

Stabilization Policy

Where there is great power there is great responsibility. – Winston Churchill¹

1 Introduction

Almost all modern governments attempt to stabilize the economy. Especially when the unemployment problem intensifies during a recession, the government is under pressure to do something. And modern governments have enormous power to influence the economy. The government is often the biggest spender in the economy. And, through the central bank, the government can influence the price of money, interest rate, and exchange rate. With great power comes great responsibility. The question is how to wield that power to achieve the common good. For the objective of economic stabilization, we hope that the government's actions are counter-cyclical, meaning that they would stimulate the economy when it is in downturns and cool the economy down when it overheats.

In IS-LM and AD-AS models, we have considered fiscal and monetary policies that may be useful for smoothing the business cycles. However, to simplify analyses, we simplify fiscal and monetary policies so much so that they reduce to three variables, government expenditure (G), tax (T), and money supply (M). In the real world, fiscal and monetary policies are far more complicated than the three variables can characterize.

In this section, we briefly describe how, in the real world, the government may stabilize the economy. We first examine the role of the so-called automatic stabilizers. Then we go deeper into the discretionary fiscal policy. Finally, we study monetary policy in more detail.

2 Automatic Fiscal Stabilizer

Modern governments are big. They take a substantial share of national income by taxation, and they are the biggest spender in the economy. The fiscal policies of the modern government can have a big impact on economic stability. Before the study of discretionary fiscal policy, we first discuss the role of automatic fiscal stabilizers.

Automatic stabilizers are relatively fixed features of the fiscal establishment that may dampen economic fluctuations without taking discretionary actions. We may divide automatic stabilizers into two groups, tax stabilizers, and spending stabilizers.

Tax Stabilizers

Many categories of taxes, including the personal income tax, corporate income tax, and sales tax, are automatic stabilizers because their revenue automatically declines when the economy contracts.

In particular, if the personal income tax is *progressive*, then it would be an even stronger automatic stabilizer. To see this, note that when a recession leads to widespread declines in personal income, people may be subject to a lower marginal tax rate under the progressive tax. Thus the tax revenue will decline more rapidly than under a flat-rate tax.

Marginal Tax Rate of China's Personal Income Tax (PIT)

China implements a seven-step progressive PIT system. The taxable income is total income minus various deductions, including an allowance of 5000 Yuan per month.

	Annual taxable income (Yuan)	Marginal tax rate (%)
1	≤ 36000	3
2	(36000, 144000]	10
3	(144000, 300000]	20
4	(300000, 420000]	25
5	(420000, 660000]	30
6	(660000, 960000]	35
7	> 960000	45

Similarly, enterprise income tax (EIT) is also a better automatic stabilizer than value-added tax (VAT) or business tax (on gross receipts). EIT is on profits, which decline rapidly when a recession comes. VAT and business tax, however, are on business activities. Even if firms do not generate profits, they have to pay VAT or business taxes as long as they are in operation. The tax revenue from VAT or business tax also declines in recessions, but not as fast as the revenue from EIT.

Spending Stabilizers

The spending stabilizers are mainly transfer payments to the unemployed and the poor. When the economy enters a recession, more people will claim unemployment benefits as they lose jobs. As a result, the fiscal spending on unemployment “insurance” automatically increases. The same is true for transfer payments to the poor.

General social security payments, such as retiree benefits, are also automatic stabilizers in a sense. Since they are stable over time, the share of social security payments in GDP automatically rises in recessions and declines in expansions. Thus they are also a stabilizing force for the economy.

The Importance of Automatic Stabilizers

Automatic stabilizers are very important to economic stability. Once in place, they work automatically, without any delay, and throughout the cycles. Discretionary policies, in contrast, are often delayed responses: it takes time for policymakers to recognize that there is something wrong going on; it takes time for politicians and technocrats to draw up plans; it takes time for a policy to exert effects on the real economy. It is not uncommon that when a discretionary policy finally has effects, the problem (e.g., recession) that the policy is intended to solve has been over.

Therefore, policymakers should consider policy effects on economic stability when they deliberate on the reforms of tax code, transfer payments, and social security programs. The more automatic stabilizers, the better. The less “automatic destabilizers,” the better. For example, although a balanced budget seems moral, the balanced-budget constraint is an automatic destabilizer since it forces the government to cut spending in recessions, when tax revenues decline, and to increase spending in expansions.

3 Discretionary Fiscal Policy

The discretionary policy is a policy based on the judgment of policymakers under a particular situation, as opposed to a policy set by a predetermined rule. Discretionary fiscal policies are discretionary policies that involve taxation and expenditure by the government, often for the purpose of dampening economic fluctuations.

Direct Government Expenditure

The discretionary fiscal policy may be direct government expenditures, tax cuts or incentives. The direct expenditure may be the provision of more public goods. For example, the government may decide to upgrade public education, public security, and so on. It may also be investments in new roads, new generations of network, electricity grids, and so on.

Note these policies also promote long-term growth. But the timing of policies is important since they have a strong impact on the short-term demand of the economy. It would be best if public spending is *countercyclical* as well as pro-growth.

Tax Cuts or Incentives

The tax cuts or incentives may be for households or businesses. Tax cuts for the households put more money in consumers’ pockets and induce them to consume more. If the tax cut is permanent, the effect on consumption would be stronger than in the case of a temporary cut. But even if the tax cut is temporary, it may still stimulate consumption due to the myopia of consumers or the *liquidity effect*.

To understand the latter, note that if consumers are liquidity-constrained, or unable to borrow, the tax cut will relax their constraint and, thus, stimulate consumption temporarily.

Tax cuts for businesses help to increase profit margins and may stimulate investment. To directly stimulate investment, the government may also provide temporary tax credits for businesses engaged in investment. For tax credits to have stimulative effects, they have to be temporary. Otherwise, businesses may adopt the usual wait-and-see attitude during recessions, delay investment until there is less uncertainty, and enjoy the tax credit later.

Deficit and Debt

Expansionary fiscal policies, discretionary or not, often lead to a budget deficit, which is the shortfall in tax revenue to pay for the expenditure. There are two ways to finance the deficit, bond issuance or money printing. The latter is illegal in many countries, including China. However, the central bank's seigniorage profit is part of government revenue, a small part in normal times. And it is legal, and common, for central banks to purchase government bonds in open-market operations.

Thus, it is bond issuance that mainly finances the budget deficit, which necessarily increases government debt. Here, the budget deficit is a *flow* variable, and government debt is a *stock* variable.

For individual households, the budget deficit is something to avoid. Any responsible head of household would try to "make ends meet." But for a nation, a self-imposed balanced-budget constraint is unnecessary and counterproductive. To see that, we first note that a government budget deficit is a net income to the private sector. Furthermore, an increase in government debt is an increase in asset-holding of the private sector. Indeed, the flight-to-safety phenomenon almost always coincides with financial crises. Panic-stricken investors and financial institutions want to sell risky assets and hold safe assets like government bonds. If there are not enough government bonds, it will take longer for financial institutions to "normalize" their balance sheets.

Second, we note that the balanced-budget constraint makes the fiscal policy necessarily pro-cyclical. When the economy enters a recession, the government will also reduce spending since the tax revenue declines. When the economy overheats, the government will increase spending since the tax revenue rises in a boom.

There is no natural virtue about a balanced budget for a government. Fiscal policies should be judged by the effects on the economy, not by whether the budget is balanced². However, the above argument takes for granted a responsible government. If the people have a strong distrust of the government, then the balanced-budget constraint is a powerful tool to rein in erratic government behavior such as fighting unnecessary foreign wars, building vanity projects, and so on.

Ricardian Equivalence

If we omit the role of money printing, we may say that the government can either raise taxes to finance the budget deficit or borrow from the market. Since the government has to pay off the debt, the choice is “tax now or tax later.” The well-known doctrine “Ricardian Equivalence” says that, under some stringent conditions, this choice does not matter, and tax cuts would fail to stimulate demand. If consumers and firms are forward-looking, then they would anticipate future tax hikes when the government cuts taxes now. They save the money, rather than being fooled into consumption or investment.

Even David Ricardo himself does not believe that the Ricardian equivalence holds in reality. He points out that individuals do not behave as rationally as required by the theory. Instead, individuals often take myopic views of the tax path.

There is another problem with the Ricardian equivalence doctrine. The government can issue long-term bonds to finance the deficit. Compared to the government, people have short lives. When middle-age individuals receive more income from a tax cut financed by a 30-year bond, they may consider it as a definite gain. The debt will be paid off by the next generation.

One reply is that people care about their descendants and that they do not leave tax burden to their heirs. Modern economists, indeed, prove that the Ricardian equivalence continues to hold with the availability of long-term financing, under some additional assumptions³. In particular, they assume that people can borrow or lend any amount at the same interest rate as the government enjoys.

In the real world, however, consumers have credit constraints, and they have to pay interest rates much higher than the government. Tax cuts are equivalent to an “inclusive” loan with an interest rate as low as the government bond. Despite the possibility of tax hikes in the future, the current tax cuts are, therefore, a definite gain to consumers. Thus the current tax cut may result in larger aggregate demand.

Furthermore, there is no reason that the government has to pay off all its debt at some point. The government may roll over the debt infinitely. Indeed, if the economy is growing, the debt burden can increase as well. Therefore, we should not avoid the budget deficit as a sin and try to minimize government debt. What is important is to use the budget deficit well.

The Limitations

First, we have mentioned earlier that the discretionary policy may be a delayed response to a crisis. After policymakers recognize the problem, draw up plans, go through political processes, and implement the plan, the crisis may already be over. Note that it also takes time for a policy to transmit to the economy.

Second, the interest costs of debt may become a burden if the government debt

risers too fast. Suppose that the debt/GDP ratio rises to 300% and that the interest rate is 2%. Then the interest costs would be 6% of GDP every year.

Here, we need to consider the effect of internal debt and external debt separately. If the government borrows from its citizens, then it adds to its internal debt. For interest payments of the internal debt, the government raises taxes and transfers them to the owners of government bonds, who are also citizens. Thus, the interest payments to the internal debt do not increase the overall burden on the economy, just like transfer payment. But unlike the usual transfer payment, the interest payments may be regressive, i.e., transferring wealth from the poor to the rich.

If the government borrows from foreigners, then it adds to its external debt. A substantial level of external debt may be more problematic for the economy than an equivalent level of internal debt. Since the interest payment on the external debt transfers wealth from citizens to foreigners, it is equivalent to a new tax on the economy in the future. Unlike the usual tax, which may be used to provide domestic public goods, the new tax will be for nothing. Therefore, if the level of external debt rises too fast, the interest payments may become an unbearable burden on the economy.

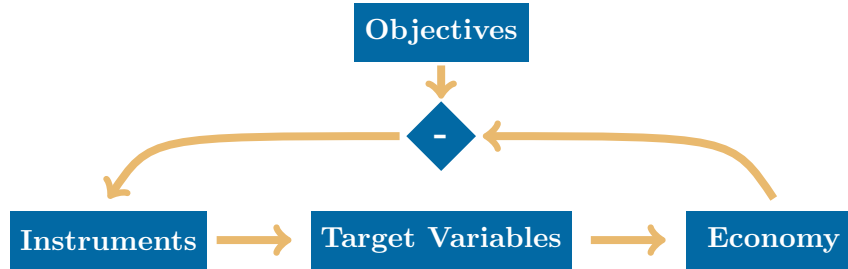
Finally, external debt usually has a currency mismatch, especially for small economies. The interest and principal payments may be in the unit of foreign currency. But the tax revenue is in domestic currency. The currency mismatch, if on a large scale, may make the country vulnerable to the *self-fulfilling currency crisis*. Suppose that there is depreciation expectation, due to some other weaknesses in the country (e.g., political instability). Investors may move portfolios out of the country, and speculators may short the currency to such an extent that the government finds it unable to service its external debt. Consequently, there may be a sovereign default and a currency devaluation larger than justified by the economic weakness.

4 Monetary Policy

Monetary policy refers to policies deliberated and implemented by the monetary authority, i.e., the central bank, to achieve some objectives set by the government or lawmakers. The objectives of monetary policy include price stability, full employment, economic growth, financial market stability, and possibly exchange-rate stability. To achieve these objectives, the central bank tries to manipulate some intermediate target variables such as the interest rate on overnight borrowing, growth of money supply, and so on. To manipulate the target variables, the central bank employs a variety of policy instruments such as open market operations (OMO), required reserves, central bank loans, liquidity facilities, and so on. Figure 1 illustrates the relationship between objectives, target variables, instruments, and the economy.

Note that monetary policy, like fiscal policy, attempts to dampen economic fluctuations. In the language of engineering, Figure 1 shows a *feedback loop*. And

Figure 1: Monetary Instruments, Target Variable, and Objectives



we hope that monetary policy achieves a *negative* feedback loop. The central bank constantly assesses the economic conditions, comparing reality to its objectives. When the economy shows signs of recession, the central bank attempts to stop the trend by deploying monetary stimulus. When the economy starts to overheat, the central bank also tries to stop the trend, by tightening liquidity.

4.1 Objectives

The most important objective of monetary policy is to maintain price stability. Many central banks, indeed, have explicitly adopted *inflation-targeting*, a standard framework for monetary policy.

Different central banks may interpret price stability differently. ECB (European Central Bank) defines price stability as inflation below 2%. Bank of England (the central of UK), under the inflation-targeting framework, sets 2% as the target, allowing for a maximum deviation of one percentage point. Even the US Fed, which has a dual mandate (promoting full-employment as well as price stability), has an aim for 2% inflation. China does not have an explicit inflation target. But whenever inflation surpasses 3% in the past, the PBoC (People's Bank of China) would warn inflation risk. Generally, developing countries allow higher inflation targets. For example, the Reserve Bank of India targets 4% and allows for a maximum deviation of two percentage points.

The reason why policymakers around the world set a positive inflation target, rather than a zero inflation target, is that positive inflation provides some cushion against deflation. When the economy slows down or enters a recession, inflation typically declines. If inflation is normally positive, then there is a period of disinflation, which is still positive inflation. Hopefully, the recession would be over when inflation declines to zero. Otherwise, deflation (negative inflation) may aggravate the economy due to, say, the debt-deflation theory.

The second most important objective is to promote full employment. Since output and employment have a stable relationship, the full-employment objective is equivalent to one that targets a zero output gap. And since the output potential is

generally growing, the zero-output-gap objective may be further translated into a growth target. China, for example, once targeted 8

For countries with a fixed exchange rate or, to a lesser extent, managed float, the central banks have to maintain exchange-rate stability. As we have discussed earlier, this objective may dominate domestic concerns such as inflation and unemployment. If that is true, then we say that the country does not have an independent monetary policy. To achieve exchange-rate stability while retaining some degree of monetary-policy independence, the central bank must keep an eye on the balance-of-payment conditions. It may implement restrictions on cross-border capital flows when necessary.

Finally, monetary authorities are also responsible for maintaining stability in the financial system. A stable financial system is essential for the working of modern economies. Since the financial system is inherently unstable, maintaining financial stability is a daunting task for central banks. We may understand the central bank's role in financial stability in two senses, crisis management and the prevention of future crises. After a crisis has broken out, the central bank has to intervene and perform as the lender of last resort. To prevent the next crisis, the central bank has to perform macroprudential regulation and oversight. We will examine these roles in more detail later.

4.2 Intermediate Target Variables

Intermediate target variables refer to variables that are vitally important to the economy and that are manipulable by the monetary authority. In normal times, a central bank usually has one target variable. For example, the Fed targets the federal funds rate, which is the interest rate banks charge when they lend excess reserves to other banks on an overnight uncollateralized basis. However, when the central bank finds the single target variable inadequate, it may target additional variables.

In response to the 2008 financial crisis, the Fed first slashed the federal funds rate to almost zero. Unable to cut rates below zero, the Fed started to conduct quantitative easing (QE), which was essentially targeting the quantity of bank reserves. Soon after the second round of QE concluded, the Fed announced Operation Twist to lower the long-term interest rate, yet another target variable used by the Fed.

Note that in most developed countries, target variables are mostly short-term interest rates (Table 1). Monetary policy that relies on interest rates as target variables is often called the “price-based” monetary policy since interest rates are essentially the price of (future) money. In contrast, monetary policy that relies on various measures of the money supply as target variables is called the “quantity-based” money policy. In normal times, the price-based monetary policy is generally more effective than the quantity-based policy since changes in interest rates directly

Table 1: Target Variables and Objectives of Major Central Banks

	Target Variables	Objectives
Eurozone	1) Main Refinancing Operations (MRO) rate	Price stability
	2) Rate on the marginal lending facility	
	3) Rate on the deposit facility	
Japan	Uncollateralized overnight call rate	Price stability
UK	Bank Rate	Price stability
US	Federal funds rate	1) Full employment
		2) Price stability

change financial costs in the economy. However, during deep recessions, the target interest rates may hit the zero lower bound. And, for various reasons, the monetary authority may be reluctant to cut interest rates below zero. Under such circumstances, the monetary authority may switch to quantity-based policies such as QE.

China’s monetary policy is a combination of price-based and quantity-based policymaking. People’s Bank of China (PBC) had been targeting money (M2) growth. But after “financial innovations” intensified in 2011, making M2 growth less connected with economic fluctuations, PBC toned down the importance of M2 growth target. From 2012, PBC started to use an alternative called AFRE (Aggregate Financing to the Real Economy), which is the total volume of financing provided by the financial system to the economy during a certain period. Meanwhile, PBC has been pushing for market-based determination of interest rates from the 1990s. The “liberalization” of interest rates paved the way for price-based policymaking. In recent years, the PBC has operated continuously on the 7-day repo to transmit policy signals through the repo rate. Furthermore, PBC has developed an interest rate corridor.

4.3 Monetary Policy Instruments

To manipulate the target variables, central banks have a variety of policy tools that we call monetary policy instruments. The usual instruments include open market operations (OMO), reserve requirement, interest rates on central-bank deposits, standing lending facilities, forward guidance, and so on.

Open Market Operations (OMO)

Through OMO, a central bank adjusts the supply of reserves, which further influences the money supply. OMO may take the form of purchasing or selling securities, often the government bonds. When the central bank purchases securities, it effectively withdraws liquidity from the financial system. When the central bank sells securities, it effectively injects liquidity into the financial system.

OMO may also take the form of repo (repurchase operation) or reverse repo. In a repo operation, the central bank borrows temporarily (say, 7-days) from the market with collaterals, in effect withdrawing liquidity from the market. In a reverse repo, the central bank lends temporarily with collaterals, in effect injecting liquidity into the market. Both repo and reverse repo are conducted using auctions.

The central bank intervention of the foreign exchange market is also part of OMO. When the central bank supports a weak domestic currency, it has to sell foreign currency and buy domestic currency, withdrawing liquidity from the market. When the central bank wants to devalue a strong domestic currency, it has to buy foreign currency and sell domestic currency, injecting liquidity into the market.

Reserve Requirement

The reserve requirement is the minimum amount of reserve commercial banks must hold at the central bank. The reserve requirement is often expressed in the *reserve requirement ratio*, which is the ratio of the required reserve to the total deposits. The reserve requirement may serve a macro-prudential purpose, preventing banks from lending excessively. But it may also serve as a monetary policy instrument that influences the *money multiplier*, which further influences the money supply.

To understand the role of the reserve requirement in influencing the money supply, note that the *base money* (or *monetary base*, *high-powered money*, etc.) consists of two components: currency in circulation (or physically in commercial banks' vaults), and the reserve,

$$B = C + R,$$

where B represents base money, C denotes currency in circulation, and R represents reserve, which is banks' deposits at the central bank.

Note that banks may deposit at the central bank more than required. The extra reserve is often called *excess reserve*. Banks may earn interest on the reserve deposit. The interest rate on the reserve is itself a monetary policy instrument. If the central bank raises the interest rate on the reserve, then banks would hold more excess reserve, thus reducing lending activity.

Note that the money supply also consists of two components, currency in circulation and deposits (demand or saving deposits). For example, M1 in China includes currency in circulation and demand deposits. Let M denote the money supply, we thus have,

$$M = C + D,$$

where D represents deposits. M may be any measure of the money supply. Broader measures such as M2 include less liquid deposits such as savings deposits.

If we further define the currency ratio and the required reserve ratio,

$$c = \frac{C}{D}, \quad r = \frac{R}{D},$$

then we have,

$$M = \frac{1+c}{c+r}B.$$

For broader money-supply measures such as M2, c is small. Hence the money supply is largely determined by base money (B) and the required reserve ratio (r). Given a level of base money, higher r results in less money supply. Note that we may call $m = (1+c)/(c+r)$ the *money multiplier*.

Standing Lending Facilities (SLF)

SLF is a mechanism by which the central bank makes short-term loans to financial institutions *on request*. SLF has different names in different central banks. The US Fed calls it the *discount window*, ECB the *marginal lending facility*, Bank of England the *operational standing facility*, and Bank of Japan the *complementary lending facility*. It is a common feature of central banking.

Like the reverse repo, SLF loans require collaterals. Unlike the reverse repo operation, it is financial institutions, in need of liquidity, that initiate SLF operations. The interest rate on SLF is an important monetary policy rate. If the central bank lowers the interest rate on SLF, then it encourages borrowing from the central bank, thus expanding the base money.

China's PBC started the SLF in 2013. A typical SLF loan in China, however, has a relatively longer maturity than SLF loans in other major central banks. The typical SLF maturity in China is one to three months, while SLF loans in other countries are typically overnight. A bank in need of overnight liquidity support has to go to the interbank market.

Forward Guidance

Forward guidance refers to the effort by the central bank to provide information about the likely future course of monetary policy. Forward guidance is a relatively new instrument. Bank of Japan started to use forward guidance in 1999, and the Fed experimented with it in the early 2000s. Since the 2008 global financial crisis, other central banks also embraced forward guidance as an indispensable instrument.

For example, the ECB began forward guidance in July 2013 when the ECB said that it expected interest rates to remain low for an extended period. Such forward guidance, by reducing policy uncertainty, may reduce the term premium of interest rates, leading to higher economic activity. Such effects may be achieved even without large-scale open market operations.

Forward guidance may or may not commits the central bank's future course of action. If a forward guidance explicitly commits a future course of policies, we

may call it *Odyssean* forward guidance⁴. If a forward guidance merely *forecasts* the economy and the central bank's actions, we may call it *Delphic* forward guidance⁵. Odyssean forward guidance is stronger than Delphic forward guidance since the former reduces policy uncertainty more than the latter. However, the public understands that the central bank may deviate from the Odyssean forward guidance in the future if the economy takes an unexpected turn. Thus the effect of Odyssean forward guidance may depend on the reputation and credibility of the central banker.

Window Guidance

Window guidance is another form of the central bank's communications with the market. In contrast to forward guidance, which is open to the public, window guidance is often closed-door and only with a few selected banks. Between 1961 and 1991, Bank of Japan used window guidance to directly affect bank lending. For the same purpose, PBC of China has been using window guidance since it stopped setting credit plans in the late 1990s.

The banks that receive window guidance may or may not comply. They have to weigh the costs of compliance with the benefits, which include the availability of liquidity support from the central bank or other policy conveniences.

The effectiveness of window guidance depends not only on the central bank's leverage over the banks but also the importance of bank lending in the financial system. If the share of total bank lending in the total financing declines, a trend known as "dis-intermediation," then window guidance will become less effective. To understand the term dis-intermediation, note that bank lending is *indirect finance*, meaning that the savers finance the lender through the intermediation of banks. In contrast, bond and equity issuance is *direct finance*, meaning that buyers of the bonds and stocks directly finance entities that issuer.

Finally, note that there are other monetary policy instruments employed by central banks. Nowadays, almost all central bankers believe in the value of transparency and predictability. As a result, the websites of central banks around the world provide rich information on the objectives, target variables, and policy instruments. Interested students are encouraged to explore these websites.

4.4 Monetary Policy Rule

A monetary policy rule characterizes how a central bank responds, by manipulating the target variable, responds to changes in economic conditions. Note that central banks do not generally follow any policy rule. But their responsiveness to changing economic conditions leads to an *empirical* relation between the target variable and economic objectives such as inflation and unemployment. If such a relationship is relatively stable over time, the rule may give some guidance for central bankers.

The most well-known monetary policy rule is the Taylor rule, which was proposed by John B. Taylor in 1993. According to the Taylor rule, the target interest rate (e.g., federal funds rate in the US) responds to the inflation gap and the output gap in the following fashion,

$$i_t = \pi_t + r^* + \theta_\pi(\pi_t - \pi^*) + \theta_y(y_t - \bar{y}), \quad (1)$$

where i_t is the target rate, π_t is the inflation rate, r^* is an assumed *natural rate of interest*, π^* is the inflation target, y_t is the logarithm of the total output, \bar{y} is the logarithm of the potential output, θ_π and θ_y are constants measuring how the monetary authority would respond to the inflation gap ($\pi_t - \pi^*$) and the output gap ($y_t - \bar{y}$), respectively.

The natural rate of interest, r^* , or neutral rate of interest, was invented by the Swedish economist Knut Wicksell, who defines the natural rate of interest as a real short-term rate that makes output equal to potential (natural) output with constant inflation. If the Taylor rule in (1) is perfect, in the sense that it keeps the economy at the state of zero output gap and zero inflation gap, then r^* will be the prevailing real interest rate in such a perfect economy. The natural rate of interest is unobservable. Taylor assumed that $r^* = 2\%$ for the US economy.

Both θ_π and θ_y should be positive. By specifying $\theta_\pi > 0$, the Taylor rule says that the central bank should raise the target interest rate more than the increase in inflation. For example, if $\theta_\pi = 0.5$ and inflation rises by 1%, then the central bank should raise the target rate by 1.5%. The idea that the nominal interest rate should rise faster than inflation (to effectively control inflation) is often called the *Taylor principle*.

If both θ_π and θ_y are positive, then the Taylor rule also achieves a tradeoff between two conflicting objectives. An expansionary monetary policy leads to a higher output (or employment) at the cost of higher inflation. If we fix $\theta_\pi = 0.5$, then the parameter θ_y controls how much weight to put on output or employment. The smaller θ_y , the lower weight on output or employment. If $\theta_y = 0$, then the Taylor rule reduces to a strict version of inflation targeting that pays little attention to the output (employment) gap.

4.5 Monetary Policy Transmission

In the previous chapter, we have discussed two traditional channels of monetary policy transmission. The first is the interest-rate channel implicit in the closed-economy IS-LM model: monetary expansion leads to a decline of the interest rate, which stimulates the investment. The second is the exchange-rate channel implicit in the small-open-economy with a floating exchange rate: monetary expansion devalues the domestic currency, which stimulates the net export.

In reality, even the interest-rate channel is not as simple as the IS-LM model describes. The central bank usually controls a target interest rate through open

market operations. For example, the Fed ensures that the federal funds rate falls in the targeted range. If the rate rises beyond the upper bound, then the Fed will intervene to bring down the rate, by injecting liquidity. In normal times, the Fed does not need to intervene since other private financial institutions will anticipate the Fed's move and take advantage of the elevated interest rate. Their actions would help the Fed to stabilize the federal funds rate within the targeted range.

And some target interest rates may be policy rates that the central bank sets. Examples include ECB's interest rate on the deposit facility, ECB's rate on the marginal lending facility, Bank of England's bank rate (on banks' reserve at BoE), and so on. When ECB decided to adopt a negative interest rate on its deposit facility in June 2014, banks had no choice but to pay interest on their deposits at ECB. This presumably may encourage banks to lend more.

Through either open market operations or interest rate policy, the monetary authority directly influences short-term interest rates in the money market (the short rate in abbreviation). And changes in the short rate transmit to the real economy via multiple channels.

First, the short rate influences banks' deposit and lending rates. The money market is an alternative source of funding for banks. A lower money-market rate induces banks to offer lower deposit rates for savers and lower lending rates for borrowers. Lower deposit rates encourage consumption, and lower lending rates encourage investment financed by bank lending. Conversely, higher deposit rates lead to more savings and less consumption and discourage investment financed by bank loans.

Second, the short rate influences the risk appetite of financial institutions. Institutions such as insurance companies and pension funds usually have relatively rigid built-in expectations about the return to capital. For example, pension funds usually target an annual return of 7 to 8 percent. Other institutions, under shareholders' pressure on short-term performance, may also fall victim to such rigid expectations. A low short rate, thus, often compels financial institutions to "hunt for yield" by taking more risks. Consequently, banks may make risky loans to small businesses that are willing to pay higher interest rates. And institutional investors may scramble to buy risky corporate bonds, making bond-financing cheap for risky investments. Conversely, a high short rate discourages risk-taking.

Third, the short rate influences asset prices. A lower short rate leads to higher prices of not only risky bonds but also almost every other asset. To understand this, note first that a lower short rate corresponds to a lower discount rate for future cash flows, which translates into a higher asset price, the present value of the future cash flows. Furthermore, a low short rate also corresponds to an abundant supply of liquidity, which encourages speculations in the financial markets. Higher liquidity itself elevates asset prices since it makes investors feel safe holding the assets.

Rising stock and housing prices would have "wealth effects" on consumers. Con-

sumers who feel richer may increase spending. The housing price is particularly important. A rising housing price may encourage the purchase of houses, which would lead further to spendings on durable household goods. Rising asset prices also relax borrowing constraints on businesses. Assets, whether financial or real (land, houses, etc.), are collaterals for borrowing. Higher asset prices imply higher borrowing power.

Conversely, a higher short rate leads to lower asset prices, which make consumers feel poorer and, thus, reduce consumption. In particular, a declining housing price discourages housing purchases and depresses the consumption of household durables. Lower asset prices also lead to worsening credit conditions for businesses due to the lower value of collaterals.

Last but not least important, the actions and forward guidance of the monetary authority directly change the expectation of consumers and businesses. First, a change in the market expectation of future interest rates immediately affects the current long-term interest rates. For example, if the central bank pledges to keep the short rate at a low level for a long time, then the long-term interest rate will decline immediately. Second, the monetary authority may guide the market expectation toward an equilibrium of stability. The presence of expectation often gives rise to the problem of “multiple equilibria,” some of which may be undesirable. For example, if people expect inflation to rise substantially, then substantial inflation will realize as a result of hastened purchases and hoarding. This phenomenon is also known as “self-fulfilling prophecy.” If, however, the monetary authority pledges to maintain price stability and if the pledge is credible, then the market expectation will be anchored for the good low-inflation equilibrium.

The above discussion on the transmission of monetary policy is by no means exhaustive. Monetary policies may have more subtle ways to influence the economy. Furthermore, different channels of transmission may reinforce each other dynamically. For example, lower deposit and lending rates stimulate spending on consumption and investment, contributing to higher inflation expectation. The elevated inflation expectation, in turn, contributes to a lower real interest rate, stimulating consumption and investment.

5 Financial Stability

As Hyman Minsky argues, financial instability often underlies the instability of a modern economy. To stabilize the economy, the government must keep an eye on the health of the financial industry. When a financial crisis erupts, the government often has to intervene and acts as the savior. And to prevent the next crisis, the government has to strengthen regulation and oversight. The former role is known as the “lender of last resort,” and the latter is essentially what “macroprudential policy” is all about. Both responsibility, in most countries and at least partly, falls

on the monetary authority.

5.1 Lender of Last Resort

Financial crises usually involve “runs” on financial institutions. For example, panic savers may want to withdraw deposits from banks. If all savers do this, even healthy banks will go bankrupt. Such “bank runs” can also happen to other modern financial institutions such as investment banks, insurance companies, and so on, which rely on short-term financing. If the market suspects the viability of an institution, then no one would be willing to lend to the institution. Even if the institution is otherwise healthy, it will fail due to the lack of liquidity. Under such circumstances, only the central bank is able to intervene and perform the role of the lender-of-last-resort.

Indeed, after Lehman Brothers failed during the 2008 global financial crisis, other investment banks and insurance companies also became suspect. Even Goldman Sachs and Morgan Stanley, the last two US investment banks, suffered from “runs.” In response, the Fed introduced several short-term credit and liquidity facilities to help stabilize markets. And Goldman Sachs and Morgan Stanley were heavy users of these facilities.

The possibility of central bank assistance, however, may encourage financial institutions to take excessive risks, paving the way for future crises. This problem is known as *moral hazard*. Managers may go out of their ways to expand the balance sheet, hoping that their institutions to become “too big to fail.”

Aware of the moral hazard problem, the central bank may make it clear that it won’t save those institutions that have taken excessive risks. However, when a crisis does happen, refusing to be the lender of last resort may become a choice too costly to the financial market and the economy. This problem is an example of *time inconsistency*. The central bank is in a similar position as a stern father, who threatens to spank his kid severely for certain misbehavior. But when the kid does misbehave, the father may have to scale down the spanking, possibly under the pressure of the mother and grandparents.

5.2 Macroprudential Policy

Macroprudential policies refer to rules and actions that promote the stability of the financial system as a whole. In contrast, we may call supervisory or regulatory policies for individual financial institutions “microprudential policies.”

We may define the stability of the financial system as the absence of systemic vulnerabilities, which may include asset bubbles, excessive risk-taking by banks, excessive debt (households, corporations, local governments), and so on. It is challenging, if not impossible, to ensure the persistent stability of the financial system. Too often, an emerging bubble is indistinguishable from healthy accommodation to

economic expansion. The ever-evolving shadow banking makes it even more difficult to identify problems. Even when problems are identifiable, intervention at an early stage may be politically infeasible. Pressure groups, who benefit from asset and credit bubbles, may criticize the macroprudential authority for being excessively active, threatening economic freedoms. Often it would be too late when the macroprudential authority identifies a systemic vulnerability and decides to act on it. And the action to stop a bubble often causes the bubble to burst. China's stock market panic in 2015 provides a vivid example⁶.

5.2.1 Rules on Leverage

The macroprudential policy may take the form of rules on the maximum leverage financial institutions can take. For example, the macroprudential authority (domestic or international) typically imposes a capital adequacy requirement on banks. That is to say, banks must set aside enough capital buffers for negative shocks. A required reserve ratio serves a similar purpose as the capital adequacy requirement, limiting the leverage of banks' lending business.

There are also rules on leverage that apply to individuals or households. The macroprudential authority typically imposes a minimum margin requirement for margin trading of stocks. Brokers must apply the minimum rules to customers, but they are free to apply more stringent requirements.

The macroprudential authority may also set a minimum down-payment ratio for home buyers. For example, China requires first-time home-buyers to make down payments of at least 30%, and, in some cities, the second-time home-buyers must make down payments of at least 70%. The down-payment requirement effectively reduces the average leverage of home buyers.

For consumer loans in general, the authority may also set a cap of the debt-payment-to-income ratio. In the US, the Consumer Financial Protection Bureau (CFPB) sets a cap of 43% for the debt-payment-to-income ratio, which is the total monthly debt payments divided by the gross monthly income. In China, banks have an implicit cap of 50% for the debt-payment-to-income ratio.

5.2.2 Financial Market Entry

The macroprudential policy may also take the form of restrictions on market entry. For example, in most countries, a new bank has to obtain a license to operate. Licensing requires the attainment of some minimum standards on financial and operational soundness. The license can be expensive, meaning that the process of obtaining one is difficult, especially for nationwide operations. An expensive license acts as an ultimate threat to the new bank. If it does not meet regulatory requirements, then the authority may revoke the license.

The market entry restriction on financial institutions, and financial regulation in general, is justified by the fact that the financial industry exhibits externality due to its interconnected nature. Banks lend to each other. Insurance companies write insurances (on bonds and companies) that other financial firms trade and hold. And investment banks are counterparties to almost all other financial firms. One bank's default risk, thus, is another's counterparty risk. One bank's default may lead to the collapse of the entire financial system, as shown in Lehman Brother's downfall in 2008. Therefore, the social cost of one bank's default far exceeds the costs to the shareholders of the bank, hence the externality. Left to their own, shareholders of financial firms will take more risk than a benevolent social planner would allow.

5.2.3 Limiting Speculations

The macroprudential policy may also take the form of restrictions on speculation. The stock market and housing market are particularly prone to speculative bubbles, thanks to the visibility and accessibility of the two markets to retail investors. Speculative bubbles are usually the product of word-of-mouth feedback loops. An initial rise in asset price attracts new retail investors into the market. Their entry pushes the asset price even higher, attracting even more investors into the game. Hence a positive feedback loop or a vicious cycle from the perspective of a benevolent social planner.

Stock Market

In the stock market, retail investors have neither the ability nor patience to analyze businesses. They contribute nothing to the market but liquidity. The marginal benefits of increased liquidity to "price discovery" may quickly decline to zero as the army of retail speculators rush into the market. As more money chase the limited supply of stocks, the stock prices soar far above the level that the fundamentals can sustain. The feedback loop requires, however, a continuous flow of new money into the market. When almost everyone, including professors and delivery guys, has entered and is talking passionately about stock picks, days of the bull market are numbered. When the market crashes, the wealth of a large population will be damaged, if not destroyed, leading to a sudden contraction of aggregate consumption. If there are not many retail investors, then the impact of a stock crash on consumption will not be as big.

It is, thus, desirable from the perspective of a benevolent social planner that the access to stock speculation should be restricted to a limited circle, just like access to casinos should be difficult. The every-man-a-speculator culture is not good for the economy, whether "bears" or "bulls" dominate the stock market. Gambling in the stock market does not require any special knowledge or expertise. So almost everyone from any occupation can participate, with a strong emotional satisfaction that derives from the gambling instinct in human nature. The emotional satisfaction

is the strongest during the bull market, where the pleasure of making money quickly and the satisfaction of gambling instinct reinforce each other. The term “stock mania” accurately describes such a state of mass mental disease. When a stock mania captures a substantial portion of the population, human capital as a whole is subject to a hit. It is a waste of human capital for every man to become a speculator. And even if speculation had some social benefits, the every-man-a-speculator culture works against the principles of division of labor.

To limit stock speculation, the government may tax stock transactions. For example, China levies a small stamp tax on stock transactions. More potently, the government may tax capital gains, especially short-term capital gains. In the US, short-term capital gains are taxed at the investor’s ordinary income tax rate, with the definition of “short-term” being a year or less. Long-term capital gains are taxed at a lower rate. Note that such taxes on transactions or capital gains are extremely unpopular. The financial industry is clearly in opposition to any such taxes. So are retail investors, though they as a whole lose money in the stock market almost all the time.

For more dangerous types of trading such as margin trading, futures, options, and so on, the government may impose minimum eligibility requirements. For example, to qualify for opening a margin account in China, investors should have tradable securities or cash worth at least 500-thousand RMB. The eligibility requirements often include a minimum understanding of the risks involved in trading. But this is just part of the paperwork. Brokerages are more than happy to open whatever accounts for investors as long as they satisfy the minimum financial requirements.

Housing Market

The feedback loop in the housing market can be even stronger than in the stock market. Rises of housing prices not only attract but also scare new buyers into the market. Unlike stocks, houses are real assets that everyone has to live in, either owning or renting one. And the quality of housing directly determines the quality of living. Especially in countries where home-ownership is treasured and envied, purchasing a house is almost a necessary investment. Young couples who are waiting for marriage, for example, cannot wait to buy a home when they find that housing prices are rising.

Furthermore, investment in homes has built-in leverage. Even a down-payment of 30% implies a leverage ratio of more than three. When housing prices rise, thus, the wealth of homeowners rises dramatically. This serves an irresistible word-of-mouth advertisement for home purchases. Even in countries where land supply is elastic (e.g., the US), housing prices can rise fast as speculative demand surges, as illustrated in the housing bubble of the US in 2004-2006. In countries where land supply for home-building is relatively inelastic, say, due to regulation of land use, speculative demand can easily send housing prices to the sky.

When housing prices are rising, the economy can easily overheat. First, to

satisfy speculative demand, housing developers cannot wait to build more homes. Residential construction competes for resources from other sectors, leading to a larger share of residential construction in GDP. Second, home purchases lead to demand for home renovation and household durables. Finally, the wealth effect of rising housing prices leads to a consumption boom in general.

When housing prices start to decline, however, all these sources of demand will disappear. Furthermore, the leverage in home-purchasing will start to bite the households that take too much debt and the whole economy. Since the house is usually the biggest asset for a household, the decline of housing value can easily make the “net worth” of household negative. In countries where personal bankruptcy is not allowed, people have to cut consumption, so as to “save out of” the negative net worth. In countries where personal bankruptcy is convenient, people may choose to foreclose their home en masse. This would cause trouble for banks and other financial institutions that hold mortgages, mortgage-backed-securities (MBS), or other derivatives on home mortgages. The 2008 US subprime mortgage crisis was a vivid example.

To limit speculations in the real estate market, governments around the world have introduced various measures. There are various kinds of transaction taxes such as stamp tax, capital gain tax, and so on. There is also the property tax that affects the “carry” cost of property holding. Note that the major objective of the property tax is not macroprudential but financing the government, especially the local government. And there are outright restrictions on home purchases and mortgage loans. China offers many examples of such policies. The success of these policies in limiting speculations, however, is dubious at best.

Notes

¹In 1906, Churchill gave a speech in the House of Commons that contained the following sentence: Where there is great power there is great responsibility, where there is less power there is less responsibility, and where there is no power there can, I think, be no responsibility.

²This view was first proposed by Abba Lerner (1903–1982) in “Functional Finance and the Federal Debt.” *Social Research* 10: 38–51.

³Barro, Robert J. (1974). Are Government Bonds Net Wealth? *Journal of Political Economy*. 82 (6): 1095–1117.

⁴Odysseus is the hero of Homer’s epic poem the *Odyssey*. He went through a committed journey back home, an “Odyssean journey”, and reasserted himself as the rightful king of Ithaca.

⁵Delphi is the ancient Greek sanctuary for the oracle who was consulted about important decisions such as whether to wage a war.

⁶Junhui Qian, 2016, The 2015 Stock Panic of China: A Narrative. Working Paper.