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Betancourt, Erico Wulf; Piasecki, Ryszard

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The Mundell-Fleming Model and Macroeconomic Stabilization Policies

Erico Wulf Betancourt https://orcid.org/0000-0002-3863-3263
Ph.D., University of La Serena, La Serena, Chile, e-mail: ewulf@userena.cl

Ryszard Piasecki https://orcid.org/0000-0002-7669-6759
Ph.D., University of Lodz, Lodz, Poland, e-mail: ryszard.piasecki@uni.lodz.pl

Abstract

This paper analyzes the fiscal policy implications set in the Mundell-Fleming (M-F) model and its effectiveness in emerging economies. It also widens the scope of the policy mix with alternative exchange rates. The empirical evidence about the economies of Chile (1991–2003) and Colombia (1994–2004), about institutions, fiscal policy rule, and the eurozone conditions (1999), were considered relevant The paper has three sections a. The budget-surplus fiscal policy rule and policy effectiveness, b. The role of institutions in setting policy rules, c. The experience of the Chilean and Colombian economies concerning fiscal policy rules within the M-F framework. The main conclusion is that as long as country risk is lower due to countercyclical fiscal policy rules, governments have an alternative means of getting funds at a lower international interest rate. The fiscal policy effect on GDP (output)becomes positive.

Keywords: policy rules, monetary policy autonomy, fiscal policy setting

JEL: E5, E6, F3, G2

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Introduction

The standard Mundell-Fleming (M-F) model gives a binary outcome concerning macroeconomic policy effectiveness (Maitra 2017). Thus, fiscal policy is more effective with a fixed exchange rate (1, 0). The opposite is true for monetary policy, which is more effective with a flexible exchange (0, 1) (De Gregorio 2001). This was the key foundation for setting the conditions of the eurozone in 1999. While the euro was in place as the common currency, the fiscal policy was the first policy tool. So, to sustain its value, it was necessary to provide an institutional framework for fiscal discipline concerning the fiscal deficit rule at 3% of GDP.

Nevertheless, understanding the policy implications of this outcome will require a better understanding of the importance of countercyclical fiscal policy, how it is coordinated with monetary policy, as well as the quality of institutions. This argument extends beyond the issue of policy options to make it a proper institutional setting that can fit policy alternatives for controlling output fluctuations (Wang 2005). With monetary policy focused on external balance, fiscal policy focused on the internal balance, and free capital flows, the exchange rate policy, becomes relevant for dealing with the output gap (De Gregorio 2001; Sachs and Larrain 2002).

On the other hand, when it comes to being a reliable player in global financial markets, any government may be interested in improving its reputation (Stokey 1991), showing commitment to policy rules as a credible guideline to shape expected decisions (Bassetto 2005). Most emerging economies, compared to developed ones are characterised by a wide variety of institutional settings and quality standards. Therefore, an institutional gap arises in implementing policy rules. Those countries with higher quality institutions are better positioned to define policy rules than those with weaker institutional settings (Céspedes and Soto 2005). Fragile institutions lead to higher volatility, so it is harder to keep both the stability of the output path and low country risk (Ennis 2007). In fact, given a free capital flow, fiscal and monetary policies are not independent of one another (Vargas 2005; Lozano 2010).

The paper has three sections a. The budget-surplus fiscal policy rule and policy effectiveness, b. The role of institutions in setting policy rules, c. The experience of the Chilean and Colombian economies concerning fiscal policy rules within the M-F framework. The main conclusions are: the fiscal policy concerning output should be reset given free capital flow, flexible exchange rate, and economic agents which diversify their portfolio. As long as the country's risk is lower due to countercyclical policy rules, governments have an alternative source of funds at a lower international interest rate.

The budget-surplus fiscal policy rule and policy effectiveness

There are numerous examples and case studies regarding the experience of fiscal policy rules in Latin American economies: Brazil (1995) (Moreira, Mendonca, and Sachsida 2021), Colombia (2000, 2011), Chile (2000), Mexico (2006), and New Zealand (Grûnwald 2018).

New Zealand gives more weight to transparency than the law (New Zealand Government, 2015). According to IMF (International Monetary Found) data, the fiscal policy rule has become increasingly relevant. In 1990, it registered nine countries with fiscal policy rules. In comparison, in 2015, there were 96 countries (International Monetary Fund 2017). These rules, coordinated with the Central Bank, make a policy framework aimed at reducing output volatility and improving credit worthiness. Moreover, within a rational expectation framework, a monetary policy rule requires a fiscal policy rule (Favero and Monacelli 2005; Moreira, Mendonca, and Sachsida 2021).

The B-S (Budget-Surplus) rule means that given output fluctuations, a fiscal policy follows a countercyclical pattern of spending behaviour. So, when national incomes increase above the expected spending trend, savings increase. When incomes fall below the spending trend, accumulated savings allows people to keep spending. So, when the economic cycle is on the expansion path, savings smooth the expansion such that output growth becomes more stable and less inflationary. On the other hand, when the economic cycle is in a downward trend, spending may keep its pace, softening the impact of output contraction (Grûnwald 2018). The expected outcome is lower output volatility along the different stages of the economic cycle (Piasecki and Wulf 2014).

Other positive externalities of a fiscal policy rule, such as lower country risk level, lower sovereign risk premiums measured by the EMBI (Emerging Market Bond Index), and higher credit worthiness, lead to higher-grade investment status. Governments get more autonomy for alternative sources of financial resources to fund their social programs aside from domestic debt or tax increases. Therefore, a government may issue bonds in the international financial markets at a lower international interest rate, as has been the case in the Chilean economy since 2008 (Fuentes, Schmidt-Hebel, and Soto 2021). How does this countercyclical setting of fiscal policy fit into the M-F model? Let us consider a policy framework with different exchange rate regimes.

The flexible exchange rate

The standard case with perfect capital mobility assumes that fiscal policy does not affect output. However, given that the B-S rule allows a government with a better investment status to obtain funds from external markets while maintaining the parity

condition, there is no impact on the domestic interest rate. With external government sources, other foreign private resources coming in, and with the net inflow of resources higher than the outflow, appreciation of the domestic currency will occur. It may be assumed that the government may use low price elasticity to boost exports. Therefore, some exports of goods with high price elasticity will fall, but others with low price elasticity will keep their growth path. So, output expands, the IS (Investiment Saving) moves along the line of the interest rate parity condition). In order to return to equilibrium in the money market, the LM (Liquidity Money) moves to the right, as a domestic currency is needed.

The Chilean economy in 2008–2009, with the global subprime recession and inflation above the target of 3%, followed a path of expenditure expansion (17% as a share of GDP in 2009) to compensate for the restrictive monetary policy (Fuentes, Schmidt-Hebel, and Soto 2021). The net outcome was a decrease in output because of the strong stand of monetary policy against inflation (Céspedes and Soto 2005). However, the fiscal policy countercyclical expansion made a case for mitigating the expected deeper recession (there was only a –1.5% drop in Chilean GDP growth) (Fuentes, Schmidt-Hebel, and Soto 2021).

The fixed exchange rate

A basic financial wealth model (W_t) is useful to outline the framework of a portfolio with two assets issued in the domestic economy with free flow capital: bonds issued in the domestic currency (*Bd*), and bonds issued in foreign currency (*Bf*), e.g., USD. Both are positively correlated to one another and are risk-free. Investors allocate their resources to either one, following their risk preferences so that by dividing by half their resources, they have 50% of each. Thus, the wealth equation for one period "t" becomes:

$$Max W_t = \alpha_1 B_t d + \alpha_2 B_t f \quad \alpha_1 + \alpha_2 = 1. \tag{1}$$

Additionally, both firms and banks operate in the so-called forward rate market, which means that they decide based on the forward exchange rate (Wolnicki and Piasecki 2021).

Equation (1) says that any domestic investor will react to changes in the expected return of both *Bd* and *Bf* to maximize their wealth in one period. So, an expansive monetary policy would make domestic investors react, increasing their demand for foreign assets. The forward exchange rate expectation puts pressure on the fixed exchange rate, which becomes overvalued. So, the central bank sells its international reserves as needed. However, as domestic investors also sell their Bf to get cash in the domestic currency, the exchange rate moves back endogenously over time to its previous fixed level. However, the outcome is more money in the economy, which puts pressure on the ex-

change rate, which must have monetary policy rules, otherwise, the fixed exchange rate is short-lived. Thus, monetary policy may become effective while the exchange rate is fixed as investors diversify their financial portfolio between *Bd* and *Bf*. Therefore, although a fraction of the initial money supply increase was sterilized, it is the portfolio allocation taking place that is the key variable in the effectiveness of the monetary policy on output (Lozano 2010). It follows that macroeconomic policy rules widen the scope of its effectiveness, given alternative exchange rates.

The eurozone crisis in 2010 is probably within this scenario, with the European Central Bank applying an active monetary policy and buying government and small saver bonds. It simultaneously worked with a monetary policy tied to a 2% inflation rate and an active countercyclical fiscal policy, as the fiscal deficit was restricted to 3% of GDP (Sachs and Larrain 2003; Calderon, Duncan, and Schmidt-Hebel 2004).

The key assumption and weakness in the standard model is that, following a decrease in the interest rate, the portfolio deals with one financial instrument, i.e., bonds issued in the domestic currency (De Gregorio 2001). Given the foreign currency forward market and the portfolio diversification set by equation (1), an expansionary monetary policy will lead to endogenous exchange rate fluctuations around its fixed value. It will also lead to fluctuations in the forward exchange rate, either above (undervalue the fixed exchange rate) or below (overvalued the fixed exchange rate) its expected fixed value, which is a constraint on holding the exchange rate fixed for a long time unless there are monetary policy rules.

It follows that, given the B-S rules for fiscal policy, the interaction between exchange rate stability, capital mobility, and autonomous monetary policy, works properly either with the flexible or fixed exchange rate. With a flexible exchange rate, a sudden but transitory capital outflow would lead to a depreciation that would increase the interest rate. A fixed exchange rate and the expected depreciation would require the Central Bank to reduce its reserves. The aggregate demand contraction due to lower money supply and the higher interest rate would be supported by the countercyclical fiscal policy, making the monetary policy less contractive in the short term. On the financial side, as equation (1) suggests, a portfolio allocation would take place, selling domestic bonds issued in foreign currency to get high-power money, leading to an endogenous increase in money supply, coupled with a less contractive effect on output.

The role of institutions in setting policy rules

Considering the relevance of macroeconomic policy rules and their implications for the M-F model design for policy effectiveness, it is helpful to analyze institutional factors as a boundary for policy design. Do institutions play a role in supporting policy rules? What difference does having stronger or weaker institutions make?

The situation concerning institutional quality is different, whether it deals with developed countries or emerging economies. Developed countries with a higher rate of institutions have better conditions for countercyclical policies than emerging economies with weaker institutions (Calderon, Duncan, and Schmidt-Hebel 2004).

Between 1990 and 2003, 14/20 countries in the sample had an ICRG (Institutional Credit Risk Group) above the breaking point level (58.9 for fiscal policy and 57.5 for monetary policy) to apply countercyclical macroeconomic policies, both fiscal and monetary. South Korea had an ICRG of 74.9, Chile – 73.19, Malaysia – 72.21, and Argentina – 70.59. These countries were among the highest in the ranking.

The ICRG index considers 12 measures of institutional quality: government stability, socioeconomic conditions, investment profile, internal and external conflict, corruption, law and order, ethnic tensions, democratic accountability, religious tensions, military in politics, and bureaucracy quality. Its value goes from 0 (the lowest quality of institutions) to 100 (the highest).

It follows that any particular set of macroeconomic policies is somehow a proxy of the quality of institutions that policymakers have as a constraint. In particular, a cyclical pattern of fiscal behaviour is more sensitive to changes in the quality of institutions, so higher-quality institutions have a higher probability of countercyclical fiscal policy (Calderon, Duncan, and Schmidt-Hebel 2004).

The Chilean economic experience

The Chilean economy had two periods that fit the analysis of countercyclical policies, 1991–2003 and 2003–2008:

- 1991–2003
  - Due to the Asian economic crisis (1997) and the recession in the U.S. (2001), the autonomous Central Bank started to apply its monetary policy based upon an explicit annual inflation target (15–20%), measured by the CPI (Consumer Price Index) Then following a step-by-step approach, it moved to get the necessary credible status before implementing the current format of 2–4% inflation. During this period,

Chilean fiscal policy had a surplus because of increased taxes, which made higher spending possible (Fuentes, Schmidt-Hebel, and Soto 2021).

- To achieve the objective of external payment stability, the initial monetary framework (1991–1999) was complemented with current account targets and a half-flexible exchange rate (dirty floating) within a range defined by the Central Bank. This focus on exchange rate management was a key variable for inflation targets.
- Most of the emerging economies in the 1990s faced inflationary pressures arising from exchange rate fluctuations because of "high pass-through". While the pass-through in Latin American economies was 47%, in average emerging economies, it was 33%, and in developed economies, it was only 9%.
- In Chile, the pass-through was 35%, while in Colombia, it was 38%. This means that both Chile and Colombia were below the average for Latin American economies, but above the average for emerging economies. This factor made the exchange rate a relevant variable for inflation-targeting purposes. Moreover, exchange rate fluctuations had a shorter inflationary channel through tradable goods, which makes it suitable for inflation targeting given an expected depreciation (Céspedes and Soto 2005).
- Concerning the current account, the Chilean central bank also set a target for its deficit. Besides getting the exchange rate within sight of monetary autonomy, the capital account was also regulated by adding a percentage of the reserve (30%) for incoming capital inflows. So, this approach looks like the M-F at its best. The "trilemma" was taken into account in this design: the half-flexible exchange rate, current account deficit targets, and tax for capital inflows allowed the monetary policy to be autonomous enough to achieve the inflationary target.
- The Asian economic crisis (1997–1998) tested this setting. Some data are useful for evaluating the outcomes. The inflation rate moved from 6% (1997) to 4.7% (1998) and 2.3% (1999). In 1998, the real GDP was 3.9%, and in 1999, it was –1.1% (Central Bank of Chile 2001). So, a rigid mix of policy options to get inflation under control as a priority restricted the policy alternatives for the Chilean economic when facing the consequences of the Asian economic crisis.

- 2003–2008
  - With the U.S. recession taking place (2001), the Chilean GDP was 3.3% (2001) and 3.1% (2002) (World Bank 2020). This recession (2001) meant that inflation of 4.5% in 2000 decreased to 2.8% in 2002, but it kept within the level from 1999 (Céspedes and Soto 2005). In 2000, the Chilean economy moved further, setting a budget structural surplus target of 1%. The new fiscal policy approach was complementary to the monetary policy, making a completely different frame-

> work. The inflation target became flexible within the 2–4% range. The exchange rate policy was free-floating, and the capital account was fully open. This update in the policy framework was possible because of the fiscal policy rule, which provided the necessary autonomy to the monetary policy to keep inflation in check, as was the case in the financial recession of 2008.

So, this pattern of improving the quality of macroeconomic tools for stabilization accompanied the increasing credibility of the Central Bank to cope with inflation within the context of free capital flows and its disciplinary stance (Calderon, Duncan, and Schmidt-Hebel 2004).

As the Central Bank's credibility became stronger, its new policy framework was more flexible, allowing it to cope with shocks. At the same time, it allowed higher autonomy to the monetary policy so that free capital flows, flexible exchange rates, and more independent monetary policy became possible. The fiscal policy rule has some positive aspects (Calderon, Duncan, and Schmidt-Hebel 2004; Fuentes, Schmidt-Hebel, and Soto 2021). The 1% budget structural surplus rule made it the "fourth element" of this new policy setting.

The implementation of fiscal policy rules was a high-value innovation for a comprehensive toolkit for dealing with cyclical fluctuations and internal targets for output performance and inflation.

If the interest rate had to move upward, the budget surplus rules were ready to provide the backup: a countercyclical expenditure expansion financed by past savings, reducing output fall and further volatility.

This setting was the one that was applied against the US financial recession of 2008 caused by the subprime financial markets. Additionally, there was empirical evidence that between 2000 and 2005, that there was a positive correlation between the US economy fluctuation and other economies. The Chilean economy had to wait almost one year to register positive impact (Garcia 2008). Moreover, with the global financial sector at risk of collapse, there were difficult choices for policymakers in Chile, given the inflation level of 7,8% in 2007, which was above the target zone (3%). There were two problems to be solved simultaneously. First, there were the food price shocks, which lasted for six to twelve months, coupled with the important share of food in the CPI. There was also the expected recession due to the subprime crisis (Garcia 2008). Therefore, to cope with such a persistent threat to the inflation target, in the last quarter of 2008, the Central Bank increased the prime interest rate from 6.25% to 8.25%.

On the fiscal policy side, the Chilean economy had an accumulated savings of 27% of its GDP. It allowed public spending to increase at a very high rate (12.5% in 2008 and 17% in 2009) to back up the impact of the higher interest rate. So, monetary policy autonomy was fully granted by the fiscal policy rule of a 1% budget surplus, which had been

applied in the Chilean economy since 2001 and updated to 0.5% of GDP growth after the recession, which prevented the need to support domestic activity.

The performance of inflation and Chilean GDP growth in 2008 and 2009, in the middle of a global financial recession, justified the relevance of this complementarity. The inflation rate in 2008 was 7.5%, and GDP growth was 3.5%.

In 2009, the inflation rate (6.3%) was still above target, and GDP growth was –1.6%, which is close, although slightly higher than during the recession of 1999 (–1.1%).

Thus, even though the Asian economic crisis (1999) was different from that of the US (2008), the available policy tools to cope with each one (ceteris paribus) and especially its flexibility account for the difference between the outcomes. In fact, the scope of the 2008 recession was both wider and deeper. Moreover, it was a global recession involving the global financial system, and it lasted almost ten years before returning to normal policy status. Even so, the updated fiscal policy rule (0.5% instead of the original 1% surplus) allowed a faster recovery in the next three years (2010–2012), with average GDP growth of 5.7% and inflation mostly within the target zone of 2–4%. The post-Asian economic recovery (2000–2002), with no B-S rule, was slower, with an average of 3.9%, although inflation was within the target.

The Colombian economic experience

The Colombian economy without fiscal policy rule

If weak institutions do not allow fiscal policy rules, the exchange rate rule becomes the "second-best" plan. It means that to get inflation under control, a target zone for exchange rate depreciation is set.

This is what happened with Colombia's economy (1990–2010). Lacking a fiscal policy rule, the exchange rate rule based on changes in international reserves was implemented to mitigate the pass-through from depreciation to inflation (Vargas 2005). Moreover, the relatively lower "pass-through" factor (38%) (Céspedes and Soto 2005) made the exchange rate a reliable tool for controlling inflation in Colombia's economy.

The institutional situation of the Colombian economy in those years was below the necessary standard to have credible fiscal and monetary policy rules. Countries with a low ICRG (International Country Risk Guide) index are not able to increase government spending while the downside of cyclical fluctuations is taking place (Calderon, Duncan, and Schmidt-Hebel 2004). Thus, between 1990 and 2003, the ICRG for Colombia (55.2) was below the breaking point (58.9 for fiscal policy and 57.5 for monetary policy) to apply countercyclical macroeconomic policies, either fiscal or monetary. By contrast,

Chile had an ICRG of 73.2% (Calderon, Duncan, and Schmidt-Hebel 2004). These factors make it more difficult to evaluate the Mundell-Fleming implications. It depends on a strong institutional environment that provides the conditions for macroeconomic policy to be fully effective.

The exchange rate policy rule in Colombia did not mean a risk-free policy. The question about which rule was more important – the monetary policy or the exchange rate rule – implied credibility considerations on the one hand, and on the other, whether the real commitment was to get inflation or the exchange rate under control. This was mostly because the Central Bank's sterilization policies also meant a risk in terms of its debt position.

The distributional effect of exchange rate fluctuations also had complications. While appreciation was a gain for consumers, it implied a loss for exporters. The opposite was true for depreciation, which was a gain for exporters, but a loss for consumers. So implementing this rule meant the Central Bank's neutrality about its distributive preferences, more so given that between 1991 and 1993, capital controls were lifted.

How did it work? Let us consider two different periods, 1994–1999 and 2000–2004, before the Colombian economy started its fiscal policy rule (2010).

In the first period (1994–1999), the Colombian economy had a large external imbalance which led it to move away from the exchange rate policy rule in 1999 as a consequence of the Asian economic crisis, which led to the GDP falling by –4.2%, coupled with the financial crisis. Moreover, this disequilibrium meant a depreciation of 22% in the middle of the crisis and a drop in external reserves of 18%. Inflation fell from 16.3% in December 1998 to 9.3% in December 1999, as evidence that the policy anchor was the monetary policy and its explicit inflation target, complemented by the exchange rate regime. This would suggest that the free capital flow, exchange rate changes, and monetary policy worked together correctly, with the exchange rate rule playing a key role.

From 2000, an inflation-targeting rule was set, complemented by a floating exchange rate regime aimed at increasing international reserves while keeping volatility under control (Vargas 2005). Between 2000 and 2004, the spillover effects of the uncertainty in Brazil's economy (2002), and its currency depreciation by 30%, hit the Colombian economy while the inflation targeting was fully in place. It led to a series of conventional actions, such as increasing interest rates and reducing external reserves. The intervention in the exchange rate market was a very effective complement to the monetary policy to get output volatility under control. As a result, inflation expectations in Colombia fell in 2001, improving the credibility of the rule as the year-by-year inflation converged toward the target zone of 5–6% in 2004, while the average GDP growth was positive, at 2.9% (Vargas 2005).

The appreciation situation in 2003 led to a similar policy combination between increasing international reserves and inflation target policy. However, the monetary policy effect is stronger regarding the portfolio balance effect.

The Colombian economy with a fiscal policy rule

In mid–2010, the Colombian economy set a fiscal policy rule which was conceived to have a countercyclical fiscal policy, i.e., for a 1% increase in the output gap, the primary surplus increased by 0.3%.

Another purpose was to anchor economic expectations making the adjustment to any shock smoother. There was also the problem of confronting the "Dutch disease" while Colombia improved its productive matrix with mining and energy-related exports. The final goal was to get a more stable economy through a sustainable government budget in the long run and to complement other countercyclical policies.

Some data show how the fiscal policy rule works in terms of GDP growth performance and its impact on creditworthiness in external financial markets. The Colombian economy's average GDP growth between 2014 and 2018 was 2.7%. Another indicator, such as the debt to GDP share, shows that once the fiscal rule was applied (2010), the government debt/GDP ratio increased steadily from 12.5% to 22.5% between 2012 and 2015 (Statista n.d.). This outcome suggests that the fiscal policy rule makes it less risky for international financial markets to grant loans to economies. In Chile, between 2012 and 2018, following the adjustment in the fiscal policy rule, the Government Debt/GDP ratio rose from 11.9% to 25.6% (Statista n.d.).

Conclusions

This paper has allowed us to go deeper into the main setting of the Mundell-Fleming model, which is relevant to emerging economies. They are constrained by macroeconomic policy rules, the behaviour of the economic agents in terms of their portfolio allocation, and the quality of institutions. The positive impact of such a rules on improving credit worthiness and access to international financial markets were analyzed. The main conclusions are: a. given free capital flow, flexible exchange rate, and economic agents which diversify their portfolio, the GDP effect of fiscal policy should be reset, b. as long as the country's risk is lower due to countercyclical policy rules governments have an alternative source of funds at a lower international interest rate, making fiscal policy eligible for GDP in case of the financial crisis like 2008.

The eurozone experience and its 3% limit for the fiscal deficit are considered relevant of the fiscal policy within rules. However, for emerging economies, it requires

institutional conditions that not all meet adequately. This represents a constraint for the Mundell-Fleming model to be applied in the emerging economies, if such institutional conditions do not meet the necessary requirements measured by the ICRG (Institutional Credit Risk Group).

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Model Mundella-Fleminga a polityka stabilizacji makroekonomicznej

W artykule analizowane są implikacje polityczne i gospodarcze wynikające z modelu M-F w odniesieniu do gospodarek wschodzących. Ich zróżnicowane warunki instytucjonalne i kulturowe utrudniają zdefiniowanie prawidłowych reguł polityki fiskalnej w odniesieniu do wyboru reżimów kursowych i ich dopasowania do wymogów polityki makroekonomicznej. Na podstawie doświadczeń z Chile, Kolumbii i Unii Europejskiej podjęta została próba wyjaśnienia, w jaki sposób zasady polityki fiskalnej poszerzają zakres możliwości wykorzystania polityki kursowej. Zasadniczym problemem jest wykorzystanie polityki fiskalnej do stawienia czoła szokom finansowym przy utrzymaniu autonomii polityki monetarnej.

Słowa kluczowe: polityka fiskalna, model M-F, reżimy kursowe, autonomia monetarna