Gray Rhinos and Black Swans in China's Current Economy (Postprint)

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Abstract

Following a period of prolonged high-speed growth and shifts in the international economic landscape, the Chinese economy faces relatively severe systemic risks. The Chinese government attaches great importance to this issue, advocating for prevention against both "black swan" events and "gray rhino" risks. This article analyzes the "gray rhino" and "black swan" risks confronting the Chinese economy, arguing that the most significant current "gray rhino" is the continuously expanding aggregate debt and elevated leverage ratio, while the current "black swan" consists of unpredictable severe external shocks. The two underlying factors that could cause the "gray rhino" to charge are economic downturn and rising interest rates, and the greatest risk at present is that a "black swan" could trigger the "gray rhino" through trade channels.

Full Text

"Gray Rhino" and "Black Swan" in China's Current Economy

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Abstract: After a prolonged period of rapid growth and shifts in the international economic landscape, China's economy faces severe systemic risks. The Chinese government attaches great importance to this issue, emphasizing the need to guard against both "black swans" and "gray rhinos." This paper analyzes the "gray rhinos" and "black swans" confronting China's economy, arguing that the most significant "gray rhino" is the continuously expanding overall debt and high leverage ratio, while the "black swan" consists of unpredictable, severe external shocks. The two potential factors that could set the "gray rhino"

running are economic downturn and rising interest rates, and the greatest risk lies in the "black swan" detonating the "gray rhino" through trade channels.

Keywords: Gray Rhino, Black Swan, debt, leverage ratio, external shock

Introduction

Since the 1990s, the frequency, scope, and impact of financial crises—exemplified by the East Asian financial crisis, the U.S. subprime mortgage crisis, and the European debt crisis—have been accelerating and intensifying [1]. Systemic risk associated with financial crises has become a hot topic in international academic research. Two nearly household terms have emerged from this discourse: "black swan" and "gray rhino." Coined by Nassim Nicholas Taleb, Distinguished Professor at New York University [2], and Michele Wucker, Guggenheim Fellow [3], in 2007 and 2016 respectively, these metaphors characterize systemic risk. A "black swan" refers to low-probability events that are difficult to predict but, when they occur suddenly, trigger chain reactions with enormous negative impacts. A "gray rhino"denotes risks that are highly probable, extremely impactful, somewhat predictable, and latent but often ignored. These concepts have vividly captured the characteristics of systemic risks, transforming abstract academic notions into accessible descriptions that have resonated internationally. Books by Taleb and Wucker [2,3] became bestsellers worldwide.

After more than 30 years of high-speed growth, China' s economy shifted to medium-high speed growth in 2012, entering an adjustment period. Accumulated contradictions and the effects of economic slowdown have significantly increased systemic risks in China' s economy. The Party Central Committee with Comrade Xi Jinping at its core attaches great importance to systemic risk prevention, with General Secretary Xi Jinping and Premier Li Keqiang repeatedly emphasizing the need to "firmly hold the bottom line of not allowing systemic risks to occur." At the Fifth National Financial Work Conference on July 14-15, 2017, the State Council Financial Stability and Development Committee was established. General Secretary Xi Jinping stressed the need to "strengthen the People' s Bank of China' s macroprudential management and systemic risk prevention responsibilities, implement regulatory duties of financial supervision departments, and strengthen regulatory accountability." On July 17, 2017, a *People' s Daily* commentary titled "Effectively Preventing Financial Risks—Second Commentary on Doing a Good Job in Current Financial Work" [4] stated that "preventing and resolving financial risks requires enhanced awareness of potential dangers···We must guard against both 'black swans' and 'gray rhinos,' neither taking risk signals lightly nor ignoring them." On August 15, 2017, Wang Zuji, President of China Construction Bank, published an article in *People' s Daily* [5], stating that preventing "black swans" and "gray rhinos" is the responsibility of large state-owned commercial banks. On November 4, 2017, the People' s Bank of China website published Governor Zhou Xiaochuan' s article "Hold

the Bottom Line of Not Allowing Systemic Financial Risks" [6], emphasizing the need to strengthen prevention of both "black swans" and "gray rhinos." On November 8, 2017, the State Council Financial Stability and Development Committee was formally established with State Council Vice Premier Ma Kai as its director.

These developments demonstrate the nation' s high attention to "gray rhinos" and "black swans" in China' s economy. This paper attempts to systematically analyze the "gray rhinos" and "black swans" in China' s current economy to identify the crux of problems and address them promptly.

The Biggest "Gray Rhino" in China's Current Economy: Overall Debt

While individual risk factors such as shadow banking and real estate bubbles have long been recognized by the Chinese government and society, with continuous policy measures to strengthen control, the largest "gray rhino" in China's current economy is the continuously accumulating overall debt across the economic system and the high leverage ratio. Various debts in China' s economic system have formed a massive debt chain through financial intermediaries (commercial banks). Liquidity difficulties or payment crises in any link can be transmitted through this chain, triggering systemic crises. This section analyzes China' s economic "gray rhino" from this perspective.

Overall Debt Situation in China' s Current Economy Since the 2007 subprime crisis, against the backdrop of global quantitative easing and generally loose domestic policies , China' s economy has experienced obvious deleveraging, with debt financing increasing rapidly and debt accumulating quickly. According to Bank for International Settlements (BIS) statistics, by the end of Q1 2017, China' s non-financial sector credit balance reached 196.9 trillion RMB, accounting for 257.8% of GDP (compared to 141% at end-2008), far exceeding the average level of emerging market economies (189%) and the average of all reporting countries (238%), approaching the average of developed economies (267.9%). Using the BIS credit-to-GDP gap indicator , China's figure was 22.1% at end-Q1 2017, ranking first in the world despite having declined from its peak, far exceeding the BIS' s normal range of 2%–10%, implying unsustainable risks.

The Chinese government has always attached great importance to financial risk prevention, placing risk prevention in a prominent position. However, against a backdrop of generally weak macroeconomics and the need to maintain stable growth, China' s deleveraging policies have been relatively moderate, with generally loose monetary and credit conditions, low interest rate levels, and conservative macro deleveraging. Micro entities tend to overestimate themselves, hold optimistic expectations about the future, underestimate risks, lack motivation to actively deleverage, and have been slow in deleveraging. Some sectors, such as real estate, continue to increase leverage, and debt ratios continue to rise. As shown in Figure 2 [Figure 2: see original paper], although the growth rate of China' s "credit balance/GDP" has slowed, the overall debt level has not

fallen to a level that eliminates crisis risk, and the "gray rhino" characteristics of accumulated debt persist.

Debt Structure Analysis in China's Current Economy To identify weak links in the debt chain and locate "gray rhino" risk points, this section analyzes China's economic debt structure.

Debtors: Non-financial enterprises and local governments have relatively high debt and are weak entities in the debt chain. BIS statistics show that non-financial enterprise credit rose from 96.3% of GDP at end-2008 to 165.3% at end-Q1 2017, an increase of 69 percentage points. Government credit balance rose from 27.1% of GDP at end-2008 to 46.9% at end-Q1 2017, an increase of 19.8 percentage points, with central government debt remaining basically stable and the entire increase coming from local government credit. Household credit balance rose from 17.9% of GDP at end-2008 to 45.5% at end-Q1 2017, an increase of 27.6 percentage points, with housing credit contributing nearly 60% of this increase.

Risk Sources: Real estate-related credit has expanded rapidly, closely related to real estate prices, creating asset price risk exposure. In the first three quarters of 2017, 39% of new loans were real estate loans, with real estate loan balances accounting for 25% of total bank loan balances. Individual housing loans rose from 10.4% of GDP at end-2008 to 26.5% at end-Q1 2017, an increase of 16.1 percentage points (Figure 3 [Figure 3: see original paper]). As of end-June 2017, banking institutions' total RMB loans reached 114.57 trillion RMB, with real estate loan balances at 29.72 trillion RMB, accounting for 25.9% of total RMB loans. Meanwhile, as real estate prices have risen continuously, other bank mortgages are also primarily collateralized by land or real estate. Statistics from China's "Big Five" banks , 12 joint-stock commercial banks, 10 city commercial banks, and 8 rural commercial banks show that real estate mortgage loans account for about 43% of total commercial bank loans (Figure 4 [Figure 4: see original paper]), with direct real estate-related loans using real estate as collateral totaling approximately 39.4 trillion RMB. Excluding these direct real estate loans, other loans using real estate as collateral amount to about 13.6 trillion RMB. Housing price adjustments will directly affect bank loan quality, creating obvious asset price risk.

Financial Intermediaries: Debt financing is concentrated in commercial banks, increasing banking system vulnerability. Although China's bond market has developed rapidly in recent years, with direct debt financing's share rising, indirect debt financing through banks remains dominant. BIS statistics show that 75% of non-financial enterprise and household debt in China comes from commercial banks at end-Q1 2017, far exceeding the 49% average in developed countries. Commercial banks link all creditors and debtors as financial intermediaries; payment difficulties in any local area can be transmitted through commercial banks, becoming systemic risk. Meanwhile, driven by profit, commercial banks' off-balance-sheet businesses have expanded rapidly,

shadow banking has grown quickly, and problems such as maturity mismatch have become prominent. The banking system' s own risks cannot be ignored.

Sustainability Analysis of Debt by Sector in China's Current Economy
The size of the "gray rhino" does not directly determine the probability of harm; the "gray rhino"running is what causes direct impact. When the "gray rhino"will start running is the key research question. The root of a debt crisis is whether principal and interest payments can be sustained. When payments cannot be made, a "Minsky Moment" occurs. This is the focus of "gray rhino" research. Analyzing the sustainability of debt across sectors helps identify conditions and signs of a "Minsky Moment" and provides early warning of debt risks.

Non-Financial Enterprise Debt Sustainability Depends on Debt Use Efficiency and Returns: China' s non-financial enterprise leverage ratio has risen rapidly since 2009, increasing 23 percentage points of GDP in one year, remaining relatively stable in 2010–2011, then experiencing continuous growth from 2012–2015, rising 43 percentage points of GDP in three years. Under deleveraging policies since 2016, the leverage ratio has gradually stabilized (Figure 2 [Figure 2: see original paper]). By ownership, state-owned enterprises (SOEs) have increased leverage more prominently. Taking industrial enterprises above designated size as an example (Figure 5 [Figure 5: see original paper]), after the 2008 financial crisis, the asset-liability ratios of state-controlled industrial enterprises and other ownership enterprises diverged significantly. The state-controlled industrial enterprises' ratio rose from 56.5% in 2007 to 62.3% in 2013, reaching a peak since 2000. Under deleveraging pressure, it fell slightly to 61.6% in 2016, still 5 percentage points higher than in 2007. Meanwhile, other ownership types of industrial enterprises' asset-liability ratios have been declining continuously, from 58.3% in 2007 to 52.3% in 2016, a decrease of 6 percentage points. SOEs are the main entities increasing leverage, and their debt sustainability is critical.

Under the assumption of going concern, the condition for non-financial enterprises to maintain debt sustainability is continuous interest payment. From a financial perspective, the condition for continuous interest payment is that total profit must exceed interest expenses, meaning the interest coverage ratio must be greater than 2. Examining China' s SOE and other ownership enterprises' financial data (Figure 6 [Figure 6: see original paper]): from 1998–2000, the interest coverage ratio of state-owned and state-controlled enterprises was below 2, creating payment crisis risk, which the central government resolved through fiscal injection to establish four asset management companies; from 2001–2007, under the combined effects of SOE reform and an economic upswing, enterprise performance improved significantly, with the interest coverage ratio above 2 and strong debt-bearing capacity; in 2008, affected by the international financial crisis, the ratio fell to 2.9; in 2009–2010, as enterprise performance improved, the indicator rose, then began to fall as leverage increased; in 2016, the interest coverage ratios of state-owned and state-controlled enterprises and state-controlled

industrial enterprises both fell to around 3; in 2017, affected by cyclical economic recovery, the indicator improved, returning above 3. Meanwhile, the interest coverage ratio of other ownership industrial enterprises remained above 8, with still high debt protection capacity. This shows that China' s enterprise debt risk is concentrated in SOEs.

Although the interest coverage ratio can intuitively judge enterprise debt risk, it cannot identify risk sources. Based on the condition that the interest coverage ratio must be greater than 2, using DuPont financial decomposition, the condition for enterprises to sustain interest payments can be derived as: interest-bearing debt turnover × sales profit rate > interest rate, i.e., interest-bearing debt ratio × asset-liability ratio × asset turnover × sales profit rate > interest rate. This condition has clear economic meaning: whether enterprise debt can be sustained depends on debt use efficiency (turnover times) and returns (sales profit rate), being inversely proportional to interest-bearing debt ratio and asset-liability ratio, and directly proportional to asset turnover and sales profit rate. Based on China' s SOE financial statistics and assuming all long-term liabilities are interest-bearing, calculations show: as illustrated in Figure 7 [Figure 7: see original paper], due to the dual decline in asset turnover (from 0.62 times in 2007 to 0.34 times in 2016) and sales profit rate (from 9.9% in 2007 to 5.0% in 2016), China' s SOE debt-bearing capacity declined significantly in 2015–2016. As shown in Figure 8 [Figure 8: see original paper], the product of interest-bearing debt turnover and sales profit rate has approached the 同期 loan interest rate, facing payment difficulties, with bond market defaults occurring. In 2017, with cyclical economic recovery, the sales profit rate rebounded significantly (SOE sales profit rate was 5.8% in the first three quarters of 2017, up 0.8 percentage points from 2016), and China' s SOE debt-bearing capacity improved.

The above analysis shows that the risk point of China' s non-financial enterprise debt lies in the decline of operational efficiency and returns. Once the returns from debt use are insufficient to cover debt costs (interest expenses), a payment crisis will occur. Currently, China' s interest rates remain at a relatively low level. If interest rates rise rapidly, exceeding the speed of enterprise performance recovery, a crisis will emerge.

Local Government Debt Sustainability Depends on Economic Growth Rate: According to BIS statistics, China' s government debt-to-GDP ratio has risen significantly since 2008, with the entire increase coming from local government debt. Local government debt rose from 10.4% of GDP in 2008 to 30.2% in 2016, an increase of nearly 20 percentage points. The debt ratio is the key indicator for measuring local government debt risk, calculated as debt balance divided by comprehensive financial resources, where comprehensive financial resources include public fiscal revenue, transfer payments, government fund revenue, and state capital operating revenue. According to Ministry of Finance statistics, China' s local government debt ratio was 79.8% in 2016, below the 100% international warning line (Table 1). BIS includes some local investment and financing platform debts in local government debt, concluding that China'

s local government debt ratio exceeded 100% starting in 2015, reaching 117% in 2016, surpassing the international warning line.

The debt ratio is a static measure of debt burden capacity. Dynamic monitoring of local government debt sustainability can use the dynamic government debt sustainability formula:

$$e_0 - t_0$$

where z represents the government debt burden ratio; e_0 represents autonomous government expenditure (excluding debt interest payments) as a share of GDP; t_0 represents government fiscal revenue (excluding debt income) as a share of GDP; c is a constant; n represents nominal GDP growth rate; i represents local bond interest rate; and t represents time.

The most fundamental factor for local government debt sustainability is the comparison between nominal GDP growth rate and bond interest rate. Under deficit conditions ($e_0 - t_0 < 0$), when nominal GDP growth rate exceeds the government debt interest rate ($n - i > 0$), the government debt burden ratio tends to stabilize in the long term, converging to the ratio of the basic fiscal deficit to the difference between nominal GDP growth rate and government debt interest rate. When nominal GDP growth rate is lower than the government debt interest rate ($n - i < 0$), fiscal revenue growth from GDP growth cannot cover government debt interest expenses, and the debt burden ratio will tend toward infinity. From this indicator, China' s local government debt-bearing capacity has declined with the economic slowdown. As shown in Figure 9 [Figure 9: see original paper], local nominal GDP growth rate fell to 5.6% in 2015, significantly narrowing the gap with local bond bidding interest rates. Some provinces' GDP growth has fallen below interest rate levels: in 2015, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, and Gansu had nominal GDP growth below the 3.4% interest rate level; in 2016, Shanxi, Inner Mongolia, Liaoning, and Heilongjiang had nominal GDP growth below the 2.9% interest rate level, placing their debt burden in an unsustainable state. Since 2017, China' s economy has experienced cyclical recovery. Although local government bond bidding interest rates have risen to around 4%, local GDP growth rates have gradually increased, improving debt sustainability.

The above analysis shows that the risk point of China' s local government debt lies in excessively rapid economic slowdown. Economic deceleration will significantly reduce local fiscal capacity. Particularly, when nominal economic growth falls below interest rate levels, local debt becomes highly prone to payment crises. Currently, China' s local government bond bidding interest rates have risen somewhat. If interest rates rise faster than economic recovery, local government debt problems will become prominent again.

Real Estate Debt Sustainability Depends on Household Income and Rental Levels: Real estate debt involves two entities: real estate enterprises and homebuying residents. Although China' s real estate enterprises currently have high debt ratios, part of their liabilities consists of presale funds, with

interest-bearing debt not being particularly prominent, and sales profit rates remain at double-digit highs. According to enterprise debt sustainability indicators, there is no obvious debt risk yet.

The direct indicator for measuring residents' real estate debt sustainability is the housing price-to-income ratio. Based on National Bureau of Statistics data, as shown in Figure 10 [Figure 10: see original paper], in 2016 China's highest price-to-income ratios were Shenzhen (26.1), Xiamen (18.2), Beijing (16.3), Shanghai (15.4), Nanjing (13.1), Tianjin (12.0), and Hangzhou (10.7), all exceeding the internationally recognized reasonable level of 6–7. Some city statistical bureau data differs significantly from market monitoring data, with actual price-to-income ratios being even higher.

From the perspective of household payment capacity, the condition for mortgage sustainability is: income -principal and interest payments > 0. When income consists mainly of household disposable income and rental income, and expenses assume equal principal and interest payments, the condition for mortgage sustainability can be derived as:

$$(r_i \times (1-a) + r_r)/(1-k) > i_h \times \frac{(1+i_h)^n}{(1+i_h)^n - 1}$$

where r_i represents the income-to-housing-price ratio (inverse of price-to-income ratio), a is the living expense-to-income ratio, r_r is the monthly rental-to-housing-price ratio (inverse of price-to-rent ratio), k is the down payment ratio, i_h is the mortgage interest rate, and n is the loan term in months. Under the assumptions of $a = 0$ and $k = 0$, the relationship becomes clearer:

$$r_i + r_r > i_h \times \frac{(1+i_h)^n}{(1+i_h)^n - 1}$$

If the loan term n is infinite, the condition simplifies to:

$$r_i + r_r > i_h$$

This condition means that the combined flow of income-to-housing-price ratio and rental income ratio must be sufficient to cover interest expenses.

Using data from the National Bureau of Statistics and the China Real Estate Association to assess mortgage risk in 35 cities reveals: under a 30-year loan term, ignoring living expenses and down payment ratios, and using National Bureau of Statistics housing price data, only Shenzhen residents have income and rental income flows insufficient to cover mortgage interest payments—that is, the sum of income-to-housing-price ratio and rental income ratio is below the loan interest rate burden (6.1%), indicating payment risk. However, due to tax avoidance and other reasons, National Bureau of Statistics housing price data significantly underestimates actual prices. China Real Estate Association monitoring data is closer to reality. Using this data, Beijing, Xiamen, Shanghai, and Shenzhen were all in a risk state in 2016, with the sum of income-to-housing-price ratio

and rental income ratio below the actual interest rate burden (6.1%, yellow line in Figure 11 [Figure 11: see original paper]). Beijing is already approaching the mortgage monthly interest rate, and in an infinite loan term state would also be in a risk state, where household income and rental income flows are insufficient to pay interest. Of course, considering income inequality, mortgages in Beijing and other cities may still be affordable for high-income groups but have become unaffordable for average-income families. Housing prices in various cities continued to rise in 2017, and as shown in Figure 12 [Figure 12: see original paper], the rental-to-housing-price ratio continued to decline while real estate loan interest rates trended upward, with risk conditions not improving. Real estate risks in hot cities have not subsided.

China' s Commercial Banking System Shows Obvious Vulnerability: This is manifested in three aspects.

1.3.4.1 Savings Deposits Diverted by Internet Finance Development, Interbank Assets Increasing, Market Interest Rate Risk and Maturity Mismatch Risk Rising: Following the 2003 shareholding reform, China' s commercial banks' asset quality improved significantly. However, during the credit expansion since 2008, asset quality has also changed, directly reflected in rising non-performing loans. By end-June 2017, non-performing loan balances reached 1.6 trillion RMB, with the non-performing loan ratio at 1.74% and provision coverage ratio down to 177%. Overall, China' s commercial banks' non-performing loan levels remain below the international banking average, with risks still manageable.

From a micro perspective, China' s commercial banks' vulnerability is increasing. The development of internet finance and money market funds has diverted savings deposits, with the proportion of commercial banks' household savings deposits declining significantly. As shown in Figure 14 [Figure 14: see original paper], in Q1 2017, the proportion of household savings deposits in total liabilities of large and medium-sized commercial banks decreased by 3 and 4 percentage points respectively compared to Q1 2010. Interbank business has developed rapidly, with interbank certificates of deposit (recorded as bonds payable in statements) rising rapidly as a share of liabilities. As shown in Figure 15 [Figure 15: see original paper], in Q1 2017, the proportion of bonds payable in total liabilities of medium-sized and small banks increased by 7.2 and 6 percentage points respectively compared to Q1 2010. Interbank certificate of deposit interest rates are generally higher than household savings deposit rates and are more volatile; more interbank liabilities tend to increase bank operating costs and interest rate volatility risks. Interbank liabilities generally have short maturities, and using these short-term funds to maintain long-term credit tends to increase maturity mismatch risks. Additionally, interbank certificates of deposit increase mutual dependence among commercial banks, increasing the possibility of risk transmission.

1.3.4.2 Rapid Development of Off-Balance-Sheet Business, Increased Risk Exposure Without Provisions or Supervision: With the develop-

ment of entrusted wealth management and other businesses, China' s banking off-balance-sheet business has grown rapidly. By end-2016, the balance of off-balance-sheet business (including the off-balance-sheet portion of custodial assets) reached 253.52 trillion RMB , with off-balance-sheet assets equivalent to 109.16% of on-balance-sheet total assets, up 12.04 percentage points from the previous year-end. Some off-balance-sheet businesses have risks that are "unknown" and for which "the magnitude of risk is unclear," without corresponding risk provisions. Some off-balance-sheet businesses essentially circumvent capital adequacy constraints, regulatory oversight, market discipline, and even legal constraints, concealing some high-risk businesses. Some off-balance-sheet and on-balance-sheet businesses are intertwined, forming complex relationships that increase bank risks.

1.3.4.3 Growth in Real Estate-Backed Mortgages Increases Sensitivity to Housing Prices: Credit funds entering the stock market through on- and off-market financing already provided a lesson in the 2015 A-share market crash, and risks in this area have clearly declined. Housing mortgages are currently the main assets held by China' s banks that contain asset price risk. Currently, 25% of bank loans are collateralized by real estate. As analyzed earlier, from the perspective of residents' income balance, except for Beijing, Xiamen, Shanghai, and Shenzhen, most Chinese cities' residents have guaranteed repayment capacity. Analyzing current real estate mortgage risk from a capital investment perspective, the basic assessment formula can be: asset price (collateral price) - loan amount > 0. Assuming asset income (rent or housing price increase) grows at an annual rate of g, using the Dividend Discount Model (DDM):

$$\text{Asset Price} = \text{Asset Income} \times \frac{1+g}{\text{Interest Rate} - g}$$

This can be derived to:

$$(1-k) \times (1+g) + g > i$$

where r_r represents the housing income-to-price ratio, i represents the market interest rate (represented by the risk-free rate), k is the down payment ratio, and g is the income growth rate.

Regarding housing income, this can be rent plus housing price appreciation. Assuming $g = 0$, the requirement becomes $(1-k) \times r_r > i$. Using market data, we can estimate the relationship between rental-to-housing-price ratios and interest rates in China' s 35 cities. In October 2017, rental-to-housing-price ratios in China' s 35 cities ranged between 1%-3.8%. Assuming a 30% down payment ratio and using the risk-free rate (i) represented by the 10-year government bond yield at end-October 2017 (3.907%), 20 of the 35 cities have current rental levels (with 0% housing price increase and 0% rent growth) insufficient to guarantee housing mortgage safety. The gap between the vertical bars and horizontal lines in Figure 16 [Figure 16: see original paper] can approximate the required housing price appreciation or rent growth rate. Specifically, Xiamen, Tianjin,

Shijiazhuang, Shenzhen, Fuzhou, Beijing, and Shanghai require annual growth rates above 1.8%. Once rent or housing prices fall and market interest rates continue to rise, asset prices will shrink, increasing bank risks.

In summary, the key points that could set the overall debt "gray rhino" running are: (1) growth rates, including enterprise capital turnover, sales profits, local economic growth, personal income growth, and rent/housing price increases—slowing growth will significantly increase risk levels; (2) interest rate levels—China is currently in a stage of gradually rising from low interest rates. If interest rates rise too quickly, they could burst asset bubbles and cause the "gray rhino" to run. International experience shows that both Japan's and the U.S. financial crises were triggered by rapid interest rate increases.

Unpredictable Severe External Shocks as China's Economic "Black Swan"

Compared with "gray rhinos," the impact of "black swans" on China's economy is much smaller, and unpredictable severe external shocks have a higher probability of becoming China's economic "black swan." This is because for unexpected events within China's economy: due to the Chinese government's high control over social and economic resources, strong social mobilization capacity, and high administrative efficiency, unexpected events in the economic system can be resolved at relatively low economic cost. The impact pathway of unexpected events is their contagion effect, and China has institutional advantages unmatched by Western countries in blocking the transmission of low-probability events. Therefore, China's economic "black swan" is more likely to be a low-probability external shock. Many severe external shocks are largely uncontrollable. Once they erupt, given China's high integration with the world and its leadership in globalization, the impact on China's economy cannot be underestimated.

External severe shocks have unpredictability and uncontrollability, easily creating "black swan" effects. China's economic development history has repeatedly proven that external severe shocks easily produce "black swan" effects. For example, the 1998 Asian financial crisis increased China's economic difficulties in the short term and pushed China's economy into a downward cycle. Similarly, the 2008 global financial crisis caused China's export growth to decline, leading to a significant slowdown in China's economic growth.

Potential "Black Swans" in China's Current External Environment

China's external environment is generally healthy and stable. Economically, the world economy shows a trend of synchronized recovery; politically, peace and development remain the theme of human society. However, the world situation has been quietly changing in recent years, with isolationism, separatism, and populism rising in Western countries, world trade facing anti-globalization and trade protectionist policies, local conflicts and terrorism still threatening world peace, and policy instability of political strongmen increasing the possibility

of sudden events. For China' s economy, two potential "black swans" deserve attention.

(1) Escalation of the North Korean Nuclear Crisis. There is a risk of moving from "words" to "actions" between North Korea and the United States. Although rational analysis suggests that military action does not serve either country' s interests and the actual probability of war is low, both sides are not only "talking" but also showing off their muscles through "nuclear tests" and "military exercises." From the perspective of competing to appear tougher, North Korea and the U.S. are playing a "Chicken Game" to some extent, where a low-probability accidental event could occur. Currently, differences between North Korea and the U.S. are substantial. The U.S. finds it difficult to sign a peaceful coexistence agreement with a nuclear-armed North Korea, and North Korea' s nuclear weapons increasingly threaten U.S. security; North Korea, for its own interests, finds it difficult to easily abandon nuclear weapons without significant security guarantees. The confrontational situation seems difficult to change. This makes some accidental factors, unpredictable factors, or misjudgments by both sides make military conflict possible. Once war breaks out between North Korea and the U.S., South Korea and Japan will be directly involved, and under the Sino-North Korean Treaty of Friendship, Cooperation and Mutual Assistance, China will find it difficult to remain a bystander. For a China that is highly integrated with international markets and needs a peaceful and stable environment, North Korea-U.S. military action will have a severe impact on China' s economy.

(2) Comprehensive China-U.S. Trade War. U.S. President Trump repeatedly stated during his campaign that China is the culprit behind the loss of U.S. manufacturing jobs. "If we take trade measures against China, it can bring us millions of jobs." Trump declared he would wage a trade war with China. In his inaugural address, he also stated, "From this day forward, a new vision will govern our land. From this moment on, it' s going to be America First. Every decision on trade, taxes, immigration, and foreign policy will be made to benefit American workers and American families." In August 2017, Trump instructed U.S. Trade Representative Lighthizer to decide whether to initiate a Section 301 investigation against China. However, the U.S. and China are deeply economically interdependent, and a trade war would only hurt both sides, not serving U.S. interests . Therefore, after taking office, the Trump administration did not introduce substantive trade restrictions against China. During Trump' s visit to China in November 2017, a $250 billion trade deal was signed, and U.S.-China trade relations developed positively, making the probability of a comprehensive trade war very small. However, Trump often acts unexpectedly. During his visit to Vietnam for the APEC meeting after leaving China, he again emphasized his America First policy. After returning to the U.S., the Commerce Department initiated anti-dumping and countervailing investigations against Chinese products for the first time in 25 years, and the U.S. explicitly denied China' s market economy status. Therefore, the "black swan" of a comprehensive China-U.S. trade war has not completely disappeared, and once it

erupts, it will also have a huge impact on China' s economy.

The biggest characteristic of a "black swan" is unpredictability. In addition to the two potential dangers mentioned above, some major unforeseen external events could become China' s economic "black swan."

Transmission Channels of "Black Swan" Impact on China External shocks have unpredictability and uncontrollability and could become "black swans" for China' s current economic development. Once they erupt, the impact of external "black swans" through internal "gray rhinos" cannot be underestimated.

2.3.1 Impacting China's Economic Growth Through Export Channels: The direct channel for external shocks to affect China' s economy is exports. Declining external demand reduces China's exports, leading to economic slowdown. The 2008 subprime crisis was a typical external demand shock, causing China' s exports to fall 16% in 2009 and resulting in a significant slowdown in China' s economic growth. The impact of external demand on the economy is several times the export increase (decrease), a relationship that can be measured by the foreign trade multiplier. The size of the foreign trade multiplier depends on the marginal propensity to consume and marginal propensity to import, with the specific relationship as follows:

$$\text{Foreign Trade Multiplier} = \frac{1}{1 - \text{Marginal Propensity to Consume} + \text{Marginal Propensity to Import}}$$

Specifically regarding a China-U.S. trade war, in 2016, China' s exports to the U.S. accounted for 18.5% of China' s total exports, a seemingly not high proportion. However, looking at the chain, China has obvious characteristics as the world' s processing factory, with the U.S. at the consumption terminal (final demand), China at the processing and production end, and some countries serving as raw material suppliers. China' s trade surplus with the U.S. accounts for 50% of China' s total trade surplus. In terms of the trade multiplier, China' s trade with the U.S. has a large multiplier due to the very small marginal propensity to import from the U.S. As shown in Figure 17 [Figure 17: see original paper], China' s overall export growth almost completely coincides with export growth to the U.S., with exports to the U.S. being decisive for China' s overall export trends. Therefore, once a comprehensive China-U.S. trade war breaks out, its impact cannot be underestimated.

2.3.2 Affecting Domestic Supply and Prices Through Import Product Supply Channels: Another pathway for external shocks to affect China is through the impact on energy and raw material supply and prices, thereby affecting domestic production and price levels. China' s characteristics as a processing base plus domestic demand growth determine the need to import large quantities of energy and raw materials from abroad. In 2015, China' s oil external dependence reached 72%, and iron ore external dependence reached

87%. Changes in international supply and prices will significantly affect the supply of some products in China, causing large domestic price fluctuations. Once regional political crises occur, such as conflict between North Korea and the U.S., the supply and prices of some bulk commodities will inevitably be affected, bringing supply shocks.

2.3.3 "Black Swan" Detonating "Gray Rhino": The greatest risk of external shocks is their interaction with internal economic vulnerabilities, detonating the "gray rhino." As analyzed earlier, economic slowdown and rising interest rates could be two trigger points for China's "gray rhino." If a sudden "black swan" rapidly reduces China's economic growth rate through trade channels in the short term, or drives domestic interest rates to soar through capital channels, it could detonate the "gray rhino," increasing China's economic difficulties. Moreover, the impact of "black swans" is also unpredictable. For example, once war breaks out between North Korea and the U.S., we will face many decisions, each of which will produce many unpredictable impacts, potentially affecting the entire world political and economic landscape and changing the entire development environment.

Conclusions and Policy Recommendations

The biggest "gray rhino" in China's current economy is the continuously expanding overall debt and high leverage ratio, with obvious risk signs in real estate, local government debt, and shadow banking. The key trigger points lie in economic growth rate and interest rate levels. If growth and interest rates deviate significantly, with interest rates rising faster than growth recovery, the "gray rhino" may run, triggering a debt crisis. Meanwhile, an unstable external environment could also bring external shocks that become China's economic "black swan," with the "black swan" detonating the "gray rhino" through trade channels being the greatest risk.

Since the 18th Party Congress, the Chinese government has vigorously promoted economic transformation, and China's economy has stabilized and improved, with steady economic growth recovery, overall stable price and interest rate levels, and positive progress in deleveraging. The momentum from the 19th Party Congress has brought more positive factors, and the danger of the "gray rhino" is gradually being brought under control. Moreover, the Chinese government's emphasis on and institutional development for preventing "gray rhinos" and "black swans" have greatly enhanced the possibility of preventing and responding to them. Analyzing "gray rhinos" and "black swans" does not mean they will inevitably occur but rather serves as a reminder to pay attention to risk points, identify the crux of problems, and prevent and resolve risks.

Based on the above understanding of "gray rhinos" and "black swans" in China's economy, we recommend that the Chinese government:

Take Effective Action to Resolve the "Gray Rhino": 1. **Stabilize growth and improve growth quality and efficiency.** Promoting economic

growth and improving debt repayment capacity are the most positive and effective measures to resolve gray rhinos. The focus of stabilizing growth should be on improving economic growth quality and efficiency and promoting balanced economic structure. SOEs need to effectively improve asset turnover and sales profit rates to enhance debt service capacity. 2. **Deleverage and control continued debt expansion.** The current debt scale is already large, and there is an urgent need to control debt expansion and reduce leverage ratios. Macro policies should be stable and moderately tight, avoiding flood-like stimulus, and structurally promoting capital flows to more efficient sectors (such as private enterprises). Micro entities need to objectively assess their own risks, avoid overly optimistic future estimates, and effectively reduce debt dependence. 3. **Stabilize housing prices and guard against real estate bubbles.** Currently, housing prices in some cities are unaffordable for ordinary people, and their collateral is built on growth requirements, with risks already existing. Long-term mechanisms for stabilizing housing prices need to be established to prevent housing price bubbles. High-risk operations such as zero down payments and high collateral in mortgages must be eliminated. 4. **Strengthen supervision and enhance commercial banks'risk prevention capabilities.** The government should strengthen supervision of commercial banks' off-balance-sheet businesses and effectively guard against their risks. Commercial banks should also actively improve asset quality and risk response capabilities. Policies should encourage early write-off and disposal of bad debts to reduce burdens.

Take Proactive Precautions Against "Black Swans" : 1. **Adopt probabilistic thinking and do not neglect low-probability events.** "Black swans" are low-probability events, but we must not assume they will not occur. We must have probabilistic thinking, estimate worst-case scenarios, and not neglect them. 2. **Intervene proactively and exert China' s external influence.** Although external shocks are uncontrollable, "uncontrollable" does not mean "inactive." Whether in North Korea-U.S. relations or China-U.S. trade wars, China must exert positive influence to steer developments in directions favorable to China. Research on these events should be strengthened to find effective ways to influence their development. 3. **Prepare contingency plans for all aspects to guard against contingencies.** The essence of "black swans" is their unpredictability; the most feasible approach is to prepare contingency plans. China should actively prepare various external shock contingency plans, such as increasing oil reserves and strengthening control of the China-North Korea border, to guard against contingencies through various 预案.

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Footnotes

China implemented proactive fiscal policies and moderately loose monetary policies in 2009–2010, and proactive fiscal policies and prudent monetary policies in 2011–2017.

BIS non-financial sector credit includes credit financing for non-financial enterprises, households, and government; the People' s Bank of China' s total social financing stock mainly includes non-financial enterprise and household financing, excluding government financing.

Credit-to-GDP gaps: (actual-trend)-China-Credit from All sectors to Private non-financial sector. For explanation of this indicator, see: Drehmann M, Tsatsaronis K. The credit-to-GDP gap and countercyclical capital buffers: questions and answers. BIS Quarterly Review, 2014, 3: 55-73.

The "Big Five" banks refer to: Industrial and Commercial Bank of China, Bank of China, China Construction Bank, Agricultural Bank of China, and Bank of Communications.

The "Minsky Moment" is the moment of asset value collapse described by American economist Hyman Minsky. The logic is: when the economy is good, investors tend to take on more risk; as the economy continues to improve, investors take on greater risk levels until they exceed the balance of payments and

collapse.

The average price-to-income ratio is calculated as the ratio of average annual household total income to the average price of a housing unit: Price-to-Income Ratio = (Housing Price per Household) ÷ (Annual Household Income). Where: Housing Price per Household = Per Capita Housing Area ×Average Household Size ×Average Sales Price per Square Meter; Annual Household Income = Average Household Size ×Per Capita Annual Income. Price-to-Income Ratio = Per Capita Housing Area ×Average Sales Price per Square Meter / Per Capita Annual Income.

On November 2, 2017, the 1-year interbank certificate of deposit rate reached 4.48%, while the 1-year savings deposit rate was only 2.1%.

Source: People' s Bank of China "China Financial Stability Report," p. 39.

"Chicken Game" refers to a game where both parties refuse to yield, aiming to crush the opponent' s will. The result is often the worst possible outcome. For example, two people driving cars at high speed toward each other—the one who swerves to avoid collision is the "chicken."

Common name for Section 301 of the U.S. Trade Act of 1974.

Representative research is the Peterson Institute report: Noland, Marcus, Gary Clyde Hufbauer, Sherman Robinson, and Tyler Moran. Assessing Trade Agendas in the US Presidential Campaign. Washington, DC: Peterson Institute for International Economics. PIIE Briefings, 2016.

Note: Figure translations are in progress. See original paper for figures.