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Disinflationary Effects on Unemployment in Republic of Korea

Md Mahmud Hasan Shah, PhD
Associate Professor, Department of Economics, Jagannath University, Dhaka

Abstract: *The aim of this study is to assess the impact of disinflationary and aggregate demand shocks on the unemployment in the Korean economy. A structural VAR model deploys by applying a set of long runs, and short runs restrictions on monthly data for the period 1997-2015. The results show that the movement towards unemployment has been influenced by aggregate demand disruptions and supply shocks. This indication seems to contradict the predictions of "natural rate" theories. The long-run Phillip's curve is held in the Korean economy, although Korean markets do not affect by the Chinese economy.*

Keywords: Disinflationary, Unemployment, Structural VAR model, Natural-rate

Introduction

The unemployment increases in Korea due to disinflationary policies and other unfavorable shocks to aggregate demand. The government of Korea introduced the five-year plan in 1993 to encourage the free-market principle and to respond to the demands of the public. This five-year plan makes a tight fiscal policy and conservative monetary policy instruments adopted to control inflation (Chung, 2007). Restrictive monetary policies result cyclical unemployment. However, monetary policy and aggretate demand independently help to achive long-run equilibrium in unemployment. Disinflationary effect was first time seen from 1982 to 1986 , and it continued to rise from 1999 to till date. This is illustrated in Figure (2). This disinflation happens due to weak local demand, driven by strictness, debt and a slow economic growth. The gradual drop in the price of oil makes things cheaper. One may consider dropping prices would be something to celebrate. But, it warns for deflationary traps and downward spirals abound. The Bank of Korea launched an interest rate cut program to keep off the threat. Why do economists get worried on dropping prices? As the disinflation is a key variable. If the nominal interest rate decreases below zero-bound interst rate that mean reduce investors' bank balances monthly and it will encourage to take out their deposits from the banks and consequently liquidity will increase. Together with inflation, this sets the bottom of the real interest rate. When real rates cannot fall and inflation rate is low far enough to perk up prices and increase demand, demand may continue to decline further. It is a fearful a trap of deflationary. There are other difficulties too. The lower level of projected inflation increases debts burden. The borrowers are likely to save more than the previous time, when the demand sapped overall. Disinflationary results are not flexibility in the labor market. Labors are opposed to reduce wage in cash terms, but firms decrease the wages by freezing pay in cash term due to inflationary pressure. Disinflationary creates this problem. Hence, this paper addresses the disinflationary effect on the unemployment rate.

Literature Review

The Korean labor market comprises a significant number of jobs in the earlier years, together with economic growth but also during and after the financial crisis of 1997/98, which addressed to peak in the unemployment rate, the recapture of employment was rapid and robust. However, the recovery went together with a fast increase of non-regular or unusual forms of work. This trend has raised much anxiety in Korean society about the hazard of persistent labor market duality or segmentation Grubb, Lee & Tergeist (2007). Source of present unemployment in Korea originated from low domestic demand, non-flexibility in labor market, and local economy. Low price level influences weak domestic demand.

Sobczak (1998) found, a widely held view that maintains Spain's disinflation in 1996-97 cannot be explained adequately by the recession in 1992-93, nor by a positive supply shock, even if both factors contributed to declining inflationary pressures. A standard Phillips curve model use for investigating the causes of the disinflation in Spain. Most of macro econometrics models and modern macroeconomic models symbolize some form of the augmented Phillips curve. The fundamental building block is describing the adjustment over time of prices to movements in potential capacity and output and around aggregate demand. The specific form of the Phillips curve could perform a critical role in influencing the short-run response to changes in exogenous shocks and policy. There has continuously been a subject of substantial debate about the dynamics of price adjustment in Keynesian models. There is extensive literature that has incorporated price adjustment either implicitly or explicitly on incorrect opportunities on the part of negotiators in labor or goods markets or on the ad hoc presentence of asymmetrical rigidities between prices and wages. A talented and influential development have staggered contracts models of Phelps (1978), Taylor (1983), Chadha, Masson & Meredith (1992) and Nelson (2007). The wages tend to be a nominal term for a discreate period for this model. It is set by various agents at different points in time. Consequently, contracts have similarities. Agents are supposed to contract a wage in agreement with their expectations of future output and price levels for the projected duration of the deal.

As Korea is an industrial and export-oriented country, a small open economy is considered. This methodology is impressed by Ribba (2006) and Taylor (1999). Figure (2) shows, the highest exporting countries are China (26% in 2013), and the United State (12% in 2013) from the historical data. Exports fuel its economy. So, the China's economy considered as an exogenous shock. Korea's inflation declined substantially that depends not only with the inflation of China but also with the oil price.

From a policy maker's point of view, oil price shocks attempt the trade-off relation between higher unemployment and high inflation. Bernanke, Gertler, Watson, Sims, & Friedman (1997) claim that monetary policy-makers have historically proved that inflation will be increase during that period, as a result a higher economic slowdown at oil price shocks (Herrera & Pesavento, 2009). They additional suggested that the oil price shocks will decrease in GDP growth for the systematic component of monetary policy

accounts. Kilian (2009) observed that the fiscal does not responses to such crises and however some of them are argued that smaller result. In addition, Most of the economists have fictional conclusions. Kilian (2009) proposes a recursive structural VAR model (SVAR) for the global oil price and recognizes three different shocks to the oil market: a crude oil supply shock, all industrial commodities, and a demand shock. His results suggested that the consequences of higher oil prices influence to the U.S. Consumer Price Index (CPI) and U.S. real GDP. Kilian (2009) warns when the precautionary demand increases, as a result increase in the price of crude oil. A increase in the aggregate demand for industrial commodities causes a delayed but sustained growth in the actual price of oil; and that crude oil production disruption generates a small and transitory increase in the real price of oil within the first year. Kilian (2009) does not justify the collaboration between the US economy and global oil market.

Oil price has no wealth effect in labor supply. Oil prices are allowed to have permanent effects on all of the output, inflation, and the nominal interest rate in the model (Shapiro & Watson, 1988). Husain et al. (2015) found that oil price reduces the production cost and price. The Administration (2015) report shows that South Korea was the world's ninth-largest energy consumer in 2014. Other liquids and petroleum, including biofuels, accounted for the most substantial portion (39%) of South Korea's primary energy consumption in 2014. The focus of this earlier contribution of Ribba (2006) that both long-run and short-run movement in unemployment is influenced by random noise to aggregate supply shocks, as well as by aggregate demand. However, this work is for explicit modeling of disinflationary, focuses on exporting countries and oil prices.

In the first stage, theoretical arguments and cointegration analysis are suggested for the long-run relationships. A long-run tradeoff relation between unemployment and inflation for the Korean economy exists. In the second stage, the dynamic effects of four (oil price shock, demand shocks, monetary policy shocks, and supply shocks) different kinds of structural disturbance at different horizons on inflation and unemployment. Since the hypothetical presence of long-run effects of other demand shocks and monetary policy on unemployment are detected, there is no imposing prior low-frequency constraints, and identification achieved by imposing a set of simultaneous, short-run restriction on the cointegrated VAR. The second conclusion I plan from the innovations accounting is from the supply shocks play an essential role, the movements in the unemployment rate, both over the economic cycle and over the long term, can be clarified by the three shocks.

Methodology

The dynamics of the disinflationary base on the theoretical model of Ribba (2006), Ball & Mankiw (2002) and Ball (1999) suggests the following stochastic process for unemployment, short run interest rate, and inflation. In this paper, a structural cointegrated VAR model with monthly data for the period 1997-2015, is developed to cover structural shocks by following a set of identification restrictions that goal to attain some characteristics of a small open economy like Korea. Furthermore, the neutrality restrictions capable of avoiding concealing potential permanent consequences on unemployment, monetary policy, and aggregate demand shocks intervention.

Econometric model

Based on the theoretical discussion the vector of endogenous variables can be written as Xt = [Ue, oil, ksir, cpi, cint, ccpi]. Where Ue is the unemployment rate, oil is the oil price, ksir is the short-term interest rate of Korea, cpi is the consumer price level of Korea, cint and ccpi are respectively the short-term interest and consumer price level of China. Since Korea is a small open economy with risk of external shock, this paper deployed to investigate a six-variable Structural Vector Autoregression Model (SVAR) based on Ribba (2006) model. This model accounts for oil price shock as an external shock. The importance of oil price shocks on macroeconomic activities has been recognized by Shapiro & Watson (1988), Hamilton (1983, 1994, 1996, 2003), Ferderer (1996) and Kilian (2009), and much more.

A six-variable Structural Vector Autoregression Model (SVAR) is the written by general form:

$$x_t = \sum_{i=1}^{p} A_i x_{t-i} + B v_t \ldots\ldots\ldots (1)$$

Where Xt = [Ue, oil, ksir, cpi, cint, ccpi] and v is the shock vector.

The A and B are 6x6 matrices of coefficients, and Matrix A is represented to define the impulse responses of endogenous variables to structure shocks, denoted by $v_t = v_t^{ue} v_t^{oil} v_t^{ksir} v_t^{cpi} v_t^{cint} v_t^{ccpi}$. Matrix B contains the structural form parameter of the mode. v_t is an n-vector of serially uncorrelated, zero mean structural shocks with an identity covariance matrix, $\sum_v = E[v_t v_t'] = I$, the LR effect of the structural shocks on the variables.

$$x_t = (I - \sum_{i=1}^{p} A_i L)^{-1} B v_t = -\Pi^{-1} B v_t \ldots\ldots\ldots (2)$$

Now if all variables are stationary at first difference within the system, the estimated coefficient of Π from the equation and accordingly, LR restrictions can be imposed.

Identification and contemporaneous restriction

The restrictions are imposed based on Ribba (2006) with slight modification by including oil price shocks from Shapiro & Watson (1988). The five structural innovations present in the SVAR system represent shocks to the Republic of Korea unemployment rate, the short-run interest rate and the consumer price index, China's the short-term interest rate and its consumer price level. In the system of equations, the unemployment rate presents the Korean unemployment rate shock. Column (1) in the SVAR system in both panels represents a contemporaneous response of unemployment rate to the external shock as per standard long run Philips curve. But, in this paper I try to find that the Korean economy is concerned for the selected period, I cannot reject a negative long-run equilibrium relation between unemployment and inflation, and it shows that a long-run non-vertical Phillips curve is present for the Korean economy in the sample period. Column (2) of the SVAR indicates the oil price shocks to be continuously affected to all

others variable in the system without unemployment according to Shapiro & Watson (1988). Column (3) in the SVAR depicts monetary policy shocks and it is supposed to be a contemporaneous response of monetary policy to both the external shock emanating from oil price, the interest rate and the price level of China. There is a relationship between the interest rate and inflation. Expansionary monetary policy given the uncertainty in the oil price that could have a reducing effect on industrial production affected by the emanation from column (4). The SVAR system shows the price level will be simultaneously influenced both by the change of oil price and aggregate demand. A possible negative demand shock generated by the price of oil due to the postponement of consumption by individuals and households of expensive items such as cars, appliances, and investment goods. Friedman (1976) suggests that when low inflation rises, it creates more significant uncertainty about future inflation, which generates subsequent negative impacts on output due to suboptimal resource allocation.

Column (5) and (6) in the SVAR system correspond to external shock emanating from the short-run interest rate and consumer price index of China. As far as the monetary policy shock is concerned, an open economy considers, it is not attainable to perform a completely independent monetary policy. Hence, it assumes that the central bank sets the short-term interest rate after observing the current China short-term interest rate.

Data

The monthly data from the Republic of Korea and China retrieved from the database of OECD and US. Energy Information Administration, including different time spans between 1997 and 2015. Primarily, the choice of the duration and countries purely based on data availability and highest exporter country of Korea. It is worth noting that our sample countries include both economies that have been balanced data set for a model. The series are monthly and not seasonally adjusted. Therefore, need to improve seasonally. It would potentially distort the result.

Estimation

A six-dimensional VAR with Xt = [Ue, oil, ksir, cpi, print, ccpi] is used in the model. Where Ue, oil, ksir, and cpi are correspondingly, the Korean unemployment rate, the short-term interest rate, and the consumer price index. Cint and cpi are respectively the China's short-term interest rate and the consumer price index.

The separate series incorporated in Xt perform as all are I(1) processes. This is reported in figure (1). In particular, the rate of unemployment is a unit root. So, this leads to the dynamic processes in the demand and supply shocks.

Accordingly, to the time series analysis a VAR model is specified for the chosen of lag length with one lag by the Hannan-Quinn (HQIC) (Table 1). Moreover, based on Johansen's (1992) test for cointegration, at the 5% level, a cointegration rank of five is selected (Table 2).

Empirical Illustration of SVAR Findings

The parameters of the SVAR model estimates in two stages. In the first stage, the OLS residuals of reduced form VAR in (2) is obtained.

Now, there is a presence for long-run relation for five cointegration equation under the Structural VAR model. For the first stage, execute two restrictions on each cointegration vector, the consumer price, and short-run interest rate of China are zero. Under the assumption to find our Phillips curve. LR test statics is significant under the SVAR system. Oh (2006) found that nonlinear Phillips curve for Korea. The long-run vertical Phillips curve without passing through oil price and with oil price cannot reject (Table 4 and 5). That means a long-run Phillips curve may be present. These findings are slightly similar to Oh (2006) and Sung-teak (2006).

On the other hand, there is in the long run relations from the economic theory from the second relation, this is contradictions in national and foreign nominal interest rates. It should reflect discrepancies from the inflation rate policy. This conclusion found the link to Purchasing Power Parity (PPP) or, more precisely, it falls here the joint consideration of Uncovered Interest Parity (UIP) and PPP (See Tables 6 and 7). These results are consistent and important to note. The nominal shocks have permanent effects on real variables. There is a long-run association between unemployment and inflation. However, if there is a long-lasting effect of monetary and other nominal shocks on the real side, it is consistent that PPP (or UIP) are not held. These results indicate that there is a non-vertical long-run Phillips curve. Chen (2013) found a low performance of PPP in South Korea. The reasons of low performance of nominal shocks and monetary policy, they have long run effects on the real side. As a result, PPP or UIP does not hold. Moreover, the labor market is non-flexible. But also, the Real Residential Property price has been marginally increasing from 2001 to the present behind the core inflation from 2005.

Moreover, one might surprise if there is an alternative and economically credible long-run equilibria could have recuperated under the selected long-run structure. The possibility of other long-run equilibrium relations contained in the cointegration space have tested. A test has been employed to check the long-run equilibrium relationship between unemployment in Korea and China's real interest rate (See Tables 8 and 9), this set of restrictions may reject at the conventional level. It indicates that there is a long-run equilibrium relation which is linking to short-term domestic nominal interest rate to China real rate and domestic inflation. Expected to test whether a long-run behavior of Korean monetary policy influenced by the China variables due to tight control of domestic inflation. There is no equilibrium relation for the cointegration space (see Tables 10 and 11).

Table 12: Estimated results of SVAR Model

	Experiment	Statistical Finding	Korean Economy Experience
1.1	Test for a Long-run relationship between inflation and unemployment (a Long-run Phillips Curve)	(Table 4) LR test of identifying restorations: chi2(3)=3.933 (p=0.266) (Not rejected)	(Oh, 2006), (Sung-teak, 2006) is found that Korean economy holds Phillips curve.
1.2	Test for a Long-run relationship between inflation and unemployment passing through oil price	(Table 5) LR test of identifying restorations: chi2(3)=2.012 (p=0.366) (Not rejected)	According to the literature review, historical and empirical result of the study suggests that Long-run vertical Phillips curve exists in Korean Economy.
2.1	Test for the joint consideration of Purchasing Power Parity (PPP) and Uncovered Interest Parity (UIP).	(Table 6) LR test of identifying restorations: chi2(3)=242.9 (p=0.0) (Rejected)	(Chen, 2013) found that low performance of PPP in South Korea. If monetary and other nominal shocks have long-lasting effects on the real side, then it follows that PPP (UIP) does not hold. Moreover, non-flexible labor market. Real Residential Property Price has been marginally increasing from 2001 to the present behind the core inflation from 2005.
2.2	Test for the joint consideration of Purchasing Power Parity (PPP) and Uncovered Interest Parity (UIP) passing through oil price	(Table 7) LR test of identifying restorations: chi2(3)=244.8 (p=0.0) (Rejected)	

3.1	Test for the long-run equilibrium relation between Korean Unemployment and the China real interest rate. (a14=-a15 and a13=0) through oil price.	(Table 8) LR test of identifying restorations: chi2(3)=108.7 (p=0.0) (Rejected)	Korean government closely observes the China economy policy. So, no significance relation.
3.2	Test for a long-run equilibrium relation between Korean Unemployment and the China real interest rate. (a14=-a15 and a13=0)	(Table 9) LR test of identifying restorations: chi2(3)=110.6 (p=0.0) (Rejected)	
4.1	Test for the possibility of a long-run behavior of Korean monetary policy influenced by the China variables and moreover, oriented to tight control of domestic inflation. (a24=-1 and a25=1) passing through oil price	(Table 10) LR test of identifying restorations: chi2(3)=237.1 (p=0.0) (Rejected)	(Greenwood-Nimmo, Nguyen, & Shin, 2012) found that the Korean economy and China's economy have a short-term and mid-term relation. Observation is that Korean government maintains tight control of monetary policy.
4.2	Test for the possibility of a long-run behavior of Korean monetary policy influenced by the China variables and moreover, oriented to tight control of domestic inflation. (a24=-1 and a25=1) passing through oil price	(Table 11) LR test of identifying restorations: chi2(3) =239 (p=0.0) (Rejected)	
5	Assume that Korean unemployment does not directly affect by oil price, rather oil price effect to CPI of Korea then interest rate, Korean CPI influence by CPI of China. Interest rate and CPI of China do not affect unemployment, interest rate of Korea and oil price. (0*= Recursive of Restrictions)	(Table 12) LR test of identifying restorations: chi2(3)=8.527 (p=0.130) (Not rejected)	

Source: Calculated by the author

Therefore, this result is consistent with the existence of a non-vertical long-run Phillips curve. One may wonder if alternative and economically credible long run equilibrium would have discovered in the long-run structure. Hence, to scrutinize the robustness of

conclusions, there is a possibility that other long-run equilibrium relations is pressent in the cointegration space and consequently, could have logically be chosen. Evaluated two new ties: the initial just-identified structure and alternatively, to test for the chance of a long-run behavior of Korean monetary policy affected by the China's variables and, additionally, adjusted to tight control of Korean inflation. This results also show that there is an equilibrium relation in the cointegration space.

Conclusion

The unemployment rate is growing in most of the developed countries in recent years. South Korea is not independent of this effect. Ball (1999) finds that the declining rate of inflation effects on unemployment. As a result, a longer disinflationary duration has a larger effect on unemployment. In this paper I explored the relations between unemployment and inflation in the context of the Korean economy for the period 1997-2015. A cointegrated VAR model is estimated by applying a set of existing over-identification restrictions. A monetary policy shock identified that if the central bank was primarily concerned with controlling the inflation rate during this period and more importantly consider the Bank of Korea's interest rate decision. I attempted to incorporate a structural VAR model idea that for a small open economy, this is not possible to perform for independent monetary policy. As it is not wholly separate. The conclusions can summarize as follows: there is no possibility to reject the hypothesis of a long-term trade off between unemployment, inflation and in addition, monetary policy shocks and aggregate demand shocks have long run effects on the rate of unemployment. As a supply shocks, for example, a change in the labor force or productivity, these play an important role in justifying movements in inflation and unemployment at all time. These results is not consistent with `natural-rate' based models for the Korean economy but give the impression of consistent, at least partly consistent, with a historical explanation of unemployment dynamics. I do not investigate any specific channels through which is transmitted through demand shocks to consistent effects on the real variables in this paper and there is a possibility to do future research.

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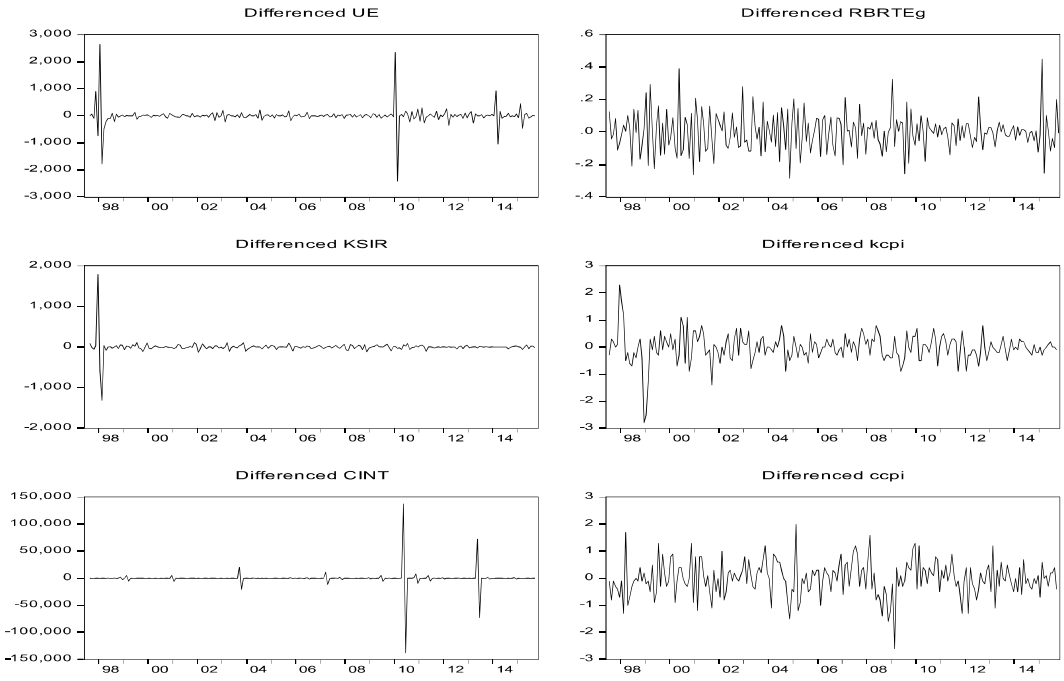
<Figure 1>



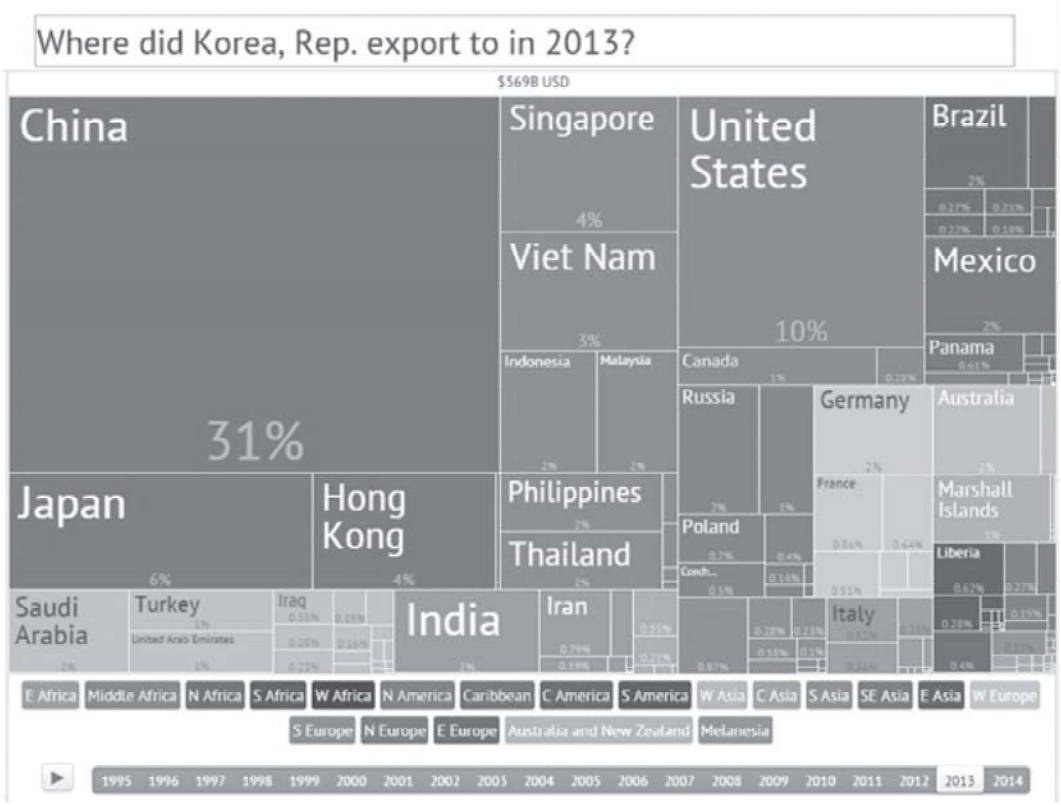
<Figure 2>


SOUTH KOREA INFLATION RATE
35
30
25
20
15
10
5
0
1971
1980
1989
1998
2007


SOUTH KOREA UNEMPLOYMEN..
..... SOUTH KOREA INTEREST RATE
8
7
6
5
4
3
2
6
5
4
3
2
1
2001
2004
2007
2010
2013


SOUTH KOREA UNEMPLOYMEN…
…. SOUTH KOREA TOTAL WAGES
8
7
6
5
4
3
2
3400000
3200000
3000000
2800000
2600000
2400000
2001
2004
2007
2010
2013

<Figure 3>



<Table 1> Unit Root Test

Variable Name	First Difference t-Statistic	Variable Name	First Difference t-Statistic
Ue	-10.380*	Kcpi	-5.944*
Rbrteg	-11.845*	Cint	-11.69*
Ksir	-17.22*	Ccpi	-5.985*
1% level	-3.46194	5% level	-2.87533
10% level	-2.5742		
All variables are first difference stationary at 1% level.			

<Table 2> Lag Selection-order criteria

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-2431.1				254.299	22.5658	22.6037	22.65
1	-2314.86	232.49	36	0.00	120.981	21.8228	22.0879*	22.4791*
2	2267.37	94.983	36	0.00	108.85	21.7164	22.2088	22.9352
3	-2237.41	59.91	36	0.00	115.33	21.7723	22.492	23.5537
4	-2169.08	136.67*	36	0.00	85.7921*	21.4729*	22.4199	23.8169
Endogenous: due drbrte daksir dkcpi dcint dccpi Exogenous: _cons								

<Table 3> Cointegration Rank Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.455398	416.0855	117.7082	0.0000
At most 1 *	0.356539	284.2147	88.80380	0.0000
At most 2 *	0.339327	188.5407	63.87610	0.0000
At most 3 *	0.257202	98.59504	42.91525	0.0000
At most 4 *	0.107869	34.07410	25.87211	0.0038
At most 5	0.041975	9.305186	12.51798	0.1624

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.455398	131.8708	44.49720	0.0000
At most 1 *	0.356539	95.67398	38.33101	0.0000
At most 2 *	0.339327	89.94566	32.11832	0.0000
At most 3 *	0.257202	64.52093	25.82321	0.0000
At most 4 *	0.107869	24.76892	19.38704	0.0075
At most 5	0.041975	9.305186	12.51798	0.1624

Max- eigen value test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Estimated results of SVAR Model

<Table 4>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	1.89	0	0	0	0	0
drbrte	0	.072	0	0	0	0
dksir	2.23	−.003	2.064	0	0	0
dkcpi	2.12	−.019	1.70	.75	0	0
dcint	0	−.005	−.081	.005	104.53	0
dccpi	0	.003	.036	.233	13.41	.658

LR test of identifying restrictions: chi2 (3) = 3.933 Prob > chi2 = 0.269

<Table 5>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	1.89	0	0	0	0	0
drbrte	0.177	0.071	0	0	0	0
dksir	2.23	−0.002	2.06	0	0	0
dkcpi	2.11	−0.02	1.70	0.75	0	0
dcint	0	−0.005	−.08	0.005	104.53	0
dccpi	0	0.004	0.04	0.23	13.41	0.66

LR test of identifying restrictions: chi2 (2) = 2.012 Prob > chi2 = 0.366

<Table 6>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	1.90	0	0	0	0	0
drbrte	0	0.072	0	0	0	0
dksir	3.79	−.004	3.52	0	0	0
dkcpi	−0.77	−0.018	−1	0.836	0	0
dcint	−1.04	−0.004	−1	0.028	107.5	0
dccpi	0.917	0.005	1	0.138	5.372	0.684

LR test of identifying restrictions: chi2 (4) = 244.8 Prob > chi2 = 0.000

<Table 7>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	1.88	0	0	0	0	0
drbrte	0.177	0.071	0	0	0	0
dksir	3.790	−0.017	3.516	0	0	0
dkcpi	−.774	−0.0175	−1	0.836	0	0
dcint	−1.039	−0.004	−1	0.027	107.54	0
dccpi	0.917	0.005	1	0.137	5.371	0.684

LR test of identifying restrictions: chi2 (3) = 242.9 Prob > chi2 = 0.000

<Table 8>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	2.064	0	0	0	0	0
drbrte	0.211	0.072	0	0	0	0
dksir	3.105	−0.001	2.409	0	0	0
dkcpi	0	−0.020	0.567	0.754	0	0
dcint	−1	−0.004	−0.639	−0.021	107.439	0
dccpi	−1	0.004	−0.530	0.202	18.89	0.674

LR test of identifying restrictions: chi2 (3) = 108.7 Prob > chi2 = 0.000

<Table 9>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	2.074	0	0	0	0	0
drbrte	0	0.072	0	0	0	0
dksir	3.105	−0.003	2.408	0	0	0
dkcpi	0	−.018	0.567	0.754	0	0
dcint	−1	−0.004	−0.639	−0.021	107.438	0
dccpi	−1	0.005	−0.530	0.202	18.876	0.674

LR test of identifying restrictions: chi2 (4) = 110.6 Prob > chi2 = 0.000

<Table 10>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	1.889	0	0	0	0	0
drbrte	0.177	0.072	0	0	0	0
dksir	3.753	−0.004	3.482	0	0	0
dkcpi	−0.773	−0.017	−1	0.838	0	0
dcint	1.071	0.004	1	−0.099	109.27	0
dccpi	−0.277	0.004	−0.138	0.198	13.40	0.658

LR test of identifying restrictions: chi2 (2) = 237.1 Prob > chi2 = 0.000

<Table 11>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	1.897	0	0	0	0	0
drbrte	0	0.072	0	0	0	0
dksir	3.753	−0.004	3.48	0	0	0
dkcpi	−0.773	−0.017	−1	0.838	0	0
dcint	1.071	−0.004	1	−0.099	109.27	0
dccpi	−0.277	0.004	−0.138	0.198	13.41	0.658

LR test of identifying restrictions: chi2 (3) = 239 Prob > chi2 = 0.000

<Table 12>

	due	*drbrte*	*dksir*	*dkcpi*	*dcint*	*dccpi*
due	0.266	0	0	0	0	0
drbrte	0	0.072	0	0	0	0
dksir	−0.051	0	0.907	0	0	0
dkcpi	0.091	−0.018	0.684	0.762	0	0
dcint	0	−0.012	0.216	0.145	0.460	0
dccpi	−0.057	0	0	0.183	0.179	0.656

LR test of identifying restrictions: chi2 (5) = 8.527 Prob > chi2 = 0.130