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Berument, Hakan; Dogan, Nukhet; Tansel, Aysit

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Macroeconomic policy and unemployment by economic activity: evidence from Turkey

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Macroeconomic Policy and Unemployment by Economic Activity: Evidence from Turkey

Hakan Berument
Nukhet Dogan
Aysit Tansel

April 2008

Forschungsinstitut
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Institute for the Study
of Labor

Macroeconomic Policy and Unemployment by Economic Activity: Evidence from Turkey

Hakan Berument
Bilkent University

Nukhet Dogan
Gazi University

Aysit Tansel
Middle East Technical University
and IZA

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

Macroeconomic Policy and Unemployment by Economic Activity: Evidence from Turkey*

This paper investigates how macroeconomic policy shocks in Turkey affect the total unemployment and provides evidence on the differential responses of the unemployment by sectors of economic activity. Our paper extends the previous work in two respects. First, we consider not only the response of total unemployment but also the response of unemployment by 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 quarterly data used which covers the period 1988:01 to 2004:04 from Turkey. A VAR model with a recursive order is employed to estimate the effects of shocks in real GDP, price, exchange rate, interbank interest rate, money supply and own sectoral unemployment on unemployment by sectors of economic activity. The results indicate that the positive income shock is followed by a decrease in unemployment in all economic activity groups during the initial periods except the unemployment in the *Electricity* sector and the *Community Services* sector. A positive money shock decreases unemployment in sectors of *Mining*, *Manufacturing*, *Construction*, *Wholesale-Retail Trade*, *Transportation* and, *Finance-Insurance*. Opposite results are obtained with the interbank interest rate shocks. Even if, they are not statistically significant, a positive interbank interest rate shock increases the unemployment in all economic activities at the initial levels but derives down the unemployment in the *Agriculture* and the *Community Services* sectors at the initial level. Moreover, a positive price shock increases unemployment in all economic sectors in the long run except the *Mining* and the *Community Services*. Thus, unemployment in different sectors of economic activity responds differently to various macroeconomic policy shocks.

JEL Classification: E60, E24

Keywords: macroeconomic policy shocks, unemployment by economic activity

Corresponding author:

Hakan Berument
Department of Economics
Bilkent University
06800 Ankara
Turkey
E-mail: berument@bilkent.edu.tr

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1. Introduction

This paper investigates the effect of various macroeconomic policy shocks on total unemployment and unemployment by branches of economic activity. Economic shocks do affect the output, and due to Okun's law these shocks do also affect unemployment. Empirical studies such as Cascio (2001), Orphanides and Williams (2002), and Djivre and Ribon (2003) investigate the relationship between monetary policy shocks and total unemployment. They find that tight monetary policy increases unemployment. Christiano et al. (1997) showed theoretically that response of unemployment is sensitive to frictionless labor markets, wage contracts and factor hoarding; all of which dampens the 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, the sectors of economic activity may differ by their liquidity requirements and labor-capital ratios. Second, they may further differ in terms of their openness to foreign trade and imported input requirements. Third, they may also differ in terms of their labor market conditions. For this reason, unemployment response is expected to be different in different labor market conditions and in different sectors of economic activity. Therefore, our aim in this paper is to investigate empirically the effects of different macroeconomic policy shocks on total unemployment and the unemployment in various sectors of economic activity. Such an investigation has not been carried out hitherto.

Although there are various studies that look at the effects of different policy shocks on total unemployment, to the best of our knowledge, there is no study that examines the relationship between macroeconomics policy shocks that we consider and unemployment by sectors of economic activity. Empirical studies such as Cascio (2001) for 11 European countries, Orphanides and Williams (2002) and Ravn and Simonelli (2006) for the US, Djivre and Ribon (2003) for Israel, investigate the relationship between monetary policy shocks and total unemployment. They find that tight monetary policy increases unemployment. On the other hand, Agenor and Aizenman (1999) theoretically look at the effects of fiscal policies on output, wages and employment with in a small open economy within general equilibrium framework. They argue that expansionary fiscal policies increase unemployment. Alexius and Holmlund (2007) conclude that monetary policy has more persistent effects on unemployment than the fiscal policy and foreign demand in Sweden. Their results show that 30 percent of the fluctuations in unemployment are caused by shocks to monetary policy during 1980 to 2005. Differently, Zavodny and Zha (2000) examine the relationship between monetary policy and the race-specific unemployment rates in the US. They find that the black

unemployment rate does respond slightly differently than the overall unemployment rate to macroeconomic variable shocks. Berument, Dogan and Tansel (2006) study whether various macroeconomic policy instruments on unemployment by different levels of education and gender in Turkey with the finding of substation educational and gender differences. Carlino and DeFina (1998) study the possibility that the monetary policy has different effects across regions in the US since the timing and the magnitude of cycles in economic activity vary across regions. They conclude that different regions are affected differently by monetary policy. Algan (2002) found that a positive demand shock decreases the unemployment rate permanently in France and USA.

In addition to the studies that look at the effect of policy innovation on unemployment, there is another set of research which investigates the relationship between output and different groups of unemployment. Lynch and Hyclak(1984) and Ewing, Levernier and Malikin (2002) examine effect of output deviations on unemployment rate for different age, gender and race groups of the United States. They conclude that the effects of output deviations are different on each of the different of subgroups age, gender and race. Furthermore, Blackley (1991), Freeman (2000), Izraeli and Murphy (2003) and Bisping and Patron (2005) show that output and unemployment relationship differs among demographic groups within and between regions in the United States. Paci, Pigliaru and Pugno (2001) also analyzed the existing patterns of unemployment across western European regions. Within a three-sector model (agriculture, industry and services) they assessed whether sectoral dynamics help explaining the observed heterogeneity in the growth and employment. But they did not consider the relationship 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, exchange rate, money, prices, interbank interest rate and unemployment on the unemployment rates by sectors of economic activity. The 9 main sectors of the economic activity considered include *Agriculture, Mining, Manufacturing, Electricity, Construction, Wholesale-Retail Trade, Transportation, Finance-Insurance* and *Community Services*. The detailed definitions of these sectors of economic activities are given in Footnote 5. For the analyses in this paper the quarterly Turkish data for the period 1988:1 to 2004:4 are used. There are several advantages to using the Turkish data. First, Turkey is one of the predominant emerging markets; therefore, studying this country is itself interesting. 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, high

variability of the Turkish economic variables decreases the *Type-II error* – the error that is made when an incorrect null hypothesis is not rejected.

The empirical evidence provided in this paper suggests that an income shock causes a decrease in the unemployment in all sectors of economic activity except in the Electricity and the Community Services sectors. Moreover, the income shock affects the unemployment in all of the sectors in the short run except the unemployment in the Mining sector. On the other hand, a price shock affects the unemployment in all of the sectors in the long run except the unemployment in the Mining and Community Services sector. With regards to the money supply innovations, the results indicate statistically significant declines during the initial periods in unemployment in the Mining, Manufacturing, Construction, Wholesale-Retail Trade, Transportation, Finance-Insurance sectors. However, in the Agriculture sector a marginally significant increase in unemployment is observed during the initial periods. Positive, one unit interbank interest rate innovation has a positive and statistically significant impact on the unemployment in the Manufacturing sector.

The following section discusses the recent trends in unemployment rates in Turkey. Section 3 presents the data and the model specification. The empirical evidence is presented in section 4. Section 5 discusses the implications of the results. The last section gives the concluding remarks.

2. The Recent Trends in Unemployment Rates

In this section, we first give an overview of the economic development of Turkey for the period 1988 to 2004. Figure 1 shows the evolution of the real GDP growth and the unemployment rate for the period 1988-2004. The left axis show the values of the GDP growth rate and the right axis show the values of the unemployment rate. During this period the Turkish economy witnessed several economic shocks due to both domestic and external causes. The first economic crisis occurred in 1991 and was due to the adverse effects of the Gulf War. Figure 1 shows that the 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 caused by Turkey's own structural 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 and in the following year the growth rate was 7.95 and unemployment rate was 7.5 percent. The third crisis was in 1999; GDP declined by 6.08 percent and unemployment rate increased to 7.65 percent. This crisis was due to lagged effect of the Russian crisis and the two major earthquakes in the Marmara region during that year. The earthquakes affected the

industrial heartland of the country, where the immediate and adjacent provinces accounted for around one-third of Turkey's overall output. The last major crisis in this period was the liquidity crisis due to worsening of the current account and a fragile banking system in November 2000 and followed by the full-blown banking crisis in February 2001. This was the most severe crisis of the recent history of Turkey 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". This problem continued in 2004. When the GDP growth rate was 9.9 percent and unemployment again remained at a high level of 10 percent. Further, unlike in the previous crises the unemployment rate for the educated youth was very high. It was 27 percent in 2001. The numbers unemployed stood at about 2.3 million people in 2005.

According to the Turkish Statistical Institute (TURKSTAT), unemployed are defined as all persons 15 years of age and over who are not employed during the reference period, who have taken specific step(s) to obtain a job during the last three months and are available to start work within 15 days (see TURKSTAT, 2005). In order to visualize the evolution of the unemployment we plot the unemployment rate by four major economic activities, Industry, Construction, Services and Agriculture over the 1988-2004 period in Figure 2. A band pass filter is used to remove the trends and the high frequency variability in the unemployment series. Figure 2 shows that the unemployment in different sectors have different patterns over time, the services sector unemployment is the least violate, while the Agricultural sector unemployment is the most volatile among the unemployment rates of the four major economic activities. Moreover Service, Industry and Construction unemployment series are closer to each other compared to the Agricultural sector. During the period after 1994, the cyclical volatility is higher than during the earlier period. In particular, the cycles expand after 1998. Therefore, unemployment in each sector of economic activity behaves differently over time and we claim that they respond differently to various macroeconomic shocks that is what we investigate in this paper.

3. Data and Model Specification

Quarterly VAR model is used to address how changes in macroeconomic indicators affect overall unemployment and the unemployment by the different branches of economic activity for the period from 1988:01 to 2004:04. These macroeconomic indicators are real GDP (Y), price (P), exchange rate (EXCH), interbank interest rate (INTERBANK) and money (M1) plus repo (M). Real GDP is used as a measure of income. Price level is measured

by the GDP deflator. The Exchange rate is defined as Turkish lira value of the official currency basket, which is composed of 1 USD and 0.77 Euro. Interest rate is interbank overnight interest rate. Finally, M1+repo are taken as the measure of money. There are two reasons for including repo in the money supply aggregates (Berument, 2007). First, most of the repo transactions are overnight, hence this money aggregate is liquid. Second, agents prefer to repo their savings rather than open deposit accounts since the repo rates were considerably higher than bank deposit interest rates during the period studied.

All the data for macroeconomic indicators except unemployment are taken from the electronic database system of Central Bank of the Republic of Turkey (CBRT). The total unemployment and the unemployment by branch of economic activity are compiled from the Household Labor Force Surveys (HLFS), which are conducted by the Turkish Statistical Institute (TURKSTAT, 2005). The aim of the HLFS surveys was to produce data on the labor force participation and the unemployment rates and the number of persons employed, underemployed and unemployed. During the period 1988-1999, 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 the year 2000, application frequency, sample size, estimation dimension, questionnaire design and some other aspects of the HLFS were changed. Since 2000, the households have been followed quarterly and panel features are 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[1].

In the VAR specification seven dummy variables are used as exogenous variables. To account for seasonality, three seasonal dummies are included. One dummy variable included to account for the change in the definition of M1 and repo after 1996. In order to address the three domestic financial crises in April 1994, November 2000 and February 2001 three exogenous dummy variables are also included in the VAR model. The dummy variables for 1991 and 1999 crises were statistically insignificant, therefore they 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.

[1] We used Chow-Lin technique (Chow and Lin, 1971) based upon the GDP calculations that uses the production side of the national income accounting for the interpolation.

One of the concerns about the VAR models is whether to use VAR model in levels or in its error correction form, if some of the series I(1) and series are cointegrated. If the variables are cointegrated then there are two different ways of specifying a VAR: one is the unrestricted VAR model in levels and the second is the Vector Error Correction Model (VECM). Hamilton (1994) and Lütkepohl and Reimers (1992) argued that running 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 VAR in levels (see, Masconi, 1998), Naka and Tufte (1997) argued that this is true only when the cointegrating vectors are known. Naka and Tufte (1997) highlighted several advantages of estimating VAR models in levels when a cointagrating vector exists rather than employing a VECM. Their most important finding is that when the cointegrating restrictions are true, unrestricted VAR models in levels may be more efficient than the VECM at the short horizons. Also Clement and Hendry (1995) and Engle and Yoo (1987) have shown that VAR is superior to VECM at the short horizons. Therefore, in this study we implement the VAR, using the variables in levels. One may also suggest that estimating the model in differences of the series (without the error correction term). However, if there is a long term relationship among the series, dropping the error correction term will lead to inconsistent estimates (see Lütkepohl, 1991). We performed a battery of unit root and cointegration tests[2]. For all the VAR specifications that we consider, we can reject the null hypotheses that there is no cointegration vector. Thus, we consider that 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 first variable affects all the remaining variables contemporaneously, but others affect first variable with a lag but not contemporaneously. Second variable is contemporaneously affected by the first variable, contemporaneously affected by the other variables, and is affected by all the variables with lags. The same applies to the all other variables as well. Our variables are ordered as real GDP, price, exchange rate, interbank interest rate, money and unemployment. This imposes extreme information assumption that income and prices are set up before setting up the interbank rate as an indicator of monetary policy. This implicitly assumes that central bank knew these variables before setting up its policy variable. Most papers such as Christiano and Eichenbaum (1992), Eichenbaum and Evans (1995), Strongin (1995), Bernanke and Blinder

[2] Testing for unit root by using Augmented Dickey-Fuller, the Phillips and Perron and the Kwiatkowski, Phillips, Schmidt, and Shin unit root tests result with λ_{max} and λ_{trace} statistics introduced by Johansen (1988, 1991) which are all available from the corresponding author upon request.

(1992), Bernanke and Mihov (1995), Gertler and Gilchrist (1994) and Christiano et al. (1999) assume this type of ordering while some other papers use a different type of ordering. For example, Sims and Zha (1995) and Leeper, Sims and Zha (1996) order income and prices after the short-term interest rate. Even if this allows that the contemporaneous income and price level are not known by monetary policy maker when they setup the interbank interest rate, this implies that the interbank rate contemporaneously affects income and prices which is unrealistic either.

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 the most of the period that we consider. The exchange rate was announced every morning by the CBRT. It depreciated 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 at the end but before the unemployment. Cooley and Hansen (1989, 1997), King (1991), Christino (1991) and Christiano and Eichenbaum (1995) motivate this choice. They assume that economic variables affect all movements in money. In this paper, it is also assumed that the money supply and unemployment are not predetermined relative to the policy shocks. Furthermore, this ordering implies that monetary policy actions (such as 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+repo and unemployment, the resulting evidence is consistent with the nature of macroeconomic policy agreements[3].

Economic theory does not provide enough guidance for determining the structure of the model. Therefore, it is important to test the impulse responses for sensitivity to alternative orders. In order to explore our results for their sensitivity to the order used, we use two different ordering of the VAR analysis. First, we order the variables as interbank interest rate, exchange rate' income, price, money and unemployment. This ordering implies that central bank does not have any information for the current state of the economy but the interbank interest rate affects all the variables contemporaneously. Small open economies also use the

[3] Leeper and Zha (2001, p.16) notes that there is a loose connection between economic theory and behavioral relationships that is used in VAR identification – ordering of the variables here. They further note that the most cited works in the area such as Leeper, Sims and Zha (1996), Christiano, Eichenbaum and Evans (1999), and Bernanke and Mihov (1998) did not provide a connection between economic theory and the relationships they used in the VAR models. However, in this paper we used the two identification schemes that Christiano, Eichenbaum and Evans (1999) used in their study.

exchange rates as their policy tool. Moreover, for most of the period that we consider exchange rate was dictated by the Central Bank. Thus, we place the exchange rate first and repeat the exercise as a second set of alternative ordering. The order of the variables is exchange rate, interbank interest rate, real GDP, price, M1+repo and unemployment. The impulse responses to alternative ordering were mostly parallel to our benchmark specification[4].

4. Empirical Evidence

A quarterly VAR model with a recursive order is employed to estimate the effects of real GDP, price, exchange rate, interbank interest rate, money supply, total unemployment and the unemployment by branches of economic activity for the period from 1988:01 to 2004:04. Figures 3 to 12 plot the responses of the total unemployment and the unemployment by the 9 branches of economic activity to five macro economic shocks and the shocks to the unemployment itself. The order of the impulse response functions in each branch of the economic activity and the total unemployment is as follows: real GDP, exchange rate, money supply, price and interbank interest rate. The error bands for the impulse responses are drawn at the 90% levels of confidence. The standard errors are calculated by bootstrapping with 3000 draws.

Figure 3 shows the responses of the total unemployment to various macroeconomic shocks over a sixteen quarterly forecast horizon. One standard deviation shock to income decreases the total unemployment for 9 quarters but only the first and the third quarter of the decreases are statistically significant. Upper left corner of Figure 3 shows that after the ninth quarter the response turns out to be positive and during the periods from 13 to 16 the responses are statistically significant. Evidence on the effect of higher output is parallel to the finding by Algan (2002) for France and the USA, Ewing, Levernier and Malikin (2002) for the USA and Berument, Dogan and Tansel (2006) for Turkey. They all find that a positive demand shock decreases the unemployment rate. Similarly, Zavodny and Zha (2000) find that a negative demand shock increases the unemployment in the USA. The response of the total unemployment to exchange rate innovations is positive for the first period after that the response falls below zero. However, none of them are statistically significant. A shock on the money supply has a negative effect on the total unemployment for seven periods but only the second quarter is statistically significant. One standard deviation shock to price and interbank

[4] These results are available upon request from the authors.

interest rate decreases the total unemployment for six and seven periods, respectively. After that the effects are positive and statistically significant for the ninth and eleventh quarters. If one interprets the positive innovation to the interest rate as an indicator of the tight monetary policy, then the finding of higher unemployment is parallel to Cascio (2001), Orphanides and Williams (2002), Djivre and Ribon (2003), Rawn and Simonelli (2006) and Alexius and Holmlund (2007). Shock to total unemployment is instantaneously statistically significant even if it follows a cyclical behavior. The evidence dies out after the sixth quarter. In sum, while income, price and interbank interest rate shocks affect the overall unemployment in the long run, money and income shocks have a short run effect on the overall unemployment. However the exchange rate does not affect unemployment in either the short run or the long run.

We next assess how different unemployment levels respond to five macroeconomic shocks. The groups of economic activities we consider are as follows; Agriculture, Mining, Manufacturing, Electricity, Construction, Wholesale-Retail Trade, Transportation, Finance-Insurance, Community Services.[5] In order to save space we will elaborate only on the statistically significant results.

First we will look at how one standard deviation shock to income affects unemployment by sectors of economic activity. Figure 4 shows that innovation to income affects the unemployment of Agriculture negatively but after the sixth quarter the effect is positive. The negative effect is statistically significant only for the periods between one and four. In Figure 6, the response of the Manufacturing unemployment to income shock is negative and statistically significant only for the initial level. Figure 7 reports that the Electricity unemployment responses are positive and statistically significant at the initial levels. Figure 8 suggest that the Construction unemployment have negative response for the periods between one and nine. But only first four periods are statistically significant. Figure 9 suggests that the Wholesale-Retail Trade has negative and significant impact until the eleventh period. Positive innovation to income affects the Transportation unemployment negatively. However it is statistically significant only for the first and the third periods. Figure 11 shows that the Finance-Insurance unemployment has significant effects in the first, third and fifth periods, which are negative. Finally income shock increases the Community Services unemployment for the whole period. But it is significant only at the initial level. In

[5] The detailed definitions of these economic activities are as follows. Agriculture includes Forestry, Hunting and Fishing. Mining includes quarrying. Electricity includes gas and water. Wholesale and Retail Trade includes restaurants and hotels. Transportation includes communication and storage. Finance-Insurance includes real estate and business service. Community Services include social and personal services.

sum the general trend is that a shock on the income decreases the unemployment in different economic activities except in the Electricity and the Community Services which are statistically significant only at the initial levels. Moreover, the income shock affects all of the economic activities in the short run except the Mining and has the biggest impact on the Electricity and the Community Services.

Turkey is 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. Exchange rate also affects the economic performance through net exports. Higher exchange rate encourages exports and discourages imports. Berument and Pasaogullari, (2003) provides a discussion of the effect of exchange rate depreciation on the Turkish economic performance. Therefore, we next assess how unemployment by various economic activities responds to the exchange rate innovations. Exchange rate innovation does not have statistically significant effect on the unemployment by economic activity except for the unemployment in the Manufacturing and the Finance-Insurance sectors. For these two sectors the impacts are positive and significant just for the initial levels. Figures 6 and 11 show that the unemployment in these two economic activities are adversely affected by the exchange rate depreciation in the short run.

Next we consider the response of unemployment by branch of economic activity to the money supply shock. Figure 4 shows that the response of Agricultural unemployment to money shock is positive and marginally significant in the first quarter. On the other hand Figure 5 shows that a money innovation has a statistically significant and negative contemporaneous impact on Mining unemployment. Moreover, Figures 6, 9 and 10 show that a monetary expansion has statistically significant and negative effects as of the first quarter after the shock for the unemployment in the Manufacturing, Wholesale-Retail Trade and Transportation sectors. In addition, the effect of a money innovation on the unemployment in the Construction and Finance-Insurance sectors are negative and significant in the second quarter for construction and the periods between one and three for Finance-Insurance sectors, respectively. The unemployment impact of a money shock can be summarized as follows. First, monetary supply expansion has statistically negative effects in the first quarters on the unemployment in Mining, Manufacturing, Construction, Wholesale-Retail Trade, Transportation and Finance-Insurance. On the other hand, Agriculture has statistically positive effects in the first quarter. Second, the money shock affects the unemployment all of the economic activities in the short run except the unemployment in the Electricity and the

Community Services sectors. Third, one standard deviation shock to money has the biggest impact on the unemployment in Mining sector.

We now report the effects of a price shock on the unemployment by different economic activities. A price innovation has statistically significant and positive effects from about tenth quarter onwards on the unemployment in all of the economic activities except the unemployment in the Mining and the Community Services activities. The response of the Community Services unemployment is negative and not statistically significant for the whole period. Furthermore, the largest impact of a price shock is observed on the unemployment in the Electricity and the Mining activities.

Next, we interpret the innovation to the interbank interest rate. The interbank interest rate shocks increase unemployment for the Manufacturing just at the initial levels and it is statistically significant just for first period. In sum, while shocks to the interbank interest rate have no long run effect on the unemployment in all the economic activities, the Manufacturing unemployment is affected only in the short run.

Finally we consider the responses of the unemployment in various economic activities to their own shock that is, to a shock in their own unemployment. The initial responses of unemployment for most economic activities to their own shocks are positive and statistically significant for about all of the periods except the unemployment in the Agriculture, Mining, Electricity and the Construction sectors. These shocks are persistent.

The main conclusions of five macroeconomic shocks can be summarized as follows. First, positive income shocks decrease unemployment across economic activities except the Electricity and the Community Services unemployment. Second, exchange rate does not have statistically significant effect on unemployment except for the Manufacturing and the Finance-Insurance unemployment, which are statistically significant just for the initial level. Third, a one unit positive shock to the money decreases the unemployment in the Mining, Manufacturing, Construction, Wholesale-Retail Trade, Transportation and the Finance-Insurance sectors for the first periods. Further, the money has a significant and positive impact on Agricultural unemployment but has no effect on the Electricity and the Community Services unemployment. Fourth, price shock affects unemployment in all of the economic activities in the long run except the Mining and the Community Services unemployment. Fifth, one unit interbank interest rate innovation is significant and has a positive impact on the unemployment in the Manufacturing at the initial level. Finally, while income shock affects the Electricity unemployment in the long run, the price shock affects it in the short run and

these effects are the largest among all the other economic activities. However exchange rate and money supply do not have any effect on the unemployment in the Electricity sector.

5. Discussion and Policy Implications

The evidence reported above suggests that the exchange rate and the interbank interest rate innovations do not have any statistically significant effects on the unemployment by economic activity except for the unemployment in the Manufacturing for both innovations and the Finance-Insurance sector for the exchange rate innovation. For these two sectors, the impacts are positive and statistically significant just for the initial levels. Whereas the exchange rate and the interbank interest rate shocks mostly do not affect unemployment, Money (M1+repo) has more sizeable effects on unemployment. Money shock has negative and significant effects in the first quarters on the unemployment in Agriculture, Mining, Manufacturing, Construction, Wholesale, Transportation and the Finance sectors. This finding is interesting; interbank interest rate and exchange rate are often taken as monetary policy tools and innovations in these two variables are often considered as an indicator of monetary policy (see Berument, 2007). Therefore, one may interpret this as an evidence for the monetary policy ineffectiveness. However, measuring the monetary policy is a difficult task. The Central Bank of the Republic of Turkey (CBRT) used various aggregates to implement its policy for the time period that we consider. CBRT used money aggregates (such as monetary base or Net Domestic Asset), interbank rate, exchange rate, and spread between the interbank rate and depreciation rate as policy tool for the time period that we consider. Thus, we do not have any single series that we could use for the whole time span as a measure of the monetary policy. Therefore, the new definition which can be measured could be developed. However, interestingly, the evidence for the effect of money aggregate (M1+repo) on unemployment is strong. Thus, one may argue that interest rate channel and exchange rate channels may not be the transmission mechanism of the monetary policy rather the direct effect of monetary policy (liquidity effect) or other forms of mechanisms might be the mechanisms that transmit the monetary policy.[6] Another explanation could be put forward is that the economic performance is affected by long term interest rates but not short term interest rate (Bernanke and Reinhart, 2004). If the relationship between long and short term interest rates are not stable (evidence on this issue one may look at Berument and Froyen, 2006), then, the innovations on short term interest rate (interbank interest rate here) may not

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

affect the long term interest rates (and thus the economic performance). However, M1+repo may move with the long term interest rate and decreases unemployment.[7]

When we look at how one standard deviation shock to income affects the unemployment by sectors of economic activity, Figure 3 to 12 shows that there is no significant long run effect on unemployment. However, shock to the income generally decreases the unemployment in different economic activities except the Electricity and the Community Services which are statistically significant only at the initial levels. This suggests that income policies are more effective that than the interbank interest rate and the exchange rate policies to hamper unemployment. Therefore, income policies that also incorporate structural reforms should be emphasized for fighting unemployment in various sectors of economic activity. With regards to the unexpected positive effects of the income shocks on the unemployment in the Electricity and the Community services activities, we can offer the following observation in these two economic activity groups. First of all, we note that "Electricity" sector includes natural gas and water services which are mostly provided by the governmental organizations. The Community services activity groups includes social and personal services such as to render services for needy children in orphanages and kindergartens, services for old people at rest homes, care for children at nurseries and day care houses, and services for handicapped and paralyzed persons at rehabilitation centers. Most of these services are also provided by the governmental organizations. There is evidence that the demand for the services of these sectors and hence the derived demand for the labor in these sectors are both inelastic labor demand in the Electricity and the Community services sectors imply that the employment and hence the unemployment in these sectors may not be very responsive to the macroeconomic policy shocks we consider (see Glen, 1992 for the electricity sector). Further, the organizations of labor in these two sectors show somewhat different characteristics than in the other sectors. Labor in these two sectors are highly organized with trade unions. The general observation about the trade unions in Turkey has been that in response to various shocks they demand wage increases rather than employment increases (Senses, 1994). For this reason a positive income shock may translate into wage increases rather than employment increases and hence contributes to increases in unemployment due to non-organized part of the labor in these two sectors.

[7] We could not include the long term interest rates into the analysis directly since there is no reliable long term interest data is available (see, Berument and Yucel, 2005).

A price innovation has statistically significant and positive effects from about tenth quarter onwards on the unemployment in all of the economic activities except the unemployment in the Mining and the Community Services. Thus one may argue that the identification scheme that we used might allow us to capture the supply shocks (see Christiano et al., 1999). Alternatively, price shocks might be capturing the inefficiency. In order to reason this out we make the assumption that government sector is less efficient than the private sector (see Cakmak and Zaim, 1992). Berument (2003) argued that the biggest 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, the price shocks might be capturing the effect of the government sector pricing. High price shocks in government sector might be stemming from its 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 have a negative impact on the economy and increases unemployment. This clearly suggests that the structural reforms where privatization plays an important role might increase efficiency and decrease unemployment.

Finally, we consider the responses of the unemployment in various economic activities to their own shock. The initial responses of unemployment for most economic activities to their own shocks are positive and statistically significant for about all of the periods except the unemployment in the Agriculture, Mining, Electricity, and the Construction sectors. These shocks are persistent. Therefore, one may argue that heterodox rather than orthodox policies can use to hamper the unemployment.

The main conclusions of five macroeconomic shocks can be summarized as follows. Interbank interest rate and exchange rate is not the effective tools for fighting unemployment. Even if interbank and exchange rate do not measure the monetary policy, M1+repo could measure the monetary policy through the bank lending channel and it is an effective tool in the short run. However, it seems that the income policy is a more effective tool in affecting the unemployment than the monetary policy. Thus, government should concentrate on the income policies as well as structural adjustment policies in order to increase income and to hamper the unemployment rate rather than rely on the interest rate or the exchange rate policies.

6. Conclusion

The motivation of this paper has been the theoretical implication that unemployment is sensitive to labor market rigidities. This was reinforced by the observation that the 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 the unemployment in nine 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. Accordingly, we investigate the effect of changes in various macroeconomic policies on the unemployment by the nine sectors of economic activity in Turkey. This is performed by estimating VAR models for the period 1988:01 to 2004:04. The model includes six main macroeconomic variables: The real GDP, price, exchange rate, interbank interest rate, money supply and unemployment.

According to our findings the unemployment in different sectors of economic activity respond differently to various macroeconomic shocks. As a conclusion we can state that unemployment in the Electricity, Community Services, Agriculture and Manufacturing sectors respond somewhat differently than the other sectors such as Mining, Construction, Wholesale-Retail Trade and Finance-Insurance. For instance, income shocks cause a decline in the unemployment in all sectors of economic activities except in activities of the Electricity and the Community Services. These decreases are statistically significant only at the initial levels. Furthermore, the income shock affects the unemployment in all of the sectors of economic activity in the short run except the Mining sector. On the other hand, a price shock affects unemployment in all of the sectors in the long run except the Community Services unemployment. Unemployment responses in the various sectors are not statistically significant to changes in the exchange rate policy. With regards to the money supply innovations the results indicate that unemployment in various activities decrease and are statistical significant during the initial periods except the unemployment in the Agriculture which is positive and marginally significant in the initial periods. One unit interbank interest rate innovation has a positive and statistically significant impact in the short run on unemployment in the Manufacturing sector.

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Figure 1: GDP Growth Rate and Unemployment Rate, 1988-2004, Turkey.

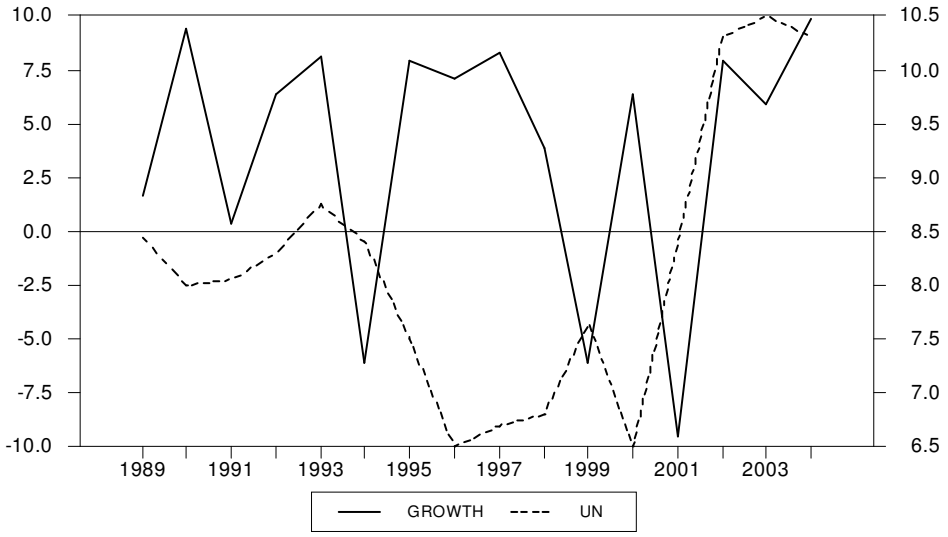

Figure 2: Unemployment by Sectors of Economic Activity, 1988-2004, Turkey

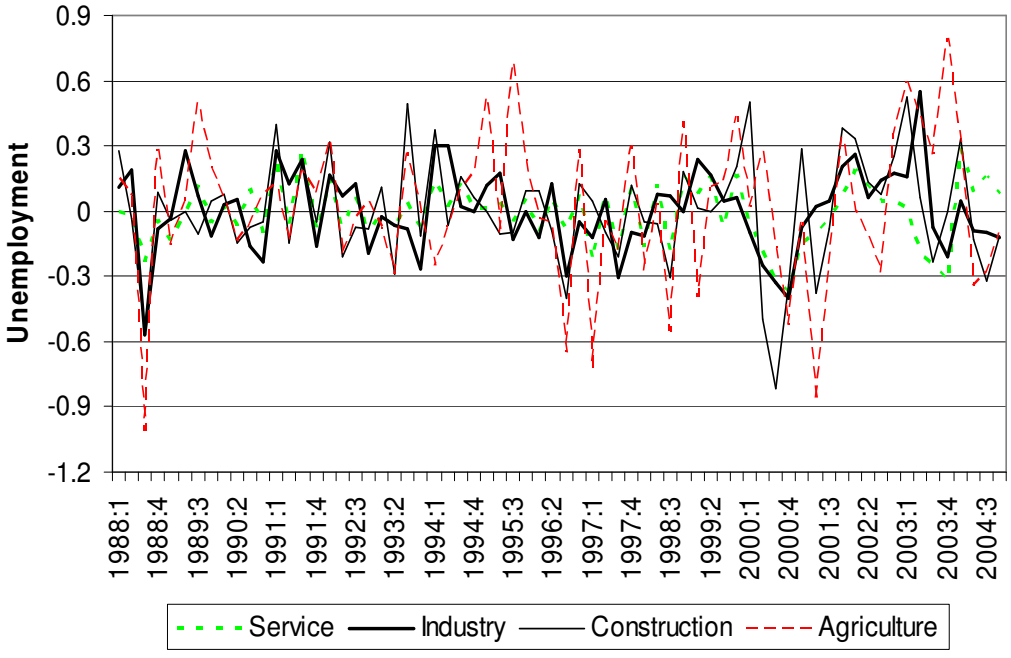

Figure 3: Responses of Total Unemployment to Economic Shocks

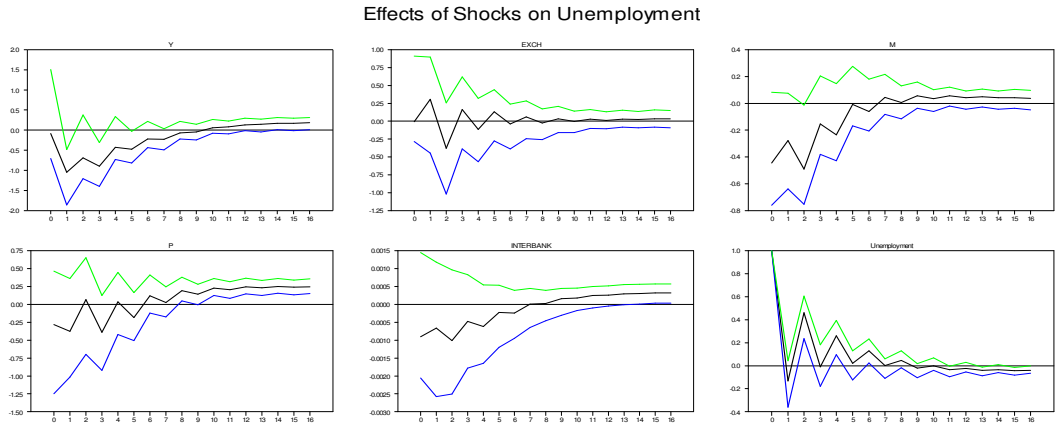

Figure 4: Responses of Agricultural Unemployment to Economic Shocks

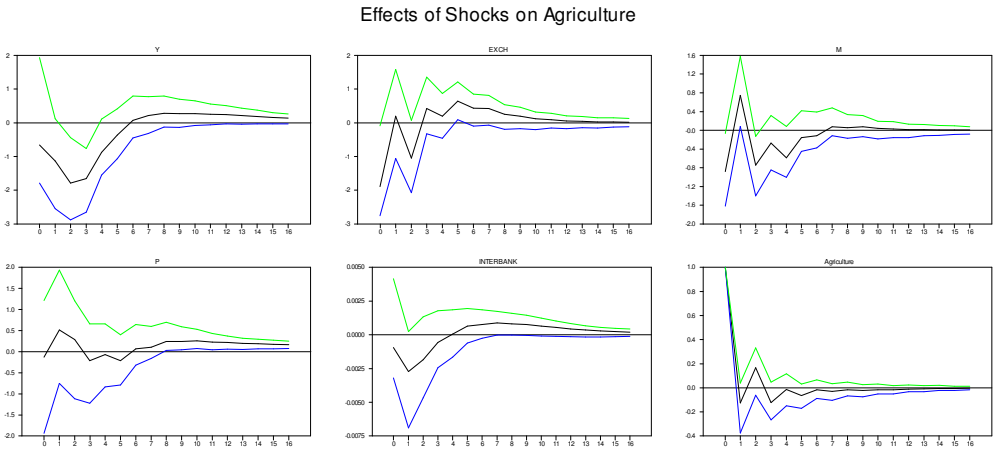

Figure 5: Responses of Mining and Quarrying Unemployment to Economic Shocks

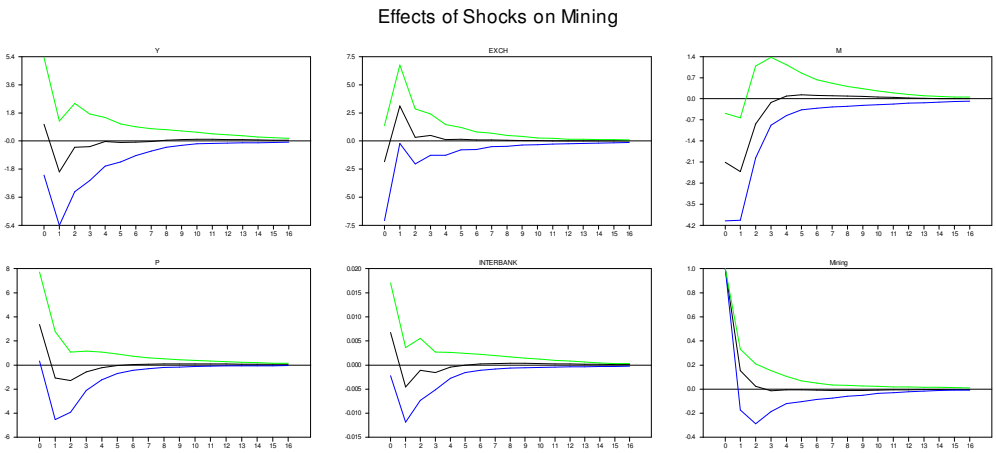

Figure 6: Responses of Manufacturing Unemployment to Economic Shocks

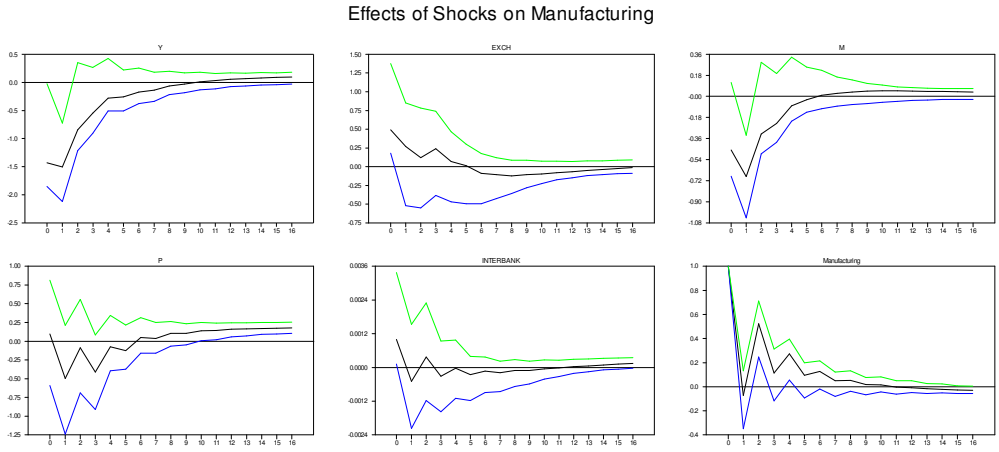

Figure 7: Responses of Electricity Unemployment to Economic Shocks

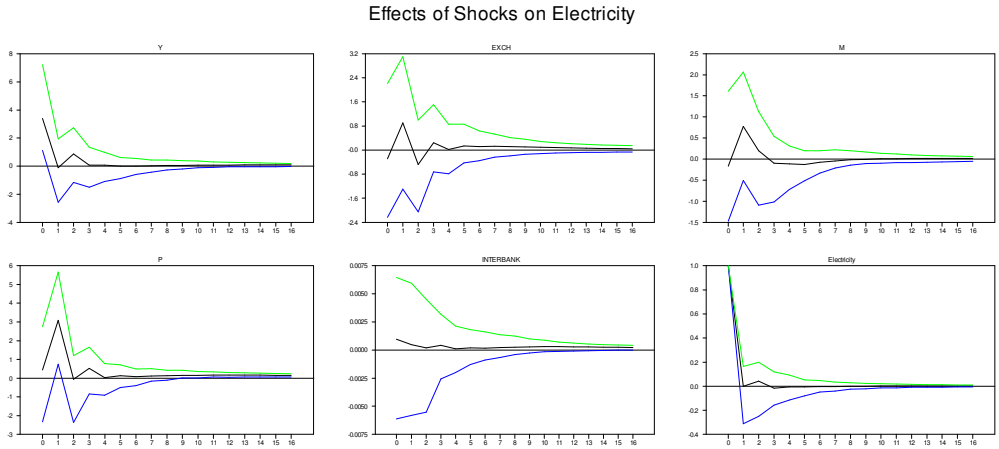

Figure 8: Responses of Construction Unemployment to Economic Shocks

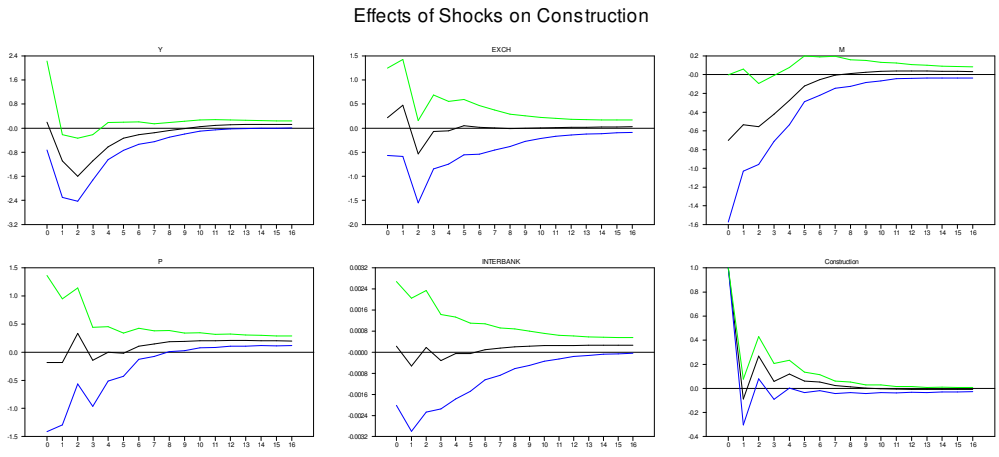

Figure 9: Responses of Wholesale-Retail Trade Unemployment to Economic Shocks

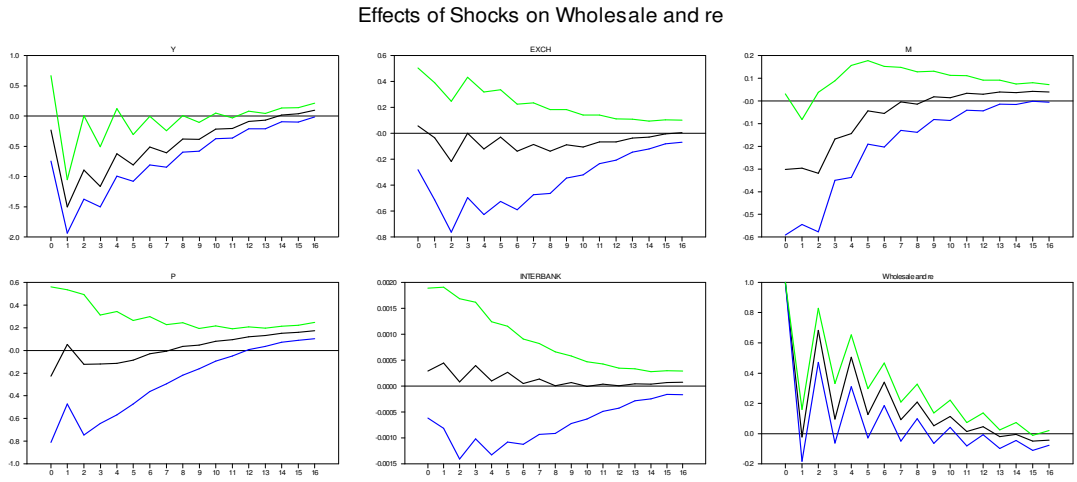

Figure 10: Responses of Transportation Unemployment to Economic Shocks

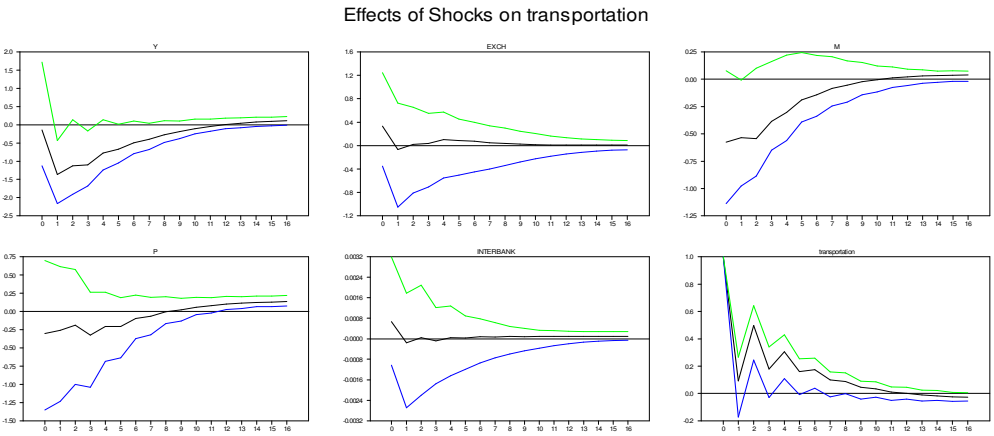

Figure 11: Responses of Finance-Insurance Unemployment to Economic Shocks

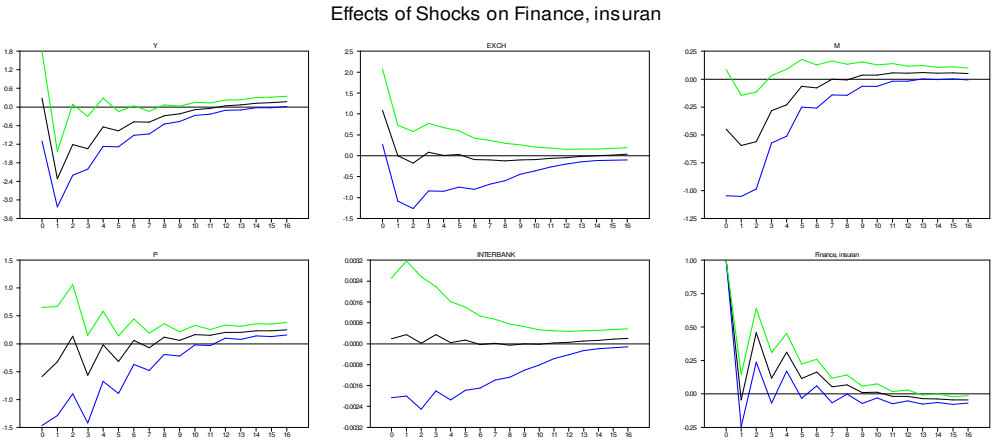
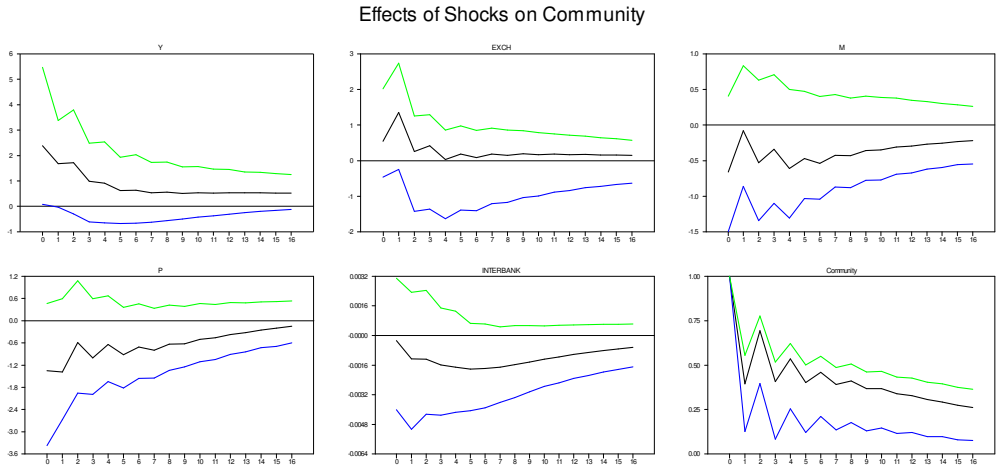
Figure 12: Responses of Community Services Unemployment to Economic Shocks