Regional Heterogeneity of the Monetary Policy in China

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Abstract

This paper examines regional heterogeneity in the transmission of China's monetary policy by estimating the effects of national-level monetary shocks on GDP growth across different economic regions. Using a Local Projections framework and an externally identified M2 monetary policy shock series from Chen et al. (2018), I find that the economically advanced East (coastal) region exhibits significantly weaker output responses compared to the rest of the country. While this pattern suggests that monetary expansion disproportionately stimulates growth in less-developed regions, further analysis indicates that the underlying drivers—such as differential land supply policies and a limited exchange rate channel—may reflect structural constraints rather than targeted policy effectiveness. These findings underscore the importance of understanding regional characteristics in shaping the aggregate impact of monetary policy and suggest that national policy interventions may need to be complemented by region-specific strategies to improve the overall transmission process.

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The effectiveness of the monetary policy often varies across significantly across regions within a country or a monetary union, especially when there are substantial differences in regional economic development. In large economies or currency unions, such as China or Euro Zone, a single monetary policy at the national level can lead to uneven outcomes, exerting heterogeneous impacts depending on different economic structure and institutional arrangement in each region. Such regional heterogeneity is highly consequential for policymakers, as uniform measures intended to stimulate the entire economy may fail to achieve their objectives, which could exacerbate rather than reduce economic inequalities across regions (Beraja et al., 2019). Thus, a monetary framework that systematically generates or fails to address these regional disparities risks long-term ineffectiveness unless it is complemented by targeted regional or fiscal interventions (Micossi, 2015; De Grauwe, 2011).

While the regional heterogeneity of monetary policy effects has been extensively studied for advanced economies, particularly in the contexts of the Euro Zone and the United States, the case for China remains underexplored despite several distinctive features that make it an important and unique subject of analysis. Unlike Euro Zone, China operates as both a monetary and fiscal union, which allows more flexible fiscal tools that can potentially accommodate regional economic disparities. In contrast to the United States, China faces relatively lower labor mobility due to substantial internal migration barriers (such as hukou system), therefore limiting the capacity of regions to adjust in response to localized shocks, such as external demand shortfalls (Farhi and Werning, 2014). Moreover, China' monetary policy framework primarily targets broad money supply (M2 growth) instead of interest rates, reflecting the characteristics of a transitional emerging market economy with an underdeveloped financial system. These unique institutional and structural characteristics imply that monetary policy transmission may differ significantly in China from those observed in advanced economies.

In this paper, I use the Local Projections (Jordà, 2005) to examine how economic activities– measured by regional and provincial GDP growth – responds to monetary policy across different economic regions. I show that the economically developed East (coastal) region responds significantly less to monetary policy shocks than the less-developed non-East regions, with the magnitude of responses in non-East regions roughly twice as large as those in the East. This finding contradicts the previous literature, which typically identifies stronger monetary transmission in more economically developed regions.

This paper makes two primary contributions to the literature. First, I provide an updated empirical perspective by focusing specifically on the period after 2005, during which China con-

sistently employed indirect monetary control via aggregate money supply (M2). Previous studies, such as Guo and Tajul (2014, 2016) and Cortes and Kong (2007) employed earlier data that covered substantial regime changes and direct monetary controls, which can potentially obscure the true effects of contemporary monetary policies. Specifically, indirect monetary policy control via M2 targeting has been firmly established by the People's Bank of China (PBoC) since 1998. Second, I adopt a recently developed methodology for identifying the monetary policy shock following Chen et al. (2018), which more accurately provides the identification of exogenous monetary policy actions compare to earlier identification approaches.

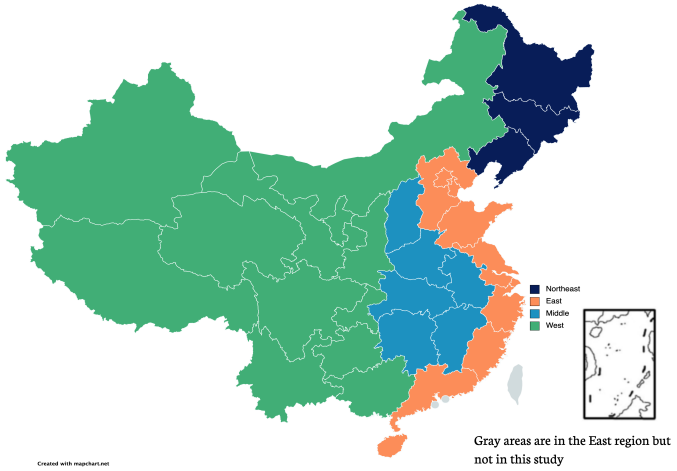
Literature Review. The empirical analyses of asymmetric effects of monetary policy on economic activity date back to the 1970s (Beare, 1976). [1] Until the 1990s, the literature almost exclusively concentrated on the United States (Garrison and Chang, 1979; Garrison and Kort, 1983; Carlino and DeFina, 1998) and occasionally on Canada (Beare, 1976). When it comes closer to the end of the century, studies focused on Europe on the occasion of the launch of the Euro (Gerlach and Smets, 1995; Tremosa-Balcells and Pons-Novell, 2001; Peersman, 2004). The global financial crisis and the broad use of the monetary policy regain the interests in this issue, for the Euro Zone (Cavallo and Ribba, 2015; Georgiadis, 2015; Mandler et al., 2016) Australia (Vespignani, 2015)Indonesia (Phiromswad, 2015), and India (Nachane et al., 2002).

There are also several studies about China. Cortes and Kong (2007) measure the impact of monetary policy on real output both at the national and regional (provincial) level during the period of 1980–2004 using the Vector Error Correction (VEC) method. They develop a provincial GDP system comprising four endogenous variables (monetary policy variable (M2) or bank lending rate), exchange rate, price index, and provincial real GDP) and one exogenous variable, world GDP. They find that monetary shocks produce greater responses in coastal, and therefore mostly the East region provinces, than in inland provinces. Guo and Tajul (2014) use the annual data from 1978 to 2011 for the three regions of China to study the regional effects of the single monetary policy. In their follow-up study (Guo and Tajul, 2016), they extend their studies to 31 provinces in mainland China and show that bank lending channel is more effective than interest rate channel at the regional level, and the finding is similar to Cortes and Kong (2007) in the sense that they also show the East region has a larger response.

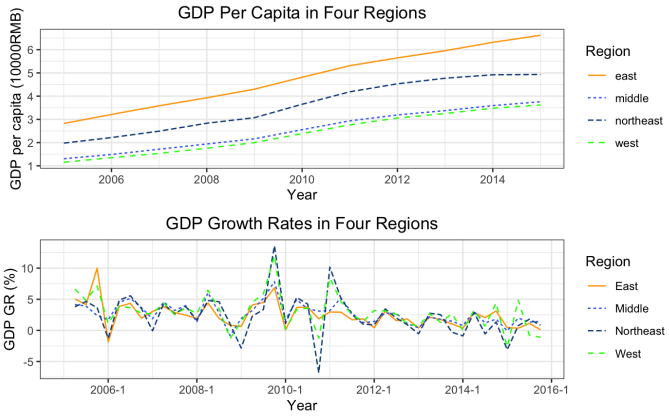
[1] I only refer to a few selected papers. See Dominguez-Torres and Hierro (2019) for a survey of the literature on the sources of heterogeneous regional effects of monetary policy.

1 China's Monetary Policy and Regional Differences in Economic Development

In this section, I discuss the key features of China's monetary policy framework and highlight the main regional differences in economic development across the country. These elements provide crucial context for understanding heterogeneity in regional monetary policy transmission.



(A) Four Economic Regions Specified by NBS of China



(B) Regional GDP per capita and GDP Growth

Figure 1. Economic Region Division and Heterogeneity in Regional GDP per capita and GDP Growth. Panel (a) displays the four economic regions of mainland China as defined by the National Bureau of Statistics: East, Middle, West, and Northeast. Panel (b) shows the average GDP per capita and GDP growth rate by region during the sample period (2005–2015). The East region consistently exhibits higher income and more stable growth compared to the others.

1.1 Monetary Policy Framework

Unlike the central banks in the advanced economies who rely on price-based instruments, the Peoples' Bank of China, (PBoC) predominantly uses quantity-based tools to conduct monetary policy. This approach aligns with China's status as an emerging economy with a less developed financial system. In 1998, the PBoC officially designated M2 growth as its primary monetary policy target, a policy stance that remained until 2018 (Huang et al., 2020). M2 is defined as the sum of M1 (currency in circulation plus demand deposits) and Quasi-Money (including time deposits, saving deposits and other Deposits).

According to Article 3 of People's Bank of China Law, the primary objective of monetary policy objectives is to maintain the stability of the value of the currency and thereby promote economic growth. Former PBoC governor, Zhou Xiaochuan, highlighted several long-standing monetary policy objectives mandated by the Chinese government, including price stability, economic growth, employment promotion, and maintaining a balanced payment position. However, as emphasized by Chen et al. (2018), while inflation control could still remain an essential objective, the overriding priority of the central government is to achieve the annual GDP growth target. Despite the PBoC's relatively limited independence compared to central banks in advanced economies, it maintains significant discretion in conducting open market operations, which form the basis of monetary policy shocks analyzed in this paper.

1.2 Regional Differences in Economic Development

To reflect substantial differences in regional economic conditions, the National Bureau of Statistics of China classifies the country into four major economic regions: East, Middle, Northeast, and West (displayed in panel (A) in Figure 1). Significant disparities exist among these regions in terms of economic performance and stability. During the 2005–2015 period, the East region consistently exhibited higher GDP per capita and more stable GDP growth compared to other regions shown in panel (B) in Figure 1.

Several structural factors differentiate the East from other regions. The East region has a more developed financial market infrastructure and is more integrated with global markets due to its export-oriented economic structure. On the other hand, central government fiscal initiatives have increasingly targeted the Middle, Northeast, and West regions to stimulate their economic develop-

ment due to their lagged development compared to the East region. These policy-driven regional differences underpin the heterogeneous responses to national monetary policies examined in this study.

2 Data

The primary dataset used in this analysis comprises quarterly regional economic data for mainland China, covering the period from 2005Q1 through 2015Q4. This period aligns with the indirect monetary control regime wherein the People's Bank of China (PBoC) explicitly targets aggregate money supply growth (M2). The dataset includes information on economic growth, inflation, monetary policy shocks, exports, and land supply at both the regional and provincial levels.

Regional Economic Indicators Quarterly GDP and consumer price index (CPI) data are sourced from the National Bureau of Statistics of China (NBS). Provincial-level GDP data, initially reported in nominal terms, have been seasonally adjusted and deflated by the author using the X-13 ARIMA-SEATS methodology and corresponding provincial CPI series. Provincial CPIs, originally reported as year-over-year growth rates, were converted into standard CPI indices by combining monthly growth data. Data coverage includes all 31 provinces in mainland China.

Monetary Policy Shock Monetary policy shocks are measured using the quarterly M2 growth shocks identified by Chen et al. (2018). These shocks isolate exogenous variations in monetary policy, specifically reflecting outcomes of open market operations distinct from changes in reserve requirement ratios. This identification method is considered superior to earlier approaches due to its clearer reflection of policy intention and its explicit control for policy targets such as inflation and GDP growth.

Export Data Provincial-level export data are obtained from the NBS, reported annually, and converted into quarterly frequency through interpolation using quadratic minimization consistent with standard practices in the literature (Denton, 1971). Export shares relative to provincial GDP are computed using annual averages from the entire sample period to capture persistent structural differences in provincial exposure to international markets.

Land Supply Data Provincial land supply data, specifically the area of state-owned land granted to regional governments, are sourced from the China National Land and Resource Statistical Year-

book. Annualized growth rates of state-owned land supply are computed for each province over the entire sample period. These data serve to examine how regional variations in land policies might mediate the differential transmission of monetary policy.

Spatial Data The spatial analysis relies on geographic information for Chinese provincial boundaries, which is used to calculate pairwise distances between provincial capital cities. These distances form the basis for constructing spatial weighting matrices, which capture inter-provincial linkages and allow for the analysis of economic spillovers and spatial interdependencies. The administrative boundary shapefiles used to identify capital locations and define provincial borders are sourced from the Humanitarian Data Exchange's China - Subnational Administrative Boundaries dataset (https://data.humdata.org/dataset/cod-ab-chn).

3 Empirical Framework

3.1 Monetary Policy Shock

Chen et al. (2018) developed a tractable rule characterizing the essential part of the otherwise intractably complex operations of China's monetary policy. Unlike the advanced economies such as the U.S., the Taylor Rule does not apply to China for two major reasons: First, China is an emerging market economy with unbalanced growth the rising share of investment in GDP since the late 1990s (Chang, Chen, Waggoner, and Zha, 2016). Second, financial markets in China are underdeveloped and no interest rates have become the policy target of the monetary authority.

At the end of each year, the central government sets the target of M2 growth consistent with targeted GDP growth for the next year. Within each year, the Monetary Policy Committee meets at the end of each quarter to make a policy decision for the next quarter. The monetary policy they propose is formalized as

$$g_{m,t} = \gamma_0 + \gamma_t g_{m,t-1} + \gamma_\pi(\pi_{t-1} - \pi^*) + \gamma_{x,t}(g_{x,t-1} - g^*_{t-1}) + \epsilon_{m,t}, \tag{3.1}$$

where $g_{m,t}$ is the $M2$ growth rate, $\pi_t = \Delta P$ is the actual CPI inflation, π^* is the inflation target, $g_{x,t}$ is the actual GDP growth, $g^*_{x,t}$ is the target GDP growth. $\epsilon_{m,t}$ is a serially independent random shock that has a normal distribution with mean zero and time-varying standard deviation $\sigma_{m,t}$.

Since the GDP target serves as a lower bound,which means that it is very likley that the M2 growth response will be more aggressive when GDP is below the target, Chen et al. (2018)

allow the output coefficient to be time-varying with the form

$$\gamma_{x,t} = \begin{cases} \gamma_{x,a} & \text{if } g_{x,t-1} - g^*_{x,t} \geq 0 \\ \gamma_{x,b} & \text{if } g_{x,t-1} - g^*_{x,t} < 0 \end{cases}$$

The monetary policy shock identified by the method above and used in this paper are the residuals $\epsilon_{m,t}$, and has shown by Chen et al. (2018) that M2 growth shock is orthogonal to changes in the reserve requirement ratio and thus reflects only the outcome of open market operations. The estimated result also shows that the overriding objective of the central government is to achieve the annual GDP growth target (Chen et al., 2018). The shock series is shown in Figure 2 and their estimated coefficients are shown in Table 1.

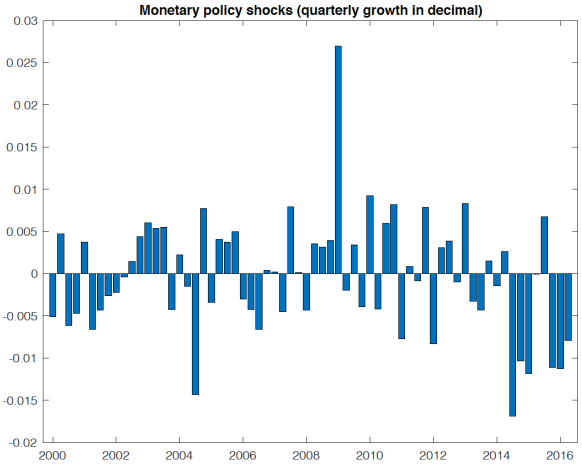


Figure 2. Quarterly M2 Shock by Chen et al. (2018). This figure plots the residual monetary policy shocks estimated by Chen et al. (2018), based on deviations from a policy rule targeting M2 growth. These shocks represent exogenous components of monetary policy after accounting for inflation and GDP targets, and are used as the main policy variable in the empirical analysis.

3.2 Estimation of Impulse Response Function

3.2.1 East and Non-east Provinces

To estimate the dynamic effects of monetary policy on economic activity, I employ the Local Projections (LP) method proposed by Jordà (2005). This approach allows direct estimation of impulse responses functions without imposing strong dynamic restrictions. I focus on real GDP responses across provinces and regions to monetary policy shocks identified using the method of Chen et al. (2018).

Coefficient	Estimate	SE	p-value
γ_m	$0.\ 391^{***}$	0.101	0.000
γ_π	-0.397^{***}	-0.121	0.001
$\gamma_{x,a}$	0.183^{***}	0.060	0.002
$\gamma_{x,b}$	-1.299^{***}	0.499	0.009
$\sigma_{x,a}$	0.005^{***}	0.001	0.000
$\sigma_{x,b}$	0.010^{***}	0.002	0.000

Table 1. Estimated Monetary Policy, Table 3 in Chen et al. (2018). This table reports the parameter estimates from the monetary policy rule specification in Chen et al. (2018), used to construct the monetary policy shock series employed in this paper. The dependent variable is quarterly M2 growth. The rule includes lagged M2 growth, lagged CPI inflation, and deviations from GDP growth targets. Parameters $\gamma_{x,a}$ and $\gamma_{x,b}$ capture asymmetry in response to GDP deviations above and below target, respectively. Standard errors are robust and p-values are reported.

The primary empirical specification pools data at both the macro-region and provincial level, and include an interaction term to capture heterogeneous responses between the East and non-East regions or provinces:

$$\begin{aligned}\ln GDP_{r,t+h} - \ln GDP_{r,t-1} = \beta_h Z_t + \beta_h^E Z_t \times 1[r = \text{East}] \\ + \gamma_h \ln CPI_t + \gamma_h^E \ln CPI_t \times 1[r = \text{East}] \\ + \sum_{l=1}^{4} \gamma_{h,l}^X X_{t-l} + \epsilon_{r,t+h}.\end{aligned} \tag{3.2}$$

where r indexes the region or province, Z_t denotes the monetary policy shock, and X_{t-l} includes the lagged GDP and lagged CPI. The coefficient β_h measures the average responses in non-East region or provinces, while β_h^E captures the differential effect for the East region or provinces. This pooled panel specification forms the core of my empirical results.

3.2.2 Regional Estimation

In addition to the pooled panel regression, I estimate region-specific impulse responses using the following specification separately for each macro-region:

$$\ln GDP_{r,t+h} - \ln GDP_{r,t-1} = \beta_h Z_t + \sum_{l=0}^{4} \gamma_h^l \ln CPI_{t-l} + \sum_{l=1}^{4} \alpha_h^l \ln GDP_{t-l} + \epsilon_{r,t+h}, \tag{3.3}$$

where $r \in \{East, Northwest, West, Middle\}$. Each region's response is estimated separately. The parameter β_h measures the cumulative response of real GDP to a 1% monetary shock.

3.2.3 Spatial Spillovers (Robustness Extension)

To account for potential output spillovers across provinces, inter-dependencies – i.e., the fact that economic activity in one province may affect neighboring provinces. Such spillovers are especially relevant in the context of national monetary policy, which is uniform across space but may propagate unevenly through trade, labor markets or shared infrastructure, I extend the baseline panel specification to include spatial lags of output following Bräuning and Sheremirov (2019):

$$\ln GDP_{r,t+h} - \ln GDP_{r,t-1} = \beta_h Z_t + \beta_h^E Z_t \times 1[r = \text{East}] + \sum_{l=1}^{4} \alpha_h^l \mathbf{W} \ln GDP_{t-l} + \kappa \text{Controls} + \epsilon_{r,t+h}. \tag{3.4}$$

The matrix $\mathbf{W}$ defines spatial weights based on the inverse distance between provincial capital cities using inter-capital distances within 2000 kilometers. Using capital city locations better captures economic interactions compared to provincial centroids, reflecting the importance of urban agglomerations and their role in economic spillovers. Control variables remain consistent with the baseline specification, including lagged GDP growth and CPI.

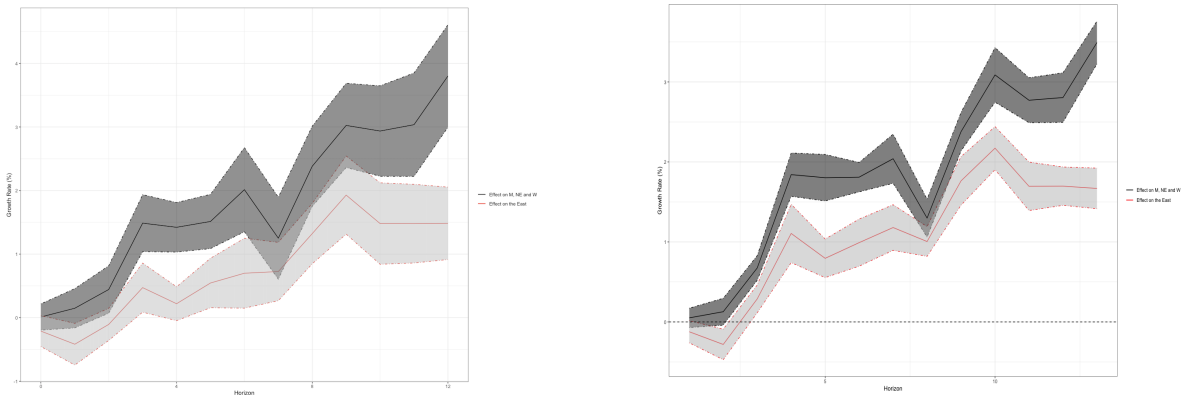
4 Result

My empirical analysis displays clear heterogeneity in regional GDP responses to monetary policy in China, revealing significantly weaker responses in the economically advanced East region compared to the less-developed Northeast, Middle, and West regions. This central finding contrasts sharply with previous literature (e.g., Cortes and Kong (2007); Guo and Tajul (2014, 2016)), which suggests stronger responses in the East.

4.1 Pooled Regional and Provincial

The estimated impulse responses from the panel Local Projections, reported with 68% confidence intervals, consistently confirm the differential effects of monetary policy shocks between the East and non-East regions (Figure 3, panels A and B). At both regional and provincial aggregation levels, GDP growth responses in the Northeast, Middle, and West regions exceed those observed in the East region throughout most of the projection horizon. The only notable exception occurs around quarter 8, when GDP responses temporarily decline across all regions. Overall, results obtained from regional-level (panel A) and provincial-level (panel B) estimations are qualitatively

similar. Provincial-level estimates offer enhanced statistical power, making differences between East and non-East responses clearer. Specifically, following a 1% increase in M2 growth, GDP growth in the East region peaks at approximately 2.2% around quarter 10, subsequently declining to 1.7% by quarter 12. In contrast, the cumulative GDP growth response for the rest of the country continues to increase, peaking at around 3.5% by quarter 12, marking the largest divergence between East and non-East regions.



(A) Regional Panel Local Projections **(B)** Provincial Panel Local Projections

Figure 3. Impulse Responses of M2 Shock on GDP Growth (Pooled IRF). Panel (a) shows pooled regional-level estimates, and panel (b) shows provincial-level estimates using panel local projections. The estimates capture differential effects of M2 shocks between the East region and the rest of the country. Each line represents cumulative GDP response, and shaded bands denote 68% confidence intervals.

4.2 Impulse Responses Estimated Separately by Region

To complement the findings from the pooled panel analysis, I also estimate the impulse response functions (IRFs) separately for each of the four major economic regions using the Local Projections method. Figure 4 displays the cumulative GDP growth responses to a 1% monetary policy shock over a 12-quarter horizon.

While the pooled specifications provide greater statistical power and allow for formal comparisons across regions, the separate IRFs offer additional intuition about the underlying heterogeneity. Across all four regions, monetary policy shocks induce positive GDP growth, but the magnitude and precision of the responses vary. For the East region, GDP growth peaks at round 2.0% within 10 quarters and gradually declines to 1.4% by quarter 12. The Middle, Northeast, and West are more volatile and less precisely estimated, particularly around quarter 9. These patterns are consistent with the higher GDP growth volatility observed during the 2008 global financial crisis as shown in Figure 1.

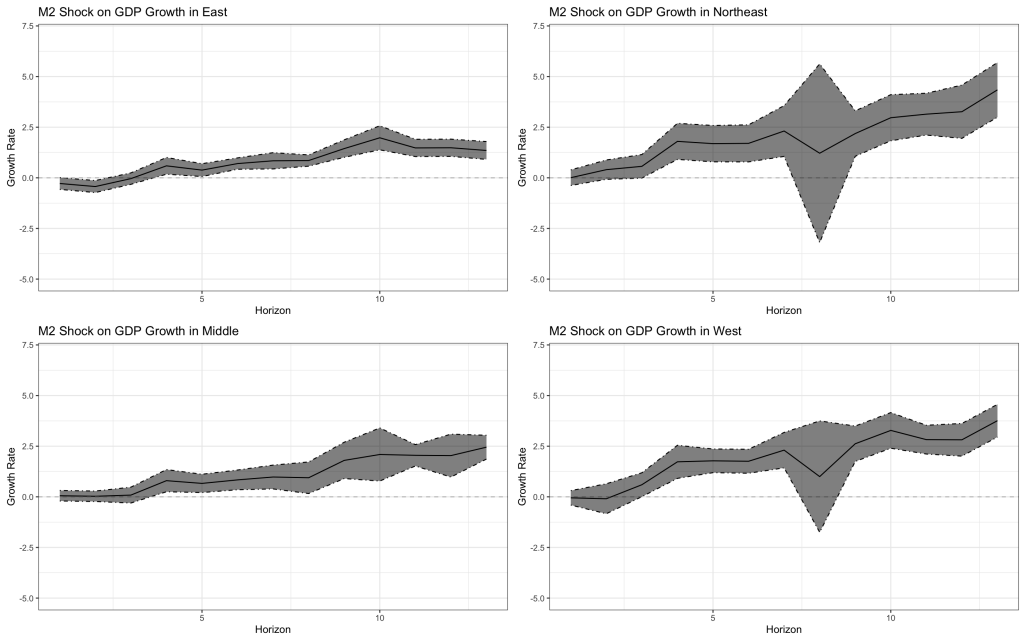


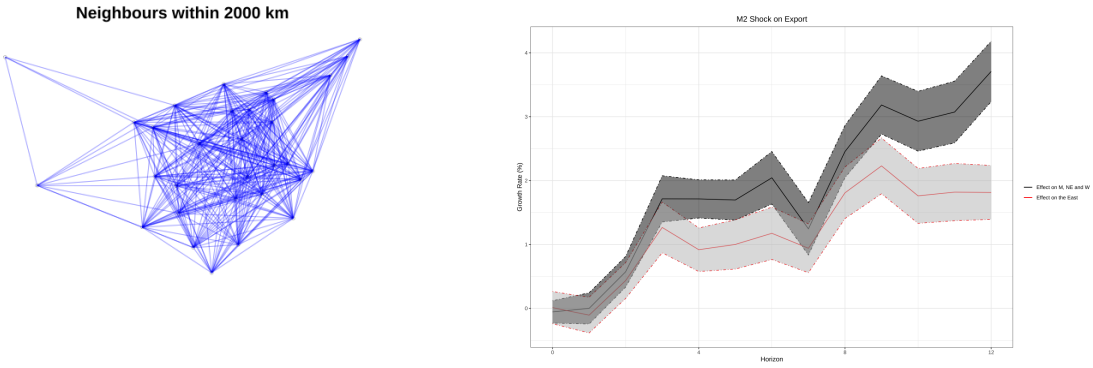
Figure 4. IRF of Monetary Policy on GDP Growth in Each Region. These impulse response functions are estimated separately for each economic region using the local projections method. The shock corresponds to a 1 percentage point increase in quarterly M2 growth. Shaded areas represent 68% confidence intervals. Responses are cumulative over the horizon and measure the effect on log GDP.

These regional-level estimates broadly reinforce the key results from the pooled analysis: non-East regions exhibit stronger responses to monetary policy shocks than the East. Taken together with the pooled panel results, this separate-region analysis illustrates consistent qualitative patterns and supports the conclusion that monetary policy has heterogeneous regional effects in China, with less pronounced transmission in the more developed East.

4.3 Spatial Spillovers

To account for potential interprovincial dependencies in economic activity, I extend the baseline panel Local Projections framework by incorporating spatial lags of output. Figure 5 presents the resulting impulse response functions (IRFs), estimated using a spatial weighting matrix based on inverse distances between provincial capital cities.

The inclusion of spatial spillovers does not alter the central finding: provinces in the East region exhibit significantly weaker responses to monetary policy shocks compared to those in the Middle, Northeast, and West. The spatial specification confirms that the cumulative GDP response in non-East provinces remains roughly twice as large as that in the East by the end of the 12-quarter horizon.



(A) Spatial Network **(B)** IRFs with the Network Effect

Figure 5. IRF of M2 Shock on GDP Growth with the Network/Spillover Effect. Panel (a) displays spatial linkages constructed using inter-capital distances within 2000 km. Panel (b) shows IRFs of GDP growth incorporating spatial spillovers via a spatial weighting matrix. The estimates suggest regional dependencies in output responses to monetary shocks.

These results corroborate the baseline conclusions and suggest that spatial propagation of economic activity—through regional trade, migration, or investment linkages—does not explain away the observed regional heterogeneity in monetary transmission. Instead, they highlight that spatial interdependence coexists with meaningful structural differences in policy responsiveness across regions. The spatial model thus complements the pooled panel results by affirming their robustness to interregional feedback effects.

4.4 Provincial-Level Heterogeneity

Figure 6 provides a heatmap of the estimated horizon-12 GDP responses to a 1% monetary policy shock, obtained from province-level Local Projections. Each province's cumulative response is depicted using a color gradient, where darker shades represent stronger output responses.

The figure reveals clear spatial patterns in the responsiveness of GDP to monetary shocks. Provinces in the East, including economically advanced coastal areas such as Shanghai, Jiangsu, and Zhejiang, exhibit systematically weaker responses relative to inland provinces. In contrast, provinces in the West, Middle, and Northeast—such as Gansu, Henan, and Liaoning—tend to display stronger and more persistent responses by quarter 12.

5 Drivers of the Different Output Effects across Regions

At first glance, the finding that monetary policy shocks generate stronger output responses in less-developed regions may appear encouraging. It suggests that expansionary policy could help reduce

regional disparities by stimulating more growth in lagging areas. To explore potential drivers, I examine two channels that may account for regional variation in output responses: the *exchange rate exposure channel* and the *land supply channel*. These mechanisms are particularly relevant in the context of China's institutional environment, where regional economies differ significantly in their export dependence and land-use dynamics. I use province-level Local Projections to obtain horizon-12 output responses (the same estimates underlying the heatmap in Figure 6) and then regress these estimates on province-level characteristics using simple OLS estimation:

$$\hat{\beta}_{12}^{(i)} = \alpha + \delta X_i + \epsilon_i, \tag{5.1}$$

where $\hat{\beta}_{12}^{(i)}$ denotes the estimated horizon-12 cumulative GDP response to a 1% M2 shock for province i, obtained from the province-level local projections. The variable X_i represents a province-specific characteristic—such as the average export-to-GDP ratio or the annualized growth rate of state-owned land supply—intended to proxy a specific transmission channel. The coefficient δ captures the cross-sectional relationship between the structural characteristic and the province's sensitivity to monetary policy shocks.

Following Georgiadis (2015), this reduced-form specification allows for a direct evaluation of whether variation in export exposure or land supply policies is associated with differential responsiveness to national monetary policy across provinces.

5.1 Exchange Rate Channel

One potential explanation for the muted monetary policy response in the East is the limited operation of the exchange rate channel. This mechanism typically links monetary easing to currency depreciation and, in turn, to increased export competitiveness and output.

However, the empirical evidence on the exchange rate channel in China presents a nuanced picture. on the one hand, studies such as Huang et al. (2020) show that monetary policy has limited influence on the exchange rate. This muted responsiveness likely stems from the rigidity of China's exchange rate regime and the importance non-policy factors—such as global conditions and structural trends rather than the monetary policy—in determining exchange rate movements. On the other hand, Chen et al. (2023) documents that, when exchange rate movements do occur, they have a meaningful impact on real economic activity. This partial disconnection between monetary policy and the exchange rate is particularly relevant for the East region. Provinces in the East

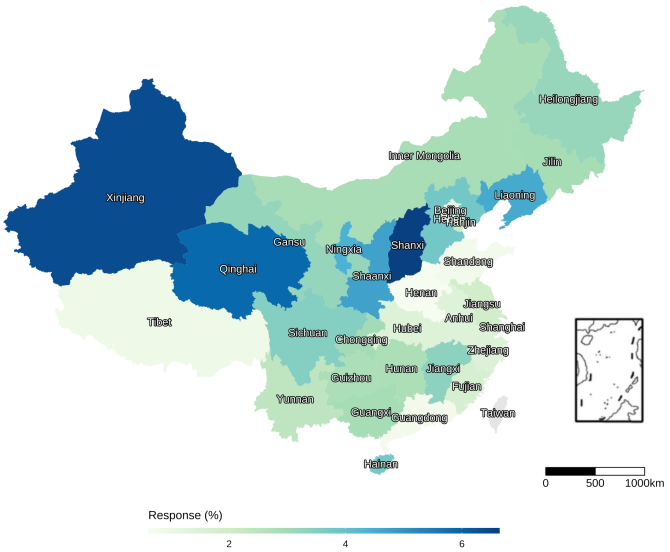


Figure 6. Horizon-12 response rates estimated from the Local Projections Model for Each Province. This heatmap shows the estimated GDP response at horizon 12 for each province following a 1% M2 shock. Estimates are obtained via province-level local projections. Darker shades indicate stronger output responses. The East shows systematically weaker effects.

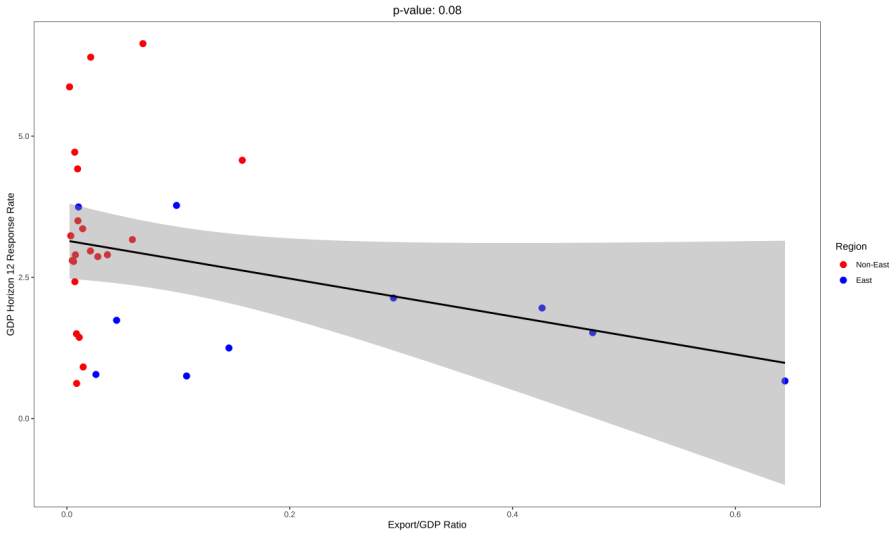


Figure 7. Export/GDP Ratio Plotted against the horizon-12 Response from the Local Projections estimate for each province. This scatter plot regresses each province's horizon-12 GDP response on its average export-to-GDP ratio (2005–2015). The negative slope suggests that provinces with greater export dependence, primarily in the East, are less responsive to monetary shocks—consistent with a muted exchange rate channel.

are more export-oriented, with exports accounting for a larger share of GDP compared to inland regions. If the exchange rate channel were fully functional, expansionary monetary policy would lead to currency depreciation, boost export competitiveness, and generate a stronger growth response in these regions. But if the exchange rate is unresponsive to monetary shocks, this mechanism is effectively blocked—particularly in export-intensive regions.

To assess this possibility empirically, I regress each province's estimated horizon-12 GDP response on its average export-to-GDP ratio (2005–2015). Figure 7 presents the results. The negative relationship is statistically significant at the 10% level, suggesting that provinces more reliant on exports tend to exhibit smaller output responses to monetary shocks. This pattern is consistent with a muted exchange rate channel. However, there is considerable dispersion among the non-East provinces, indicating that while this channel may be part of the explanation, it is likely not the only one.

5.2 Land Supply Channel

Another possible driver of regional heterogeneity in monetary policy transmission is the differential availability of land, shaped by China's institutional structure. In urban areas, all land is state-owned, and land-use rights must be acquired from the government. Since 2003, national land policy has increasingly favored the central and western regions, directing more land supply toward less-developed areas. In contrast, land supply has been increasingly restricted in coastal cities and major inland metropolises—particularly those experiencing significant population inflows (Han and Lu, 2018).

This divergence in land supply policy may help explain why expansionary monetary policy generates stronger GDP responses in inland provinces. As shown in Figure 8, there is a positive relationship between the average annual growth rate of state-owned land supply and the magnitude of the horizon-12 output response estimated for each province. This suggests that regions with more elastic land supply may be better positioned to accommodate investment responses to monetary expansion, amplifying the real effects of policy shocks.

At first glance, this appears to be a desirable pattern: monetary policy may be more effective in areas where land—an essential production input—is more readily available, and the policy bias toward inland regions may help close regional output gaps. However, this interpretation warrants caution. A growing body of research highlights the risks of overinvestment in underutilized areas. For instance, Lu (2017) document widespread construction of idle industrial parks in inland

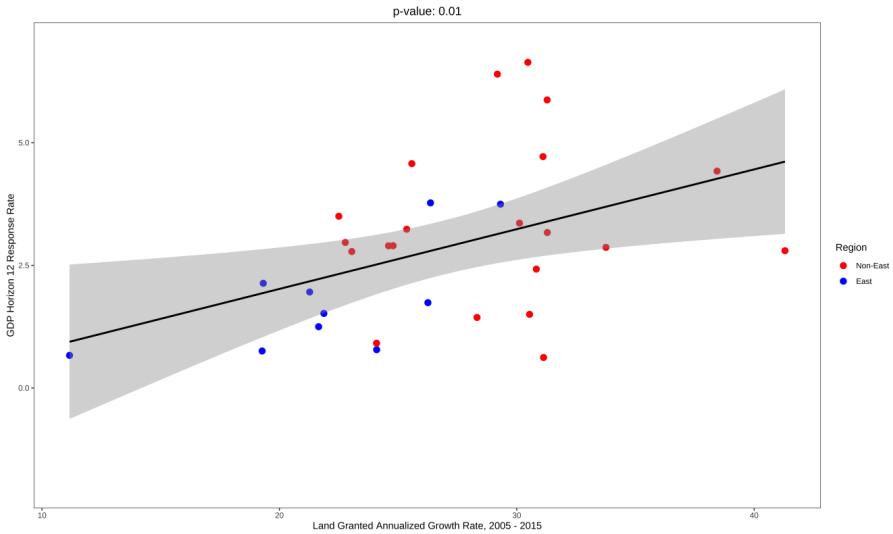


Figure 8. Annualized Growth Rate of the State-owned Land Granted Plotted against the horizon-12 Response. fhis figure plots the relationship between each province's GDP response and its annualized growth in state-owned land supply. The positive correlation indicates that increased land supply may explain stronger monetary transmission in less developed regions.

provinces, raising concerns about inefficient capital allocation. Similarly, Fang et al. (2021) show that while inland-favoring land policies may have narrowed regional output gaps, they did so at the cost of reduced incomes across the board—particularly for workers in more productive regions.

Therefore, while the land supply channel may explain part of the regional heterogeneity in monetary transmission, its implications are more complex. It raises important questions about the tradeoffs inherent in place-based policy interventions: whether fostering regional convergence in output necessarily improves aggregate efficiency or welfare remains an open issue.

6 Other Important Transmission Channels Not Explicitly Addressed

Interest Rate Channel The interest rate channel has traditionally been central to the monetary policy transmission literature. However, this study does not explicitly examine it due to the historically limited effectiveness of this channel within the Chinese context. Previous studies, including Laurens and Maino (2007) and Koivu (2009), have demonstrated that the interest rate channel in China historically exhibited only moderate effects on the real economy. Several structural factors explain this weak transmission, notably financial repression, preferential lending conditions to large state-owned enterprises, and regulatory floors and ceilings on deposit and

lending rates. Despite these historical constraints, recent policy shifts towards interest rate liberalization suggest a strengthening role of interest rates in China's monetary transmission mechanism (Fernald et al., 2014; Chen and Zha, 2017; Huang et al., 2018; Ge, 2019). Future research may increasingly need to consider this channel given its evolving significance.

Credit Channel Although this paper does not explicitly model the credit channel, a growing body of research suggests it plays a central role in China's monetary transmission.Chen et al. (2016) demonstrate that China's monetary policy affects output primarily through asymmetric credit allocation across sectors, rather than through traditional interest rate or consumption channels. In particular, during the 2009 stimulus, monetary easing disproportionately expanded credit to capital-intensive, state-dominated sectors such as real estate and heavy industry, leading to a sharp but uneven boost in GDP growth.

This finding is particularly relevant for understanding regional heterogeneity in monetary transmission. Inland regions, especially in the Northeast, Central, and Western provinces, have a higher concentration of state-owned enterprises (SOEs) due to historical industrial policies and limited private sector development. In contrast, the more market-oriented coastal provinces host a larger share of private and foreign-invested firms, which are typically more constrained by market discipline and less favored in politically driven credit allocation.

Given that SOEs are often the primary beneficiaries of directed lending during monetary expansions, it is plausible that the inland regions, with their higher SOE intensity, received a larger share of credit inflows during easing episodes—particularly under expansionary policy regimes like the 2009 stimulus. This pattern could explain why inland regions exhibit stronger output responses to monetary shocks in our estimates. However, due to the lack of comprehensive province-level credit allocation data by firm ownership or sector, we are unable to directly test this channel. Future research combining spatial and firm-level credit data would help clarify the interaction between ownership structure, credit allocation, and regional policy effectiveness.

7 Conclusion

Regional heterogeneity significantly shapes the effectiveness of monetary policy, especially when it has implications for regional economic disparities. In this paper, I utilized a newly developed identification strategy for monetary policy shocks by Chen et al. (2018) and employed the Local Projections method to investigate the varied regional impacts of China's monetary policy on

GDP growth. Contrary to previous findings in the literature, my analysis reveals that the economically developed East (coastal) region exhibits notably weaker responses to monetary policy shocks compared to less developed inland regions. This heterogeneity is partially attributable to differences in regional land supply growth rates and the limited effectiveness of the exchange rate channel in the export-oriented coastal provinces.

At first glance, these findings may suggest a favorable outcome, as monetary policy seemingly provides greater stimulus to less developed regions, potentially narrowing regional disparities. However, deeper investigation into underlying mechanisms indicates that policies like increasing land allocation to inland regions have limited efficiency and may lead to underutilized resources and unsustainable economic growth patterns. Given the ongoing population migration toward the more developed East region, reliance on such resource allocation policies could inadvertently restrict the economic potential of rapidly growing coastal cities.

Therefore, my findings highlight the necessity of formulating complementary regional development policies alongside national monetary interventions. Policymakers should cautiously design these complementary policies to balance growth across regions effectively, promoting balanced development and ensuring that national monetary interventions account for regional asymmetries in policy transmission.

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