A SOLUTION FOR THE DILLEMA BETWEEN INFLATIONARY PRESSURE AND THE POSSIBILITY OF RECESSION

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Introduction

When advanced economies attempt to stimulate economic growth, they often experience a one-two punch on the inflation front. Before the 1970s, Philips curve suggested that inflation and recession (a symbol of recession) are inversely related, but the **stagflation** of the 1970s proved that frequent recessions could rise without cooling inflation when high budget deficits, low interest rates, the oil embargo, and the collapse of managed currency rates compounded together[1].

To balance between inflationary pressures against the possibility of recessions caused by the tools used to combat inflation, we identified two economic objectives: the short run (SR) objective is to control inflation tightly and prevent the inflationary gap from widening further, while the long run (LR) objective is to boost Aggregate Supply (AS) and Aggregate Demand (AD) simultaneously to achieve sustainable growth, eliminating the possibility of recession. Given that the inflation in most advanced economies is both demand-pull and cost-push, to control inflation in the SR, we decided to target the demand side of the issue—employing contractionary fiscal policy in the form of increased personal income taxation to constrain AD. The supply side of the inflation issue is difficult to resolve in the SR; rather, we use LR supply side policy in the form of Free Trade Agreement (FTA) to improve the AS of the economy, removing cost-push inflation. In addition to supply side policy, a series of expansionary fiscal and monetary policies will also be implemented in the long run, allowing the AD of the economy to grow apace with supply side development, ultimately achieving sustained economic growth.

I. Achieving Short Run Objectives

1. Contractionary Fiscal Policy: Personal Income Tax

The **consumption function** proposed by **Keynes** states that the most important determinant of consumption is the level of disposable income[2]. Disposable income is the remaining income after deducting taxes and other mandatory charges, available to be spent or saved as one wishes, which determines the AD of the economy. Therefore, by changing people's disposable income via increasing/decreasing personal income tax, society's AD could be manipulated.

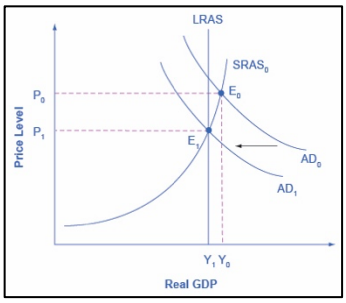
If personal income tax increases, people's disposable income would decrease, which leads to a decrease in the propensity to consume. This change in propensity to consume can be represented by the AD curve shifting leftwards[3] (Fig.1.).

Monetary policy (increasing interest rate) is not applied in the SR to cope with inflation because, compared to fiscal policy, it has a more significant trade-off, and its cost could be seen in recent events. As the Federal Reserve increases the Federal Interest Rate in the U.S., the yield curve between the U.S. 10-year bond and 2-year bond inverted by over 100BP. This inverted yield curve caused the financial crisis of three U.S. banks: Silicon Valley Bank, Credit Suisse Group, and First Republic Bank. SVB is now considered the second largest bank bankruptcy in the U.S. since the Lehman Brothers bankruptcy in 2008[4].

1.1 Short run cost-benefit analysis of contractionary fiscal policy

Benefit: Closing an Inflationary Gap

By increasing personal income taxes, the level of household disposable income falls, decreasing consumption spending and hence the AD—according to the expenditure approach of evaluating AD ($\boldsymbol{GDP = C + I + G + Nx}$), consumption (C) is one of its four constituents. Reduction in AD closes the inflationary gap of the economy, which is represented by the leftward shift of AD from AD_0 to AD_1 in Fig. 1.: the economy experiences a price level decrease from P_0 to P_1.



The general price level of the economy is controlled back to a normal level with the implementation of contractionary fiscal policy, and the inflationary pressure is thereby resolved[5].

Fig. 1. Contractionary Fiscal Policy[6].

Using contractionary fiscal policy to combat inflation is not a theoretical tool; the Roosevelt Administration had employed it as far back as the 1940s. During WWII, the U.S. civilian productivity was largely diverted to war efforts, e.g., Ford began producing tanks rather than automobiles. Meanwhile, workers generally received a significantly higher income due to their integral work in factories during wartime. This expanded consumer demand and limited supply appeared to be creating an inflationary feedback loop, which severely undermined the stability of the dollar and the U.S. economy. In response to the soaring price levels, the Roosevelt Administration implemented a series of policies that included progressive taxes: the top marginal rate for personal income taxes was raised above 90%; in the Revenue Act of 1941, the personal exemption amount was reduced from $2,000 to $1,500 for married couples. These tax increases and reforms did not cease until 1945, when the WWII ended, and it turned out that inflation gradually declined after reaching a peak and the U.S. economy recovered from the runaway spiral of wages and prices[7]. Contractionary fiscal policy was proven to be effective in eliminating inflationary pressures.

Closing an inflationary gap for the economy marks the preservation of the purchasing power of consumers and the maintenance of the profit margins of firms. Nevertheless, the variations in personal income taxes can also give rise to unintended circumstances in the economy.

Cost: Inducing Demand-Deficient Unemployment

Increment in personal income taxes can simultaneously decrease the real GDP of the economy, giving rise to a certain level of **demand-deficient unemployment**. As shown in Fig. 1., although an inward shift of AD allows the general price level of the economy to evidently decline, the real output of the economy dropped from Y_0 to Y_1. This reduction in AD, i.e., recession, can have perceptible implications on the labor market in the SR. As a result of the recession, the economy's demand for goods and services declines, so firms will have to compensate for the demand loss by reducing production. To lower the supply level, firms cut down on the employment of labor, the most variable factor of production in the SR. A large number of workers are no longer employed by the firms, resulting in demand-deficient unemployment[8].

During times of economic recession, demand-deficient unemployment is a real issue for numerous economies. In the Great Recession following the financial crisis of 2008, U.S. construction workers were largely laid off due to the struggling housing market. Demand for new homes declined dramatically, resulting in a cutback in the workforce by firms and subsequent mass unemployment. Indeed, before December 2008, the estimated number of unemployed Americans was 7.6 million; the unemployment number had grown to 14.7 million and peaked at 15.3 million in the midst of the Great Recession[9]. The unemployment rate is clearly positively correlated with recessionary pressure.

Nevertheless, the real wage of labor will not change immediately as the economy enters a recession. In SR macroeconomic equilibrium, with a given fixed level of investment, real wages stay constant when other economic conditions vary[10]. In summary, a contractionary fiscal policy in the form of increased personal income taxes will induce demand-deficient unemployment to a certain degree while the real wage of labor does not change in the SR. To offset the SR unemployment, LR economic policies will have to stimulate economic activities and boost AD to generate room for sustainable growth.

II. Achieving Long Run Objectives

To tackle cost-push inflation led by supply chain disruptions—which rises the costs of inputs—production costs must be decreased; To achieve price stability, the deflation resulting from tackling inflation needs to be balanced off to a certain extent; To achieve LR economic growth, both the AD and the LRAS needs to be increased. Thus, supply-side policies are recommended with the aid of expansionary fiscal and monetary policies to achieve the LR objectives.

1. Supply-side Policy: Free Trade Agreement (FTA)

Free Trade Agreement (FTA) is a form of **trade liberalization**, which is a **supply-side policy** referring to cross-country pacts that encourage trade by reducing trade barriers. Terms of FTA include removing quotas & tariffs on imports and reducing subsidies on domestic producers.[11] For example, tariff refers to the tax that a government imposes on its imported goods[12]. Foreigners cover this cost of exporting by increasing their prices. In Fig. 2., $S_{domestic}$ is the supply curve of domestic producers, which is proportional to the output quantity based on **the law of supply**; $S_{world\ w/tariff}$ is the curve of the imports with tariff, which is horizontal. Beyond the intersection of $S_{domestic}$ and S_{world}, imported supplies are preferred for their lower price compared to domestic supplies, thus the actual supply curve aligns with $S_{domestic}$ until Q_2, where it starts to align with S_{world}. When tariffs are removed, its cost will be deducted from the price of imports, shifting the world supply curve downwards to S_{world}, thus its intersection with $S_{domestic}$ shifts downward and leftward to Q_1. This indicates an overall decrease in the price of imported supplies and an increase in the quantity of imports in the actual supply curve, which brings several benefits to the economy with few tradeoffs.

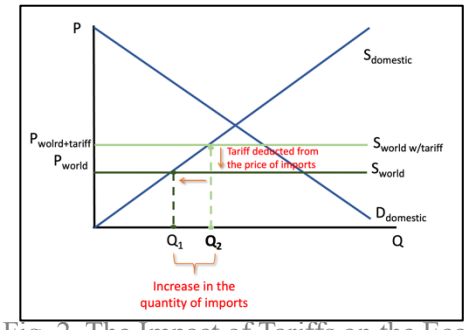


Fig. 2. The Impact of Tariffs on the Economy

1.1 Long-run cost-benefit analysis of supply-side policy

Benefit: Economic Growth in the Long Run

On the positive side, removing tariffs addresses cost-push inflation and promotes LR economic growth by decreasing **costs of production** and intensifying **competition** in the domestic market. Since the price of supplies is decreased, if raw materials are imported, then the **average production costs** for domestic producers would decrease, which increases the nation's LRAS since more can be produced with the same total cost. Meanwhile, importing allows foreign producers to enter the domestic market, which stimulates competition. When producers compete for lower prices, production efficiency is increased to achieve that. This also increases the nation's LRAS in quantity as more output can be produced using the same limited resources under efficient production. In Fig.3., the LRAS curve shifts rightward from $LRAS_1$ to $LRAS_2$ when it increases in quantity, intersecting the AD curve at a lower price level and a higher rGDP value. This impact is present for Columbia in the U.S-Columbia Trade Promotion Agreement[13]. As a result, an increase in output can generate

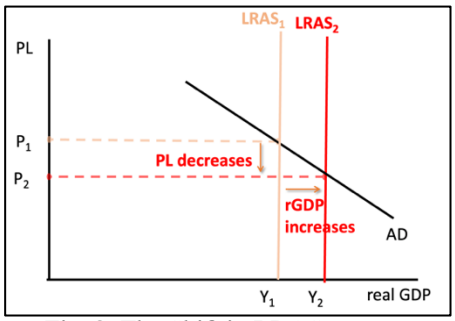


Fig. 3. The Shift in LRAS

derived-demands for labor. For example, trades in the North American Free Trade Agreement (NAFTA) between the U.S, Mexico, and Canada supported 17.7 million jobs for the U.S.[14] Thus, supply-side policies are capable of addressing inflation and achieving LR economic growth, while bringing a positive side-effect on employment [15]

In the meantime, FTA also involves trade liberalization in cooperating countries, which achieves economic growth since it favors the **exports** of domestic producers.[16] Based on the **GDP formula,** an increase in exports would increase a nation's overall GDP, thus achieving **economic growth** [17].

Cost: The Development of Domestic Producers

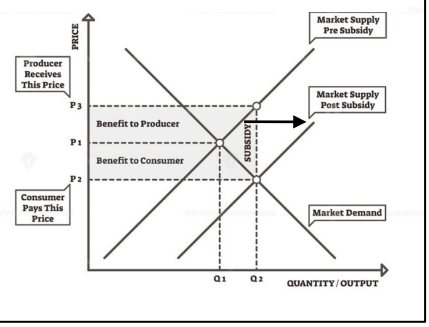
As a tradeoff of foreign competition in the domestic market, consumers' choice of foreign goods over domestic goods can impede the development of domestic producers in some sectors, which might negatively impact the GDP and economic growth as the consumption of domestic goods decreases. [18] For example, in the North American Free Trade Agreement, 1.3million local Mexican farmers were forced out of business when competing with American farm products. [19] However, this cost can be mitigated through **protectionist policies** such as offering **government subsidies** to domestic producers to cover their production costs, allowing them to lower their prices and gain competitiveness in the price competition. [20]

2. Expansionary Fiscal policies

i) Government subsidies

Subsidizing for the spheres of education and technology helps increase LRAS while it accumulates **intangible capital** and **protects domestic firms**. To avoid budget deficit and crowding out effect caused by subsidies, the money for subsidies comes from tax revenue accumulated through an increase in personal income taxation mentioned earlier. As shown in Fig.4., converting tax revenue into subsidies for technology firms, AS shifts rightwards, reducing the price and elevating the producer profit. Meanwhile, Research and Development (R&D) are facilitated by subsidies, driving production efficiency and the nation's competitiveness in international trade. Furthermore, government subsidy in education not only increases the standard of living but also increases labor efficiency, promoting the growth of AS. Subsidies in energy and food sectors can mitigate the effects of supply-chain disruptions and address the cost-push inflation. Thus, using the tax revenue to subsidize technology and education can enhance the LRAS and the nation's competitive advantage, promoting LR economic growth and aiding the supply-side policy.

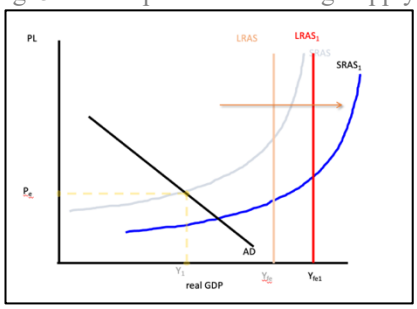
Fig. 4. Impact of subsidy on the market.



ii) Reducing Corporation Tax

Government tax reforms for corporations is a pro-growth reform that lowers the **marginal tax rates** and **cost of capital**. Specifically, this fiscal policy converts the corporation tax system into a **flat tax system** and eliminates the **Alternative Minimum Tax (AMT),** that keeps certain deductions[21]. This reduces the cost of production, which allows 1) companies' full and expensing SR investment, 2) increasing the profitability of companies, 3) multinational investment attraction, 4) companies' incentive of R&D. Under pressures of stagflation: competition, and FDI have the potential to facilitate LR growth.

Fig. 5. The Impact of Increasing Supply



A combination of productivity growth and resource reallocation drives the growth of AS. According to Fig. 5, the inflationary tendency and price decreases as the AS increases (shifts rightward). Based on the **dynamic inconsistency theory,** increasing competition within the economy increases output and reduces the gap between the actual and optimal output level[22]. Therefore, increasing competition increases AS and mitigates inflation. An experiment done by Cavaliers in 2003 demonstrated that both potential variables of competition have a significant effect on inflationary trend and that there is a significant negative relationship between average inflation and competition during this period [23]. Furthermore, the competition within the market facilitates **price competition** between firms, which lowers inflation as the price decreases. In addition, dynamic changes in market shares cause **resource reallocation** among firms. By exposing firms and products to competition, companies are encouraged to focus on areas where they have a comparative advantage to enhance their **competitive advantage**[24]. This enables the scarce skills and resources to be deployed, which increases the **resource efficiency, the nation's production capacity**,

and shifts the production **possibility curve (PPC)** outward, demonstrating increases in production and thus economic growth. Harris and Li use data from 1996 to 2004 to examine the factors affecting productivity growth and find that reallocation between firms caused 42% of total UK factor productivity; 37% from firm exit and entry of company caused by the competition and 22% from corporates' productivity growth [25]. Growing production creates a comparative advantage for the nation during international trade, facilitating trade-liberalization in the supply-side policy. Overall, the competition resulting from Corporation Tax Reduction Policy promotes productivity and resource reallocation, which lowers inflationary pressure.

2.1 Long-run cost-benefit analysis of expansionary fiscal policies

Benefits: Economic Growth and Wage Elevation

2.1.1 Benefits: Economic Growth and Wage Elevation

To begin with, cost, **government tax regime**, and **incentives** are factors that may encourage **multinational enterprises (MNE)** to invest. Cutting the corporation tax attracts FDI by providing lower production costs and incentives. Thus, nations with lower corporation taxes are more competitive when competing for FDI. Through **exogenous or neoclassical growth models,** it has been shown that FDI can directly affect economic growth through **capital accumulation** and the incorporation of new inputs and foreign technology in the production function of the host country [26]. This would further lead to **more consistent returns to investment**, while labor would grow exogenously. Barro and Sala-I-Martin demonstrated a positive correlation between capital accumulation and output; while Herzer recently determined that FDI stimulates economic growth by increasing domestic investment [27]. Therefore, the FDI attracted by low corporation tax has great potential to facilitate the growth of the economy while stabilizing the price.

In addition, the growth in the economy is also correlated with an increase in the **employment rate**. Capital cost reduction accompanied by the involvement of MNE results in the increase in demand for labor. Hence, the Corporate Tax Reduction policy brings positive side effects that help achieve the macroeconomic objectives.

Cost: Tax competition

Even though corporate tax reduction policy may promote LR economic growth, it can result in **tax competition**. Considering that a country with low corporation tax is more competitive, countries might keep lowering their tax rates to attract FDI (Fig.6.), possibly leading to a **government budget deficit, which** increases the borrowing and interest rate, causing the **crowding-out effect**. Moreover, tax competition would increase **inequality** when companies benefiting from low tax rates while ordinary workers would

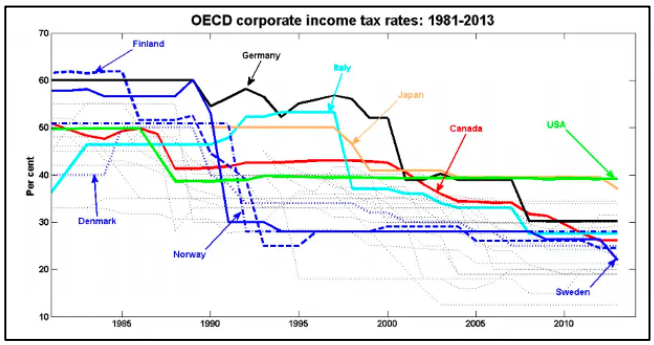


Fig. 6. OECD Tax Competition[28]

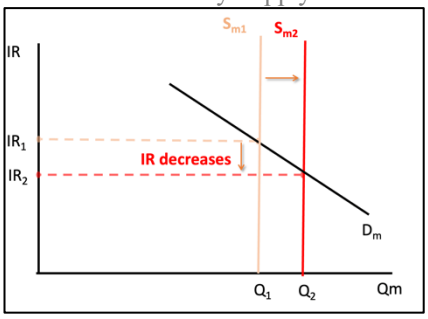
have to pay relatively high taxes.[29] This is undesirable as it conflicts with the macroeconomic objectives. [30]

3. Expansionary Monetary Policy: Open Market Operations

Expansionary monetary policies are policies that aim to increase an economy's output, price level, and employment by varying the interest rate through means of influencing the money supply. [31] After implementing SR contractionary policies, expansionary policies can be implemented to a certain extent to reboot the economy's output and price level and prevent contractionary policies from thrusting the economy into recession. Common tools of expansionary monetary policies include buying bonds in **open market operations (OMO)**, lowering the **required reserve ratio (RRR)**, and lowering **discount rates** [32].

Among the major tools, since the tool **RRR** changes the money supply by controlling banks' reserves, its impact is less predictable as its potential impact on different banks can vary according to each of their deposit bases. Meanwhile, the effect of changing **discount rates** is limited since it is rarely used[33]. However, the impact of OMO on the money supply is more straightforward since it directly liquifies money. Thus, because OMO can be more precisely controlled[34]—which is highly important as will be explained in the cost analysis—, OMO is the most recommended.

Fig. 7. The Impact of Increasing Money Supply



When **OMO** is conducted, as the government purchases securities and bonds (illiquid money) off of banks and households, Illiquid money in the economy is liquified, thus increasing the money supply. [35] Based on Fig.7., when an increase in the money supply shifts the money supply curve rightward from (S_{m1} to S_{m2}), it moves its intersection with money demands downward, decreasing the interest rate. This leads to a series of changes in a nation's economic activities, which mainly bring positive effects with few possible harms.

3.1 Long-run cost-benefit analysis of expansionary monetary policy

Benefits: Price Stability and Economic Growth

On the positive side, decreasing interest rates encourage **consumption** and **investments** [36], which balances off deflation and aids supply-side developments**.**

Interest rate is the rate of return when money is saved in banks and the cost of borrowing when they've borrowed from banks.[37]

When the interest rate decreases, saving money becomes less profitable, and borrowing money becomes less costly, thereby increasing consumers' **propensity to consume** and **propensity to borrow**, which promotes **consumption** and **loan-based expenditures** such as cars and real estate, increasing AD.[38] By increasing the AD, it raises the overall price level and GDP growth, preventing the economy from entering a recession. As seen in Fig. 8., the demand curve shifts rightward as it increases in quantity. Resultingly, its intersection with the supply curve shifts upward and rightward, representing an increase in both price level and rGDP. This effect is proven by the U.S economy's 2003 recovery from recession, which is achieved with the help of interest rates.[39] These balance off deflation and satisfy the definition of economic growth.

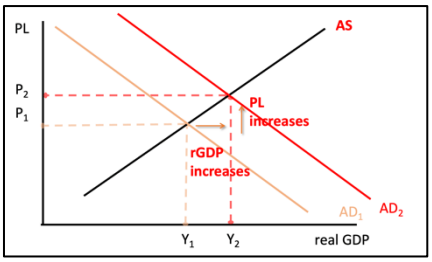


Fig. 8. The Impact of Increasing Demands

Meanwhile, a decrease in interest rates also increases firms' **propensity to invest** according to the curve **Marginal Efficiency of Capital**. As seen in Fig.9., the quantity of investment is inversely proportional to the interest rate. This is because: the interest rate from saving is the **opportunity cost** of investing—investments are only profitable (considering the opportunity cost) if their rate of return surpasses the interest rate. This means that, when the interest rate is low, consumers have a higher propensity to invest since there the opportunity cost is lower. Thus, decreasing the interest rate encourages investments. [40]Since investment is one of the major components of **GDP**, increasing investments promote economic growth. Furthermore, increasing investments increases a nation's capital stock, which improves the **productivity of labor** and reduces production costs. As a result, it shifts both the SRAS and the LRAS rightward in Fig. 10, allowing LR economic growth from the supply end.

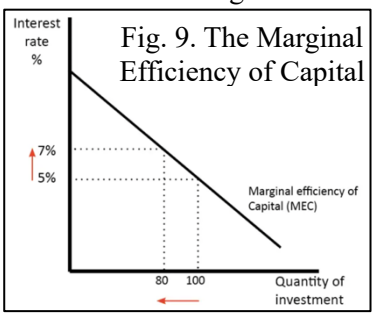


Fig. 9. The Marginal Efficiency of Capital

Cost: The Risk of Re-Entering Inflation

On the downside, as increasing demand drives the price level to increase, the economy might re-enter a detrimental demand-pull inflationary period. Thus, as open market operations increase the money supply, it might trigger consequences such as lowering individuals' real income and decreasing the nation' competitiveness in international trade, impeding overall economic growth as a result of inflation.

However, whether inflation is harmful to an economy depends on the degree of inflation. Economists believe that a mild inflation of approximately 2% is actually optimal for an economy. [41]Thus, if the **multiplier effect** of the monetary policy is meticulously calculated, the results of inflation can be made positive if the inflation rate is fixed at around 2%. This is made possible using OMO, which is a relatively predictable tool of expansionary monetary policy.

Conclusion

The dilemma between inflation and recession is a complicated issue that cannot be resolved through a single policy in the short or long run. Nonetheless, we believe that by employing contractionary fiscal policy (increasing personal income tax) in the short run and by implementing expansionary fiscal policy (decreasing firm tax), expansionary monetary policy (open market operation), and supply-side policy (trade liberalization) in the long run, the economic dilemma could be solved to an excessive extent. It is thereby of utter importance to integrate short- and long-term efforts.

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