Research on the Relationship between China’s IS Curve and Macroeconomic Variables during the COVID-19 Pandemic: From the Perspective of Consumption, Saving, and Investment

Jiajing Li*

Beijing New Channel School, Beijing 100080, China

*18511200065@163.com

Abstract

The COVID-19 pandemic emerging in 2020 has profoundly impacted China’s economic landscape, disrupting macroeconomic operations and altering micro-behaviors like household consumption and corporate investment. Existing studies focus on single variables, such as the "precautionary saving surge" and reduced corporate investment willingness. This paper analyzes the interactive relationships among consumption, saving, and investment through the dynamic changes of the IS curve during the pandemic, aiming to optimize the IS curve model, improve the macroeconomic analysis framework for emergency events, and offer theoretical references for policy-making. It employs literature research and case analysis, comparing IS curve changes and multiplier effects between lockdown and normalized periods. Existing policies alleviated demand contraction but require optimized coordination. The study suggests a "demand-confidence" mechanism and special investment funds to improve emergency macroeconomic analysis.

Keywords

COVID-19, IS Curve, Macroeconomic Variables.

1. Introduction

The COVID-19 pandemic, emerging in early 2020, has profoundly impacted the global economic landscape. In China, the pandemic not only disrupted the macroeconomic operation system but also significantly altered micro-behaviors such as household consumption, saving, and corporate investment, thereby challenging the traditional shape of the IS curve and the interlinkage mechanism among economic variables. Existing studies have primarily focused on the impact of the pandemic on single economic variables. Zhou Lu et al. [1] analyzed China's stock market data and found that household consumption behavior during the pandemic was characterized by a "surge in precautionary saving," with the marginal propensity to consume dropping from 0.62 to 0.51 and the consumption structure shifting toward medical health and online services. Jiang Jie et al. [2] studied Chinese listed companies and revealed that the pandemic transformed corporate investment decision-making logic, with the investment willingness index falling from 120 in 2019 to 85 in 2020 and significant differentiation in investment interest rate sensitivity between manufacturing and service industries. Lv Bingyang et al. [3] pointed out that the government purchase expenditure multiplier decreased from 2.5 to 1.8 during the pandemic due to the decline in household marginal propensity to consume. However, research systematically analyzing the interactive relationship among consumption, saving, and investment from the perspective of dynamic changes in the IS curve remains to be deepened, especially in integrating these micro-behavioral changes into the macroeconomic framework. This paper aims to explore the adaptive adjustment path of the IS curve model by analyzing the interaction of economic variables during the pandemic, providing theoretical references for improving the macroeconomic analysis framework under emergency events.

And the COVID-19 pandemic caused short-term severe shocks to China’s macroeconomy by disrupting personnel mobility and supply chain circulation. In the first quarter of 2020, GDP fell by 6.8% year-on-year, marking the first negative growth since China’s reform and opening-up. Restrictions on residents’ travel led to a sharp contraction in service consumption, with revenue in industries such as catering and tourism plummeting. Enterprise shutdowns and production halts depressed investment willingness, and the growth rate of fixed asset investment in manufacturing once dropped to -25.2%. This structural shock broke the equilibrium state of traditional economic operation, prompting systematic changes in consumption, saving, and investment behaviors.

The core objective of this study is to revise and analyze the changes in the IS curve model during the pandemic, enhancing the accuracy of analyzing the relationships among macroeconomic variables. The traditional IS curve is based on the assumption of a steady-state economic environment, while the uncertainties triggered by the pandemic have offset the parameters of the consumption function and investment function. By exploring these changes, on the one hand, the IS curve model under emergency events can be improved, providing an analytical tool for similar contingencies; on the other hand, it can enrich the application cases of macroeconomic theories in scenarios of asymmetric shocks, offering theoretical support for policymakers to address future uncertain events. For example, clarifying the change law of investment sensitivity to interest rates during the pandemic will help optimize the transmission efficiency of monetary policies.

2. Literature Review and Theoretical Basis

2.1. The Pandemic’s Impact on the Consumption Function and IS Curve

The IS curve, a foundational construct in macroeconomic theory, delineates the inverse relationship between interest rates and national income under product market equilibrium. Zhou Lu et al. [4] empirically analyzed China’s stock market data and documented a pronounced shift in household consumption behavior during the pandemic, characterized by a "surge in precautionary saving." As consumers’ uncertainty regarding future income intensified, the marginal propensity to consume declined from 0.62 in the pre-pandemic period to 0.51, accompanied by a structural reallocation of spending toward medical goods and online services. This behavioral adjustment triggered a leftward shift in the IS curve and an increase in its slope’s absolute value, indicating diminished sensitivity of output to interest rate fluctuations.

The economic implications are evident: the leftward IS curve reflects contraction in aggregate demand, thereby escalating recessionary pressures. For instance, in the second quarter of 2020, despite accommodative monetary policy measures (i.e., interest rate cuts), total retail sales of social consumer goods increased by only 0.2% year-on-year, significantly below the pre-pandemic growth rate of approximately 8%. This disparity underscores the challenge faced by policy interventions: monetary easing (e.g., rate reductions) and fiscal expansion (e.g., increased government expenditure) require more aggressive implementation to counteract the steeper IS curve and restore economic equilibrium.

2.2. The Pandemic’s Impact on the Investment Function

Jiang Jie et al. [5] conducted a study on Chinese listed enterprises and revealed that the pandemic induced a fundamental re-evaluation of corporate investment strategies. Confronted with short-term survival imperatives, firms prioritized liquidity preservation, as evidenced by the decline in the investment willingness index from 120 in 2019 to 85 in 2020, alongside a substantial contraction in investment scales. Notably, the sensitivity of investment to interest rates exhibited sectoral divergence: the interest rate elasticity of manufacturing investment increased from -0.35 to -0.48, whereas that of service industry investment decreased from -0.28 to -0.15. This heterogeneity across industries rendered the traditional aggregate IS model inadequate, as it failed to capture the structural changes in investment behavior.

2.3. Changes in the Multiplier Effect within the IS Curve

Fluctuations in consumption and investment during the pandemic also influenced the efficacy of fiscal policy multipliers. Lv Bingyang et al.[6] demonstrated that the decline in households' marginal propensity to consume led to a reduction in the government expenditure multiplier from 2.5 in normal economic conditions to 1.8, while the tax multiplier shifted from -1.5 to -1.2. This theoretical finding was corroborated by empirical evidence: China's 1 trillion yuan fiscal deficit expansion in 2020 generated a GDP growth effect that was 0.8 percentage points lower than the same period in 2019, illustrating the dampening effect of reduced multiplier efficiency on policy effectiveness.

2.4. Theoretical Gaps and Research Orientation

Existing literature, such as the analysis by Servaas Storm[7], has predominantly focused on the isolated impact of the pandemic on single economic variables (e.g., consumption or investment), rather than examining their interactive effects on the IS curve. Cheng Shi et al.[8] further emphasize that traditional macroeconomic models, constructed under the assumption of steady-state economic conditions, are ill-suited to explain dynamics during crisis periods. The critical research gap lies in integrating micro-level behavioral changes—including precautionary saving motives and sector-specific investment heterogeneity—into macroeconomic modeling frameworks. This study aims to address this gap by analyzing the dynamic interplay among consumption, saving, and investment and their collective influence on the IS curve during the pandemic.

3. Discussion on Consumption, Saving, Investment and IS Curve

The leftward shift of China's IS curve during the COVID-19 pandemic reflects a severe contraction in aggregate demand, amplifying recessionary pressures. This shift stems from interdependent behavioral changes in consumption, saving, and investment, empirically validated through pandemic-period data.

First, heightened income uncertainty triggered a surge in precautionary saving [1]. Household savings rates rose from 36% to 41%, while the marginal propensity to consume (MPC) declined from 0.62 to 0.51. This decline in MPC directly reduced autonomous consumption, shifting the IS curve leftward. Concurrently, investment demand contracted due to plummeting corporate profit expectations (–3.3% YoY for industrial firms) and collapsing investment willingness [2]. Critically, investment sensitivity to interest rates exhibited sectoral divergence: manufacturing elasticity increased (from –0.35 to –0.48), while services elasticity decreased (from –0.28 to –0.15). This fragmentation weakened monetary transmission efficacy; despite policy rate cuts (corporate loan rates: 5.44% - 4.61%), aggregate investment recovery remained partial.

Furthermore, falling MPC and investment confidence attenuated fiscal multipliers [3][6]. The government expenditure multiplier dropped from 2.5 to 1.8, diminishing the output impact of fiscal stimuli (e.g., a 0.8-pp smaller GDP growth effect per ¥1 trillion fiscal expansion vs. 2019). This multiplier decay steepened the IS curve slope, indicating reduced output responsiveness to interest rate changes.

The precautionary saving rise (consumption decline) and investment fragmentation (weaker policy traction) interacted with multiplier erosion, collectively contracting demand and left-shifting the IS curve. Restoring equilibrium thus necessitates coordinated expansionary policies: monetary easing (to lower interest rates) complemented by targeted fiscal interventions (e.g., sector-specific subsidies) to stimulate demand and shift the IS curve rightward.

4. Question Exploration: Demand Contraction and Policy Optimization Paths

4.1. Causes of Consumption and Investment Demand Contraction

Strengthened Precautionary Saving Motive: The pandemic increased residents' perception of uncertainty about future employment and income. In 2020, household deposit balances increased by 13.9% year-on-year, 4.2 percentage points higher than in 2019, and the savings rate rose from 36% to 41%, squeezing current consumption expenditure.

Deteriorated Corporate Profit Expectations: Supply chain disruptions and shrinking market demand led to a decline in corporate revenue. In 2020, the total profits of industrial enterprises above a designated size fell by 3.3% year-on-year, and enterprises had to cut investment plans to maintain cash flow.

Structural Tightening of the Financing Environment: Although the central bank implemented an easy monetary policy, the difficulty for small and medium-sized enterprises (SMEs) to access credit was not significantly reduced. In 2020, the growth rate of inclusive small and micro loans reached 30.3%, but its proportion in total corporate loans was only 15.6%, and financing constraints restricted investment capacity.

4.2. Improvement Effects of Existing Policies

Targeted Regulation of Monetary Policy: The central bank injected liquidity into the market through tools such as reserve requirement ratio cuts and re-lending. In 2020, the reserve requirement ratio was cut by 150 basis points in total, releasing about 1.75 trillion yuan of long-term funds. This reduced the corporate loan interest rate from 5.44% in 2019 to 4.61% in 2020, supporting the recovery of manufacturing investment. The growth rate of manufacturing investment rebounded to 5.8% in the second half of 2020.

Precise Implementation of Fiscal Policy: The government introduced tax and fee reduction policies, with new tax and fee reductions exceeding 2.6 trillion yuan in 2020, of which tax reductions for the manufacturing industry and related links accounted for 35%. Meanwhile, infrastructure investment was expanded, and the growth rate of infrastructure investment rebounded from -19.7% in the first quarter to 0.9% for the whole year of 2020, partially offsetting the decline in private investment.

Role of Consumption Stimulus Policies: Local governments issued more than 19 billion yuan in consumption vouchers, driving a consumption rebound effect of about 3.5 times. Subsidies for bulk consumption such as automobiles and home appliances led to a 1.8% year-on-year increase in automobile retail sales and a 0.9% increase in home appliance retail sales among units above a designated size in 2020, alleviating the rapid decline in consumption demand.

4.3. Policy Optimization Design

Constructing a "Demand-Confidence" Dual-Drive Mechanism: Establish a cross-departmental household income security system, such as issuing special subsidies to practitioners in industries affected by the pandemic, stabilizing income expectations to reduce precautionary saving. Meanwhile, guide positive public opinion through the media to enhance consumers' confidence in economic recovery. The consumer confidence index rebounded from 86.3 in the third quarter of 2020 to 92.1, followed by an improvement in consumption expenditure.

Innovating Investment Guidance Policy Tools: Set up special industrial investment funds for the pandemic, providing low-interest loans and risk compensation for emerging fields such as medical health and the digital economy. The scale of such funds reached 50 billion yuan in 2020, leveraging more than 200 billion yuan of social capital investment. Improve the financing guarantee system for SMEs, reducing the guarantee rate of government financing guarantee institutions for small and micro enterprises from 2.5% to below 1%, enhancing enterprise investment capacity.

Optimizing the Synergy of Fiscal and Monetary Policies: When the IS curve becomes steeper due to the pandemic, the intensity of fiscal policy should be increased, and monetary policy should be used to guide funds to key areas. For example, the 1 trillion yuan special anti-epidemic treasury bonds launched by the central bank in 2020 were matched with special re-lending, achieving precise docking of fiscal expenditure and credit investment, increasing the government expenditure multiplier by about 0.3 units.

5. Conclusion

The COVID-19 pandemic has caused China's IS curve to exhibit the characteristics of "leftward shift and increased slope" by changing consumption, saving, and investment behaviors, challenging the explanatory power of traditional macroeconomic models. Studies have shown that the rise in households' precautionary saving propensity during the pandemic, the differentiation of enterprises' investment interest rate sensitivity, and the decline in the multiplier effect are the core factors leading to changes in the IS curve. Existing policies have played a positive role in economic recovery by alleviating liquidity constraints and stimulating demand, but they still need optimization in addressing structural shocks. Future research can further combine regional economic data to explore the differentiated performance of the IS curve in regions with different development levels, providing more detailed theoretical support for precise policy implementation.

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