Macroeconomic Policy and Unemployment by Economic Activity: Evidence from Turkey

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ABSTRACT: This paper investigates how various macroeconomic policy shocks in Turkey affect unemployment and provides evidence on the differential responses of unemployment in selected sectors of economic activity. Our paper extends previous work in two respects. First, we consider not only the response of total unemployment, but also the response of unemployment by selected sectors of economic activity. Second, we consider not only the effect of monetary policy shocks, but also the effects of several other macroeconomic shocks. The results indicate that unemployment in different sectors of economic activity responds differently to various macroeconomic policy shocks.

KEY WORDS: macroeconomic policy shocks, unemployment by economic activity.

This paper investigates the effects of various macroeconomic policy shocks on total unemployment and unemployment by different branches of economic activity. Economic shocks affect output, and due to Okun's law, these shocks also affect unemployment. Empirical studies such as those by Cascio (2001), Djivre and Ribon (2003), and Orphanides and Williams (2002) investigate the relation between monetary policy shocks and total unemployment. They find that tight monetary policy increases unemployment. Christiano et al. (1997) show theoretically that the response of unemployment is sensitive to frictionless labor markets, wage contracts, and factor hoarding, all of which dampen movements in the marginal cost of production. There may be a number of reasons for the differential response of unemployment by sector of economic activity to various macroeconomic policy shocks. First, sectors of economic activity may differ in their liquidity requirements and labor-to-capital ratios. Second, they may differ in their openness to foreign trade and imported input requirements. Third, they may differ in their labor market conditions. For these reasons, the unemployment response to various macroeconomic shocks is expected to be different in different labor market conditions and in different sectors of economic activity. Thus, we investigate empirically the effects of different macroeconomic policy shocks on total unemployment and unemployment in selected sectors of economic activity. To our knowledge, such an investigation has not been carried out before for any country.

Although various studies look at the effects of different policy shocks on total unemployment, to the best of our knowledge, no study examines the relation between various macroeconomics policy shocks that we consider and unemployment by sectors of

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economic activity. Empirical studies such as those by Cascio (2001) for eleven European countries, Orphanides and Williams (2002) and Ravn and Simonelli (2006) for the United States, and Djivre and Ribon (2003) for Israel, investigate the relation between monetary policy shocks and total unemployment. They find that tight monetary policy increases unemployment. Agenor and Aizenman (1999) theoretically look at the effects of fiscal policies on output, wages, and employment in a small open economy within the general equilibrium framework and argue that expansionary fiscal policies increase unemployment. Alexius and Holmlund (2007) conclude that monetary policy has more persistent effects on unemployment than do fiscal policy and foreign demand in Sweden. Their results show that 30 percent of the fluctuations in unemployment from 1980 to 2005 are caused by shocks to monetary policy. Zavodny and Zha (2000) examine the relation between monetary policy and race-specific unemployment rates in the United States; they find that the black unemployment rate responds slightly differently than does the overall unemployment rate to macroeconomic variable shocks. Berument et al. (2006) study the effect of various macroeconomic policy instruments on unemployment by different levels of education and gender in Turkey, finding substantial educational and gender differences in policy shocks. Carlino and DeFina (1998) study the possibility that monetary policy has different effects across regions in the United States because the timing and magnitude of cycles in economic activity vary across regions. They conclude that different regions are affected differently by monetary policy. Algan (2002) finds that a positive demand shock decreases the unemployment rate permanently in France and the United States.

In addition to studies that look at the effects of policy innovations on unemployment, other research investigates the relation between output and different groups of the unemployed. Ewing et al. (2002) and Lynch and Hyclak (1984) examine the effect of output deviations on the unemployment rate for different age, gender, and race groups for the United States. They conclude that the effects of output deviations differ for each subgroup by age, gender, and race. Bisping and Patron (2005), Blackley (1991), Freeman (2000), and Izraeli and Murphy (2003), show that the output and unemployment relation differs among demographic groups within and between regions in the United States. Paci et al. (2001) also analyze the existing patterns of unemployment across western European regions. Within a three-sector model (agriculture, industry, and services), they investigate whether sectoral dynamics help to explain the observed heterogeneity in growth and employment. But they did not consider the relation between policy shocks and the type of unemployment.

This paper uses a six-variable vector autoregressive (VAR) model to analyze the effects of various shocks to output, the exchange rate, money, prices, the interbank interest rate, and unemployment on unemployment rates by selected sectors of economic activity. We consider four main sectors of economic activity—agriculture, manufacturing, construction, and wholesale-retail trade[1]—using quarterly Turkish data from the first quarter of 1988 to the fourth quarter of 2004 are used. There are several advantages to using the Turkish data. First, as one of the predominant emerging markets, Turkey is itself an interesting country for study. Second, Turkish financial and labor markets are not heavily regulated and Turkish real wages are flexible; therefore, economic shocks are transmitted to labor markets easily. Third, the high variability of Turkish economic variables decreases Type II errors, made when an incorrect null hypothesis is not rejected.

Our empirical evidence suggests that an income shock causes a decrease in unemployment in all sectors of economic activity. Moreover, the income shock affects unemployment in all sectors in the short run. On the other hand, a price shock affects unemployment

in all sectors in the long run. Regarding money innovations, the results indicate statistically significant declines during initial periods of unemployment in the manufacturing, construction, and wholesale-retail trade sectors. However, in the agriculture sector, a marginally significant increase in unemployment is observed during the initial periods. Positive, one-unit interbank interest rate and exchange rate innovations have a positive and statistically significant effect on unemployment in the manufacturing sector only.

Recent Trends in Turkey

From 1988 to 2004, the Turkish economy witnessed several economic shocks from both domestic and external causes. The first economic crisis occurred in 1991 and was due to the adverse effects of the Gulf War. The gross domestic product (GDP) growth rate declined to 0.35 percent in 1991 and increased to 8.14 percent in 1993. The second shock was in 1994 and was caused by Turkey's own policy-induced problems. This financial crisis led to a considerable decline in the value of the Turkish lira by almost 70 percent; GDP declined by 6.08 percent. However, the recovery was quick: In the following year, the growth rate was 7.95 percent and the unemployment rate was 7.5 percent. The third crisis was in 1999, when GDP declined by 6.08 percent and the unemployment rate increased to 7.65 percent. This crisis was due to lagged effects of the Russian crisis and the two major earthquakes in the Marmara region that year. The earthquakes affected the industrial heartland of the country, with the immediate and adjacent provinces to the quakes accounting for around one-third of Turkey's overall output. The last major crisis in this period was the liquidity crisis due to the worsening current account and a fragile banking system in November 2000, followed by the full-blown banking crisis in February 2001. This was the most severe crisis in Turkey's recent history, during which GDP declined by 9.54 percent. The economy bounced back and recorded high levels of economic growth of 7.9 percent in 2002. However, unemployment rates remained high, at 10.3 percent in 2002. This has been dubbed as jobless growth, a problem that continued in 2004. When the GDP growth rate was 9.9 percent, unemployment again remained at a high level of 10 percent. Further, unlike in previous crises, the unemployment rate for educated youth was very high, at 27 percent in 2001. The numbers of the unemployed stood at about 2.3 million people in 2005.

Data and Model Specification

We use a quarterly VAR model to address how changes in various macroeconomic indicators affect overall unemployment and unemployment in different branches of economic activity from the first quarter of 1988 to the fourth quarter of 2004. These macroeconomic indicators are real GDP, price, the exchange rate, the interbank interest rate, and money (M1) plus repo. Real GDP is used to measure income. The price level is measured by the GDP deflator. The exchange rate is defined as the Turkish lira value of the official currency basket, composed of 1 U.S. dollar and 0.77 euros. The interest rate is the interbank overnight interest rate. Finally, M1 plus repo are taken as the measure of money. There are two reasons to include repo in the money supply aggregates. First, as most of the repo transactions are overnight, this money aggregate is liquid. Second, agents preferred to repo their savings rather than open deposit accounts because the repo rates were considerably higher than bank deposit interest rates during the period studied (Berument 2007).

All the data for macroeconomic indicators except unemployment are taken from the electronic database system of the Central Bank of the Republic of Turkey (CBRT). Total unemployment and unemployment by branch of economic activity are compiled from the Household Labor Force Surveys (HLFS) conducted by the Turkish Statistical Institute (TURKSTAT 2005). The HLFS aimed to produce data on labor force participation, unemployment rates, and the number of persons employed, underemployed, and unemployed. From 1988 to 1999, the HLFS were conducted twice a year in April and October. The reference period was the fourth week of April and October, starting with Monday and ending with Sunday. In 2000, application frequency, sample size, estimation dimension, questionnaire design, and other aspects of the HLFS were changed. Since 2000, households have been followed quarterly and panel features included. During this period, about 23,000 households were selected in the new sampling design for each quarter. The seven days before the first application of the survey were being used as the reference period. The missing quarters for the periods between 1988 and 1999 were estimated by using the interpolation method.[2]

In the VAR specification, we use seven dummies as exogenous variables. To account for seasonality, we include three seasonal dummies. We also include one dummy variable to account for the change in the definition of M1 and repo after 1996. To address the three domestic financial crises in April 1994, November 2000, and February 2001, we include three exogenous dummy variables in the VAR model. The dummy variables for the 1991 and 1999 crises were statistically insignificant and thus are not included. In addition, the model is estimated using log levels for all the variables except the interbank interest rate. The lag length of two for the VARs is determined by the Schwartz Bayesian selection criterion.

One concern about the VAR models is whether to use the VAR model in levels or in its error correction form if some of the series are I(1) and series are cointegrated. If the variables are cointegrated, then there are two different ways to specify a VAR: the unrestricted VAR model in levels and the vector error correction model (VECM). Hamilton (1994) and Lütkepohl and Reimers (1992) argue that estimating a cointegrated system in levels is asymptotically equivalent to running a vector error correction system. Even if estimating the model in VECM is more efficient than the VAR in levels (see Masconi 1998), Naka and Tufte (1997) argue that this is true only when the cointegrating vectors are known. Naka and Tufte (1997) highlight several advantages to estimating VAR models in levels when a cointegrating vector exists rather than employing a VECM. They find that, when the cointegrating restrictions are true, unrestricted VAR models in levels may be more efficient than the VECM at short horizons. Clements and Hendry (1995) and Engle and Yoo (1987) also have shown that the VAR is superior to the VECM at short horizons. Thus, we implement the VAR using the variables in levels. One may also suggest estimating the model in the differences of the series without the error correction term. However, if there is a long-term relation among the series, dropping the error correction term leads to inconsistent estimates (see Lütkepohl 1991). We performed a battery of unit-root and cointegration tests.[3] For all the VAR specifications that we consider, we can reject the null hypotheses that there is no cointegration vector. Thus, there is at least one cointegration vector for each specification that we consider. Therefore, VAR systems are estimated in levels.

In the VAR model, ordering implies that the first variable affects all the remaining variables contemporaneously, but others affect the first variable with a lag and not contemporaneously. The second variable—and all the other variables—are contemporane-

ously affected by the first variable, contemporaneously affected by the other variables, and affected by all the variables with lags. Our variables are ordered as real GDP, price, exchange rate, interbank interest rate, money, and unemployment. This imposes an extreme information assumption that income and prices were set before the interbank rate to indicate monetary policy—that is, that the central bank knew income and prices before setting its policy. Most papers, such as those by Bernanke and Blinder (1992), Bernanke and Mihov (1998), Christiano and Eichenbaum (1992), Christiano et al. (1999), Eichenbaum and Evans (1995), Gertler and Gilchrist (1994), and Strongin (1995) assume this type of ordering. Other papers use a different type of ordering: Leeper et al. (1996) and Sims and Zha (1995) and order income and prices after the short-term interest rate. Even if this allows that monetary policymakers do not know the contemporaneous income and price levels when they set the interbank interest rate, it implies that the interbank rate contemporaneously affects income and prices, which is unrealistic.

Moreover, on the ordering on exchange rates, Berument (2007) argues that the CBRT tended to change the interbank interest rate with the exchange rate depreciation daily for its monetary policy setting for most of the period that we consider. The CBRT announced the exchange rate every morning, depreciating the local currency against the basket every day by a constant. Therefore, the public knew the monthly depreciation rate after the first or second business day of each month, but the interest rate was subject to change every day. Thus, we order the exchange rate before the interbank interest rate.

Finally, we order money near the end, but before unemployment. Christiano (1991), Christiano and Eichenbaum (1995), Cooley and Hansen (1989; 1997), and King (1991) motivate this choice. They assume that economic variables affect all movements in money. We also assume that money supply and unemployment are not predetermined relative to policy shocks. Furthermore, the ordering implies that monetary policy actions, such as a change in interest rate, have contemporaneous effects on money supply and unemployment. As a consequence, when we order the variables as real GDP, price, exchange rate, interbank interest rate, M1 plus repo, and unemployment, the resulting evidence is consistent with the nature of macroeconomic policy agreements.[4]

Economic theory does not offer enough guidance to determine the structure of the model. Therefore, it is important to test the impulse responses for sensitivity to alternative orders. To explore our results for their sensitivity to the order used, we use two different orderings of the VAR analysis. First, we order the variables as the interbank interest rate, exchange rate, income, price, money, and unemployment. This ordering implies that the central bank does not have any information for the current state of the economy, but that the interbank interest rate affects all the variables contemporaneously. Small open economies also use exchange rates as a policy tool. Moreover, for most of the period that we consider, the central bank dictated the exchange rate. Thus, we place the exchange rate first and repeat the exercise as a second set of alternative ordering. The order of the variables is, first, the exchange rate, followed by the interbank interest rate, real GDP, price, M1 plus repo, and unemployment. The impulse responses to alternative ordering were mostly parallel to our benchmark specification.[5]

Empirical Evidence

We employ a quarterly VAR model with a recursive order to estimate the effects of real GDP, price, exchange rate, interbank interest rate, money supply, total unemployment, and unemployment by selected branches of economic activity for the period from the

first quarter of 1988 to the fourth quarter of 2004. Figures 1 to 5 plot the responses of total unemployment and unemployment in four branches of economic activity to five macroeconomic shocks and the shocks to unemployment itself. As discussed above, the order of the impulse response functions in each branch of economic activity and total unemployment is as follows: real GDP, exchange rate, money, price, interbank interest rate, and unemployment. The error bands for the impulse responses are drawn at the 90 percent levels of confidence. Standard errors are calculated by bootstrapping with 3,000 draws.

Figure 1 shows the responses of total unemployment to various macroeconomic shocks over a sixteen-quarter forecast horizon. A one standard deviation shock to income decreases total unemployment for nine quarters, but only the first and third quarters of the decreases are statistically significant. The upper left corner of Figure 1 shows that, after the ninth quarter, the response turns out to be positive, and during the periods from the thirteenth to the sixteenth quarters, the responses are statistically significant. Evidence of the effect of higher output is parallel to the finding of Algan (2002) for France and the United States, Ewing et al. (2002) for the United States, and Berument et al. (2006) for Turkey. All find that a positive demand shock decreases the unemployment rate. Similarly, Zavodny and Zha (2000) find that a negative demand shock increases U.S. unemployment. The response of total unemployment to exchange rate innovations is positive for the first period; after that, the response falls below zero. However, none are statistically significant. A shock on money has a negative effect on total unemployment for seven periods, but only the second quarter is statistically significant. A one standard deviation shock to price and the interbank interest rate decreases total unemployment for six and seven periods, respectively. After that, the effects are positive and statistically significant after the ninth and eleventh quarters for these sectors, respectively. If one interprets the positive innovation to the interest rate as indicating tight monetary policy, then the finding of higher unemployment parallels Alexius and Holmlund (2007), Cascio (2001), Djivre and Ribon (2003), Orphanides and Williams (2002), and Ravn and Simonelli (2006). The shock to total unemployment is instantaneously statistically significant even if it follows cyclical behavior. The evidence dies out after the sixth quarter. In sum, though income, price, and interbank interest rate shocks affect overall unemployment in the long run, money and income shocks have a short-run effect on overall unemployment. However, the exchange rate does not affect unemployment in either the short run or the long run.

We next assess how different sectoral unemployment levels respond to five macroeconomic shocks. As mentioned above, the groups of economic activities we consider are as follows: agriculture, manufacturing, construction, and wholesale-retail trade. To save space, we elaborate only on the statistically significant results.

First we look at how a one standard deviation shock to income affects unemployment by sectors of economic activity. Figure 2 shows that an income shock negatively affects agricultural unemployment, but after the sixth quarter, the effect is positive. The negative effect is statistically significant only for the first to fourth periods. In Figure 3, the response of manufacturing unemployment to income shock is negative and statistically significant only for the initial level. Figure 4 suggests that construction unemployment responds negatively for the first through ninth periods, but only the first four periods are statistically significant. Figure 5 suggests that wholesale-retail trade has a negative and significant effect until the eleventh period. The general trend is that a shock to income decreases unemployment in the short run for all the sectors that we consider. The income shocks have the most persistent effect in wholesale-retail unemployment and the least persistent effect in manufacturing unemployment.
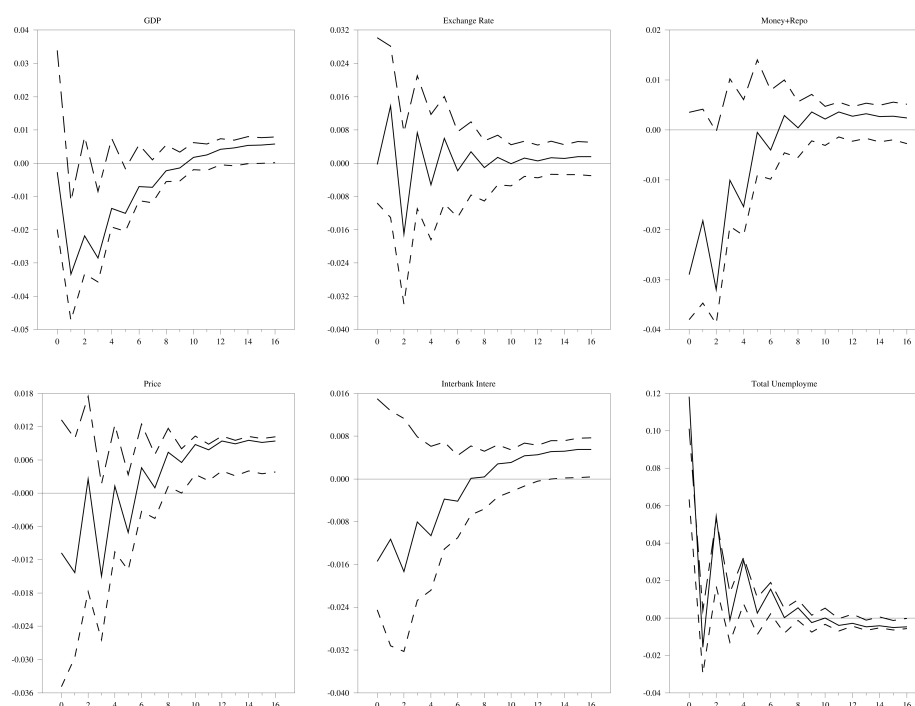
Effects of Shocks on Total Unemployment

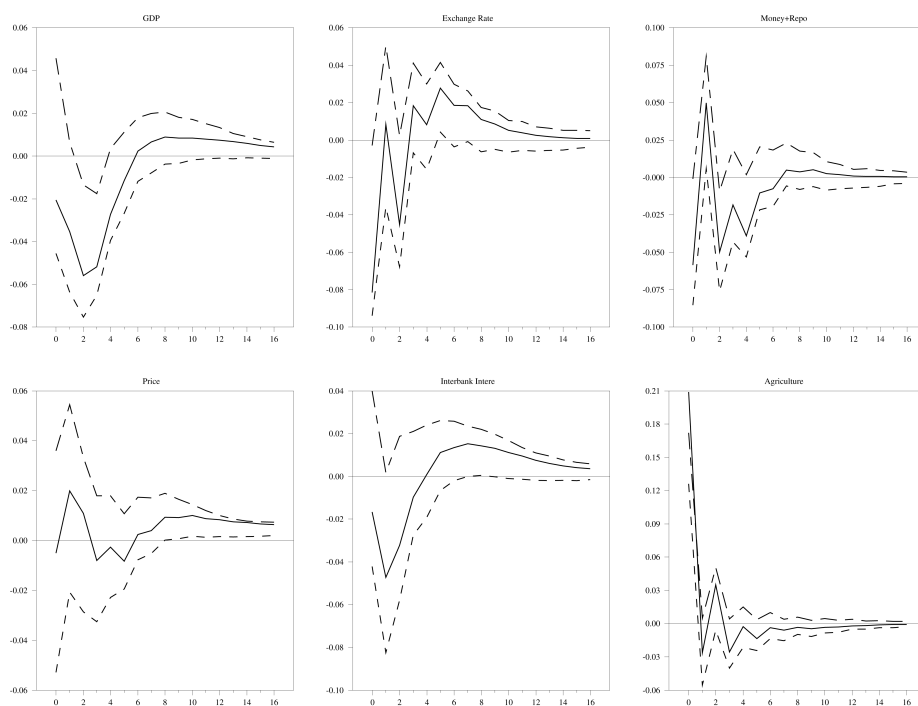**Figure 1. Responses of total unemployment to economic shocks**

Turkey has a small open economy. It mostly imports raw materials, intermediate products, machinery, and equipment for its investment. Therefore, it is plausible that exchange rate movements affect the state of the economy adversely and increase unemployment. The exchange rate also affects economic performance through net exports. A higher exchange rate encourages exports and discourages imports. Berument and Pasaogullari (2003) discuss the effect of exchange rate depreciation on Turkish economic performance. Thus, we next assess how sectoral unemployment responds to exchange rate innovations. Exchange rate innovation has a statistically significant effect only on manufacturing-sector unemployment. For this sector, the effect is positive and significant just for the initial levels; the effect exists only in the short run.

Next we consider the response of unemployment by branch of economic activity to a money shock. Figure 2 shows that the response of agricultural unemployment to a money shock is positive and marginally significant in the first quarter but decreases after the second period. However, Figures 3, 4, and 5 show that a monetary expansion has statistically significant and negative effects as of the first quarters after the monetary shocks for unemployment in the manufacturing, construction, and wholesale-retail trade sectors. The money shock affects unemployment in all economic activities only in the short run. A price shock has statistically significant and positive effects from about the tenth quarter onward on unemployment in all the sectors that we consider.

Interbank interest rate shocks increase unemployment for manufacturing only at initial levels and are statistically significant only for the first period. In sum, whereas shocks to

Effects of Shocks on Agriculture

Figure 2. Responses of agricultural unemployment to economic shocks

prices have a long-run effect for all the sectors that we consider, shocks to the interbank interest rate have no long-run effect on unemployment in all the economic activities. However, manufacturing unemployment is affected only in the short run.

Finally, we consider the responses of unemployment in various economic activities to a shock in their own unemployment. The initial responses of unemployment for all the sectors to their own shocks are positive and statistically significant, and these shocks are more persistent for the manufacturing and wholesale-retail sectors.

The main conclusions of five macroeconomic shocks can be summarized as follows. First, positive income shocks decrease unemployment across economic activities. Second, the exchange rate does not have a statistically significant effect on unemployment except for manufacturing unemployment, which is statistically significant just for the initial level. Third, whereas a one-unit positive shock to money decreases unemployment in the manufacturing, construction, and wholesale-retail trade sectors for the first periods, it increases agricultural unemployment for the first period. Fourth, a price shock affects unemployment in all economic activities in the long run. Fifth, a one-unit interbank interest rate shock is significant and has a positive effect only on manufacturing-sector unemployment at the initial level.

Discussion and Policy Implications

The evidence reported above suggests that the exchange rate and the interbank interest rate shocks do not have any statistically significant effects on unemployment by economic

Effects of Shocks on Manufacturing
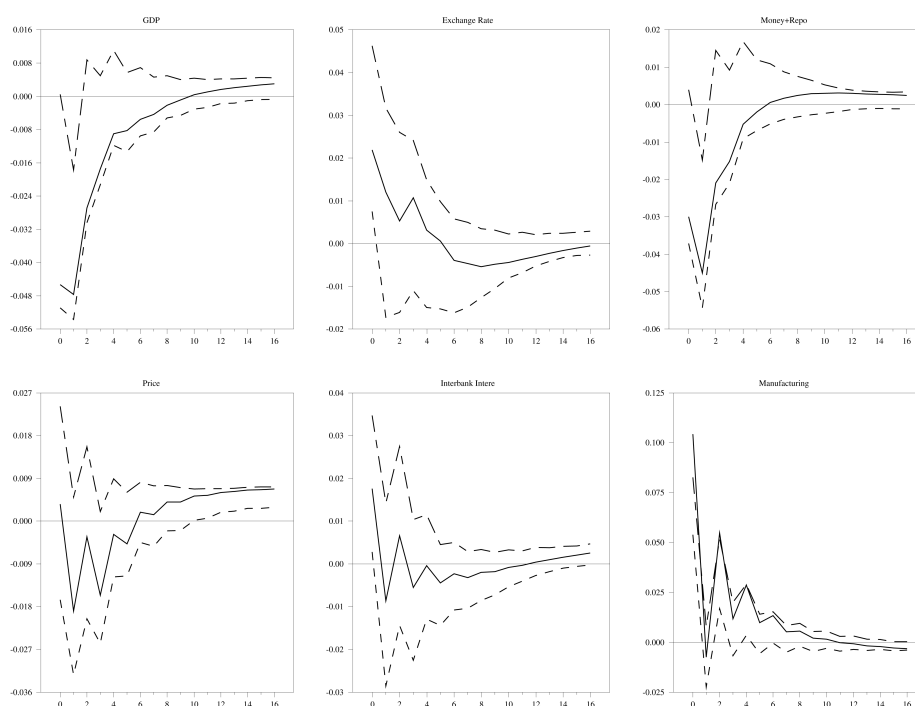
Figure 3. Responses of manufacturing unemployment to economic shocks

activity excepting unemployment in manufacturing for both shocks. For manufacturing unemployment, the effects are positive and statistically significant only for initial levels. Whereas the exchange rate and the interbank interest rate shocks mostly do not affect unemployment, money (M1 plus repo) has more sizable effects on unemployment. A money shock has negative and significant effects in the first quarters on unemployment in the manufacturing, construction, and wholesale-retail sectors. This finding is interesting because interbank interest rate and exchange rate are often taken as monetary policy tools and movements in these two variables are often considered to indicate monetary policy (see Berument 2007). Thus, one may interpret this as evidence of monetary policy ineffectiveness. However, measuring monetary policy is a difficult task, as the CBRT used money aggregates—such as the monetary base or net domestic assets, the interbank rate, exchange rate, and the spread between the interbank rate and depreciation rate—as policy tools, for the time period that we consider. Thus, we do not have a single series for the entire time span to measure monetary policy. It would be useful to develop a new measure, but interestingly, the evidence for the effect of the money aggregate (M1 plus repo) on unemployment is strong. Thus, one may argue that the interest rate and exchange rate channels may not be the transmission mechanism of monetary policy, but rather the direct effect of monetary policy (liquidity effect); or, other mechanisms might transmit monetary policy.[6] It is also possible that economic performance is affected by long-term but not short-term interest rates (Bernanke and Reinhart 2004). If the relationship between long- and short-term interest rates is not stable (see Berument and Froyen 2006), then

Effects of Shocks on Construction
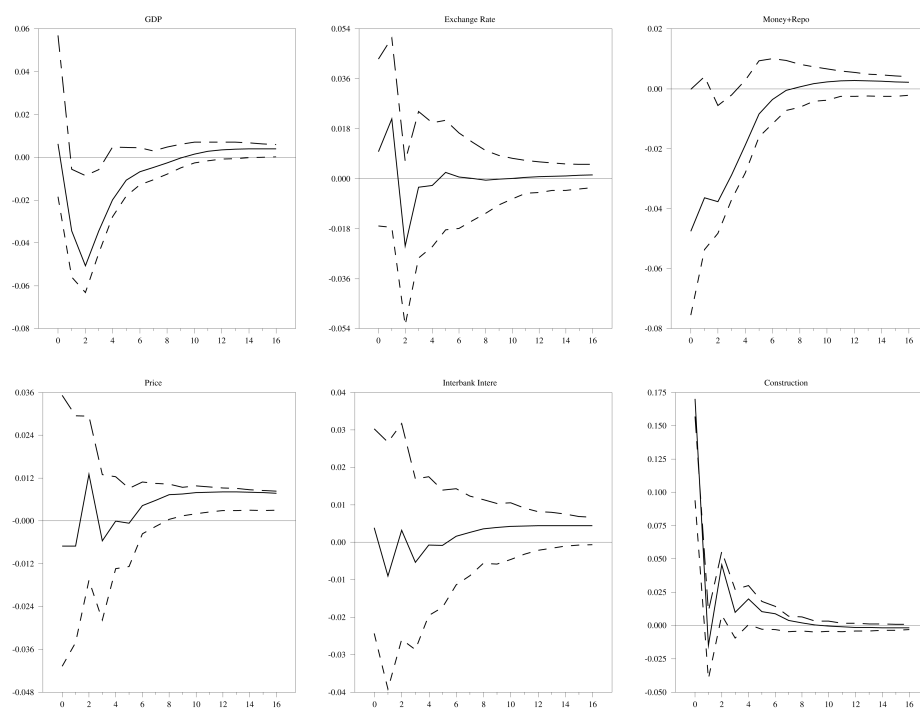
Figure 4. Responses of construction unemployment to economic shocks

movements in the short-term interest rate (here, interbank interest rate) may not affect long-term interest rates, and thus, economic performance. However, M1 plus repo may move with the long-term interest rate and decrease unemployment.[7]

A shock to income generally decreases unemployment in all economic activities in the short run. This suggests that income policies are more effective than are the interbank interest rate and exchange rate policies in tempering unemployment. Income policies that also incorporate structural reforms should be emphasized to fight unemployment in various sectors of economic activity.

A movement in prices has statistically significant and positive effects in the long run on unemployment for all the economic activities considered. Thus, one may argue that our identification scheme allows us to capture supply shocks (see Christiano et al. 1999). Alternatively, price shocks might be capturing inefficiency. To reason this out, we assume that the government sector is less efficient than the private sector (see Cakmak and Zaim 1992). Berument (2003) notes that the largest source of price shock is the government sector; the volatility in the government sector is three times higher than in those of the private sector. Thus, price shocks might be capturing the effect of government sector pricing. High price shocks in the government sector might be stemming from inefficiency, as well as high and volatile taxation policies. This could affect capital accumulation and the labor supply (see Cakmak and Zaim 1992). Thus, government-sector pricing could negatively affect the economy and increase unemployment. This clearly suggests that structural reforms in which privatization is important might increase efficiency and decrease unemployment.
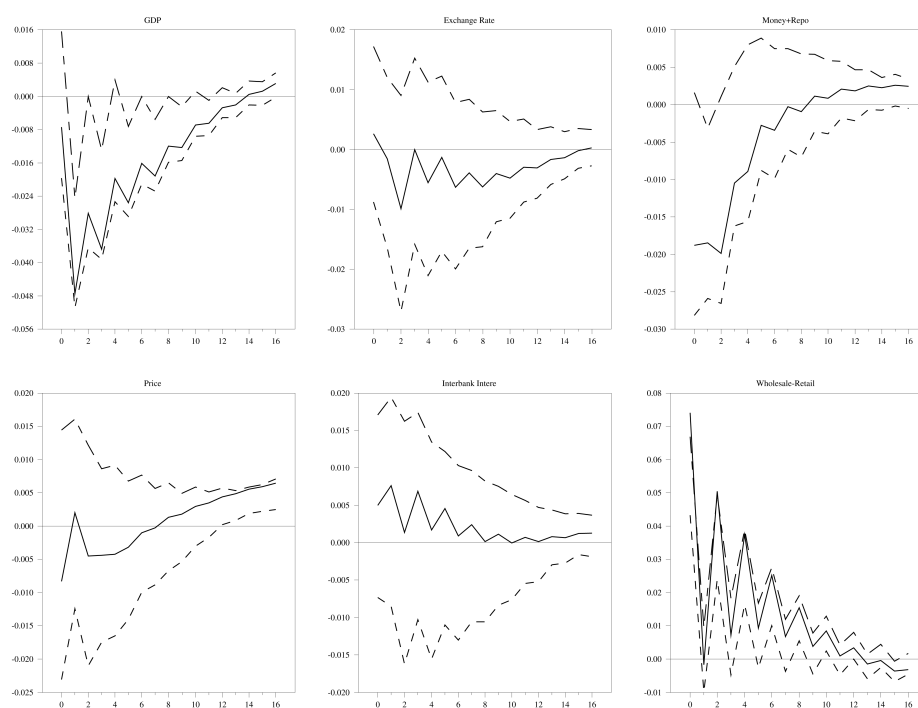
Effects of Shocks on Wholesale-Retail

Figure 5. Responses of wholesale-retail trade unemployment to economic shocks

Finally, a common feature among the unemployment rates is that the responses to their own shocks are persistent for manufacturing and wholesale-retail trade. Therefore, one may argue that heterodox rather than orthodox policies can temper unemployment.

To conclude, the interbank interest rate and exchange rate are not effective tools to fight unemployment. Even if the interbank and exchange rate do not measure monetary policy, M1 plus repo could measure monetary policy through the bank lending channel, and it is an effective tool in the short run. However, it seems that income policy is a more effective tool in affecting unemployment than monetary policy. Thus, the government should concentrate on income policies as well as structural adjustment policies to increase income and hamper the unemployment rate, rather than rely on the interest rate or exchange rate policies.

Conclusion

The motivation of this paper is the theoretical implication that unemployment is sensitive to labor market rigidities. This was reinforced by the observation that unemployment by sectors of economic activity evolved differently over time in Turkey. This paper extends the previous work in two regards. First, in contrast to the usual considerations of the responses of total unemployment, we also consider the responses of unemployment in four economic activity groups. Second, in contrast to the usual considerations of the effect of monetary policy shocks, we also consider the effect of several other macroeconomic

shocks. We find that unemployment in different sectors of economic activity, particularly agriculture and manufacturing, responds differently to various macroeconomic shocks. Interbank interest rate and exchange rate shocks have statistically significant and positive effects only on the manufacturing sector at the initial level. In addition, money shock causes a decline in unemployment of all the sectors of economic activity in the first period except in the activities of agriculture, which is positive and marginally significant in the initial period. Furthermore, whereas an income shock affects unemployment in all the sectors of economic activity in the short run, a price shock affects unemployment in all the sectors in the long run.

Notes

1. The working paper version of this work also considers five additional sectors: mining, electricity, transportation, finance-insurance, and community services (see Berument et al. 2008). These sectors are not considered here due to space limitations and their low share in the total level of unemployment.

2. We used the Chow and Lin (1971) technique based on GDP calculations that uses the production side of the national income accounting for the interpolation.

3. Testing for the unit root using the augmented Dickey–Fuller, Phillips–Perron, and Kwiatkowski et al. unit-root tests result with λmax and λ_{trace} statistics introduced by Johansen (1988; 1991), all available from the corresponding author upon request.

4. Leeper and Zha (2001, p. 16) note a loose connection between economic theory and behavioral relationships, used in the VAR identification–ordering of the variables here. They further note that the most cited works in the area, such as Bernanke and Mihov (1998), Christiano et al. (1999), and Leeper et al. (1996), do not provide a connection between economic theory and the relationships they use in the VAR models. However, this paper uses the two identification schemes that Christiano et al. (1999) use in their study.

5. These results are available from the corresponding author upon request.

6. See Mishkin (1996) for an overview of the transmission mechanisms of monetary policy.

7. We could not include the long-term interest rates into the analysis directly, as no reliable long-term interest data are available (see Berument and Yucel 2005).

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