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Macroeconomic effects of reallocation shocks Evidence from the U.S.

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1. Introduction

This thesis reexamines the Sectoral Shift Hypothesis. The latter was introduced by Lillien (1982). After his seminar work was emerged a huge amount of empirical research, although there is no unifying theoretical framework that has obtained consensus. There are several empirical studies that support SSH and many studies that do not. This dispute exists because there is empirical difficulty in separating reallocation unemployment from unemployment generated by aggregate shocks. This problem is called observational equivalence problem, the contribution of the present thesis is on the univariate and the multivariate methodology which are employed in order to examine SSH. In univariate methodology, a GARCH in mean model is applied on unemployment rate equation, after the purging of Lilien's dispersion index from aggregate shocks which are potentional cause the observational equivalence problem. In multivariate methodology, the existing literature treats sectoral shocks in a symmetric way, meaning that unemployment rate will have the same amount of response in both cases of negative or positive sectoral shocks, this is an assumption which hides from us important information about the shocks. Using Hatemi (2013) asymmetric approach it's feasible to decompose sectoral shocks in positive and negative shocks and form the cumulative term of shocks, after that they can be examined if there is any difference in unemployment's rate variance decomposition, which it can be attributed to the sign of sectoral shocks.

2. Literature review

2.1. Univariate analysis

In 1982 David Lilien wrote a path breaking paper about the positive correlation between labor reallocation and unemployment rate. His insight was that labor workers are not instanteous mobile, this means that it will take time for recently laid off workers, to be hired again in an expanding sector of the economy.

Some unemployment is inevitable in free market economies. This is attributed to the changes of the taste of people, to new technologies of production and management that are invented, to changes in prices of raw materials, especially to the cost of energy (oil, gas), also the rise of more competitive countries will be able to trigger soar of unemployment. As a consequence intertemporaly will appear expanding and declining sectors of the economy. Macroeconists have separated unemployment to two segments, frictional unemployment which is the natural rate the unemployment, and the cyclical part of unemployment which is attributed to the theory of business cycles. Cyclical unemployment is caused by recession in the economy or other aggregate reasons in general. Frictional unemployment is, as it was mentioned before, the inevitable unemployment. The reasons for this unemployment is the permanent procedure in which employees quit in order to find a better job, employers fire in order to hire more qualified workers.

Since the widespread acceptance of the natural rate of unemployment, macroeconomists tend to believe that unemployment rate is fluctuations of cyclical unemployment, which have a stable natural rate of unemployment as base line. In his paper Lilien (1982) showed that more than 50% of the unemployment rate can be attributed to fluctuation of the natural rate of unemployment itself. Lilien (1982) believes that it's impossible for workers to be mobiled instantly from a declining sector to an expanding one of the economy. The reason for this is that many times laid off worked don't have the proper qualifications to be hired again to a new job, so they have to stay idle for a long time. So it is clear that when we have a reallocation shock of employment in the economy it is possible to have an increase in unemployment rate. Lilien's dispersion hypothesis claims that intersectoral shifts in demand composition operate as the driving force of unemployment fluctuations.

The stochastic equation that Lilien used is the following.

$$y_{i,t} = Y_t + \varepsilon_{it}$$

Where $y_{i,t}$ the typical firms net hiring is decomposed in an aggregate hiring rate Y_t which is common to all firms and a firm specific component ε_{it}.

The properties of the stochastic process ε_{it} characterize the Sectoral Shifts Hypothesis (SSH) because the random variable ε_{it} is distributed $\varepsilon_{it} \sim (0, \sigma_{i,t}^2)$ which means that the variance is time depended, as a result it can be inferred that the natural rate of unemployment is not stable.

To empirically implement this insight, Lilien proxies the variance of reallocation shocks by a weighted standard deviation of cross-sectoral employment growth rates using an eleven-sector decomposition of the US economy.

$$S_{t=} \left[\sum_{i=1}^{K} w_{i,t} \ (\Delta ln x_{i,t} - \Delta ln x_t)^2 \right]^{1/2}$$

Where $x_{i,t}$ is employment in sector *i* in time *t* , x_t is the aggregate employment at time *t* , *K* is the number of nonfarm sectors of the economy , $w_{i,t}$ is the weight of each sectors employment to the aggregate employment, have this form $\left(\frac{x_{i,t}}{x_t}\right)$. The data which are used to his research are US annual data from 1948 to 1980. He estimates a linear equation in which S_t is included. Equation's form is given below.

$$u_t = a_0 + a_1 S_t + \textstyle\sum_{\forall j} a_j \ z_{t-j} + e_t$$

Lilien's result bear out that unemployment rate is positively and significant correlated with S_t . This outcome has important role in policy makers because it is inferred that when the source of high unemployment is caused by sectoral shifts, measures which main purpose is to stimulate the economy will not be able to reduce high unemployment rates. This is logical because this unemployment, in modern macroeconomics, is categorized as structural unemployment. The sum of frictional unemployment and structural unemployment is the natural rate of unemployment. As structural unemployment can be characterized the mismatch of employees skills to employers demands to fulfill the requirements of the vacancy. The proper antidote if unemployment is triggered by high dispersion is to precipitate the reallocation, and let the declining sectors to die off more quickly.

Lillien's SSH has been criticized by many researchers who claimed that Lillien's S_t is contaminated by observation equivalence problem. Observational equivalence is appeared when the sectors of the economy have different sensitivity to aggregate shock, for example, an increase in crude oil price will severely hit manufacturing sector but the blow to service will not be in the same scale. As a result S_t will rise due to changes in employment on sectors but the reason for that is an aggregate shock. In his work Lilien tried to deal with this problem by using in his reduced form equation, except from dispersion and its lags as regressors, monetary variable, money supply more exactly.

Abraham & Katz (1986) have proved that the positive correlation between the dispersion of sectoral employment growth and unemployment rate is possible to bear from an aggregate shock. Provided that sectors of employment have different cyclical sensitivities. AK (1986) worked with two hypotheses. First they assumed that the aggregate labor demand was constant and there are only sectoral shifts in employment, with the presence of frictions in labor market. They found out that there is a positive relationship between dispersion of employment growth and the unemployment rate. In the Second hypothesis they proceeded with the complete ignorance of aggregate demand fluctuations on the employment growth dispersion. Something with is consistent with Lillien's work (1982). The former is true, provided that two conditions are satisfied, first all the sectors must have the same trend rate of growth. Second sectors must not differ in their sensitivity to aggregate demand fluctuations. The violation of these conditions, traditional single factor business cycle models can produce positive correlation between dispersion of employment growth (σ_t) and change in the unemployment rate (ΔU_t) even with the absence of sectoral shifts. If the single aggregate factor can be interpreted as aggregate demand, then aggregate demand fluctuations can cause this positive correlation. This will happen under the following scenarios (1) industries trend growth rates and cyclical sensitivities are negatively correlated or (2) industries differ in their cyclical sensitivities and labor force adjustment costs are asymmetric such that an increase in employment costs more than a decline of equal magnitude. Furthermore because ΔU_t and the unemployment rate U_t are positively correlated, aggregate demand fluctuations should be capable of producing a positive correlation between U_t and sectoral employment growth dispersion (σ_t), under either of these scenarios. First AK (1986) consider the implication of a negative correlation between sectors' trend rates of growth and their cyclical sensitivities. This scenario alone is sufficient to produce positive correlation between (ΔU_t) and (σ_t) , the confirmation of this statement came from a simple example, of a hypothetical two sector economy which is driven solely by transitory fluctuations in aggregate demand around its trend rate of growth. In their model they assumed that employment in the first sector trends upward rapidly but it is relatively unresponsive to cyclical movements in gross national product (GNP). Second sector on the other hand trends upward less rapidly but it is more responsive to fluctuations in GNP. To be more specific the first sector can be services and the second could be manufacturing. Equations of two sectors can be the following

$$ln\, E_{1t} = \zeta + \Gamma_{1t} + \gamma_1 (ln\, Y_t - ln\, Y_t^*)$$

$$ln\, E_{2t} = \zeta + \Gamma_{2t} + \gamma_2 (ln\, Y_t - ln\, Y_t^*)$$

Where E_{1t} and E_{2t} are employment in the two sectors t is the time trend, Y_t is the actual GNP, Y_t^* is trend GDP $\Gamma_1 > \Gamma_2$ because service sector is growing in at a more rapid trend rate than manufacturing sector and $\gamma_1 < \gamma_2$ because service employment is less cyclically responsive than manufacturing employment. The dispersion of the rate of growth of employment across sectors at any time is defined as

$$\sigma_t = \left[\frac{E_{1,t}}{E_t} \left(\Delta ln E_{1,t} - \Delta ln E_t\right)^2 + \frac{E_{2,t}}{E_t} \left(\Delta ln E_{2,t} - \Delta ln E_t\right)^2 \right]^{1/2}$$

This is approximately equal to

$$\left| {}^{1}/{}_{2}\ (\Gamma_1 - \Gamma_2) + {}^{1}/{}_{2}\ (\gamma_1 - \gamma_2)\,(\Delta ln\, Y_t - \Delta ln\, Y_t^*) \right|$$

If we assume that the two sectors start out equal in size

Here it's possible to examine how will σ_t move over the business cycle. In the specific example we have that $\gamma_1 < \gamma_2$, so that $\gamma_1 - \gamma_2 < 0$, it is obvious that in order to be positive the second term of equation real rate GNP must be smaller than trade rate of GNP growth . This can happens during a recession. So it is clear that σ_t is greater during recessions and smaller during upturns.

Okun's law relationship bears that there is a negative relationship between unemployment rate and deviations of GNP from trend

$$U_t = \omega + \theta(lnY_t - lnY_t^*) \quad \text{where } \theta < 0.$$

Unemployment rises when the actual growth rate falls short of the trend growth rate (in a recession), and falls when the actual growth rate exceeds the trend growth rate (in an upturn). This means that σ_t and ΔU_t are positively correlated. The existence of a negative correlation between sectors' trade rates of growth and their cyclical sensitivities. We come to conclusion that ΔU_t and σ_t are positive correlated. Also in a single business cycle model in which sectors of the economy, have different sensitivities to a common shock may also generate a positive correlation between ΔU_t and σ_t , even if sectors trade rates are similar. This will occur if firms have asymmetric labor force adjustment costs in which firing cost is lesser than hiring cost. Weiss (1984) has shown in this type of model that if all firms have the same direction response to a shock but they don't share the same sensitivity and if upturns last as long as downturns, hiring costs that exceed firing costs will cause the dispersion in sector employment growth to be greater in downturns. So ΔU_t and σ_t will be positive correlated if industries have different cyclical sensitivities, and if it's easier for firms to reduce employment rapidly than increase employment rapidly.

AK (1986) found that the necessary conditions that enable aggregate demand fluctuations to generate a positive correlation between ΔU_t and σ_t exists in postwar data of the US .There is a negative correlation across industries between the trade rate of growth and the responsive of employment to cyclical fluctuations.

To present this they create models of the following form for each of 11 sectors

$$\Delta \ln E_{it} = \Gamma_{1i} + \Gamma_{2it} + \gamma_{1i}(\Delta \ln Y_t - \Delta \ln Y_t^*) + \gamma_{2i}(\Delta \ln Y_{t-1} - \Delta \ln Y_{t-1}^*) + \varepsilon_{it}$$

where E_{it} is the employment in sector *.i* , *t* is a time trend, $\ln Y_t$ is *log(GNP),* $\ln Y_t^*$ is the trend value of *log(GNP)*, and *Γ s* and *γ* s are parameters. Simple correlation between detraded $\Delta \ln E_{it}$ and the sum of *γ's* based on coefficients from OLS estimated from *US* annual data from 1949:1980 is found negative. So AK (1986) succeed to reveal that aggregate demand fluctuations are able to produce positive correlation between the dispersion of employment growth and the change in unemployment (ΔU_t andσ_t). It s obvious that ΔU_t and U_t are positive correlated, and finally this implies that positive relationship between U_t *and* σ_t does not necessarily imply an important for sectoral shifts in cyclical fluctuations.

AK (1986) came to result that positive correlation can be generated both by sectoral shift hypothesis and aggregate demand fluctuations, in order to distinguish which of them has the more important influence, they figured out that the variable of job vacancies can reveal the truth. If the pure sectoral shift hypothesis had correctly captured that (U_t *and*σ_t) are positively correlated, then (V_t *and* σ_t) should also be positively correlated. On the contrary if aggregate fluctuations produce the positive correlation at (U_t and σ_t), there must be a negative correlation between *(V_t andσ_t)*. The above predictions are founded on Beveridge curve supporting that there is an inverse relationship between *(V_t and U_t),* an aggregate shock, having the structure of the economy fixed, of the economy will lead to increase of unemployment rate and subsequently to a decline of vacant jobs, due to upcoming recession firms will be unwilling to expand their business. When there are changes in the structural characteristics of the economy the UV curve shifts either outwards if the matching between employees and jobs is getting worse and inward if there is a better matching. So an increase of dispersion of sectoral employment growth will lead to an outward shift of UV curve and positive correlation of *(V_t and U_t)*, and positive correlation of *(V_t and σ_t)*. On the other hand if there is a negative correlation between *(V_t and σ_t)* then it can be accrued that the driving cause of unemployment rise is an aggregate shock. As a proxy for job vacancies they used the normalized help wanted index (NHWI) and they found that (NHWI) and σ_t are negative correlated which means that an aggregate reason is responsible for the positive correlation between (U_t and σ_t) and not sectoral shifts.

AK (1986) formed unemployment and help wanted index equations in order to verify their assumptions. The first equation for unemployment was similar to Lillien (1982).

$$U_t = a_0 + \alpha_1\sigma_t + \alpha_2\sigma_{t-1} + \alpha_3 DMR_t + a_4 DMR_{t-1} + a_5 DMR_{t-2} + \alpha_6 U_{t-1} + \alpha_7 t + e_t$$

Where U_t represents the civilian unemployment rate, σ_t is the dispersion in employment growth rate, DMR_t is the unanticipated money growth supply, *t* is time trend, the *a's* are coefficients to be estimated and e_t is error term. With an OLS estimate on 1949:1980 annual data AK obtained positive and significant coefficients of σ_t and σ_{t-1} as Lillien did, and interpreted the positive correlatation as evidence that more rapid structural changes lead to high unemployment rates. AK also form an equation like the above, with the difference that instead of U_t they place $NHWI_t$ as a proxy for vacancy rate.

$$NHWI_t = b_0 + b_1\sigma_t + b_2\sigma_{t-1} + b_3 DMR_t + b_4 DMR_{t-1} + b_5 DMR_{t-2} + b_6 NHWI_{t-1} + \alpha_7 t + w_t$$

As it is mentioned before a positive correlation between $NHWI_t$ and σ_t supports that structural change interpretation raises unemployment as it is claimed by Lillien. On the contrary a negative correlation supports that aggregate shock is responsible for dispersion raise and the subsequent soar of unemployment. AK found that there is a negative and significant correlation between $(NHWI_t$ and $\sigma_t, \sigma_{t-1})$ $(b_1 \quad ,b_2)$<0

So empirical results did not support the sectoral shift hypothesis. On the contrary they provide support for the aggregate disturbance hypothesis. To sum up AK (1986) assertion there are evidence that support the view of cyclical unemployment movements to be primaly related to aggregate shocks. Provided that the sectors in the economy have different cyclical responsiveness to aggregate disturbances, due to that difference both dispersion in employment growth rates and unemployment are affected, producing a positive correlation between them.

AK assertion is refuted by Hossios (1994), he found evidence that the negative correlation between vacancies and dispersion of employment growth rates is not only by aggregate reasons because recently laid off workers believe that they will return to their old job or a similar one in the same sector. This happens because they have experience and subsequently higher wages, so they are reluctant to search for another job in different sector, unless they will be paid well, employers know that and in short term they are less prone to expand their businesses in order to avoid temporary high labor cost. This is a logical explanation for negative correlation between dispersion and vacancy rate. On the other hand neither sectoral shifts hypothesis can be supported by Hossios (1994), his contribution to the topic is that with U-V curve alone it's impossible to figure out which reason cause unemployment rise.

An effective way to distinguish which is the main reason for positive correlation of dispersion of sectoral growth employment and unemployment rate, is to purge Lillien's proxy from aggregate effects in order to handle the observational equivalence problem. They have been developed different methods of purging first it have to be demonstrated what is purging. When we have obtain Lilliens proxy σ_t we regress it on aggregate variables and we have

$$\sigma_t = b_0 + \sum_{j=0}^{q} b_j \, z_{t-j} + v_t$$

The choice of aggregate variables depend on the researcher Abraham and Katz (1987), Neelin (1987), Samson (1990) used only monetary variables, instead Mills, Pelloni, Zervogianni (1995) used both monetary and real variables . The above procedure of purging continues by using the residuals v_t as the purged dispersion of employment growth in the following equation.

$$u_t = a_0 + a1\nu_t + \sum_{j=0}^{T} a_{2j}\, g_{t-j} + \xi_t$$

As the choice of variables (z, g) depends on the researcher there always exists the problem of either over purging or under purging, most researchers tend to reject the sectoral shifts hypothesis. There are two exceptions, the first is MPZ (1995) they found positive correlation of unemployment rate both with purged and unpurged proxy of dispersion of sectoral employment growth. A different modeling of money growth is implemented, and finally they used updated quarterly data of US from 1960 to 1991. The Second exception was from Byun and Hwang (2006) who claimed that dispersion can sufficiently capture sectoral shifts, provided that the allocative shock has a symmetric distribution. If skewness is existed then results are affected and we have to include skewness in the regression model in order to improve the results. Kurtosis was also tested but did not seem to play a significant role. Skewness seems to be negative correlated with the unemployment rate. Once skewness is included in reduced form of unemployment even AK can't reject the sectoral shifts hypothesis. Unfortunately because we aren't able to eliminate the possibilities of mis-specifying errors or spurious regressions we are not able to verify the sectoral shift hypothesis.

Davis (1987) claimed that there were two implication that they can be tested with sectoral shifts hypothesis (1) The stage of business cycle effect (SBCE) and (2) the past patterns of labor reallocation (PPLR).

The SBCE is that sectoral shifts could be affected by the stage of business cycle, in other words there is an incentive to have intense reallocation process during recessions because the opportunity cost of losses in production are small , on the contrary during expansions when the opportunity cost of losses in production is high we have milder reallocation process. Using different methodology Davis (1987) rejects the SBCE, but MPZ (1995) accept it.

The PPLR expresses the present attachments of employees to specific sectors, there is a real allocation of workers across sectors, and also there is a desired allocation of labor which maximizes the profits for the economy. The distance between real and desired allocation can be affected by shocks in uneven periods. It is obvious that the longer the distance, the greater the mismatches in labor market and the higher the unemployment rate will be. A shock that extends this distance will have adverse effect on unemployment, on the contrary a shock that moves desired allocation towards real allocation will have milder effects on unemployment, it possible even to decrease unemployment rate. Davis (1987) find that PPLR have positive and significant influence on unemployment rate, while MPZ (1995) find also positive correlation ,but not significant different from zero. Despite that MPZ (1996) in a research on UK data 1976-1991) find evidence that support PPLR. The way that PPLR was formed is via this equation.

$$S_{t,j}^{H} = \sum_{i=1}^{K} w_{it} \left(\Delta_1 lnx_{i,t} - \Delta_1 lnx_t\right)\left(\Delta_j lnx_{i,t-1} - \Delta_j lnx_{t-1}\right) \text{ with } j = 1,2,3,..J$$

This is called horizon covariance's and measures the current direction of intersecoral reallocations relative to past directions.

The above form is included in reduced form unemployment equations.

2.2. Multivariate analysis

The use of dispersion indexes within reduced form equations has been criticized as a dead end strategy. As a consequence multivariate methodologies came to use, such as Vector auto regressions (VAR). In this area of econometric methodologies there is an important contribution of Campbell and Kuttner (1996) who proposed the usage of structural VAR (SVAR) approach to identify aggregate and sector specific impulses. They claimed that with this methodology it is possible to examine alternative restrictions, in any possible identification and not the ordinary cholesky decomposition for impulse analyses. As a starting basic structure CK(1996) have used a bivariate VAR of the natural logarithms of manufacturing employment share and aggregate employment. Data are monthly from 1955:2 to 1994:12. These variables are I(1), they use manufacturing employment share because the main separation is manufacturing and non-manufacturing sector. Their procedure is the following they use the bivariate VAR

$$y_t = (\Delta x_t , \Delta w_t)$$

$$y_t = A(L)\, y_t + \varepsilon_t$$

$$\begin{bmatrix} \Delta x_t \\ \Delta w_t \end{bmatrix} = \begin{bmatrix} 0 & a_{xw}^0 \\ a_{wx}^0 & 0 \end{bmatrix} \begin{bmatrix} \Delta x_t \\ \Delta w_t \end{bmatrix} + \begin{bmatrix} A_{xx}(L) & A_{xw}(L) \\ A_{wx}(L) & A_{ww}(L) \end{bmatrix} \begin{bmatrix} \Delta x_{t-1} \\ \Delta w_{t-1} \end{bmatrix} + \begin{bmatrix} u_t \\ v_t \end{bmatrix}$$

Where *A(L)* is a matrix of lag polynomials of order *p* and $\varepsilon_t = u_t + v_t$ is a vector of white noise shocks consisting of two components mutually and serially uncorrelated: orthogonal aggregate shocks u_t and reallocation shocks v_t. So $A_{h,k}(L)$ is lag polynomial summarizing the effect over time of the h^{th} variable on the k^{th} variable and *A(0)* would be the sub-matrix of the contemporaneous effects whose elements along the main diagonal are zeros

$$A(0)= \begin{pmatrix} 0 & a_{xw}^0 \\ a_{wx}^0 & 0 \end{pmatrix}$$

a_{xw}^0 Represent the contemporaneous effect of manufacturing employment share on the total employment and a_{wx}^0 is the contemporaneous effect of total employment on manufacturing employment share. CK (1996) first identifying scheme is that $a_{xw}^0 = 0$ this is the cholesky decomposition in which total employment is ordering first and after that is manufacturing employment share. This is a naïve assumption because the SSH is ad hoc violated, the purpose of this assumption is the establishment of a solid base in their approach. Under this restriction CK found that reallocation (manufacturing employment share) shocks account for a large amount *(59%)* of the variation in manufacturing employment and aggregate shocks account for the remaining *(41%)* , but only *a (6%)* of aggregate employment fluctuations, in due to manufacturing employment share shocks. Thus even with this hostile assumption to reallocation shock a big amount of manufacturing variance is due to reallocation shocks. Also there exists an impact in aggregate employment variance from reallocation shocks, even with this cholesky ordering.

The second identification scheme of CK (1996) is with the assumption that there is long run neutrality from aggregate employment shocks to manufacturing employment share. This method is referred to Blanchard and Quah (1989) as an alternative method to identify a VAR with long run assumptions. This long run multiplies are defined as

$$\gamma_{xw} = \frac{[a^0_{xw} + A_{xw}(1)]}{[1 - A_{xw}(1)]}$$

$$\gamma_{wx} = \frac{[a^0_{wx} + A_{wx}(1)]}{[1 - A_{wx}(1)]}$$

CK assumed that aggregate shocks have no long run effect on the manufacturing employment share, thus γ_{wx} =0. The insight of this hypothesis is that aggregate shocks can explain temporary changes in the returns of capital across sectors. An aggregate shock could be attributed to many demand side shocks. So there are no any lasting effects on capital distribution which is the main factor for manufacturing. From this assumption were generated different results in variance decomposition shares, reallocation shocks now account for (51%) of total employment variance and almost for all the variance in manufacturing. Additionally a 1% positive shock to manufacturing share raises aggregate employment by 0.5% in a month and a permanent 1% shock raise in manufacturing causes 0.8% increase in aggregate employment in the long run. These results obviously support Lillien's SSH.

The third identification scheme of CK (1996) they add the price of crude petroleum. In the previous bivariate VAR. The results for the estimated multiplies are similar to those obtained under the long run restrictions. The variance decomposition of aggregate employment is associated 10% to oil shocks, to 43% to reallocation shocks. CK also apply a more elaborate model a seven dimensional VAR including five extra sectors, which are the employment sectors of construction, transportation, wholesale and retail trade, government, insurance/real estate. Oil price variable is not included in this VAR. Variance decomposition of aggregate employment under the short run restriction that aggregate employment shocks are ahead of sectoral employment shocks, so 27% of aggregate employment fluctuations are caused from reallocation shocks and the remaining 73% from aggregate employment shocks. As it was mentioned before this short run restriction are ad hoc opposed to SSH. Even with this restriction they found an important evidence in favour of SSH.

Additionally it is tested under the long run neutrality restriction that aggregate shocks have no impact on employment share. The outcome from this assumption is that aggregate employment fluctuation is in 18% from aggregate shocks and the rest 82% from sectoral employment shocks.

Faust and Leeper (1997) support that CK (1996) SVAR has shortcomings in long run restrictions, they claimed that long-run neutrality restrictions are not normally sufficient to draw reliable results because of aggregation problems across variables and across time. FL argue that long run zero restrictions should be on finite horizon dynamics, because in the infinite future there are many reduced forms equations that they fit the sample. CK did not impose restriction in finite horizon dynamics.

Another serious shortcoming in CK research is that the reallocation disturbances have directional nature like aggregate disturbances. This is not consistent with the basic SSH that allocative innovations generate a reallocation process which is followed by greater variance in aggregate unemployment. Davis (1986) has stressed that sectoral shocks are not divided to positive or negative like aggregate shocks. According to Davis (1986) they are separated to favorable and unfavorable shocks to the existing allocation of resources. CK (1996) had recognize that it somehow departs from the standard view of sectoral shifts. The symmetric treatment of shocks means that the direction of the shock is what it counts and not the size of it, for example if the manufacturing employment share has a positive shock aggregate employment will rise and the shock is negative aggregate employment will fall. To tackle this problem it has to be employed a non linear approach, which will treat the disturbance according to its size and not sign.

Pelloni and Polasek (1999, 2003) follow CK (1996) approach with some differences they enrich Lillien's assumption that

$$y_{i,t} = Y_t + \varepsilon_{it}$$

And they argue that ε_{it} is not constant it has the following form

$$\varepsilon_{it} = u_{i,t}(h_t^i)^{1/2}$$

$$h_{i,t} = a + \sum_{j=1}^{q} \theta_j^i \, \varepsilon_{i,j-1}^2$$

With $u_{i,t}$~*iidN(0,1)* and $h_{i,t}$= Var($\varepsilon_{it}|I_{t-1}$) so the error term in Lilliens hypothesis is an ARCH generating process. The idea of volatility clustering has not been used in macroeconomic issues, it seems logical because periods of high volatility produce uncertainty to economic agents. Which make volatility clusters to endure for a long period of time. Conditional variance can now capture not only time varying variance but also a potential phenomenon of volatility clustering

Pelloni and Polasek(1999) apply a five dimensional VAR with, total employment, and the employment shares of durable, nondurable manufacturing, transport and service sectors, in natural logarithms. The VAR had the following form

$$y_t = A(L)y_t + B(L)h_t + \varepsilon_t$$

Where B(L) is a lag polynomial, h_t is a vector of conditional variances and ε_t is a vector of mutually and serially uncorrelated random errors. This is a VAR GARCH-M model, in this specification conditional means are function of the contemporaneous and lagged values of the conditional variances. The estimated conditional variances can be interpreted as measures of actual reallocations, and *B(L)*h_t component represents how the measured volatility affects back on the means aggregate and sectoral employment growths. PP (1999) with this model the produce a non linear model which overcome CK (1996) model drawback, in which sectoral shock treated symmetrically according to their direction and not according to their size. The non linearity feature in this model can be identified in shocks volatility, and its effect on conditional mean with GARCH-M model. The results of their experiment are based on quarterly US data from (1975Q1-1990Q4). The results are strongly supporting the SSH, because in variance decomposition they found that 65% of aggregate employment variance is caused by sectoral innovations. Surprisingly in choleski ordering aggregate employment is placed ahead of sectoral share employment.

The problem of nonlinearity in macroeconomic series has been subject of research in Panagiotidis and Pelloni (2007) paper and especially in labor market data series. In Pelloni Polasek (1999,2003) and Panagiotidis, Pelloni, Polasek (2003) as it is mentioned before they stressed that the assumption of symmetry in shock, overlooking of the nonlinear structure of sectoral shocks could distorts the results. To deal this problem a VAR GARCH-M has been employed. None of the aforementioned studies developed explanationary tests for the possibly that there is nonlinearity in univariate series. Also there are no tests in at the multivariate level , in general terms. PP (2007) took data from US and Canadian labor market. These time series are monthly data from (1983 to 2000) and specifically 6 series the aggregate employment, construction employment, finance sector employment, manufacturing employment, trade employment and the unemployment rate which is reformed with logistic transformation.

$$\ln\left\{\frac{y_t}{(1-y_t)}\right\} \quad 0\leq y_t \leq 1$$

All series are integrated so they used the natural logarithm difference.

The procedure was to specify the more appropriate AR model for each sere. Then the residuals of each AR model are tested in five tests with null hypothesis the linearity. These tests are the McLeod-Li and Engle for ARCH presence. TSay test with alternative hypothesis the prese3nce of a TAR model. And two general linearity test the BDS and BIcovarience. They came to the conclusion that in US labor market are evidence for non linearity in sectoral employment, linearity for unemployment rate although there are non linearity suggesting for aggregate employment. The conclusion for Canadian data is that there is nonlinearity In unemployment rate but linearity in aggregate employment, the opposite from Us data. In sectoral data there are non linearity suggestion with the ambiguity in manufacturing data where only the BDS test reject the hypothesis of linearity in data.

3. Data-Methodology

3.1. Univariate Methodology

In our model the following variables are used.

M1 money stock which is retrieved from FRED monthly seasonal adjusted data from 1959:1 to 2013:7 in our research we took the year month log difference. $\ln\frac{M1_t}{M1_{t-12}}$. In order to represent money growth.

In order to approach inflation we retrieved *cpi_all* from FRED monthly season adjusted data from 1959:1 to 2013:7. In which we used the same procedure as *M1*.

Also from FRED database we used the *tbill3M* interest rate with the same procedure we obtained the rate in 3Mtbill so as to represent the nominal interest rate.

Real interest rate can be represented by the difference of *tbill* rate and *cpi_all* rate.

The variable *Un* is also log difference unemployment rate $ln\frac{Un_t}{Un_{t-12}}$

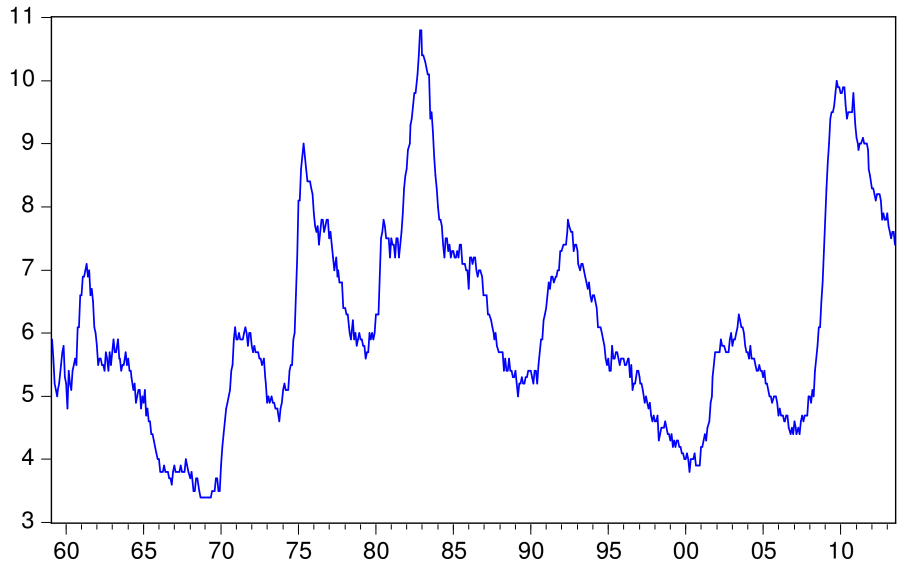


Figure 1 percentage of unemployment rate

3.2. Econometric specification

Money Growth Equation

In our model we have to set up a money growth equation with it, we will try to simulate the expected money growth. A simple approach was taken, the variable of M_1 is regressed on its own lag and on first lag of real interest rate Money growth has the following form.

$$M_1 = a + bM_1(-1) + c\ real\ int(-1) + DMR_t \quad (1)$$

Where DMR_t is the unexpected money growth, furthermore it is introduced the variable

$$DME = M1 - DMR \quad (2)$$

DME is the expected money growth which is the difference from actual and unexpected money growth.

Lilien (1982) claimed that labor reallocation is positive correlated with unemployment rate, Lilliens approximation index for labor reallocation is the following.

$$S_{t=} \left[\sum_{i=1}^{K} w_{i,t}\ (\Delta lnx_{i,t} - \Delta lnx_t)^2 \right]^{1/2} \quad (3)$$

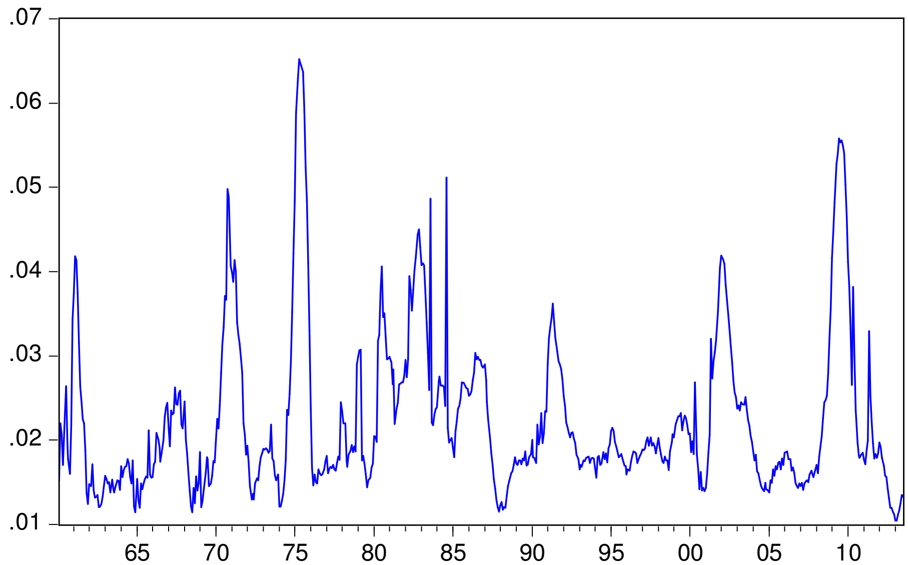


Figure 2 dispersion index S_t

In order to confirm the positive correlation a regression was run the unemployment change on its own lag and on S index and its first lag.

$$Un_t = c + aUn_{t-1} + b_1 S_t + b_2 S_{t-1} + e_t$$

The outcome from this regression is the anticipated, there is an existence of positive correlation between unemployment change and labor dispersion index.

$$Un_t = -0.009c + 0.942Un_{t-1} + 3.15S_t + 2.72S_{t-1} \quad (4)$$

(0.007) (0.02) (0.84) (0.74)

Standard error is in the parenthesis.

3.3. Purging process

To overcome the observational equivalence problem which contaminates the dispersion *S*. A purging procedure of *S* from aggregates shocks was followed. Index of dispersion of labor reallocation was regressed on his two lags, on expected money growth and its lag, on lagged unexpected money growth, on *sp500* index and on *tbill* ratio. As a result the purging equation is the following.

$$S_t = -0.0063 + 0.767S_{t-1} + 0.135S_{t-2} + 5.12DME_t - 4.95DME_{t-1} - 4.94DMR_{t-1}$$

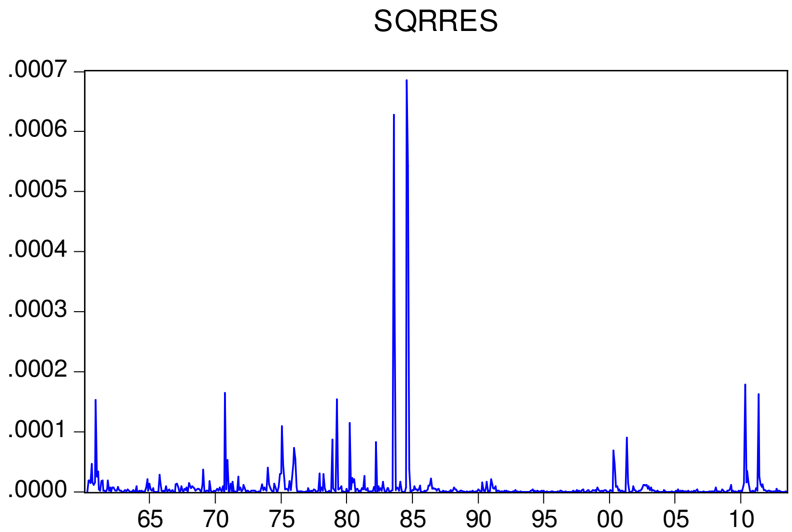
(0.003) (0.038) (0.038) (1.75) (1.69) (1.69)

$$-0.006sp500_{t-1} + 0.0138tbill_{t-1} + \xi_t \qquad (5)$$

(0.00085) (0.0049)

All the regressors are significant and they seem logical according to theory that *S* index is positively correlated with unemployment rate. ξ_t is purged from aggregate factors and it can be inferred that ξ_t represents reallocation process.

Squared residuals from the above regression are in the following diagram, in second diagram is index *S* unpurged, in order to examine them together.



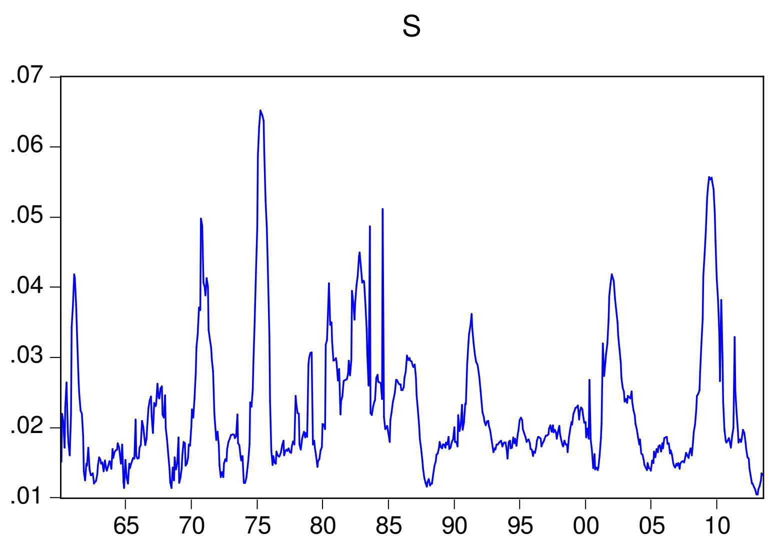


Figure 3,4 squared residuals of purged dispersion and dispersion in primitive form

There is a coincide of peaks between diagrams, of course in a different scale. Also it's figured out that *S* after purging process has smaller values because a major part of it can be explained by aggregate reasons.

After that we have to run again the regression of unemployment rate on its own first lag this time on residuals ξ_t and. ξ_{t-1} to examine if the positive correlation still exists.

$$Un_t = 0.00013 + 1.959\xi_t + 1.669\xi_{t-1} + 0.959Un_{t-1} \quad (6)$$

(0.0016) (0.544) (0.546) (0.01)

Positive correlation of unemployment rate and labor dispersion still holds and it is significant.

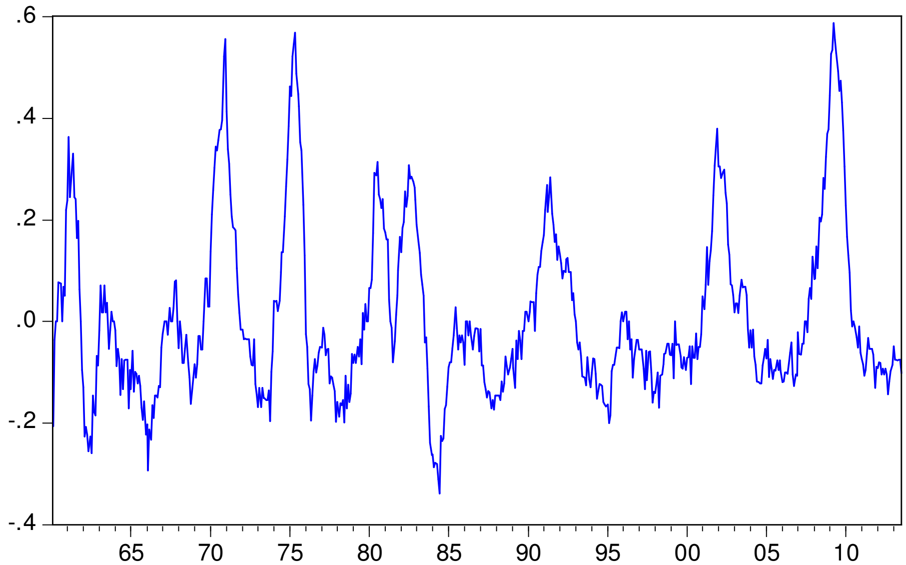


Figure 5 Logarithmic change of unemployment rate

In the above diagram is the logarithmic year month change of unemployment rate. There is a suspicion that maybe unemployment change is affected from its variance. It can be tested from a GARCH-in-mean model with threshold.

We have the following regression

$$Un_t = 6.146SQGarc_t - 0.245 + 1.308\xi_t + 1.468\xi_{t-1} + 0.567Un_{t-1} + 0.2872Un_{t-2} + e_t$$

(1.65) (0.066) (0.622) (0.61) (0.055) (0.049) (7)

$$SQGarc_{t=}0.00023 + 0.074e_{t-1}^2 - 0.107e_{t-1}^2(e_{t-1}<0) + 0.832Garc_{t-1}$$

0.000009) (0.02) (0.026) (0.062)

All regressors are significant and there is a GARCH effect in mean which it can be interpreted that an increase in unemployment change can be attributed also to an increase of unemployment change volatility. Also the threshold factor is significant and negative. The essence of this factor is that when unemployment change is lower than the anticipated, its variance is also declined.

Purging process has been criticized that after that dispersion index maybe will be over purged. In order to examine if the GARCH-in-mean term is significant another regression will be run. This time will be used dispersion index unpurged this time.

$$Un_t = 0.7738SQGarc_t - 0.044 + 2.44S_t - 1.87S_{t-1} + 0.9Un_{t-1} + e_t \quad (8)$$

(0.31) (0.015) (0.65) (0.58) (0.023)

$$SQGarc_{t=}0.00012 + 0.114e_{t-1}^2 - 0.066e_{t-1}^2(e_{t-1}<0) + 0.843Garc_{t-1}$$

(0.000009) (0.032) (0.036) (0.056)

GARCH term is also positive and significant, correlation of dispersion index and unemployment change is also positive and threshold term is negative and significant as in the former regression.

The purging procedure, in which the dispersion index was cleaned from aggregate factors, dispersion S was regressed on its own lags. It is essential to do the same procedure this time without regressing it on its own lags. So we have the following results.

$$S_t = -0.0374 + 33.23DME_t - 32.082DME_{t-1} - 32.13DMR_{t-1} + 0.006sp500_{t-1} +$$

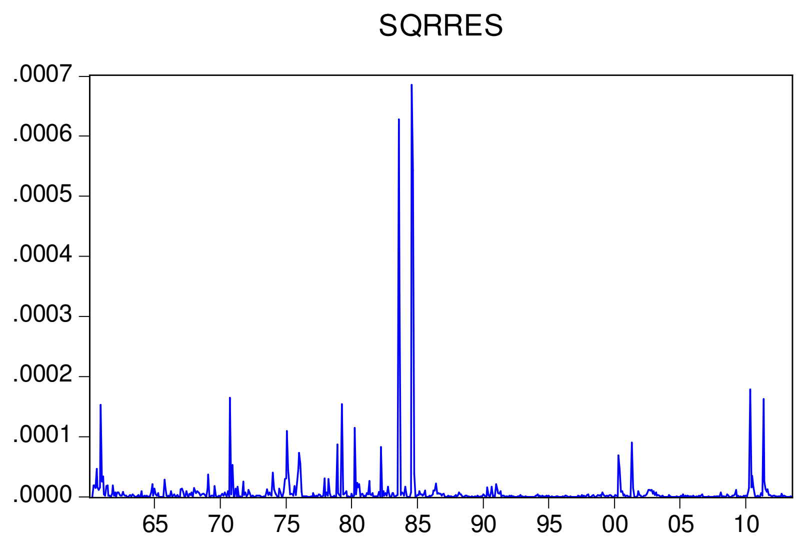
(0.007) (4.23) (4.1) (4.1) (0.002)

$$0.086tbill_{t-1} + \xi_t \quad (9)$$

(0.012)

All terms are significant and they have the same influence as former purging process

Residuals ξ_t are the purged dispersion from aggregate factors Below are the squares residuals from the two purging procedures the first diagram is from the first purging process and the second is from purging process without the use from dispersions own lags as regressors.



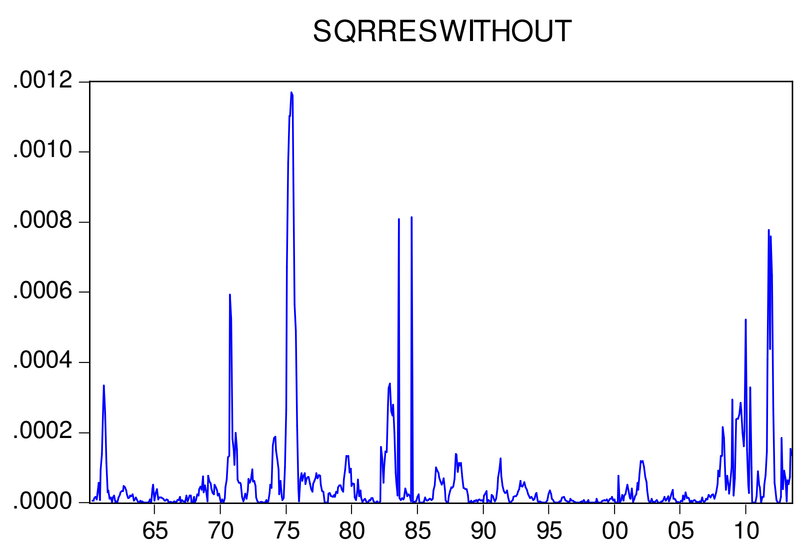


Figure 6,7 dispersion index purged when s purged on its own lags and not

It is obvious that there are the same peaks on both diagrams but in the second diagram values are magnified.

Our last step is to verify if, by using these residuals will have the same results and especially if the GARCH-in-Mean term is significant.

$$Un_t = 5.911SQGarc_t - 0.237 + 0.695\xi_t + 0.547Un_{t-1} + 0.272Un_{t-1} + e_t$$

(1.28) (0.051) (0.38) (0.058) (0.053)

$$SQGarc_{t=}0.0002 + 0.085e_{t-1}^2 - 0{,}12e_{t-1}^2(e_{t-1}<0) + 0.827Garc_{t-1} \quad (10)$$

(0.000009) (0.025) (0.025) (0.06)

We conclude that all terms are significant and the same correlations are existed. The policy meanings from these results are that events which get the unemployment change variance milder, have a positive effect on employment. In an attempt to explain it, it can be inferred that periods with relatively low unemployment variance, are tranquil periods with low uncertainty.

3.4. Multivariate methodology

Multivariate analysis approach will enable us to examine SSH. A six variable VAR will be used for this reason, these variables are levels of unemployment rate, manufacturing share of employment, construction share of employment, trade share of employment, financial services share of employment and finally the government sector share of employment. To specify instead of unemployment it is used the logistic transformation of unemployment rate.

$$\ln\left\{\frac{y_t}{(1-y_{t)}}\right\} \quad 0\leq y_t \leq 1$$

All these six variables will be used in levels, and in logarithms.

$$\ln X_t$$

As it is mentioned, in literature review part, a serious drawback of CK (1996) VAR methodology is that shocks are treated symmetrically. They assumed that negative and positive shocks have the same impact on mean of equations. There are many reasons to believe that this is not true because labor market agents will respond with different way if there is a positive shock in a sectors share employment than a negative shock in sectoral share employment. To justify this, it's easily inferred that it is easier for employers to hire than to fire employees. The intuition to overcome this obstacle is to use asymmetric responses for our variables; in this model it's employed the positive shock responses.

Sims (1980) introduced the impulse response functions in order to capture the dynamic interactions among the variables across the time, this can be achieved if the VAR will be transformed to a vector of moving average representation. This transformation can be done only if the VAR is identified, Sims employed cholesky decomposition to identify the model. The serious flaw of this decomposition is that the impulse functions are sensitive to the cholesky ordering of the variables. Koop et al (1996) and Pesaran and Shin (1998) have introduced generalized impulse functions which are not sensitive to the way the variables are ordered in the model. These approaches assume that the response of a negative shock is the same as a positive shock in absolute terms. Hatemi (2013) believes that in some cases is not true because it is possible for the economic agents to have a different reaction to positive and negative shocks, for example when the economy faces an increase in demand its easier to hire new employees than to fire employees when the opposite demand shock appears. The reasons for this maybe are the belief that the situation will change in a short time and it is not wise to lay off experiences workers, another adversary is the indemnity to the workers, any sovereign restrictions by labors legislation or other moral reasons. Hatemi (2013) suggests that variables can be fragmented to positive and negative components in order to get asymmetric generalized impulse response functions (AGIR functions). Hatemi's procedure is the following.

Positive and negative shocks can be constructed with the following way for example if we have 2 variables $X_{1,t}$ and $X_{2,t}$ the recursive method is the following

$$X_{1,t}=X_{1,t-1}+\varepsilon_{1,t}=X_{1,0}+\sum_{r=1}^{t}\varepsilon_{1,r} \quad (1)$$

and

$$X_{2,t}=X_{2,t-1}+\varepsilon_{2,t}=X_{2,0}+\sum_{r=1}^{t}\varepsilon_{2,r} \quad (2)$$

For t = 1,2,3…T

The values of $X_{1,0}$ and $X_{2,0}$ are the initial values of variables and $\varepsilon_{1,t}$, $\varepsilon_{2,t}$

Signify shocks. These error terms can be defined as positive shocks

ε_{1r}^{+} : =max ($\varepsilon_{1,t}$, 0) and ε_{2r}^{+} :=max($\varepsilon_{2,t}$,0).

Negative shocks are the following

ε_{1r}^{-} : =min ($\varepsilon_{1,t}$, 0) and ε_{2r}^{-} :=min($\varepsilon_{2,t}$,0)

These lead us to the result that $\varepsilon_{1,r}=\varepsilon_{1r}^{+}+\varepsilon_{1r}^{-}$ and $\varepsilon_{2,r}=\varepsilon_{2r}^{+}+\varepsilon_{2r}^{-}$. Consequently (1) and(2) have the form

$$X_{1,t}=X_{1,t-1}+\varepsilon_{1,t}=X_{1,0}+\sum_{r=1}^{t}\varepsilon_{1r}^{+}+\sum_{r=1}^{t}\varepsilon_{1r}^{-} \quad (3)$$

And

$$X_{2,t}=X_{2,t-1}+\varepsilon_{2,t}=X_{2,0}+\sum_{r=1}^{t}\varepsilon_{2r}^{+}+\sum_{r=1}^{t}\varepsilon_{2r}^{-} \quad (4)$$

Now we can obtain the cumulative representation of the positive and negative shocks of each variable in the form of

$$X_{1,t}^{+}:=\sum_{r=1}^{t}\varepsilon_{1r}^{+}\ ,\ X_{1,t}^{-}:=\sum_{r=1}^{t}\varepsilon_{1r}^{-}\ ,\ X_{2,t}^{+}:=\sum_{r=1}^{t}\varepsilon_{2r}^{+}\ ,\ X_{2,t}^{-}:=\sum_{r=1}^{t}\varepsilon_{2r}^{-}$$

These values can be used to estimate the asymmetric impulses and variance decompositions. If it's difficult to distinguish any exogenous variables we can use them in a VAR model. When we are interested to capture the interaction between cumulative negative shocks for example the vector$X_{t}^{-}=(X_{1,t}^{-},X_{2,t}^{-})$ then the following VAR(n) model is able to be estimated:

$$X_{t}^{-}=B_0+B_1X_{t-1}^{-}+\ldots..+B_nX_{t-n}^{-}+u_{t}^{-} \quad (5)$$

Where B_0 is a (2x2) vector, B_n is a (2x2) matrix and $u_t^-$is a (2x1) vector of negative error terms.

In order to estimate impulses we have to transform it to a moving average representation form as the following

$$X_t^- = \sum_{i=0}^{\infty} C_i + \sum_{i=0}^{\infty} A_i \; u_{t-i}^- \quad \text{for } t = 1,2, \quad T \qquad (6)$$

Where the (2x2) coefficient matrixes (A_i) are obtained recursively as the following

$$A_i = B_1 A_{i-1} + B_2 A_{i-2} + \ldots\ldots. + B_n A_{i-n} \qquad for \;\; i=1,2,3\ldots. \qquad (7)$$

Hatemi (2013) wanted to estimate the asymmetric possible relationship between world stock price index (WP) and UAE stock market price index.

He run 3 models the first is on original whole data, the second is on cumulative positive shocks and the third on cumulative negative shocks. The outcome from his experiments is that in the first model with symmetric shock impulse responses, a shock in WP generated insignificant response to UAE. After that he imported asymmetric impulses first with cumulative positive shocks in this situation there is also insignificant response in 95% of UAE to WP positive shock. But in the third situation in negative cumulative shocks there was evidence that UAE is affected by WP in a negative shock. Thus a negative change in the in world stock market will result in a significant negative change in UAE stock market.

Hatemi (2013) procedure will be employed to our research in labor market data to examine if sectoral employment share shocks affect unemployment rate. We will assume that the shocks are symmetric and as an alternative will be examined if there are any asymmetric impulse responses positive or negative in labor market.

We have the six variable VAR as it is presented before the variables are the cumulative positive or negative residuals according to the variant that is examined, in the appearance of the shock the maximum value max (0,$e_{i,t}$) it means that negative shocks will not count the only difference is that in logistic transformation of unemployment rate a positive shock is when we have negative value. So the sum of positive shocks is X_t^+ =$\sum_{i=1}^{n} e_{i,t}^+$. The appropriate lag length is 3 lags according to swarch criterion. It is the vector X_t^+ = $(X_{1t}^+, X_{2t}^+, X_3^+, X_{4t}^+, X_5^+, X_{6t}^+)'$ It has the following form

$$X_t^+ = B_0 + B_1 X_{t-1}^+ + B_2 X_{t-2}^+ + B_3 X_{t-3}^+ + u_t^+$$

B_0 is a (6x1) vector and B_i are (6x6) matrices

u_t^+ Is the vector of error terms u_t^+ =$(e_{1,t}, e_{2,t}, e_{3,t}, e_{4,t} e_{5,t}, e_{6,t})$' as it's mentioned before, error terms are positive, it has positive effect on employment in general. Component of Vector with index 1 is change in unemployment rate, index 2 is the change in manufacturing share, index 3 is the change in construction employment share ,and 4,5,6 are trade financial sector and government sector respectively. There are monthly data from (1948:2 2013:7) from bls.org

The procedure which will be followed is proposed by Toda&Yamamoto (1995) which will help to test causality without cointegration, even with integrated series.

Because the series have ARCH effects, they have to be removed. Thus GARCH filters are used, residuals after the above procedure do not have ARCH effect that will may disturb our results. Finally they can be used in the VAR model.

In our results it's found that with negative asymmetric shock it's possible to explain the greatest part of unemployment rate fluctuation.

The six variables that are used in the model: logistic transformation of unemployment rate, manufacturing share, construction share, trade share, financial services share and government sector share. In our first model, the one that shock assumed to have symmetric effects of the sectoral shocks. The outcome in variance decomposition is the following after 48 months

Due to	Shock	Value	Standard error
-//-	Aggregate unemployment	80.77%	7.3%
-//-	Manufacturing share	11.93%	3.74%
-//-	Construction share	3.07%	4.45%
-//-	Trade share	0.3%	1.32%
-//-	Financial sector share	1.39%	2.04%
-//-	Government sector share	2.48%	1.44%

Table 1: Variance decomposition of unemployment level after 48 months

With symmetric shocks

Standard error are in the parenthesis, its vital to notice that in order to obtain variance decomposition, we used cholesky decomposition, in which the ordering is general unemployment, manufacturing share employment, construction share employment, trade sector employment, financial sector and finally government sector employment. It is obvious that above ordering is very hostile to SSH, so it provides us a bottom line to our research, only a small fraction of unemployment growth rate fluctuations can be explained by this model.

Now the second model is according to Hatemi (2013) methodology we are going to use the six variable VAR but this time only positive shocks will be used, in other words SSH will be tested in an expanding labor market to sectoral employment shocks. The results in the variance decomposition of the unemployment rate fluctuation is the following.

Due to	Shock	Value	Standard error
-//-	Aggregate unemployment	94%	6.78%
-//-	Manufacturing share	0.94%	2.72%
-//-	Construction share	0.76%	2.96%
-//-	Trade share	4.11%	3.71%
-//-	Financial sector share	0.07%	0.92%
-//-	Government sector share	0.03%	0.56%

Table 2: Variance decomposition of unemployment level after 48 months

With positive shocks

The ordering is the same as in first model, in the second model is figured out that a smaller fraction of unemployment growth rate fluctuation is attributed to positive sectoral employment shocks. Almost *6%.*

The third model is to examine the responses when the variables of the VAR include only the negative shocks. In this situation the outcome in variance decomposition of unemployment growth rate is the following.

Due to	Shock	Value	Standard error
-//-	Aggregate unemployment	76%	9.3%
-//-	Manufacturing share	9.5%	5.6%
-//-	Construction share	7.99%	4.66%
-//-	Trade share	1.75%	2.52%
-//-	Financial sector share	3.57%	4.34%
-//-	Government sector share	0.59%	0.92%

Table 3: Variance decomposition of unemployment level after 48 months

With negative shocks

The ordering is the same as in the previous situations, in negative shocks variance decomposition nearly 24% of unemployment growth rate variance is attributed to sectoral shares innovations. It's larger than when we have positive shocks. It is interesting to examine how the variance decomposition is behaving across time, it was examined only the portion of unemployment's variance that is attributed to aggregate employment shocks. Below are the results for the three variations, symmetric behavior of the shocks, cumulative positive and cumulative negative shocks, across the time.

years	Symmetric	Positive	Negative
1	90%	98%	82%
2	87%	97.7%	79%
3	83%	96.12%	77%
4	80%	94%	76.5%
5	77%	91.9%	75.1%
6	74%	89.84%	73.6%
7	71%	87.9%	72.1%
8	68%	86.17%	70.7%
9	65%	84.56%	69.4%
10	62%	83%	68.2%
11	60%	81%	67.1%

Table 4 : Variance that is attributed to aggregate unemployment shocks

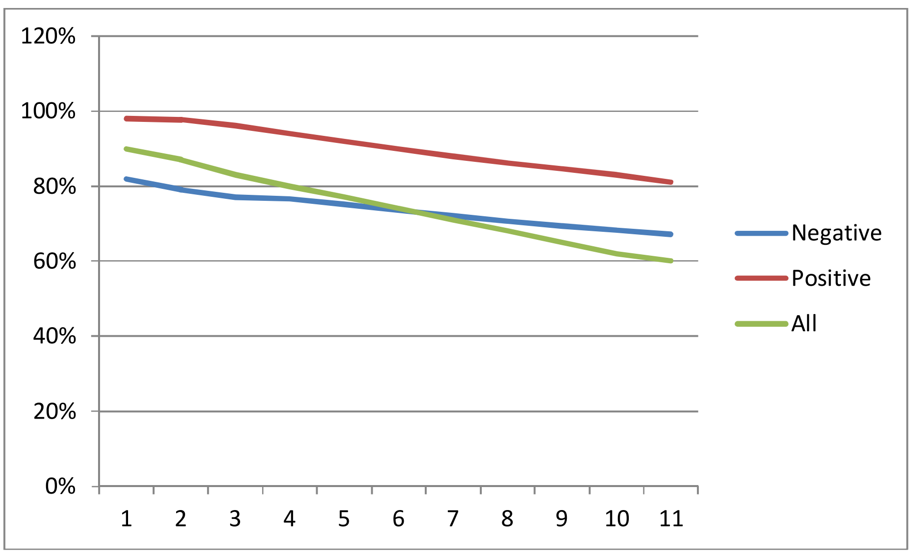


Figure 8: Variance decomposition across years with the three variations

It is clear that when we have negative cumulative sectoral shocks, the unemployment's variance that can be attributed to them is bigger from the situation we have positive cumulative sectoral shocks or symmetric shock, although 7 to 8 years negative and symmetric shocks are going to converge in a level of a bit lower from 70%. This is very important because our starting assumption is very hostile to SSH because unemployment is ahead of all variables in cholesky ordering of the VAR.

4. Conclusion

In this thesis there are examined two different approaches in order to confirm the sectoral shift hypothesis. The first approach is the one with univariate methodology which is first used by Lilien (1982). It's a reduced form equation with the growth rate of unemployment on the left hand side, on the right hand side there is the dispersion index, which is first proposed by Lilien. This index is contaminated by aggregate reasons, as it is claimed by Abraham & Katz (1986), as a result we have the observational equivalence problem. In order to purge dispersion index from aggregate reasons effects, it is regressed on aggregate reasons and the residuals from this regression are used on the right hand side of equation as a purged form of dispersion index. In this reduced form equation it is employed a GARCH in mean model with threshold, the regressor of variance it's found that has a positive sign, also the threshold term has a negative sign so that a lower that the anticipated unemployment growth will lead to lesser volatility. This seems logical because 'good news' in labor will produce less uncertainty. Positive sign of variance regressor explains that an increase in unemployment's growth rate variance will cause employers to be less prone to hire new employees, perhaps due to the uncertainty that is produced in economic agents.

In multivariate methodology the purpose is to eliminate the drawbacks of Campbell and Kuttner (1996). They have employed a VAR model with aggregate employment and sectoral employment, as identification scheme they have selected 3 methods one of them, which is utilized in the present research is the cholesky method. Placing the aggregate unemployment ahead of sectoral employments shares, in order to retrieve a solid base which cannot be challenged, although sectoral shifts hypothesis is violated in the beginning with this assumption. A basic problem in CK approach is that they assume that unemployment shocks cause symmetric responses to unemployment rate. It's easy to doubt it because for example it's easier to hire employees than to fire them for many reasons. The insight for asymmetric analysis in multivariate methodology is provided by Hatemi (2013). Thus in our research, cumulative positive sectoral shocks and cumulative negative shocks are gathered and examined separatively in order to infer if there are differences in SSH which are from the nature of shocks. Results have shown that there is difference in unemployment rates variance decomposition, especially unemployment rates variance decomposition which can be attributed to sectoral shocks is bigger when negative sectoral shocks appear.

A possible explanation for this outcome is that when a sector of the economy is facing a decline it’s possible to be supported by the owners because they have not realize that it is vain to stay in this sector, so valuable resources are spared in inefficient enterprises. Except from owners of businesses, government also will be tempted to intervene in order to save employees from unemployment, these intervene will detain ‘creative disaster’ which is crucial for an economy in order to have sustainable growth.

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