Chapter- II

Review of Literature

2.1 Introduction

This chapter presents a comprehensive analysis of the significant conceptual advancements in the theoretical and empirical literature concerning monetary and fiscal policy. It provides an insight into effectiveness of the macroeconomics policies and helps to explore the various channels of interactions between the monetary and fiscal variables. The chapter covers a broad range of topics, including theoretical viewpoints from diverse schools of thought, including concepts, models, and key debates surrounding monetary and fiscal variables. Additionally, the chapter includes a review of empirical literature on monetary and fiscal policy interactions. This analysis contributes to the ongoing discussion on the efficiency of monetary and fiscal policies in macroeconomic management, and further advances our understanding of the complex relationships between these monetary and fiscal variables in the economy.

2.2 Theoretical Literature

Various schools of economic thought hold differing views on the significance and effectiveness of monetary and fiscal policies. Classical economists contend that money is neutral and limit the role of policy due to the self-correcting nature of the economy, drawing non-interventionist policy conclusions. Conversely, Keynesians

highlight the importance of aggregate demand and argue that fiscal policy is the most effective way to stimulate demand during economic downturns.

Monetarists recognise the importance of money in influencing real variables in the short run, advocating for stable expansion of the money supply to manage inflation through monetary policy, while contending that fiscal policy leads to crowding out and is therefore ineffective. New Classical economists also draw non-interventionist policy conclusions, arguing that unanticipated changes in policy affect real variables for a brief period, while anticipated changes have no impact because economic agents have rational expectations.

However, New Keynesians extend support to Keynesian conclusions, asserting that both anticipatory monetary and fiscal policies can be effective, as long as there are rigidities in wages and price levels in the economy. The table 2.1 summarises the key propositions of various economic schools of thought and their corresponding policy conclusions.

Table 2.1:Key propositions and policy views of different school of thought

School of thought	Key Propositions	Policy Conclusions
Classical School (Prior to 1930s)	• There is presence of self adjusting tendencies in the economy. • It is based on Say's law of market: "Supply creates its own demand" • Theoretical separation between real sector and monetary sector exists. (Classical dichotomy) • Real variables like real output and employment are determined by real factors such as stock of capital, state of technology, productivity of labor, and household's preference for work and leisure. • Money exerts influence only on nominal variables like nominal wage, nominal GNP, and money balance. (Neutrality of money) • Price level is determined by quantity of money. (Quantity theory of Money) • The economy is always at full employment level.	Non-interventionist policy conclusion as markets can self correct.

Keynesian School (1930-1941)	• The level of equilibrium output/income was determined by intersection of Aggregate demand and aggregate supply. • The deficiency of aggregate demand caused high level of unemployment. • Consumption , Investment , Government expenditure and Net exports were key components of aggregate demand. • Fluctuations in output and employment was considered to be a result of inherent instability of investment component of aggregate demand. • Rate of interest was determined by demand and supply of money. • During the times of depression, there is a situation of liquidity trap in the economy. • There is no theoretical separation of real and nominal variables as the change in interest rate has impact on output and employment through its effect on investment.	Both monetary and fiscal policies can be used for stimulating demand. However, fiscal policy was considered to be more effective especially during recession.
Monetarist School	• The supply of money is the dominant influence on nominal income. • In the long run, the influence of money is primarily on the price level and other nominal magnitudes.(long run neutrality of money) • In the long run, real variables, such as output and employment, are determined by real, not monetary, factors. • In the short run, the supply of money does influence real variables. Money is the dominant factor causing cyclical movements in output and employment. (short run non neutrality of money) • The private sector is inherently stable. Instability in the economy is primarly result of government policies.	Monetary policy is more effective than fiscal policy. Monetary policy can stabilise the economy in short run. On the other, hand fiscal policy leads to crowding out of private investment.

New Classical School (1970-1990)	• It is based on belief that keynesian theoretical and policy analysis based on backward looking price expectation is fundamentally flawed. • It is based on the belief that expectations are formed by economic agents on basis of all relevant information about the variables .(Rational expectations) • In both short run and long run , anticipated aggregate demand will not affect the value of real variables such as output and employment. (Classical policy ineffectiveness postulate)	Anticipatory policy actions are ineffective and unanticipated policy shocks are effective only in short run. (Non-interventionist policy conclusion.) In case of Monetary policy , a rule based was recommended for its stable effect on output and employment.In case of Fiscal policy, avoidance of excessive deficit is recommended. As it was considered necessary for credible, noninflationary monetary policy.
New Keynesian School	• It is based on belief that despite the assumption of rational expectations automatic adjustment in the economy is not possible due to wage price rigidity on account of (i) imperfect competition (ii) efficiency wages and (iii)insider-outsider model • It is based on decision rules of economic agents that are micro-founded. • It consists of households maximising the utility function subject to inter- temporal budget constraint and firms maximising their profit subject to nominal rigidities in adjustment of prices. • The model consists of system of log-linearised equations - an Euler equation, Philips curve, Taylor rule. (Brugnolini, 2018)	Fiscal policy is effective during depression whereas monetary policy would be more effective during recession occurred for high income levels. In inflation, both monetary and fiscal policies should be applied simultaneously. (Hiç, 2019)
Source :Prepared from various chapters from Macroeconomics by Froyen (2013)		

2.2.1.Quantity theory of Money:

The Quantity Theory of Money (QTM) is a macroeconomic framework that posits a direct relationship between the circulation of money and the prices of goods and services in an economy. Irving Fisher (1911) in his book "The Purchasing power of Money" presented the relation between the quantity of money and the price level in terms of a simple 'equation of exchange. The equation is

$$M\ V = P\ T \qquad 2.1$$

where M is the quantity of money in circulation, V is the velocity of circulation, P is the price level and T is the volume of trade (Gupta, 2001).

According to Fisher (1991) and other quantity theorist, the equilibrium level of velocity was determined by institutional factors which remained fixed in the short run. They also assumed that the economy was operating at full employment level, and therefore the volume of trade (T) was considered constant. Therefore, the theory states that the quantity of money is the prime determinant of money supply. However, the Quantity Theory of Money (QTM) encountered criticisms from two schools of thought: the Banking School and the Keynesian school of thought. Quantity theorists responded to Keynesian attacks by presenting counter-arguments based on theoretical developments and empirical research. Two important theoretical developments that helped revive the quantity theory were the real balance or wealth effect and Milton Friedman's reformulation of the quantity theory as a theory of the demand for money. Milton Friedman restated the quantity theory of money by emphasizing two new

features: that it is a theory of the demand for money rather than the determination of prices and nominal income, and that there is a stable relationship between the velocity of money and independent variables that determine it. This reformulation was intended to rebut Keynesian criticisms by denying that it assumed full employment, stating it as a demand-for-money function, and refuting arguments that velocity lacked economic content, assumed constancy, or was subject to unpredictable shifts. (Humphrey,1974) Based on this Friedman stated that inflation is always a monetary phenomenon, determined by the interaction of money supply and demand.

2.2.2. Monetary Policy Rule : Taylor's rule

The Taylor rule, proposed by John Taylor in 1993, has been widely adopted by central banks to guide their decisions on setting monetary policy rates. This rule specifies a linear relationship between the nominal interest rate and several key macroeconomic variables, including the output gap, inflation rate, and real interest rate. Its enables central banks to adjust their monetary policy rates in response to changes in these variables, with the aim of achieving stable economic growth and low inflation. Taylor's seminal work on this topic was published in his 1993 study titled "Discretion Versus Policy Rules in Practice."

The rule proposed to guide monetary policy by Taylor (1993)

$$r = p + 0.5y + 0.5(p - p^*) + r^* \qquad 2.2$$

where r is the federal fund rate, r* is equilibrium real interest rate (taken as 2-percent by Taylor) p is the rate of inflation, p* is target inflation rate (taken as 2% by Taylor), y is the percent deviation of real GDP from target (Taylor,1993). This equation thus states that interest rate is expected to rise by half a percentage point in response to either (1) a one percentage point increase in inflation above the assumed 2 percent target or (2) a one percentage point increase in output relative to its potential level. (Bernanke, 2015) Although it may not necessarily be the optimal policy, the Taylor rule has garnered attention for its emphasis on rule rather discretion based policy.

2.2.3 IS-LM framework

In 1937, Hicks published an article with the title "Mr. Keynes and the 'Classics': A Suggested Interpretation" in which he presented an IS-LM framework interpretation of Keynes' macroeconomic views. The model is widely employed in macroeconomics because it illustrates the synthesis of monetary and income analysis of the economy by describing the relationship between interest rates and economic output. Model represents the intersection of two curves - IS (Investment saving) and LM (Liquidity preference Money supply) curve. The IS curve represents the equilibrium relationship between output (Y) and the interest rate (r) in the goods market. The IS curve is derived from the equilibrium condition in the goods market, which states that output is equal to the sum of consumption, investment, and government spending (Y = C + I + G), where consumption (C), investment (I), and government spending (G) are all functions of the interest rate. The LM curve represents the equilibrium relationship between the interest rate (r) and the level of money supply (M/P) in the money market

(Froyen, 2013). The LM curve is derived from the equilibrium condition in the money market, which states that the demand for money is equal to the supply of money (Md = Ms), where the demand for money (Md) is a function of output and the interest rate and the supply of money (Ms) is assumed to be fixed. The intersection of the IS and LM curves determines the equilibrium level of output (Y) and the interest rate (r) in the economy. At this point, the goods market and the money market are in simultaneous equilibrium. The IS-LM model can be used to analyse the effects of various macroeconomic policies on the economy. The table 2.2 summaries the impact of policy instruments on income and interest rate.

Table 2.2 Effects of Monetary and Fiscal Policy variables on Income and interest rate in IS - LM Analysis

Effect on	Money stock	Government spending	Taxes
Income	+	+	_
Interest rate	-	+	_

'+' means movement in the same direction as the policy instrument and '-'means movement in the opposite direction.
Source : Froyen (2013)

However, the effectiveness of policy action, depends upon the slope of IS and LM curve. The key parameter that determines the slope of the IS schedule is the interest elasticity of investment, whereas the key parameter that determines the slope of the LM schedule is the interest elasticity of money demand. The table 2.3 summarizes the effectiveness of policies under different IS-LM schedule slopes.

Table 2.3 Policy effectiveness and the slopes of the IS-LM Schedules

Slope of IS Schedule		
	Steep [Low interest elasticity of investment]	Flat [High interest elasticity of investment]
Monetary	Ineffective	Effective
Fiscal Policy	Effective	Ineffective
Slope of LM Schedule		
	Steep [Low interest elasticity of money demand]	Flat [High interest elasticity of money demand]
Monetary	Effective	Ineffective
Fiscal Policy	Ineffective	Effective
Source : Complied from Macroeconomics textbook (Froyen , 2013)		

Further, two extreme scenarios in the IS-LM provides important insight two different theoretical views :

(a) The classical case, which is characterized by the vertical LM schedule, due to the classical economists' disregard of the dependence of money demand on the interest rate. In this case, an increase in government expenditure is expected to raise the interest rate to reestablish equilibrium in the money market, as income increases. However, this rise in the interest rate is associated with a decrease in private investment, which is equal in magnitude to the increase in government spending, leading to complete crowding out. As a result, the income level returns to its initial equilibrium point. Consequently, the conclusion drawn for this case is

that fiscal policy action solely influences the interest rate and has no impact on the level of income.

(b) The liquidity trap is characterized by the horizontal LM schedule, which perfectly reflects the interest elastic money demand. In this case, an increase in government expenditure results in only a slight increase in interest rates, which is required to re-equilibrate the market since money demand is highly sensitive to the interest rate. As a result, the negative impact on the interest rate is minimal, making fiscal policy effective in raising income levels in the economy. As opposed to the above classical view , Keynesian economists on basis horizontal LM schedule argued that the optimal policy action in case of liquidity trap would be an expansionary fiscal policy.

While the IS-LM model has been criticized for its simplifying assumptions and limitations, it remains a useful tool for understanding the relationships between interest rates, output, and macroeconomic policies in an economy.

2.2.4 Mundell- Fleming Model :

The open economy version of the IS - LM model is the Mundell Fleming model. IS schedule, derived from the goods market will now include net exports, to account for foreign sectors demand.The open economy IS equation is given by

$$S(Y) + T + Z(Y, \pi) = I(r) + X(Y^f, \pi) \qquad 2.3$$

In addition to the IS-LM schedule, the open economy model also includes the BP balance of payments equilibrium schedule. The BP schedule represents the combination of interest rate and income that leads to balance of payment equilibrium at a specific exchange rate. The equation of balance of payment schedule is

$$X(Y^f, \pi) - Z(Y, \pi) + F(r - r^f) = 0 \qquad 2.4$$

where, Y^f and $r^f$is foreign income and nominal interest rate respectively , Y and r is domestic income nominal interest rate, and π is exchange rate. The equation indicates that net exports must equal net capital flows in order to maintain balance of payment equilibrium. Therefore, the BP schedule is positively sloped, import demand increases as income rises, resulting in a current account deficit and a balance of payment deficit. In order to restore equilibrium and ensure capital inflow, the domestic interest rate must rise above the international interest rate. The effectiveness of monetary and fiscal policies in the open economy relies upon the extent of capital mobility and types of exchange rate system. The effectiveness of both policies under fixed and flexible exchange rate regimes is demonstrated by the four instances of expansionary monetary and fiscal policies listed below:

A. Expansionary Monetary policy under fixed exchange rate

In fixed exchange rate regime, implementing an expansionary monetary policy results in a decline in domestic interest rates. This, in turn, causes capital outflow and reduces international reserves without affecting the exchange rate. Consequently, capital outflows reduce the money supply, and expansionary monetary policy fails to boost the real income of the economy. This illustrates the

Impossibility Trilemma (also known as the Impossibility Trinity), which demonstrates that when the exchange rate is regulated and the economy is open, the monetary authority loses its sovereignty in determining the amount of money, and the exchange rate becomes the policy variable (Gupta).

B. Expansionary Fiscal policy under fixed exchange rate

In fixed exchange rate regime, an increase in government spending will increase the domestic interest rate above the foreign interest rate, which will result in massive capital inflow. To maintain the exchange rate at its fixed value, intervention by central bank will cause the money supply to rise. This will led to expansionary effect of fiscal stimuli on real income.

C. Expansionary Monetary Policy under flexible exchange rate system

An increase in the money supply results in a fall of the domestic interest rate below the foreign interest rate. This triggers capital outflows, causing the exchange rate to depreciate. The depreciation leads to an increase in demand for exports, which, in turn, leads to fiscal expansion alongside monetary expansion. As a result, monetary policy results in an expansionary effect on income.

D. Expansionary Fiscal Policy under flexible exchange rate system

An increase in government spending will increase the domestic interest rate above the foreign interest rate, which will result in massive capital inflow.The capital inflow will cause exchange rate to depreciate, which, will lead to decrease

in demand for exports. As, exports fall the initial expansionary effect of the policy is offset by contraction in export demand. Therefore, fiscal policy is ineffective.

Under the imperfect capital mobility , monetary policy is more efficient under floating exchange rates, both in absolute terms and in comparison to a fiscal policy action of a particular magnitude. Additionally, the impact of flexible exchange rates on the effectiveness of fiscal policy - measured as an independent shift in domestic spending with a fixed money supply - is unambiguous (Boughton, 2003).

2.2.5 Macroeconomic model with Government Budget Restraint

Christ (1968) incorporated the government budget restraint function in a simple theoretical static demand model that underlines the well know IS-LM curves.

The general budget restrained equation given by Christ is

$$g = t + \Delta\frac{H}{P} \qquad 2.5$$

where g is real government purchase, t is taxes , H is high powered money stock and Pis price level (assumed as rigid in the model).

Specifically, this government budget restraint stipulates that, in each period, the total amount of government expenditure (comprising transfer payments and purchases of goods and services) must be equal to the total flow of financing from all sources, including the issuance of fiat money. Consequently, the government's ability to choose arbitrary values of policy variables such as expenditures, taxes, net borrowing from

the private sector, and new money issuance is constrained. For instance, if a government has already determined its expenditures, taxes, borrowing, and other means of finance besides printing money, then the amount of money issued must be adjusted so that the total flow of financing equals expenditure.Hence, when selecting a blend of monetary and fiscal policies, government authorities, including the central bank, are constrained by a government budget restraint (Christ,1968). This emphasizes the impact of budget constraint on the variables of monetary policy.

2.2.6. Fiscal Theory of Price Level

Leeper (1991), Sims (1991) and Woodford (1994) developed the Fiscal Theory of the Price Level (FTPL), which argues that the overall liabilities of the government, including money and bonds, are important determinants of prices and inflation. The difference between the conventional view and the FTPL is their treatment of the government's intertemporal budget equation. The inter temporal equation is expressed as

$$\frac{B}{P} = Present\ value\ of\ future\ surpluses \qquad 2.6$$

where B is the outstanding nominal debt of the government and P is the price level.

The conventional view is that the equation constrains the government's tax and spending policies, requiring policies to be designed so that the left side equals the right side, regardless of the value of P. In contrast, the FTPL argues that the equation

does not necessarily function as a policy constraint, but rather as an equilibrium condition. The market-clearing mechanism adjusts the price level to restore equilibrium if the equation is disturbed. Michael Woodford has referred to the idea that government policy need not fulfill the intertemporal budget equation for every value of P as the "non-Ricardian assumption." Consequently, non-ricardian fiscal policy can affect the economy's price level (Christiano and Fitzgerald, 2000). Therefore, The FTPL provides a structured representation of the connection between fiscal policies and monetary phenomena, explaining the process by which monetary and fiscal policies interact to establish the price level

2.2.7 Ricardian Equivalence Theorem

The conventional theory asserts that an increase in the deficit leads to a short-term boost in output and employment, a rise in interest rates, and a crowding out of private investment. Thus, budget deficit creates a monetary-fiscal link by its effect on interest rate, monetary policy variable. In contrast to this the ricardian equivalence draws different conclusion(Seater, 1993).According to this proposition, the substitution of debt for taxes to finance a particular path of government expenditure would not significantly impact current economic activity (Dalamagas, 1992). The idea, first proposed by Ricardo, argues that higher government borrowing leads to increased saving by forward-looking taxpayers in anticipation of higher taxes in the future. This idea was later endorsed by Robert Barro, and is also known as the Barro-Ricardo Equivalence Hypothesis. Under this proposition, public debt is not considered a net wealth of the private sector, as individuals are aware that they will have to pay higher

taxes in the future to repay the government debt. Consequently, the theorem implies that any increase in government borrowing will be offset precisely by an equivalent reduction in consumption, as households aim to save in preparation for paying higher taxes in the future (Buchanan, 1976 & Barro, 1974). If Ricardian equivalence prevails, there is no increase in current aggregate spending, no effect on interest rate and no crowding out. Therefore, fiscal policy is considered ineffective in stimulating aggregate demand according to the Ricardian equivalence proposition. However, other economic theories, such as the Keynesian perspective, differ in their evaluation of the effectiveness of fiscal policy in influencing aggregate demand.

2.2.8 Philips Curve

The Philips curve, which illustrates the inverse relationship between the inflation rate and the unemployment rate, was observed to hold until the late 1960s. However, in some countries such as France, the United Kingdom, and Malaysia, the two rates began moving in opposite directions, while in others, the relationship between the two rates was mixed, indicating the possibility of a negative or insignificant relationship (Gupta,). Subsequently, Edmund Phelps (1967) and Milton Friedman (1968) challenged the theoretical underpinnings of the Philips curve, proposing that rational employers and workers would pay attention only to real wages, which reflect the inflation-adjusted purchasing power of money wages. This would lead to real wages adjusting to make the supply of labor equal to the demand for labor, resulting in a unique level of unemployment, referred to as the "natural rate." Both Friedman and Phelps argued that the government could not trade higher inflation for lower unemployment indefinitely. They also distinguished between the "short-run" and

"long-run" Philips curves, with the latter represented as a vertical line at the natural rate. This indicates that after workers' expectations of price inflation have had time to adjust, the natural rate of unemployment is compatible with any rate of inflation. Economists now accept the concept of the "nonaccelerating inflation rate of unemployment" (NAIRU) as the unemployment rate that is compatible with a stable rate of inflation. In the 1960s, the Phillips curve was recognized for providing an explanation of the inflation process that was omitted from the conventional macroeconomic paradigm. In its expectations-augmented form, derived from the natural-rate hypothesis, the Phillips curve is still playing an essential role in understanding the link between two different policies goals ie. inflation to unemployment in the mainstream of macroeconomic theory years after its introduction (Hoover, 2008).

2.1.9 Monetary and Fiscal Dominant regimes

Sargent and Wallace (1981) challenged the view of monetarists that fiscal policy does not affect the price level. They argued that inflation acts as a link between monetary and fiscal policies and identified two scenarios of policy dominance. In a monetary dominant scenario, the monetary authority has independent control over monetary policy, which determines the revenue that the fiscal authority receives through seigniorage. In this case, the monetary authority can permanently control inflation by manipulating the quantity of currency in circulation. In contrast, in a fiscal dominant scenario, the fiscal authority independently sets its budgets, including announcing all current and future deficits and surpluses, and the monetary authority must finance any

revenue shortfall between the fiscal authority's demands and the amount of bonds sold to the public. If deficits cannot be fully financed by bond sales, the monetary authority must create additional money, leading to higher inflation.

Additionally, Leeper (1991) argued that both monetary and fiscal policies can be either active or passive in their approach. In a stochastic maximization model, the author examines the interactions between these policies and finds that when monetary policy is active and fiscal policy is passive, the government takes into account the impact of debt shocks when making policy decisions. Conversely, when fiscal policy is active and monetary policy is passive, fiscal policy is not limited by debt evolution and is considered to be dominant, as described by Sargent and Wallace (1981). As a result, the dominance of a particular regime and the active and passive behavior of the policy have significant effects on monetary and fiscal policy reaction functions, they highlight channels that conventional policies do not consider.

2.1.10 Key debates revolving around monetary and fiscal policies

The main areas of debate in macroeconomics are focused on the efficacy and necessity of monetary and fiscal policy, as well as the choice between rule-based and discretionary policies (Bilgili,2001).

Keynesian theory emphasizes the importance of aggregate spending and its components in stabilizing the economy, while Monetarists prioritize the role of money supply. The core tenet of Keynesian economics is that the private sector is inherently

unstable and requires active government intervention to promote stability. Conversely, Monetarists view the private sector as inherently stable and capable of withstanding economic shocks, leading to a divergence in their views on the need for policy intervention (Froyen,2013).

In the context of combating economic downturns, Keynesians contend that fiscal policy is the most effective tool to stimulate demand and reduce unemployment, arguing that an increase in aggregate demand does not necessarily lead to inflation during recession, but rather spurs actual economic output. However, this view is challenged by Monetarists, who argue that fiscal policy alone is insufficient to stabilize the economy and can lead to crowding out of private investment. In his paper "The Counter-Revolution in Monetary Theory," Milton Friedman argues that the quantity of money is the most crucial factor in determining economic stability, highlighting a key difference between the Keynesian and Monetarist perspectives.

The debate between Keynesians and monetarists goes beyond the need and effectiveness of policies and extends to their recommendations on rule-based or discretionary policy. Keynesians favoured discretionary fiscal and monetary policy actions while monetarist advocated a constant money growth rate rule for stabilisation of the economy (Froyen, 2013). The "Rules versus Discretion" literature emerged as a more rigorous and persuasive reformulation of the arguments against discretionary action. The argument here is that if authorities incorrectly assume that expectations are relatively rigid or place too much emphasis on the short run, such as during approaching elections, they may implement an inflationary policy that they had

previously pledged to avoid, resulting in time inconsistency. Unless authorities are deterred from such actions by the possible costs of future reputation loss, resulting in a reputational equilibrium, discretionary measures will result in a higher inflation rate while maintaining the same unemployment rate as a monetary rule. (Goodhart, 1989). Therefore, Barro and Gordon (1983) and Kydland & Prescott (1977) recommended that precommitment by setting a rule based policy might be optimal. Theoretical basis for a rule based policy was the assumption of economic agents forming rational expectations and time inconsistency (Blinder,1987 and Kydland & Prescott, 1977). However, Goodhart (1989) demonstrated in his paper titled "The conduct of monetary policy" on basis of the experience of the 1980s that economy does not tend to revert to a unique equilibrium with any noticeable speed. If the natural forces driving the economy back to a unique equilibrium are much weaker than anticipated, or perhaps nonexistent, or if they are neutralized by other market considerations, the authorities have a great deal more opportunity for intervention and discretion. Since the government cannot rely solely on rational agents acting in efficient markets, there is a greater need for discretion.

2. 2 Empirical Literature

Chowdhury (1986) evaluated the impact of monetary and fiscal policy in India by applying a modified version of the St. Louis equation. The findings of the study indicated that an increase in the size of government expenditure had a more significant impact on the changes in nominal income than an expansion of the monetary base.In addition, the long term effect of modifying the growth rate of the

two policy variables were significantly different from one another. Altering the growth rate of government spending had a more significant impact on nominal income compared to changing the rate of growth of monetary base, and the magnitude of the effect was greater in the case of fiscal policy.

Ansari (1996) conducted a study to analyze the relative significance of monetary and fiscal policy in India, using a more comprehensive approach of multivariate vector autoregression. The analysis of causality results was based on joint F-tests and dynamic multipliers that employed variance decompositions and impulse response functions. The study's findings strongly supported the importance of fiscal policy from a Keynesian perspective.Additionally, there was minimal evidence of exogeneity of money supply, which challenged the validity of the monetarist argument. Conversely, the study found that Indian monetary policy seemed to accommodate changes in government spending, prices, and output, indicating support for the structuralist-Mundellian viewpoint.

Dhanasekaran (1996) revealed some significant insights into the relationship between monetary and fiscal policies and their impact on the growth of GNP by using St. Louis equation on the Indian economy. According to findings of the study, the growth rate of money supply played a crucial role in determining the growth rate of nominal GNP, along with the rate of growth in government expenditure. In addition, the study revealed that monetary variables were more influential than fiscal variables in explaining subsequent changes in GNP. Monetary action had a more substantial, predictable, and faster impact on nominal GDP compared to fiscal action. Therefore,

the study concluded that monetary policy is more effective when it is accompanied by government expenditure.

Melitz (1997) used data from 15 European Union countries and five other OECD countries to examine how monetary and fiscal authorities behave and interact with each other. Using a VAR model, the study found that the two policies were strategic substitutes. It was observed that an easy fiscal policy led to a tight monetary policy, and an easy monetary policy led to a tight fiscal policy. Furthermore, the study revealed the stabilizing impact of monetary and fiscal policy on the business cycle, although the automatic stabilization was weak in the case of fiscal policy. Additionally, the study highlighted the destabilizing response of government expenditure during the expansion phase.

Kaur (2001) examined the relative effectiveness of fiscal and monetary policies in India for the period 1950 to 1990. The study employed a single equation model with change in GNP (a measure of economic activity) as dependent variable ,change in monetary base (as a measure of monetary policy), and change in government expenditure (as a measure of fiscal policy) as explanatory variable. The empirical findings indicated that fiscal policy was more effective than monetary policy. Moreover, the relative speed of monetary or fiscal influences, as assessed by the time lag between the two policies' effects on economic activity, revealed that fiscal policy in India is more effective than monetary policy.

Muscatelli et al. (2002) examined the responsiveness of monetary and fiscal policy to macroeconomic targets and the strategic interdependence between the policy

instruments in five OECD countries: Germany, France, Italy, the UK, and the USA. The study employed two VAR methodologies to estimate the relationships between macroeconomic variables and policy instruments. The study found that the interdependence between monetary and fiscal policies was not uniform across countries. Specifically, in the US and the UK, interest rates decreased significantly in the initial quarter after a fiscal expansionary shock. In contrast, no clear monetary response was observed in Italy, Germany, or France, although there were indications that monetary policy counteracted fiscal policy shocks in Germany. The study also found that monetary policy responded as expected to shocks in inflation and the output gap, with a more robust response in countries such as Germany and the US. Similarly, fiscal policy responded to shocks to the output gap, with a decrease in the deficit observed after a brief delay. However, the evidence on countercyclical responses to inflation was not uniform and was weaker, with significant countercyclical responses observed only in France and the US. Moreover, fiscal shocks had a standard expansionary effect on output in the US and, to a lesser extent, the UK, while negative (non-Keynesian) impacts on the output gap were observed in other countries, including Germany, after 5–9 quarters, although these effects were significant only in Germany at even longer horizons. Finally, the study used Bayesian VAR to explore the complementarity between monetary and fiscal policies, finding evidence of complementarity between the policies for the UK and the US only.

Lambertini and Rovelli (2003) employed a game theory approach to investigate the interrelationships between monetary and fiscal policies in the European Monetary Union (EMU). The study looked at different game situations and found that both the

fiscal and monetary authorities liked the outcome of a Stackelberg game better than a Nash game, irrespective of which authority was the leader. However, each authority also preferred to leave the disadvantage of the first move to the other, given their different but non-conflicting priorities, and being the last to move could help them achieve their preferred outcome. Given the different welfare goals of each authority, the study contended that this outcome was logical.Furthermore, the study revealed that the most preferable outcome was one where the fiscal authority took the lead in the macroeconomic policy game. The authors suggested that the government should act as the leader and adopt a fiscal policy rule based on the minimization of a loss function, which also internalized the objective of price stability. The findings of this study suggested that coordination between monetary and fiscal policies was crucial to achieving efficient outcomes in the context of the EMU.

Semmler and Zhang (2004) investigated the empirical relationship between monetary and fiscal policy in the Euro area. Initially, the study estimated the relationship between primary surplus and government debt using a vector autoregression (VAR) model for France and Germany. The findings revealed a negative relationship between primary surplus and government debt, indicating the existence of a non-Ricardian policy regime in both countries. Subsequently, the study obtained mixed results from the Granger causality test between short-term interest rate, primary surplus, and inflation rate in Germany, France, and Italy. Furthermore, the study investigated the time-varying interaction between monetary and fiscal policy by employing a state-space model with Markov switching. The outcomes of the state-space model revealed weak policy interactions between policies for both France and Germany, and both

policies were found to move in opposite directions. Finally, the study examined the impact of forward-looking behavior on policy interaction, and the results suggested that fiscal policy was unaffected by the expectations of monetary policy in Germany.

Fialho and Portugal (2005) used a VAR model and the impulse response function to examine the relationship between the public debt-to-GDP ratio and the primary surplus-to-GDP ratio in Brazil from 1995 to 2003 in order to determine whether a monetary or fiscal dominance regime existed. The study also employed a Markov-switching vector autoregressive model (MS-VAR) to comprehend the interplay between monetary and fiscal policies. The VAR result revealed a positive and statistically significant response of debt in the subsequent period to a change in primary surplus, indicating a fiscally dominant regime. The positive correlation reflected the economic authorities' lack of commitment to debt management. A non-Ricardian regime was further supported by the observation that an increase in the surplus decreased nominal income and increased the debt level in the subsequent period. In addition, the results of the MS-VAR model demonstrated that the coordination between Brazil's monetary and fiscal policies during the study period was primarily of the substitute type, with a fiscal regime dominating.

Zoli (2005) analyzed the impact of fiscal policy on monetary policy in emerging marketeconomies including Argentina, Brazil, Colombia, Mexico, Thailand, and Poland. First, a test of fiscal dominance was conducted by estimating a VAR model, Granger causality, and impulse response with variables such as real primary balance and real public sector liabilities. No relationship between shocks to current primary balances and future government liabilities was taken as an indication of a fiscal

dominant regime. The study found evidence of fiscal dominance in Argentina and Brazil during the 1900s and early 2000s. However, mixed results were found in the case of the rest of the emerging market economies. Second, the study evaluated the monetary policy reaction function for the emerging market economies to determine whether the fiscal variable, i.e., change in real primary balance, significantly entered the reaction function of the monetary authority. The results showed that variables such as the output gap, lagged inflation, the deviation of expected inflation from the target, or changes in exchange rates had a significant impact on monetary policy, while real primary balance had no such significant impact. Further, the study analyzed whether fiscal policy could have an impact on monetary policy through different channels of transmission. It assessed the impact of news about fiscal variables and policy on variables such as the country's premium and exchange rate movements using an event study approach for Brazil. The regression model estimated for Brazil included an unanticipated component of major fiscal and macroeconomic variables, and dummy variables capturing events related to fiscal policy were included as explanatory variables with the country's premium or exchange rate as the dependent variable. The findings suggested that fiscal policy actions significantly contributed to the movement in the exchange rate and the country's premium more than monetary policy actions.

Kaur and Kaur (2008) empirically tested the relative effectiveness of monetary and fiscal policy in India for the period 1980 to 2005. The time period was divided into pre reform period from 1980 to 1991 and post reform period from 1991 to 2005 (post reform period). The study employs granger causality test and a three variable VAR model .GNP is used as an indicator of economic growth, money supply (M3) as a

measure of monetary policy and government expenditure as a measure of fiscal policy. The result shows government expenditure causes GNP in pre reform period whereas money supply causes GNP in post reform period. Therefore, it concludes that fiscal policy is more effective in the pre reform period and monetary policy in the post reform period. Further, VAR model in the study points at the importance and complementarity of both policies during the entire time period .

Leith and Lewis (2008) developed a macroeconomic model that involved two countries operating under a flexible exchange rate with independent monetary and fiscal policies. The model was calibrated on the basis of the behavior of the US and Euro area economies. The study showed that if a debt shock occurred, a combination of non-Ricardian consumer behavior and active monetary policy resulted in a debt interest spiral that could only be stabilized by strong fiscal feedback. If one country lacked such fiscal feedback, then the potentially unstable debt-interest spiral could only be countered by a passive monetary policy. Interestingly, the study also found that the passive monetary policy and weak fiscal feedback did not need to occur in the same country to counteract the debt-interest rate spiral. Therefore, a greater responsiveness in terms of tax revenues was required to support an active monetary policy in case of non-Ricardian consumer.In addition, the study's simulations revealed that fiscal shocks had a lesser impact on variables such as output and inflation if tax adjustments were made by the fiscal authority. However, output and inflation were affected by a fiscal shock if monetary policy switched to being passive to comprise for the unstable fiscal authority. Overall, the study's findings emphasized the importance of strong fiscal feedback in stabilizing the debt-interest spiral, especially

in the presence of non-Ricardian consumer behavior and active monetary policy. The study highlighted the importance of coordinated and responsible action from both monetary and fiscal authorities in preventing and managing fiscal shocks in a global economy.

Arby and Hanif (2010) empirically investigated the independence of Pakistan's monetary and fiscal policy from 1965 to 2009 using Granger causality and cointegration tests. In addition, they examined the extent of coordination between the two policies in various economic shocks using a macroeconomics environment matrix and a policy response matrix. The macroeconomics environment matrix comprised of four possible economic scenarios, namely (a) high growth and high inflation, (b) high growth and low inflation, (c) low growth and high inflation, and (d) low growth and low inflation. The policy response matrix indicated that a coordinated policy action would be contractionary for both policies if scenario (a) prevailed, expansionary if scenario (d) prevailed, and moved in opposite directions if scenarios (b) and (c) prevailed. The ratio of high powered money to GDP was used as an indicator of monetary policy, while the budget deficit served as an indicator of fiscal policy. The results of the Granger causality and Phillips-Ouliaris cointegration tests showed that neither the ratio of high-powered money to GDP nor budget deficit/GDP caused the other, and growth rates of high-powered money and budget deficit did not cause each other. The analysis concluded that the two policies were therefore independent of one another. Furthermore, the matrix approach to coordination revealed that coordination between the two policies was highest when both inflation and growth were low and lowest when inflation and growth were high. The study also revealed that during the

last 44 years, policy coordination was achieved in only 12 out of 44 years under study. Thus, the formation of monetary and fiscal coordination board had no impact on the conduct of monetary and fiscal policy.

Chuku (2010) studied the interactions between monetary and fiscal policies in Nigeria between 1970 and 2008. The time varying parameters of the relationship between the policies were estimated with a state-space model with Markov-switching. The result revealed a negative correlation between fiscal balances and government liabilities, which implied a non ricardian fiscal policy. This implied that fiscal policies drove changes in prices and that the price level had to adjust to ensure equilibrium in private sector wealth and government solvency. The study further suggested that for most of the sample period (1980–1994), monetary and fiscal policies in Nigeria had interacted in a counteractive manner. However, between 1998 and 2008, the study inferred some form of accommodativeness. Accommodativeness was interpreted as a strategy of adjustment in times of macroeconomic disturbances. The post-1970 (Civil War) period had two policy regimes: counteractive and accommodative, which were weak strategic substitutes. Based on the findings, the fiscal authorities played the primary role, while the monetary authorities were reactive, managing the monetary instrument based on fiscal activities. The study revealed the existence of fiscal dominance in Nigeria's monetary and fiscal policies.

Raj et al. (2011) studied the interaction of monetary and fiscal policy in India from the period of 2000Q2 to 2010Q1. A VAR model with variables such as output gap, inflation rate, gross fiscal deficit and policy rate was estimated for this period. The

study revealed a unidirectional causality from gross fiscal deficit to policy rate, indicating the unilateral influence of fiscal policy on the conduct of monetary policy. Furthermore, the impulse response to various shock revealed that the monetary policy rate reacted highly sensitively and countercyclically to shocks in inflation. However, the response of fiscal policy to shocks in inflation and output was found to be pro-cyclical. The study showed that fiscal policy was effective in increasing the level of output only in the short run. The fact that fiscal expansion led to economic slowdown was seen as an evidence of (a) reduction in government saying and thus investment , due to rising fiscal deficit (b) crowding out of private investment.

Moreira et al. (2012) investigated the impact of fiscal policy on real variables such as the real demand for money, the ratio of investment to GDP, and the output gap in the Brazilian economy from 1995 to 2008 and tested the hypothesis of Ricardian equivalence. The study employed non-Ricardian models and evaluated the fiscal policy transmission mechanism by estimating the relationship between the primary surplus and public debt, as well as the "fiscal" investment-savings (IS) curve. It also examined whether monetary or fiscal policies were passive or active in accordance with the Leeper model. The results indicated that public debt played a crucial role in determining variables such as the real demand for money, the ratio of investment to GDP, and the output gap. A negative linear association was found between the ratio of public debt to GDP and investment to GDP ratio and output gap. The ratio of the primary surplus to GDP had a direct and positive reaction to an increase in the ratio of public debt to GDP, whereas the ratio of debt to GDP had a negative and indirect effect on the output gap via the primary surplus. Thus, the fiscal policy was found to

be active, while the monetary policy was passive. In addition, the result of the Leeper model also showed that Brazil was operating under fiscal dominance, indicating that the price level was determined by the fiscal policy rather than monetary policy.

Gerba and Hauzenberger (2013) used a structural time-varying parameter vector autoregression model with stochastic volatility to analyze the US economy from 1979 to 2012. The study identified four structural shocks, namely business cycle, monetary policy, spending, and taxes, by applying sign restrictions. Variables used in the study were government spending, net taxes, output, inflation, and short-term interest rate. The results demonstrated that the relationship between fiscal and monetary policies differed based on type of shock. Specifically, the policies acted as substitutes in event of shock to government spending or monetary policy whereas tax shocks or business cycle shocks led to them acting as complements. The study further found that increased government spending was more effective than implementing tax cuts in stimulating economic growth. Additionally, government spending showed significant acyclicality , pointing to strong inertias and path-dependencies in government spending policies. Furthermore, while government revenues played a significant role in shaping government spending decisions, the study did not find evidence of reverse causal relationship between government spending and tax decisions.

Kuncoro and Sebayang (2013) studied the dynamic interaction between monetary and fiscal policy and the presence of monetary and fiscal dominant phases in Indonesia for the period of 1999-2000. Firstly, the study estimated the monetary policy and fiscal policy reaction functions individually using the ordinary least square method. In the

case of the monetary policy reaction function, the relative interest rate (ratio of domestic to US interest rate) was expressed as a function of inflation, output gap, depreciation of domestic currency against the US dollar, growth of money supply, oil prices, primary balance to GDP ratio, debt to GDP ratio, and inflation targeting. The results found changes in the inflation rate, growth of real money supply, depreciation of currency, and oil prices as the main determinants of monetary policy. However, contrary to the expected positive relationship between interest rate and inflation rate, a negative relationship was found. The output gap was not significant in determining monetary policy action while the introduction of inflation targeting made the policy more responsive towards the movement in the inflation rate. This showed that price stabilization had been a priority over output stabilization. With regard to the impact of fiscal policy variables on monetary policy, fiscal surplus was found to be statistically significant, suggesting that fiscal policy is taken into consideration while determining the relative interest rate. In the case of the fiscal reaction function, the ratio of primary balance to GDP was expressed as a function of the relative interest rate (ratio of domestic to US interest rate), inflation, output gap, depreciation of domestic currency against the US dollar, growth of money supply, oil prices, the lagged value of the primary balance to GDP ratio, and debt to GDP ratio. The estimation result showed that changes in the interest rate, depreciation of domestic currency, oil prices, and changes in real money supply played an important role in determining fiscal primary balance. However, the output gap was found to have no significant influence on primary balance, indicating that fiscal policy was not much focused on output stabilization. As far as the impact of monetary policy variables on fiscal policy was

concerned, interest rate changes were found to be statistically insignificant, suggesting that fiscal surplus is not responsive to monetary policy.

Musa et al. (2013) examined the impact of interactions between monetary policy and fiscal policy variables on non-policy macroeconomic variables such as real GDP and CPI in Nigeria from 1970 to 2010. The study employed co-integration analysis, as well as impulse response function and variance decomposition tools for VEC. The results of the co-integration analysis revealed the existence of a long-run equilibrium relationship between the variables. Additionally, a persistence profile constructed to evaluate convergence to equilibrium in the face of exposure to shock to the entire system revealed a stable co-integrating relationship between the variables. The study further revealed that a shock to monetary policy variables had a positive impact on both prices and economic growth, with the impact on economic growth being negative in the case of an exchange rate shock. A shock to monetary policy rates started with a negative impact on economic growth, followed by a positive impact, eventually moving towards zero in the long run. On the other hand, an expansionary monetary policy had a significant positive impact on prices in the long run. As for fiscal policy variables, the study revealed that both government revenue and expenditure exerted a positive impact on economic growth and prices. The result of the variance decomposition of real GDP and inflation showed that a large variation in both variables was due to their own shocks. However, over time, the contribution of other variables increased. In the latter years of the study, the contribution of money supply was found to be higher for both real GDP and inflation. Along with money

supply, the contribution of government revenue was also high for real GDP, andthe contribution of monetary policy rate was also high for the inflation rate.

Tarawalie et al. (2013) investigated coordination between monetary and fiscal policy for WAMZ countries from 1980 to 2011. The study employed a set-theoretic approach and a VAR model using both time series and panel data. The set-theoretic model revealed weak policy coordination in all countries, with monetary policies being more prudent than fiscal policies in all countries except Gambia, where both were found to be prudent. The result of the impulse response function of VAR showed that the monetary policy response to a fiscal deficit shock was adequate only in Gambia, Guinea, and Liberia. In the case of an inflationary shock, fiscal policy responses remained inadequate in all countries except for Gambia and Ghana, while monetary policy responded appropriately only in Gambia and Nigeria. In the case of an exchange rate shock, monetary policy responded adequately in Gambia, Ghana, Liberia, and Sierra Leone, while fiscal policy responded adequately only in Gambia and Liberia. Based on these results, the study concluded that inflationary pressure and fiscal deficits remained a challenge in most of the WAMZ countries, with weak policy coordination being a contributing factor. The study highlighted the need for better coordination between monetary and fiscal policies in these countries to achieve macroeconomic stability and sustainable economic growth.

Cevik et al. (2014) used a Markov regime-switching model to examine interactions between monetary and fiscal policy in six emerging European economies: the Czech Republic, Estonia, Hungary, Poland, Slovenia, and the Slovak Republic, from 1995 to

2010. The active and passive policy regimes were determined using a variant of the monetary policy rule proposed by Taylor (1993) and the fiscal policy rule proposed by David and Leeper (2007). The empirical findings revealed that the Czech Republic, Estonia, Hungary, and Poland followed both active and passive monetary policies, whereas Slovenia and the Slovak Republic followed only passive monetary policies. Regarding fiscal policy, Estonia, Hungary, Poland, and Slovenia experienced alternating periods of active and passive fiscal regimes, whereas the Czech and Slovak republics were governed by a single fiscal rule. Further, the study showed serious debt sustainability issue for Estonia , Hungary and Poland due to existence of major active time period of fiscal policy.

Wesselbaum (2014) estimated a Markov-switching model to characterize the interactions between fiscal and monetary policy in New Zealand from 1994 to 2014. The model used government debt as a function of interest rate payments and output to describe fiscal policy rules, while an augmented Taylor-type interest rate rule with feedback to inflation, output, and government debt was used to explain monetary policy. The findings revealed that interactions between monetary and fiscal policy in New Zealand were subject to frequent regime switches, and the nature of these interactions depended on the prevailing regime. Furthermore, the results mapped out two different types of regimes: (a) accommodative monetary policy regime and (b) non-accommodative monetary policy regime. In the non-accommodating monetary policy regime, the monetary policy was determined only by inflation, and changes in government debt had no impact on the interest rate. In contrast, in the accommodating monetary policy regime, in addition to the inflation rate, the interest rate was also

influenced by government debt and output. Increased government debt lowered the interest rate in the non-accommodating regime. Additionally, the variances of the monetary policy and debt shocks differed between the two types of regimes of monetary policy.

Bertella et al. (2015) examined the interaction between monetary and fiscal policy using a nonlinear dynamic model. The study analyzed two different policy reaction functions, one pertaining to inflation targets and the other to economic growth targets. In addition, it illustrated the trajectory of public debt and real interest rates in stable and unstable equilibrium. Fiscal policy was measured by public debt, while monetary policy was measured by a reaction function of a central bank. Simulations based on the model were conducted for Brazil and the UK, revealing that equilibrium was unstable in the Brazilian case and stable in the UK case. When the growth rate of the economy was greater than the difference between the central bank's reaction function and the real interest rate, the behavior of the public debt and the real interest rate was found to be non-explosive. The study also indicated that fiscal adjustments could have unintended and unacceptable effects on economic growth and employment levels. The study concluded that any actions taken by Brazil should have been fiscal, with an emphasis on increasing the primary surplus, while the central bank should have focused on combating inflation and regaining credibility. For countries experiencing a recession, it was recommended that they adopt a Growth Target (GT) regime rather than an IT regime.

Dosi et al.(2015) explored the combination of fiscal and monetary policies that could be effective in stabilizing economies during deep recessions and banking crises. The study employed an agent-based model to simulate various macro- and micro-empirical regularities. The findings revealed that an optimal policy mix would involve allowing for unconstrained counter-cyclical policies that targeted employment. The study argued that a combination of policies would be effective in addressing the root causes of economic downturns, such as the contraction of private credit and the decrease in aggregate demand. Monetary policy alone may not have been sufficient to address these issues, and fiscal policy should have played a more active role. Additionally, the authors examined the role of fiscal rules in stabilizing the economy and concluded that implementing imposition of fiscal rules were self-defeating, as it depressed the economy without any improvement in public finances, and could undermine the effectiveness of counter-cyclical fiscal policy, leading to further economic instability. Furthermore, the authors found that the effects of both monetary and fiscal policies were more pronounced in economies with higher levels of income inequality, with monetary policy being less effective and fiscal policy remaining effective. They explained that this was because monetary policy tended to benefit those with higher incomes, whereas fiscal policy could directly target those in need. Overall, their study provided valuable insights for designing policy mixes to stabilize macroeconomies in crisis-prone economies.

Rothenberg (2015) examined policy history to determine how the United States blends monetary and fiscal policy. The effectiveness of fiscal policy was evaluated using standard budget measures, cyclically adjusted budget balance, and standard

budget balance measures. The study evaluated federal funds rates and the Taylor rule principle in terms of monetary policy. The study employed a standard two-sample correlation technique to compare the relative effectiveness of the policies, which revealed a degree of coordination between the policy mix. The study found, however, that the independence of the monetary authority in the United States resulted in several periods of disjointed policy mixes. Overall, the study indicates that the relationship between monetary and fiscal policy in the United States is complex and affected by several variables.

Jawadi et al. (2016) assessed the effect of fiscal and monetary policy shocks on macroeconomic variables for five emerging market economies, namely, Brazil, Russia, India, China, and South Africa, during the time period between 1990 to 2013. The study used a reduced-form PVAR model with variables: real GDP, government spending, nominal central bank rate, money supply growth rate, US fed funds rate, and price deflator. The results showed that a positive interest rate shock led to a contractionary effect on real GDP, a tightening of the liquidity in the market, and a fall in the price deflator. On the other hand, a positive shock to government spending led to an expansionary effect on output and a fall in prices. In addition, the study found evidence of policy spillovers. Monetary contractions were followed by a decline in government spending, and expansionary fiscal actions were followed by growth in the money supply.

Kliem et al. (2016) investigated the relationship between budget deficits and inflation in three industrialized countries, namely the United States, Germany, and Italy, from

1970 to 1999 using a TVP-VAR model and a narrative approach. The variables used in the model included primary deficits over one-period-lagged debt, inflation, real GDP growth, nominal interest rates, and money growth. The findings of the study suggested that the relationship between deficits and inflation depended on the interaction between monetary and fiscal policy. In Germany, where the monetary authority dominated, there was no long-term relationship between deficits and inflation. However, in Italy and the US, a regime of fiscal dominance was identified in the 1970s based on the narrative account, which was supported by a high low-frequency relationship between public deficits and inflation in the same period. The study also highlighted that the relationship between deficit and inflation was influenced by factors such as the independence of the central bank and the fiscal authority's commitment to price stability. These findings had significant implications for policymakers in these countries, who needed to consider the unique characteristics of their economies when formulating fiscal and monetary policies.

Mallick and Sethi (2016) investigated the relationship between India’s monetary and fiscal policy using monthly data for four variables: gross fiscal deficit (GFD), output gap, inflation, and interest rates from April 2010 to March 2015. GFD and output gap were used to represent fiscal policy, while inflation and interest rates represented monetary policy. Due to unavailability of monthly data on GDP , the Index of Industrial Production (IIP) was used as a proxy for GDP, and the output gap was calculated using the Hodrick-Presscot Filter. The result of the study indicated that fiscal policy variables responded to shock in variables representing monetary policy, but the reverse was not observed. Variables representing monetary policy were not

very responsive to any shock that occurred in variables representing fiscal policy. The study emphasized the need for cooperation between fiscal and monetary policies to achieve the objective of price stability by monetary policy.

da Silva and Vieira (2017) assessed the efficacy of monetary and fiscal policies across a panel data set of 113 advanced and emerging/developing economies, prior to and following the financial crisis (2009-2012). The results obtained from system GMM dynamic panel data models indicated that advanced economies demonstrated countercyclical monetary policies only before the international financial crisis. On the other hand, fiscal policy was observed to be procyclical exclusively during the pre-crisis period. The findings further suggested that interest rate smoothing played a crucial role in the execution of monetary policy worldwide. The estimations also revealed that monetary authorities in advanced economies ceased to react to the output gap after the crisis, likely due to the zero lower bound on interest rates, shifting towards unconventional monetary policy measures. Moreover, in the post crises period no correlation was found between output gap and government spending, which indicated a lack of fiscal consolidation after the crisis.

Arora (2018) used a Structural Var model to investigate the effects of different types of shock on monetary and fiscal policy in India. The three types of shock examined were debt-financed government spending, debt-financed tax rebate, and interest rate. Variables such as interest rate, inflation rate, debt, output gap, exchange rate, taxes, and expenditure were used in the study, which covered the period 1990Q1–2011Q4. The study found that the response of Indian monetary policy to tax rebate shocks and

spending shocks was different. Specifically, in the case of a tax rebate shock, Indian monetary policy responded by reducing interest rates to accommodate fiscal expansion. However, monetary policy did not seem to accommodate expenditure shocks. Interestingly, the study also found that the monetary policy shock was accompanied by fiscal expansion, which could compromise the credibility of the central bank's actions, indicating fiscal policy dominance. When comparing the effectiveness of the policies, the interest rate was found to be more effective in stimulating output. Additionally, of the two fiscal policy instruments analyzed, tax rebate was found to be the better option for stimulating output, considering the output-debt trade-off.

Özer, M., & Karagöl, V. (2018) examined the growth effectiveness of fiscal and monetary policies to determine which was more effective in promoting economic growth in Turkey from 1998 to 2016. The study employed an ARDL model and Granger causality tests to test the long-run equilibrium relationship between real GDP, government final consumption expenditure, and policy rate. The results indicate that the monetary policy variable had only a short-term impact on growth and did not show any causality. The fiscal policy variable, on the other hand, had an impact on growth in both the short and long run. Thus, the fiscal policy seemed to be more effective than the monetary policy, which implies the need to rethink the implementation of both policies in Turkey.

António et al. (2019) examined the nature of monetary and fiscal policies of the 28 EU countries from 1970 to 2015, using a panel data set. The analysis employed the

OLS-FE, 2SLS, and SUR estimation methods. The monetary policy reaction function was estimated with interest rate as a dependent variable and lagged short-term interest rate, inflation gap, and money supply growth gap, output gap, current account balance, and exchange rate as explanatory variables. The fiscal policy reaction function, on the other hand, had the primary balance as a dependent variable and the debt-to-GDP ratio as an explanatory variable. The estimation results revealed that inflation was an important factor in understanding the dynamics of interest rates. The study also revealed that the monetary policy was mainly pro-cyclical in nature and was influenced by external factors. In the case of fiscal policy, the results showed a positive relationship between the primary balance and government debt, indicating a Ricardian fiscal regime. Furthermore, the study analyzed the interactions between monetary and fiscal policies by incorporating the primary balance as an additional explanatory variable in the monetary policy reaction function and inflation, interest rate, and output gap for fiscal policy. The results revealed a passive behavior of monetary authorities and a Ricardian fiscal policy regime. In the case of individual countries, however, there was evidence of variation in interest rate-inflation dynamics and debt-primary balance dynamics due to each country's unique fiscal policy. In addition, an analysis of institutional factors revealed that the introduction of a common currency shared by 19 of the 28 EU member states had a structural effect on the response and interaction between the two policies.

Al-shawarby and Mossallamy (2019) estimated a New Keynesian small open economy dynamic stochastic general equilibrium (DSGE) model for Egypt between 2004 to 2016. The study evaluated the interaction between monetary and fiscal

policies and their impact on economic stabilization based on a DSGE model that incorporated fiscal behavior and used Bayesian techniques. The DSGE model was calibrated using quarterly data on seven observable variables: real GDP growth, domestic CPI inflation, nominal exchange rate growth, terms of trade growth, interbank overnight policy rate, government spending and income taxes as shares of GDP. The findings revealed that both monetary and fiscal policy instruments in Egypt contributed to economic stability through their effects on inflation, output, and debt stock. The estimates from the monetary policy Taylor rule indicated that the Central Bank of Egypt (CBE) prioritized output targeting and anti-inflationary policy but responded only moderately to changes in nominal exchange rates. Interest rate smoothing had a substantial impact on the central bank's decision. Furthermore, the results indicated that fiscal policy played a crucial role in output and government debt stabilization. To stabilize output, the fiscal authority implemented counter-cyclical tax and pro-cyclical expenditure programs. Additionally, the past values of fiscal instruments influenced the evolution of the future fiscal policy-making process.

Ng'Ang'a et al. (2019) examined the factors that determined monetary and fiscal policy rules in Kenya under different policy regimes from 1963 to 2014. The study employed Markov switching models to estimate and identify the fiscal and monetary policy regimes. Fiscal policy reaction was based on an extension of Bohn's intertemporal government budget constraint, which incorporated the fiscal policy response to the prior debt level, while monetary policy reaction was based on Taylor's rule. The study identified a sustainable fiscal regime through the positive response of the fiscal balance to an increase in the previous debt level, and the optimal monetary

response was found to be a positive increase in the real interest rate in response to an increase in inflation. The results revealed that the unsustainable fiscal policy was dominant in comparison to a sustainable regime, and that unsustainable fiscal policy was followed by active monetary policy that was contractionary in nature. This demonstrated that long-run fiscal sustainability was achieved as monetary policy pacified the effect of fiscal policy. The study concluded that commitment to fiscal consolidation was needed for effective policy coordination between fiscal and monetary policies to ensure sustainable economic growth in Kenya.

Büyükbaşaran et al. (2020) analyzed the interaction between monetary and fiscal policy in Turkey from 2003 to 2018 using a Bayesian Structural Vector Autoregression (SVAR) model with sign and zero restrictions. The study investigated the reaction of fiscal and monetary variables to different macroeconomic shocks and whether the type of shock had an impact. The SVAR model included six variables: real tax revenue growth, real government spending growth, real GDP growth, inflation, nominal interest rate, and nominal exchange rate. The empirical results revealed that an increase in tax revenue (anticipated) had an immediate negative impact on output, and it was followed by a decline in growth and inflation, which lowered the nominal interest rate. However, a positive correlation was found between the growth of tax revenue (unanticipated) and output. An increase in government spending growth, both anticipated and unanticipated, resulted in a temporary gain in growth and tax revenue, as well as a decrease in the inflation rate. Furthermore, following a positive monetary policy shock, growth and inflation decreased, and the nominal exchange rate appreciated. The most notable result was that fiscal variables

responded to a change in the monetary policy rate in a countercyclical manner. A tight fiscal policy shock (a rise in tax revenue or government spending) was accompanied by a loose monetary policy response (a decrease in interest rate), while a tight monetary policy shock (an increase in interest rate) was followed by an expansionary fiscal policy response via government spending. The results demonstrated that fiscal and monetary authorities had distinct objectives and priorities, which might result in contradictory policy responses to economic shocks in the economy. Further, the analysis revealed that in the event of a shock to aggregate demand and aggregate supply, both policies moved in the same direction. In this situation, a tight monetary policy was followed by a restrictive fiscal policy, and vice versa. The interplay between monetary and fiscal policies in terms of complements and substitutes depended on the nature of the shocks.

2.3 Review of macro-econometric modelling in India

Most macroeconomic model in India pertaining to monetary and fiscal policy modelling have focussed on budget of the central government and the monetisation of debt. Few key highlights of work done on macro econometric model related to monetary and fiscal policy are presented in table 2.4.

Table 2.4 Key highlights of macroeconomic modelling related to monetary and fiscal policy in India

Study	Key Highlights
Bhattacharya (1984)	The study at hand is primarily concerned with an in-depth examination of government finances and related issues, employing a detailed model of government receipts and expenditures wherein the majority of the items are endogenously determined. The significance of this model stems from the fact that, in the Indian context, the purview of government finances encompasses not only administrative departments but also departmental enterprises, such as railways and public sector undertakings. Thus, a comprehensive approach is necessary to adequately capture the complex interplay between various factors that influence government finances in this context.
Bhattacharya et.al. (1994)	The research primarily focused on analyzing government finances and associated issues, akin to the study conducted by Bhattacharya (1984), with an added emphasis on the public sector borrowing requirements that arise from a convoluted set of interactions and constraints.
Krishnamurty (1985)	This study aimed to provide a thorough analysis of government finances and its associated concerns through the use of a detailed model that accounted for the endogenous nature of the majority of government receipts and expenditures. Given the Indian context, the government's finances were not limited to administrative departments but also included departmental enterprises, such as railways and public sector undertakings. Thus, it was crucial to adopt a comprehensive approach that considered the intricate interactions and constraints that affected government finances in this context. By employing a comprehensive model, this study sought to capture the complex dynamics that underlay government finances and to contribute to a deeper understanding of the factors that influenced them.

Pani (1977)	The research conducted a comprehensive analysis of India's money and credit markets and provided a detailed examination of various institutional intricacies that had been overlooked in most previous studies. It also proposed a convincing endogenous justification for a range of interest rates, including the call money rate, bank rate, deposit rate, and rate of return on commercial bank loans and advances.
Ahluwalia (1979) and Pandit (1973)	To model India's money and credit markets, the study used the bazaar bill rate, which was prevalent in informal urban markets situated between the challenging rural money/credit markets and the formal money markets.
Pandit and Bhattacharya (1987)	The research was focused on constructing a model that addresses the potential conflict between inflation and economic growth in India.
Source: Krishnamurty, K. (2002). Macroeconometric models for India	

Prior to the 1980s, large scale macroeconometric modeling was the dominant method of economic analysis, particularly in academic and policy research. However, the emergence of the new classical economics school of thought posed challenges to the effectiveness of policies based on these models.

Furthermore, the "Structural macro modelling" approach, which was associated with the Cowles Commission, came under criticism for its lack of theoretical specification in the form of parameter restrictions across equations, which affected the identification of structural parameters. Consequently, an alternative methodology in the form of vector autoregression (VAR) modeling, developed by Sims (1980), emerged to address these concerns. Sims suggested using the dynamic reduced form in which each variable is directly regressed upon, as opposed to structural models that

lacked well-specified theoretical parameters across equations. Towards the end of the 1980s, there was a proliferation of empirical investigations into time series data methods, which cast doubt on their efficacy and performance when compared with macroeconomic models (Kling and Blesser (1985), McNees (1986), Makridakis (1986), Wallis (1989), Aoki (1990)). This trend of using time series data methods, in essence, indicated that the techniques reliant on time series data produced outcomes that were comparable to, or even better than, the conventional macroeconometric models (Biswas et al., 2010).

2.4 Research Gap

The research on this issue in India is limited, and this study aims to expand the temporal scope. Previous studies suffered from various limitations, including the use of simple linear equations that could not capture the dynamic relationship between variables and policy targets. The St. Louis equation used in some studies (such as Kaur and Sarbjit) experienced endogeneity issues. Furthermore, the study by Kaur and Sarbjit utilized the VAR model with only three variables and omitted essential variables, and employed OLS method and Granger causality test, which could not analyze the interactions and the impact of fiscal and monetary shocks effectively. In contrast, Impulse Response Functions could achieve this goal.

Additionally, the VAR model employed by Raj, Khundrakpam & Das overlooked the exchange rate variable, despite its significance, as indicated by the exchange rate augmented Taylor rule (Mohanty and Klau, 2005). Furthermore, The study done by

Arora (2018) covers the time period from 1990 to 2011 and has discussed only three types of shocks.

2.5 Conclusion

This chapter presents an overview of the principal theoretical constructs and empirical studies that pertain to monetary and fiscal policy. Despite significant scholarly work, a uniform agreement concerning the interrelationships among monetary and fiscal variables remains elusive, and a comprehensive framework that incorporates all such interactions is presently lacking.

The research on monetary and fiscal policies based on the review can be divided into following categories.

The first category is the Fiscal theory of price level. It is a theoretical approach that analyzes the inter-temporal solvency constraint. This approach requires that the present value of government liabilities should equal the present value of government revenues. However, this condition is not satisfied by the time paths of government debt, expenditure, and taxes. As a result, the equilibrium requires an adjustment in the price level to ensure government solvency. This approach suggests a non-standard relationship between government fiscal policy and the price level. It alters the stability conditions that are associated with the central bank's interest rate policy.

The second approach examines the strategic interactions between monetary and fiscal policies using a game theory framework.This approach has been demonstrated by

Lambertini and Rovelli (2003). One of the key insights of the game theory approach is that the optimal policy for each player depends not only on its own preferences and constraints but also on the expected actions of the other player. For example, if the central bank expects the government to pursue expansionary fiscal policy, it may respond by tightening monetary policy to offset the inflationary effects of the fiscal stimulus.

The third approach involves empirical research. The empirical literature on the interactions between fiscal and monetary policies is mainly based on (a) assessing the effectiveness of fiscal and monetary policies and (b) the interactions between monetary and fiscal policies, primarily utilizing Vector Autoregression (VAR) models, as illustrated by Muscatelli et al. (2002). Identification of monetary or fiscal dominant regimes is another important aspect of empirical research. This involves using Markov switching models or VAR models with public debt and primary surplus as variables to identify phases of active and passive policies.

Specifically for examine the interplay between fiscal and monetary policies. Various empirical methods have been employed in the literature to One strand of research utilized Vector Autoregressive models (VAR) (Canzoneri, Cumby and Diba, 2000; Muscatelli et al., 2002). Another employed state space models with Markov Switching have also been used (Afonso & Toffano, 2013; Davig & Leeper, 2009; Semmler & Zhang, 2003) to examine the existence of regime changes in the interaction between monetary and fiscal policies and to investigate how these interactions may have evolved over time.

The fourth approach extends the analysis of monetary and fiscal policy interactions to include open economies. This approach focuses on the interactions between fiscal and monetary policies in multiple countries, as exemplified by Leith and Lewis (2008).

Although theoretical literature (example QTM, FTPL etc) on the interactions between fiscal and monetary policies is more abundant than empirical literature, comparing the findings can be challenging. There are some difficulties in comparing the results due to diverse complications inherent in macroeconomic time series. These complications include unit roots, and in the case of policy decisions, real-time versus revised data (Gerba and Hauzenberger, 2013). As a consequence, the empirical models have departed from their theoretical counterparts. Moreover , empirical studies (for example Muscatelli et al. (2002)) find that the monetary and fiscal policy interactions are asymmetric and different for different countries. Thus highlighting the importance of considering country-specific characteristics when analyzing the interdependence between monetary and fiscal policy and their effectiveness in achieving macroeconomic targets.