2016). Measuring the macroeconomic impact of monetary policy at the zero lower bound. *Journal of Money, Credit and Banking*, 48(2-3), 253-291.

논문접수일: 2022.11.26
 논문심사일: 2022.12.21
 게재확정일: 2022.12.27