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Asymmetric Effects of Monetary Policy and Business Cycles in Iran using Markov-switching Models

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Abstract

This paper investigates the asymmetric effects of monetary policy on economic growth over business cycles in Iran. Estimating the models using the Hamilton (1989) Markov-switching model and by employing the data for 1960-2012, the results well identify two regimes characterized as expansion and recession. Moreover, the results show that an expansionary monetary policy has a positive and statistically significant effect on economic growth during recession, in expansionary regimes while the effects are stronger during recessions than expansions as predicted by finance constraints models. By using time-varying transition probability Markov-switching models, the results also show that an expansionary monetary policy raises the probability of switching from a recession to an expansion but reduces the probability of switching from an expansion to a recession.

Keywords: *Monetary policy, Business cycles, Asymmetry, Markov-switching.*

JEL Classification: *E52, E32, G10*

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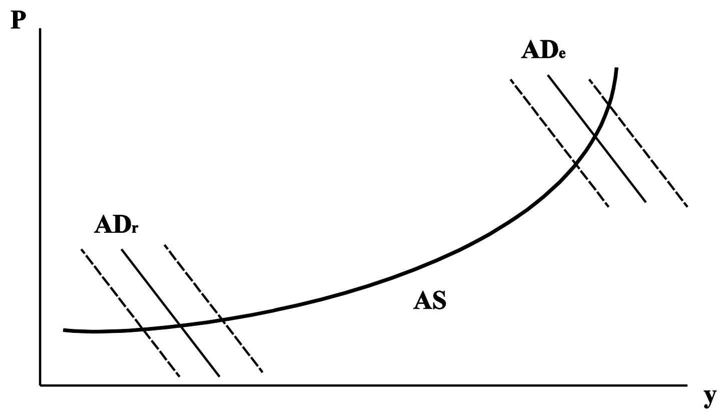
1. Introduction

It has been of great interest to macroeconomists whether monetary policy has the same sort of effects in recessions and expansions. Theoretical explanations for the asymmetric effects of monetary policy across business cycles have been proposed at least since the great depression. Keynes (1936) theorized that the movement of certain macroeconomic variables across business cycles may be asymmetric. The Keynesian models of the downward rigidity of wages and prices yields a convex aggregate supply curve in which monetary policy will have asymmetric effects on real output. Figure 1 illustrates that during expansionary periods (at the relatively steep part of aggregate supply curve) monetary policy shocks, represented by the shift in aggregate demand (ADe), translate more into change in price (wage) level, while in the recessions (at the flat part of the aggregate supply curve) monetary policy shocks, represented by the shift in aggregate demand (ADr), have more real effects.

Figure 1. Convex Aggregate Supply Curve



Source: Kakes, J. (1998). "Monetary Transmission and Business Cycle Asymmetry." Memeo: University of Groningen.

Recent financial theories of business cycle developed by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997), among others, emphasize the role of balance sheet to describe how financial factors may enhance the effects of monetary policy. This class of models is based on "credit market imperfections" theories. These models explain that when there is asymmetric information in the financial market, agents (borrowers) may behave as if they were constrained financially. Finance constraints are more likely to bind in recessions when the net worth of borrowers is low. The lower the net worth, the greater the external finance premium should be. Higher external finance premium creates a financial propagation mechanism which amplify the interest rate effects of monetary policy on investment demand by reducing liquidity and thus reducing investment demand for constrained borrowers. This implies that monetary policy is more effective in recessions than expansions. The empirical evidence of an asymmetric effect of the monetary policy was first sparked by Cover (1992) and then was verified by a large and growing body of empirical literature by employing different econometric frameworks.[1]

This paper empirically examines the asymmetric effects of monetary policy across business cycles. More specifically we examine questions like: Does monetary policy have the same sort of effects in recessions and expansions? Given that the economy is currently in a recession, does monetary policy increase the probability of switching to an expansion? We study these kinds of questions by employing Markov-switching models developed by Hamilton (1989). Unlike linear models this approach allows for nonlinearity and asymmetry. Besides, the Hamilton algorithm endogenously determines the optimal recession dating based on the data. In this study the Hamilton (1989) Markov-switching model is modified to allow monetary policy to affect economic growth. Moreover, the basic Markov-switching model is extended to a time-varying transition probability Markov-switching model to allow the probability of moving from one state to another depending on monetary policy.

The rest of paper is structured as follows: The next section reviews the related literature. Section 3 presents econometric framework and the data. Section 4 reports the empirical results regarding the potentially asymmetric effects of monetary policy across business cycles and whether monetary policy affects the transition probability of switching between regimes. Finally, concluding remarks are offered in Section 5.

1. See among others, Morgan (1993), Karras (1996a, b), Weise (1999), Garcia and Schaller (2002), Florio (2005), Tan and Habibullah (2007) and Hoppner et al. (2008).

2. Literature Review

In recent years, a large and growing body of empirical studies has focused on different types of asymmetric effects of monetary policy on real output. These asymmetries can be classified into three sub-categories: (1) Asymmetry linked to the direction of the monetary policy action, (2) Asymmetry related to the size of the monetary policy and (3) Asymmetry over the business cycle.

The empirical study of asymmetric effects of monetary policy was first carried out by Cover (1992) who showed that a tight monetary policy is more effective than an easy one in US. De Long et al. (1988)[1] employed Cover's procedure but they used the broader monetary aggregates M2 and M3. Their annual data revealed that expansionary monetary shocks had smaller effects on output than contractionary shocks. Morgan (1993) verified this kind of asymmetry by using an alternative measure of monetary policy, the Federal funds rate. Karras (1996a) confirmed Cover's result by employing panel data estimation for a panel of 18 European countries. By utilizing a similar methodology, Karras (1996b) found that asymmetry is an international phenomenon. Karras and Stokes (1999) extended cover model by adding a price equation to the process to look into the reasons for the asymmetry. Weise (1999) examined asymmetry using a nonlinear VAR models and the impulse response functions generated by these models. The results indicate that positive and negative monetary policy shocks have symmetric effects on US output. By employing a similar methodology Ravn and Sola (2004) found that negative unanticipated money supply shocks have greater real output effects than positive ones for the US post-war period.

Florio (2005) examined this kind of asymmetry for Italy using the three month interbank rate as monetary policy indicator and found that positive shocks (tight monetary policy) have stronger effects on output. He also considered the effects of monetary policy on prices and found that convex aggregate supply curve (asymmetric price adjustment) is the main source of asymmetry in Italy. By employing a similar methodology, Tan et al. (2010) concluded that tight monetary policy is more effective than easy monetary policy in Indonesia, Malaysia, the Philippines and Thailand. However, using Hamilton (1989) Markov-switching model and US quarterly data, Ravn and

1.Cover revealed also the results of asymmetric effects of monetary policy in U.S. in a Working Paper in 1988.

Sola (1997) and Lo and Piger (2005) could not find any strong evidence of asymmetry between positive and negative policy shocks.

Using Markov-switching models and US quarterly data Ravn and Sola (1997, 2004) analysed big versus small monetary policy shocks and found that big shocks are neutral but small shocks have real effects, confirming the asymmetry related to the size of money-supply shocks. By using nonlinear VAR model and impulse response functions generated by this model Weise (1999) confirmed the asymmetry related to the size of US monetary policy shocks, particularly for negative shocks when the economy is in a low growth state. Utilizing a time-varying transition probability (TVTP) Markov-switching model Lo and Piger (2005), could not find any strong evidence of asymmetry related to the size of monetary policy.

The asymmetric effects of monetary policy over business cycle were first examined by Thoma (1994) who studied the stability of money-income causality over the business cycle in US and found that the relationship between money and income becomes stronger in recessionary periods than expansionary periods. Kakes (1998) employed Markov-switching model to investigate state asymmetries in US, Germany, UK, Belgium and the Netherlands. He found cyclical asymmetries for US and Germany and to a lesser extent, for UK and Belgium, but not for the Netherlands. Shen (2000) also employed Markov-switching models but could not detect state asymmetries in Taiwan.

Garcia and Schaller (2002) examined state asymmetries in US by extending the Markov-switching model in two dimensions. First, they allowed monetary policy to affect the growth rate of output. Second, they allowed the probability of moving from one state to another to depend on monetary policy. Their results showed strong evidence that monetary policy has stronger effects during recessions than expansions. Moreover, change in the interest rate has a substantial effect on the probability of state switches. By employing the same methodology, Dolado and Maria-Dolores (2001) confirmed asymmetry over business cycle using Spanish quarterly data at the aggregate and the sectorial level. In another study Dolado and Maria-Dolores (2006) verified state asymmetry in Euro area. They followed Dolado and Maria-Dolores (2001) methodology but measured monetary policy as residuals of a forward-looking Taylor rule reaction function. The Taylor rule equation is estimated using interest rate, inflation rate and output gap.

By employing the Markov-switching model, Aragon and Portugal (2009) examined asymmetric effects of positive and negative monetary policy shocks over business cycle in Brazil. The results for most of the estimated specifications indicate asymmetry between positive and negative monetary policy shocks in booms, while in recessionary periods, no evidence of asymmetry related to the sign of monetary policy is found. Moreover, there are no strong evidence of asymmetry related to the phase of the business cycle. Tan and Habibullah (2007) also employed the Markov-switching models and found that monetary policy has stronger effects on output during recessions than booms in four ASEAN economies: Indonesia, Malaysia, the Philippines and Thailand.

Estimating a model within a Baysian framework, by using Markov chain Monte Carlo (MCMC) simulation Kaufmann (2002) confirmed state asymmetry in Austria. Sensier et al. (2002) used smooth transition regression (STR) models to study the nonlinear relationship between monetary policy and output in UK and found that change in interest rate has a greater effect on output in expansions than recessions. Hoppner et al. (2008) applied a time varying coefficient VAR (TVC-VAR) model and concluded that monetary policy shocks have stronger effects during recessions than booms.

In the case of Iran, Fardar (2003) employed the ordinary least square approach and found that negative monetary policy shocks had a significant impact on economic growth in recessions and expansions. But, the effects of negative monetary policy shocks on economic growth were not significant in recessions and expansions. Asgharpour (2005) studied asymmetry related to the direction and size of monetary policy shocks for the period 1959-2004. The results of this study indicate that negative monetary policy shocks have a greater impact on real GDP. Moreover, big monetary policy shocks are more effective than small shocks. Using co-integration and error correction modelling approaches for the period 1959-2005, Mehrara (2008) found that negative monetary policy shocks have a stronger impact on economic growth than positive shocks. By employing artificial neural network models, Motafakker Azad et al. (2010) confirmed the asymmetric effects of monetary policy shocks over business cycles (Sharifi Renani et al., 2012).

Sharifi Renani et al. (2012) analysed the asymmetric effects of positive and negative monetary shocks on real GDP using Markov-switching models for the period 1989-2008. Positive and negative monetary shocks were identified using Hodrick-Prescott filter. The results of this study indicate that, expansionary monetary policies increase real output in recessionary regimes, while contractionary policies decrease real output. On the other hand, during expansionary regimes, implementing expansionary monetary policies decrease real output while contractionary monetary policies raise real output. Accordingly, they have suggested to the monetary policy makers to implement expansionary monetary policies during recessions and to implement contractionary policies during expansionary regimes. The findings of this study also indicate that monetary shocks are more effective in recessions than booms.

Gholami et al. (2013) investigated the asymmetric effects of monetary policy on GDP over business cycles for the period 1959-2009. They utilized Multiple Regime Smooth Transition Autoregressive Models (MRSTAR) and identified four regimes in business cycles of Iran based on the growth of oil revenue and the growth of private sector investment. They found that the impact of M1 (as monetary policy indicator) on GDP is asymmetric over business cycles in Iran. The greatest impact of M1 on GDP is when the growth of oil revenue and the growth of private sector investment are higher than 5% and 12%, respectively. The smallest impact of M1 on GDP is when the growth of oil revenue and the growth of private sector investment are lower than 5% and 12%, respectively.

Employing Markov-switching models and using quarterly data for 1990-2011, Jafari Samimi et al. (2014) analysed the asymmetric effects of monetary gaps on inflation across high and low inflation regimes in Iran. In order to identify monetary gaps, simple sum and Divisia monetary aggregates have been utilized. The results show that the effects of monetary gaps are stronger in low inflation regimes than high inflation regimes. The results of this study also indicate that Divisia monetary aggregates compared to simple sum monetary aggregates have a stronger impact on inflation suggesting that Divisia monetary aggregates are a better proxy for examination of the role of money in macroeconomic policies.

Komijani et al. (2015) analysed asymmetric effects of monetary policy on inflation and output gap in Iran by employing the threshold regression approach. Empirical results of this study show that the Central Bank of Iran reacts more to negative output gaps than positive ones. Moreover, the Central Bank reacts to inflation only when the inflation rate is higher than a threshold. These findings indicate that monetary authorities have responded more to the output and employment than inflation during the sample period.

Most of the literature related to the issue of asymmetry are reported in the context of developed countries and to a lesser extent for developing ones. This gap, mixed results and insufficiency of empirical studies in developing economies deserve further research.

3. Econometric Framework

3.1. Fixed transition probability Markov-switching model (benchmark model)

Let $g_t = 100 * \Delta\log(GNP_t)$, where $\log(GNP_t)$ is the logarithm of the real gross national product. Therefore, g_t can be interpreted as economic growth. Consider the following fixed transition probability Markov-switching Autoregressive $(FTP - MS - AR(q))$ model:

$$\varphi(L)g_t = \mu_{S_t} + \epsilon_t, \qquad \epsilon_t \sim i.i.d.N(0, \sigma_{S_t}^2), \tag{1}$$

where, $\varphi(L) = 1 - L - L^2 - \cdots - L^k$ and L is the lag operator. Terms μ_{S_t} and $\sigma_{S_t}^2$ are respectively the state-dependent mean and variance of g_t. The unobserved state variable S_t is a latent dummy variable equaling either 0 or 1, which indicates expansion/recession states. This stochastic process is characterised by a transition probability matrix which can be written as:

$$p = \begin{bmatrix} p^{00} & p^{01} \\ p^{10} & p^{11} \end{bmatrix} \tag{2}$$

where $p^{ij} = prob(S_t = j | S_{t-1} = i)$ with $\sum_{j=0}^{1} p^{ij} = 1$ for all i. (3)

In other words, p^{10} is the probability of going from state 1 to state 0 and clearly is equal to $1 - p^{11}$. Initially, we assume that these transition probabilities are fixed over time and take the following Logit form:

$$p^{00} = \frac{\exp(\theta_0)}{1+\exp(\theta_0)} \tag{4}$$

$$p^{21} = \frac{\exp(\gamma_0)}{1+\exp(\gamma_0)} \tag{5}$$

Parameters determine the transition probabilities through the logistic distribution functions in (4) and (5). Later, the assumption of fixed transition probability will be relaxed to examine how monetary policy affects the probability of switching between states. Once the parameter estimates are obtained, the filtered probabilities will be computed. Filtered probabilities $p(S_t = j|\emptyset_t)$ are inferences about S_t conditional on information up to time t. The so-called filter probabilities are given by:

$$p(S_t = j|\emptyset_t) = \sum_{i=0}^{1} \dots \sum_{k=0}^{1} p\,(S_t = j, S_{t-1} = i, \dots, S_{t-r} = k|\emptyset_t) \qquad (6)$$

$j, i, \dots, k = 0,1$

These filtered probabilities provide information about the regime in which the series is most likely to have been at every point in the sample. They are therefore very useful for dating regimes.

3.2. A modified Markov-switching model

Do changes in monetary policy have the same sort of effects on economic growth in alternative states of the economy characterized as recession and expansion? In other words, are the effects of monetary policy asymmetric during recessionary and expansionary periods? To answer this question we consider a modified Markov-switching model as follows:

$$R_t = \mu_{S_t} + \sum_{j=0}^{q} \beta_{S_{t,j}} X_{t-j} + \epsilon_t, \qquad \epsilon_t \sim i.i.d.N(0, \sigma_{S_t}^2), \qquad (7)$$

where X_{t-j} is monetary policy indicator at time $t - j$ measured by using real M2 growth rate. Clearly, the monetary policy is allowed to have different impacts on economic growth across different states. The asymmetric impacts of monetary policy can be tested by comparing the coefficients of X_{t-j} in different states.

3.3. Time-varying transition probability Markov-switching model

Do a tight monetary policy increase the probability of a recession? The time-varying transition probability Markov-switching model is well-suited to answer this question because it provides the probability of switching between alternative regimes. This model assumes that the transition probabilities are not constant but vary depending on evolutions in monetary policy. The time-varying transition probability matrix can be specified as follows:

$$p_t = \begin{bmatrix} p_t^{00}(Z_{\boldsymbol{t}}) & p_t^{01}(Z_{\boldsymbol{t}}) \\ p_t^{10}(Z_{\boldsymbol{t}}) & p_t^{11}(Z_t) \end{bmatrix}, \quad (8)$$

where $p_t^{ij} = prob(S_t = j | S_{t-1} = i,\ Z_{\boldsymbol{t}})$, and $Z_{\boldsymbol{t}} = \{Z_t, Z_{t-1}, ...\}$ is monetary policy. Therefore, the probability of switching between alternative states is assumed to depend on monetary policy. The functions of the transition probabilities are then specified as follows:

$$p_t^{00}(Z_{\boldsymbol{t}}) = \frac{\exp(\theta_0 + \theta_1 Z_t)}{1 + \exp(\theta_0 + \theta_1 Z_t)}\ , \quad (9)$$

$$p_t^{11}(Z_{\boldsymbol{t}}) = \frac{\exp(\gamma_0 + \gamma_1 Z_{\boldsymbol{t}})}{1 + \exp(\gamma_0 + \gamma_1 Z_{\boldsymbol{t}})}\ . \quad (10)$$

Clearly,

$$\frac{\partial p_t^{00}}{\partial Z_{\boldsymbol{t}}} = \theta_1 p_t^{00}(1 - p_t^{00}), \quad (11)$$

$$\frac{\partial p_t^{11}}{\partial \boldsymbol{Z_t}} = \gamma_1 p_t^{11}(1 - p_t^{11}). \quad (12)$$

Since $0 \leq p_t^{00}, p_t^{11} \leq 1$, the signs of $\frac{\partial p_t^{00}}{\partial \boldsymbol{Z_t}}$ and $\frac{\partial p_t^{11}}{\partial \boldsymbol{Z_t}}$ are determined by the signs of θ_1 and γ_1, respectively. Thus, the estimates of θ_1 and γ_1 indicate how monetary policy affects the shifts between recession and expansion. For instance, a positive θ_1 suggests that a tight monetary policy makes the economy less likely to stay in state 0 and makes it more likely to turn into state 1. In contrast, a negative θ_1 may indicate that a tight monetary policy makes state 0 more possible to turn into state 1.

1. Empirical Results

4.1. Benchmark model

Table 1 presents the estimation results for linear and Markov-switching models. Columns (1) and (2) report the estimates for the linear and FTP-MS-AR(0) models. No AR lag in g_t is chosen based on non-autocorrelated error terms. In our sample, the data strongly reject the linear model in favour of the

Table 1. Linear and Markov-switching Models

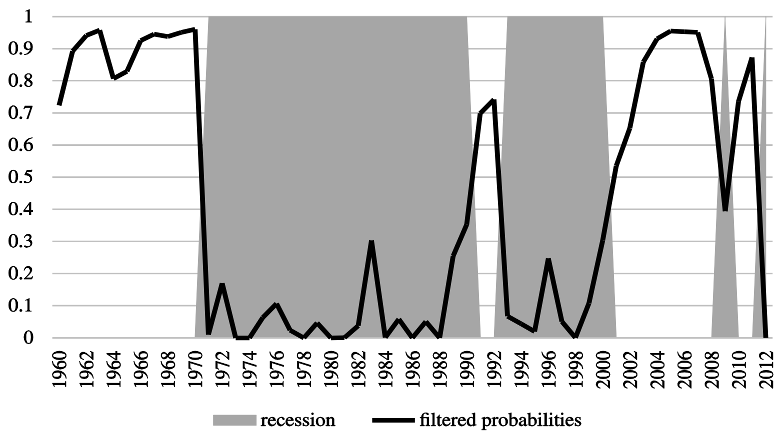
	(1) Linear	(2) Benchmark Markov-switching	(3) Linear (model with M2G)	(4) Modified Markov-switching (model with M2G)	(5) TVTP Markov-switching
μ	5.074*** (1.844)		-1.484 (2.380)		
μ_0		8.225*** (1.164)		0.907*** (0.147)	7.219*** (2.080)
μ_1		2.830 (3.252)		-1.861 (2.955)	-3.017 (4.770)
σ	13.428				
σ_0		1.439*** (0.203)		-1.506*** (0.533)	1.925*** (0.211)
σ_1		2.814*** (0.147)		2.567*** (0.136)	2.854*** (0.192)
β			0.611*** (0.195)		
β_0				0.440*** (0.012)	
β_1				0.638*** (0.241)	
θ_0		2.126*** (0.913)		0.265 (1.086)	-0.0003*** (0.000)
θ_1					.0234*** (0.058)
γ_0		-2.460*** (0.925)		-2.902*** (0.910)	-0.281*** (0.093)
γ_1					-0.281*** (0.054)
p^{00}		0.893		0.566	
p^{10}		0.079		0.052	
logLik	-212.359	-202.794	-153.230	-146.501	-152.415

NOTE: The entries in brackets are the standard errors. The dependent variable is the growth rate of real GNP. *** denotes significant at 1% significance level.
Source: Research findings.

Markov-switching model. First of all, the Markov-switching model yields a higher value of the likelihood function than the linear model. The likelihood-ratio (LR) test statistic is 19.13[1] compared with the 99%-critical value, 14.02, for the simple two-means, two-variance model tabulated by Garcia (1998) under the null of no switching. This finding suggests the Markov-switching model performs better than the simple linear model.

The Markov-switching model identifies a regime with a higher mean and lower variance, and a regime with a lower mean and greater variance conventionally labelled as expansion (regime 0) and recession (regime 1), respectively. Finally, the transition probabilities show that both regimes are highly persistent. The expansion regime persists on average for $\frac{1}{1-p^{00}} = 9.38$ years while it is expected that the recession regime will persist for $\frac{1}{1-p11} = 12.7$ years. Figure 2 plots the filtered probabilities of state 0 (expansion regime) based on equation (6). Simply taking 0.5 as the cut-off value, the periods with filtered probabilities greater (less) than 0.5 are more likely to be an expansion (recession) state. In the figure 2 the shaded and unshaded areas indicate recession and expansion periods, respectively.

Figure 2: Filtered Probabilities in Regime 0 (expansion)



Source: Author's calculation.

1. LR test statistic is computed as $LR = 2LL\_M2 - 2LL\_M1$. Where LL_M2 the LogLik of the Markov-switching is model and LL_M1 is the LogLik of the linear model.

4.2. A modified Markov-switching model

The results of a modified Markov-switching model based on equation (7) are reported in column (4) of Table 1. As depicted in table 1, the Markov-switching model in equation (7) has a clear identification of the expansion and recession regimes. Thus, the coefficients β_0 and β_1 indicate how economic growth responds to the impact of monetary policy in expansionary and recessionary periods, respectively. These coefficients show that a contractionary monetary policy (decrease of M2G) leads to a decrease in economic growth, no matter the economy is in an expansion or recession regime. Moreover, the asymmetric effects of monetary policy emerge in the estimations since we have $\hat{\beta}_1 > \hat{\beta}_0$. Accordingly, monetary policy has a stronger impact on economic growth during recessionary periods than expansions. For instance, a 1% increase in real M2 induces a 0.440% increase in economic growth during expansions and a 0.638% increase in returns during recessions. These findings are consistent with the findings in Gracia and Shaller (2002), Tan and Habibullah (2007) and Zare et al. (2014), among others.

It may be of interest to compare the above estimates with the one obtained from a simple linear model:

$$g_t = \mu + \beta X_t + \epsilon_t \tag{13}$$

Empirical results for equation (13) are reported in column (3) of table 1. It is clear that real M2 growth rate as the measure of monetary policy has significant effects on economic growth. Moreover, the coefficients estimated in the linear model are in between the state-dependent coefficients in Markov-switching models. That is, $\beta_0 < \beta < \beta_1$. As suggested by LR statistic in section 2.1, economic growth is better approximated by a regime-switching framework than a linear model. Thus, we may overestimate the effects of monetary policy on economic growth in expansionary periods and underestimate the effects in recessionary periods when simply using a linear model to investigate the relationship between monetary policy and economic growth.

4.3. Time-varying transition probability Markov-switching model

Does monetary policy affect the dynamics of switching between regimes? In order to answer this question, we consider a time-varying transition probability matrix in the Markov-switching model as formulated in section 1.3. Column (5) of Table 2 which presents the results from the TVTP Markov-switching model. Clearly, it is found that $\hat{\theta}_1 > 0$ and $\hat{\gamma}_1 < 0$. Here, $\hat{\theta}_1 > 0$ means that an expansionary monetary policy raises the probability of remaining in an expansion regime [i.e. $p_t^{00}(Z_t)$]. Furthermore, an expansionary monetary policy reduces the probability of switching from an expansion regime to a recession one [i.e., $p_t^{01}(Z_t) = 1 - p_t^{00}(Z_t)$] . In addition, since we get $\hat{\gamma}_1 < 0$, an expansionary monetary policy decreases the probability of being trapped in a recession [i.e., $p_t^{11}(Z_t)$] while it can increase the probability of switching from a recession to an expansion [i.e., $p_t^{10}(Z_t) = 1 - p_t^{11}(Z_t)$].

5. Conclusion

This paper empirically examines the asymmetric impacts of monetary policy across business cycles in Iran by employing the data covering 1960-2012. According to recent financial theories of business cycle monetary policy may have greater effects in recessions than expansions. Using modified versions of the Markov-switching model developed by Hamilton (1989), this paper has presented a positive effect of an expansionary monetary policy on the growth rate of real output. Moreover, it has been shown that monetary policy seems to have much larger effects during recessions than expansions providing evidence to support the models with finance constraints.

Finally, by allowing the transition probabilities to vary depending on evolutions in monetary policy, the paper has considered a specification that monetary policy may affect the dynamics of switching between regimes. Empirical results suggest that an expansionary monetary policy raises the probability of remaining in an expansion regime while reduces the probability of switching from an expansion regime to a recession one. In addition, an expansionary monetary policy decreases the probability of being trapped in a recession while it can increase the probability of switching from a recession to an expansion.

As a policy implication, monetary policy makers should consider the business cycles in implementing monetary policies and condition any shifts in policy on the phase of business cycles. If policy makers respond to shocks in a linear and symmetric way without considering the phase of business cycles, the shifts in the policy rate may fail to stimulate output sufficiently or may cause abrupt halt in output. For instance, if the Central Bank tends to stimulate output by implementing expansionary monetary policy, the size of the shifts in policy rate should be limited to specific phase of the business cycles at the time of policy implementation.

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