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Potential Output in Iran; A Comparison of Alternative Methods, 1978-2008

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Abstract

This paper examines potential output with alternative methods for the period 1978-2008 using annual data of the Iranian economy. We applied Hodrick – Prescott Filter, Production Function and SVAR methods for estimation of annually potential output. The results show that the turning points for these methods look similar and almost produce similar results for output gap. Also the estimated potential output and output gap are conformed to economic and political events as output gap has decreased in war period (1980-1989) because of war expenditures, reducing production and therefore decreasing GDP. Also Iranian economy has been faced with negative output gap and therefore a severe recession because of the crisis in South East Asia in late 1990s. Gap trend is uprising after 2005 for the reason that happening oil shock and economic advancement for increasing oil income.

Keywords: Potential output, Output gap, Hodrick-Prescott Filter, Production Function, Structural VAR, Iran

JEL: C13, C22, C32, C87, E52, E62

1. Introduction

This article examines 'potential output' by estimating the level and rate of growth of potential output, and comparing the results with observed output trends, one can obtain a measure of the degree of spare capacity in the economy, and the rate in which capacity is expanding. Most macroeconomic models used for forecasting and policy analysis require estimates of potential output.

The gap between actual and potential output is a key variable determining the evolution of prices and wages while output in excess of potential leads to higher inflation, sustained disinflation requires output to fall below potential, ceteris paribus. It is therefore essential to use an appropriate method to measure potential output.

Therefore it is generally accepted that the output gap - the difference between output and its potential or long-run sustainable level - is a key indicator of inflationary pressures and, as such, is an important variable for monetary policy. The construction of economic forecasts and the conduct of monetary policy are complicated, however, by the fact that potential output is unobservable and must therefore be estimated. Several competing methodologies exist for estimating the output gap, and there is a lack of consensus as to which is best. This paper evaluates some of the competing methodologies based on their ability to accurately measure the output gap in a model economy. Because the output gap is unobservable, competing methodologies for estimating it are difficult to assess, and evaluation techniques have varied.

This paper takes a different approach regarding by statistical limitation in Iranian Economy and assessing some of the competing estimators of the output gap on the basis of their ability to accurately estimate the output gap of a model economy. In this paper, we show how potential output can be estimated and projected through three approaches derived from the Hodrick Prescott Filter, Production Function and structural vector autoregression (SVAR) methodology. Then we compare results between methods and examine their correlation. Also the results are analyzed with economic events in four periods.

2. Literature Review

Tim Willems, (2011) estimated Output Gap and separated trend from cycle via Bayesian estimation of a New Keynesian model, augmented with an unobserved components model for output. The resulting estimate compared with popular proxies used in the literature. It turns out that the model-based approach may have important advantages for the conduct of monetary policy.

Researchers of Bank of Japan (2003) estimated the Output Gap as an Indicator for the Pressure on Price Change. The output gap for 2001 was estimated as –3 to –4 percent, this wide output gap may be thought of as the fundamental backdrop to the continuing gradual decline in current prices.

Paolo Guarda, (2002) estimated output gaps for Luxembourg. This study reviews several of the many alternative methods of estimating output gaps and applies six of these to annual data for Luxembourg. The sign of the output gap on the different measures seems to be systematically related, suggesting that the methods are at least measuring a related concept.

Odile Chagny and Jörg Döpke, (2001) examined Output Gap in the Euro-Zone and provided estimates of output gap in Euro Zone by using different methods including Structural VAR. the results show the methods imply different turning points, and the estimated level of the output gap differs greatly.

Geraldine Slevin (2001) examined potential output and output gap in Ireland. This paper estimates potential output using a number of statistical trend methods and a Cobb Douglas production function.

Valerrie Cerra and Sweta Chaman Saxena, (2000) examined Output Gaps with Alternative Methods including Structural VAR for Sweden . The paper reviews a number of different methods that can be used to estimate potential output and output gap. The estimates show that output gap was between -5.5 and 0.2 percent in period, from 1997 to 1998.

Kavi Gounder and Steven Morling (2000) measured potential output in Fiji. The paper reviews four methods that can be used to estimate potential output and the output gap, including linear trends, Hodrick-Prescott (HP) filters, aggregate production functions, and structural vector autoregressions. The results suggest that the output gap is measured very imprecisely in Fiji

Iris Claus (1999) estimated potential output for New Zealand by a structural VAR approach. A measure of potential output is obtained using a structural vector autoregression (SVAR) methodology.

Gordon de Brouwer (1998) reviews five methods of estimating it for Australian GDP data, including linear time trends, Hodrick-Prescott (HP) filter trends, multivariate HP filter trends, unobservable components models and a production function model. Estimates of the gap vary with the method used and are sensitive to changes in model specification and sample period.

Alain DeSerres, Alain Guay and Pierre St-Amant(1995) examined potential output by the structural vector autoregression in the Mexican economy. They find that world oil shocks have been an important source of both actual and potential output fluctuations over a sample period extending from 1965 to 1994.

3. Research Method

We examined output gap by three methods; Hodrick Prescott filter, Production Function and SVAR for Iran by using annual data. At first because of Iran is oil exporting country then we used non-oil GDP rather than GDP. Second we used a logarithmic transformation on GDP to obtain a more homogeneous variance of a series and avoid numerical instability. Third, we used unit root test on the logarithm of GDP in order to resolve spurious regression and other problems with non-stationary time series.

3.1 Unit Root Test

For unit root tests, we applied Augmented Dicky- Fuller Test. The results show that logarithm of gross potential output is not stationary in level.

Table (1) shows the results of the augmented Dickey-Fuller (1979) test of the null hypothesis of non stationary GDP. The results are unambiguous and clearly support the hypothesis that the time series are stationary in first differences.

Table 1: Unit Root Test on LGDP and first difference of it on the basis of Augmented Dicky - Fuller and Phillips Perron Tests

Unit Root Test on LGDP					
	Variable	Test Statistic	Test Critical Values		
			1%	5%	10%
Augmented Dickey-Fuller	Trend and Intercept	-0.4111	-4.3082	-3.5731	-3.2203
	Intercept	0.9347	-3.6752	-2.9665	-2.6220
Unit Root Test on first difference of LGDP					
Augmented Dickey-Fuller	Trend and Intercept	-5.3022	-4.3226	-3.5796	-3.2239
	Intercept	-4.102473	-3.6852	-2.9705	-2.6242

The results of Augmented Dickey-fuller test on LGDP illustrated in Table (1). In this case, the test statistic is in critical values whether there is a constant and/or trend included. In this case, the absolute test statistic is given between the critical values, so the null hypothesis of unit root in the LGDP series cannot be rejected. As it is shown, for instance, Augmented Dickey-Fuller test statistic in significance level of 5% is about -0.41 in Trend and Intercept, but this amount is between critical values of -3.57 and 3.57. Therefore, we conclude that LGDP is not stationary. Appropriate lag length of dependent variable can be obtained from Akaike information (AIC), Schwartz – Baysian (SBC) and Hannan – Quinn (HQC) Criteria. LGDP is not stationary on its level. On the basis of Augmented Dickey-fuller Unit Root Test, Null Hypothesis of LGDP has a Unit Root doesn’t reject. In other words LGDP has unit root and its fluctuations around time trend is not stationary.

Therefore we try on difference of LGDP for gain of a stationary time series. After testing by unit root tests we fine that LGDP is I(1). This means that D(LGDP) – first difference of LGDP – is stationary. Augmented Dickey-fuller test on first difference of LGDP illustrated in Table (1). The test statistic is more than critical values whether there is a constant and/or trend included. Therefore DLGDP is stationary.

We can also find that LGDP is not stationary on level graphically. A visual plot of the data is usually the first step in the analysis of any time series. Any time series data can be thought of as being generated by a stochastic or random process and a concrete set of data, such as that shown in figure (1) can be regarded as non stationary because these time series visually, at least, their mean, variance and auto covariance do not seem to be time-invariant. (Gujarati, 1995, PP 710:715)

The first impression that we get from the time series plotted in the following figure is that it all seems to be trending upward, although the trend is not smooth. The LGDP is in fact non stationary time series.

Figure 1: LGDP Trend (million Dollars)

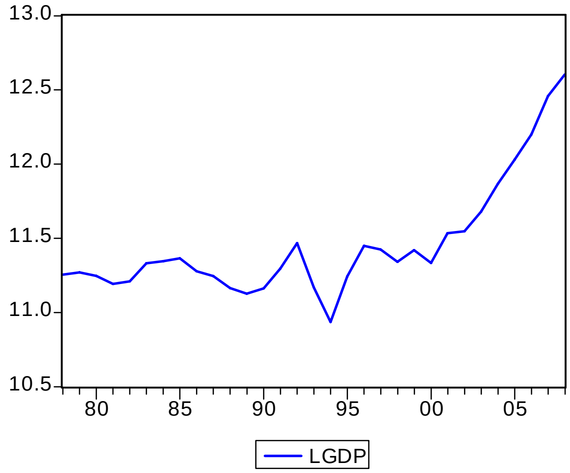
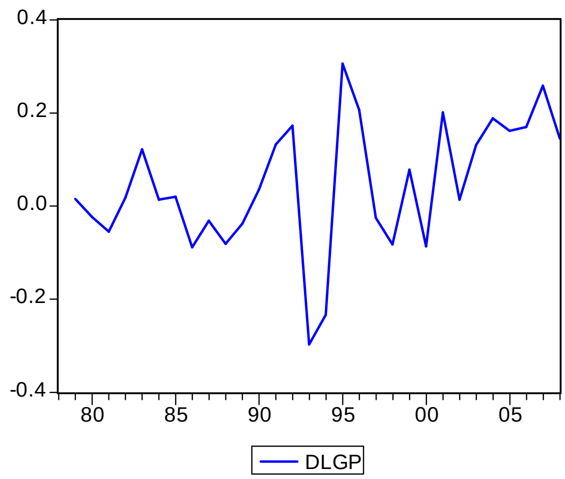


Figure (2) shows First-Differenced GDP in Iran. Compared with the GDP series given in figure (1), the differenced GDP series shown in figure (2) does not show any trend. Therefore D(LGDP) in stationary. Because of D(LGDP) is stationary , as noted , it is an I(0) stochastic process , which means GDP itself is an I(1) time series and essentially it is a random walk.

Figure 2: D(LGDP)



3.2. Hodrick-Prescott Filter

The Hodrick-Prescott filter was created with the assumption that unobserved shocks to trend output occur all the time. The HP filter is a technique to distinguish output's long-term trend from its short-term business cycle variation. Applied economists adapted the filter by identifying the long-term trend as potential output. The Hodrick-Prescott (1997) filter, is based on the assumption that a given time series y_t is the sum of a trend or growth component g_t and a cyclical component c_t.

$y_t = g_t + c_t$ For t= 1,…, T (1)

According to Hodrick and Prescott, "our prior knowledge is that the growth component varies 'smoothly' over time," where the measure of smoothness of the $\{g_t\}$ path is chosen to be the sum of the squares of its second difference. The cyclical component c_t represents deviations from g_t and over long time periods their average is assumed to be near zero. The growth component g_t is extracted by minimizing the following loss function.

$$Min\left\{\sum_{t=1}^{T} c_t^2 + \lambda \sum_{t=1}^{T} \left[\left(g_t - g_{t-1}\right) - \left(g_{t-1} - g_{t-2}\right)\right]^2\right\} \quad (2)$$

The first sum represents the penalty for deviations of the observed series from the trend growth series $c_t = y_t - g_t$, while the second sum represents the penalty for sharp changes in the trend growth component. (Hodrick-Prescott, 1997, PP 1:16)

We can define the filter as follows. If y denotes real GDP, the filter is defined as:

$$\min \sum_{t=1}^{T}\left(y_t - y_t^*\right)^2 + \lambda \sum_{t=2}^{T-1}\left[\left(y_{t+1}^* - y_t^*\right) - \left(y_t^* - y_{t-1}^*\right)\right]^2 \quad (3)$$

with y^* as the smooth component which gives the estimate of potential GDP in this context. Broadly speaking the procedure contains two commands: (i) minimize the distance between the actual and the trend value of the time series and (ii) minimize the change of the trend value. (Arora and Bhundia, 2003, P 4)

Two arguments commonly made in favor of HP filter are that it extracts the relevant business-cycle frequencies of the spectrum and that it closely approximates the cyclical component implied by reasonable time series models of output. (Burnside, 1998, PP 475:490)

The filter involves the smoothing parameter λ which penalizes the acceleration in the trend component relative to the business cycle component. Researchers typically set λ= 100 when working with annually data. Some studies discuss the appropriate setting of the smoothing parameter. Someone argue that a smoothing parameter of 10 will do the same trend cycle decomposition as using 1600 for quarterly data. The arbitrary choice of the smoothing parameter is one of the mayor criticisms of the filter. (Baxter and King, 1995)

The parameter λ is crucial, as it represents the terms on which deviations from trend are traded off against variability in the trend. The higher is λ the stiffer is the trend component. In fact, when λ→∞ the trend becomes a straight line and the HP filter gives the same result as the linear time trends method. Unfortunately, the results can be quite sensitive to the choice of λ and there is no objective criterion by which to choose this parameter. Hodrick and Prescott recommend a value of λ= 100 for yearly data and λ= 1600 for quarterly data.(Guarda, 2002, PP 10:12)

These values have become “industry standards” but are actually arbitrary. The HP-filter has been controversial in the literature. It has been argued in favor of the filter, that an output gap calculated with an HP-filter is a stationary time series even if the original series is I(1) or even integrated of a higher degree. (Cogley and Nason, 1995, PP 253:278) Therefore as we used annually data, the smoothing parameter should be 100. Figures (3) and (4) show potential output and output gap using Hodrick Prescott Filtering Methodology respectively.

Figure 3: Estimated potential output by Hodrick Prescott Filter

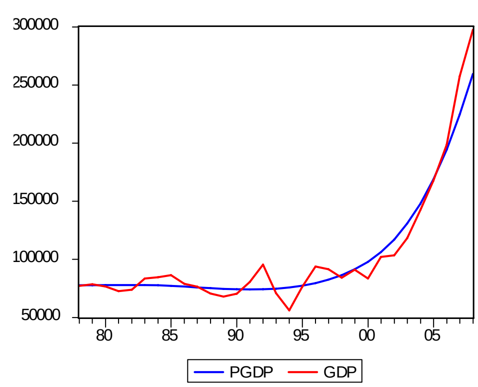
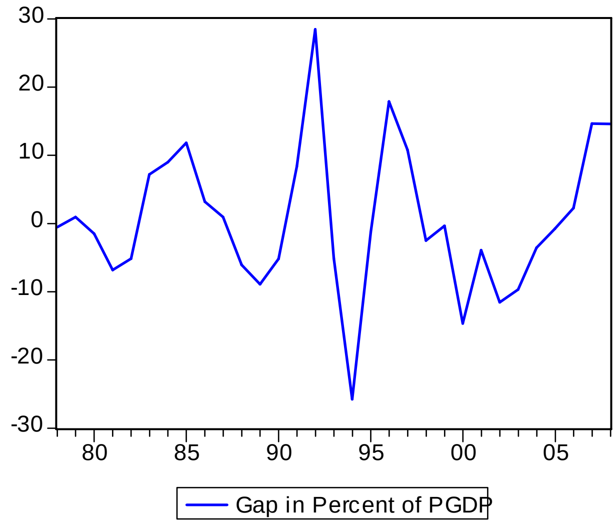


Figure 4: Estimated output gap in percent of potential output by Hodrick Prescott Filter



3.3. Production Function Approach

This approach explicitly identify the sources of output growth – capital, labor, productivity, and sometimes intermediate inputs. Also, the Cobb- Douglas production function is frequently used in applied research, since it is very easy to interpret and implement.

By assuming a log-linear macro production function which is called the Cobb-Douglas production function as follows:

$$Q = B K^{\alpha} L^{\beta} \tag{4}$$

Here Q is GDP, K the capital input, L the labor input, and B is constant coefficient. β is labor share and α is the capital share. In other words, we suppose that output (Y) is determined via the interaction of the capital input (K), the labor input (L), and B. Given this, we may define potential output, i.e., the level of output attained when all capital and labor resources are fully utilized. Estimated output will be potential output in this method. Since data on the capital stock are readily available in the form of the Central Bank's Capital Stock, we take this as the potential capital input (K*). In contrast to capital, for labor it is easier to acquire data on the potential labor input. Potential labor input can be active population in our society and therefore we can achieve it easier than potential capital input

When elasticity of substitution between labor and capital will be one (α+β=1), we can rewrite equation (3.12) to per capita easily:

$$q(t) = B.k(t)^{\alpha} \tag{5}$$

In this equation, q and k are GDP per capita and capital per capita respectively. Technical progress is a production input besides capital and labor. Also, this input has direct relation to time. Hence, we put time trend as showing effect of technical progress. It is common that we show this input in exponential form. This equation here:

$$q(t) = Be^{mt}\left[k(t)\right]^{\alpha} \tag{6}$$

Considering technical progress in exponential form shows implicitly that it has constant rate. In other words, technical progress develops to constant rate during time. If all of active population is employed then economy will arrive to potential output. Of course We have natural unemployment but because this rate is not available therefore we consider that if all of these unemployment people are employed then economy will achieve to potential output. Finally, we can show relation between actual and potential output in considered in following equation:

$$Q_A(t) = e^{f\left[u^*(t)\right]}.Q(t) \quad f' \rangle 0 \tag{7}$$

In this relation, Q_A, Q and u^* denotes as potential output, actual output and cyclical unemployment rate. Cyclical unemployment rate means real unemployment rate minus non-accelerating-inflation rate of unemployment. The NAIRU has used in this model is taken from paper estimated by Khalesi and Siami- senior experts of Management and planning organization. It is important point that equation (7) is only connective relation between potential output and actual output and it is not showing of causality relation between these variables. We change equation (7) in per capita form (per capita is calculated the variable divided active population):

$$q_A(t) = e^{f\left[u^*(t)\right]}.q(t) \tag{8}$$

We choose exponential form for unemployment because this relation $e^{f\left[u^*(t)\right]}$ can be fluctuated around one. This relation is less than one when economy is in recession and is more than one when actual economy is more than potential output. We consider this relation as simple linear relation, that is:

$$f\left[u^*(t)\right] = \theta \cdot u^*(t) \tag{9}$$

Considering relations (7), (8) and (9), there is the following relation:

$$q_A(t) = B\, e^{mt+\theta u^*(t)}.\left[k(t)\right]^{\alpha} \tag{10}$$

we show this relation as a econometric model:

$$q_A(t) = B\left[k(t)\right]^{\alpha} e^{mt+\theta u^*(t)}\, e\, \varepsilon^{t} \tag{11}$$

We write this relation to log-linear and estimate it by OLS method.

$$\ln q_A(t) = \ln B + \alpha \ln k(t) + mt + \theta\, u^*(t) + \varepsilon_t \tag{12}$$

Equation (3.20) is estimated easily by OLS method and also, we have needed statistics.(Kalantari and Arabmazar, 1997, PP 56:60)

We use this relation for estimation of Iranian potential output. The results shows R^2 and Adjusted R^2 are almost 0.82 and coefficients are significant. Figure (5) shows actual and potential output calculated with this method. Also Figure (6) illustrates estimated output gap.

Figure 5: Estimated Potential Output by Production Function Approach

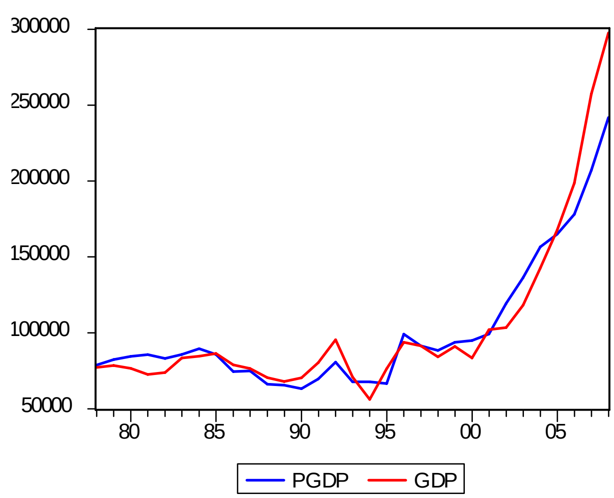
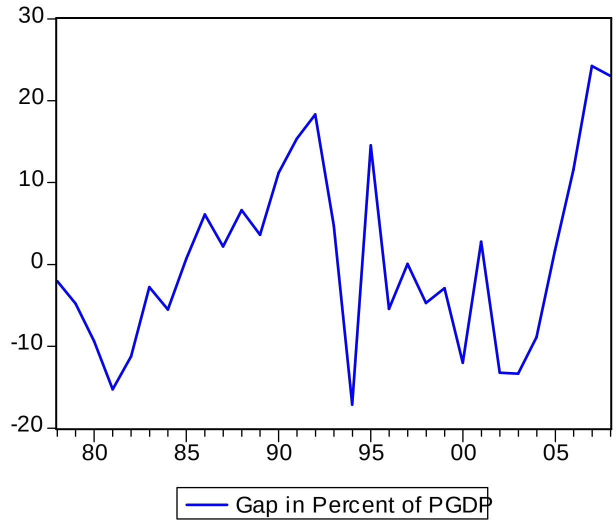


Figure 6: Estimated output gap in percent of potential output by Production Function Approach



3.4. SVAR Method

Structural Vector Autoregressive is a statistical approach which estimates a vector of variables, including the change in inflation and output, as a function of those same variables. All variables are treated as endogenous and written as a linear combination of lagged values of itself and of the other variables in the system, although the exogenous variables can be defined. (Quah and Blanchard, 1989, PP 655:670)

Mechanical filters, such as the Hodrick and Prescott filter, are technique that extracts a trend measure from actual output series. However, these filters as we said in previous section have been criticized such as the HP filter with (nearly) integrated data can induce spurious cyclicality and also the HP filters do not accurately decompose time series into their trend and cyclical components when the data have the typical spectral Granger shape. The typical Granger shape is characteristic of nearly all macroeconomic time series. Moreover, this filter shows instability of estimates near the end of the sample period. Therefore we say SVAR advantages by following cases: First, Univariate and multivariate filters often assume that the trend component in output can be characterized as a random walk, an assumption that is not maintained in the SVAR approach. (Guarda, 2002, PP 25:27)

Second, unlike some methods (such as trend-based methods, filter-based methods and the Beveridge-Nelson decomposition) the SVAR approach can be given an economic interpretation. For example, we can interpret fluctuations in potential output as being caused by certain types of shocks (Demand and supply shocks) whereas the other methods cannot. Third, contrary to other methods, such as those based on the Hodrick-Prescott filter, the SVAR method does not require the imposition of an arbitrary smoothing parameter. Fourth, it theoretically overcomes the “end point problem” inherent in two sided filters. (Blanchard and Quah, 1989; King, Plosser, Stock and Watson, 1991).

We examine output gap through an approach derived from the structural vector autoregression (SVAR) methodology developed by Shapiro and Watson (1988), Blanchard and Quah (1989), and King et al. (1991). This methodology involves the estimation of a vector autoregression (VAR) model for the particular economy under study. We then identify different variables by making long-term assumptions based on macroeconomic theory. In order to distinguish among various sources of output fluctuation, we apply a variant of the structural VAR methodology to an autoregressive system composed of five variables, each follow a stationary stochastic process. It is assumed that the private consumption, the rate of growth of output, the monetary aggregate are endogenous and the price of oil and a dummy variable are exogenous to the Iranian economy in the long term.

We estimated Multivariate VAR model with three endogenous variables and two exogenous ones. Figures (7) and (8) illustrate potential output and output gap using SVAR Method respectively.

Figure 7: Estimated Potential Output by SVAR method

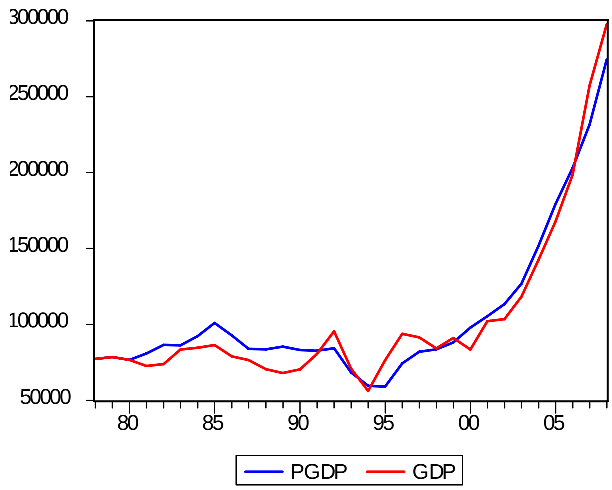
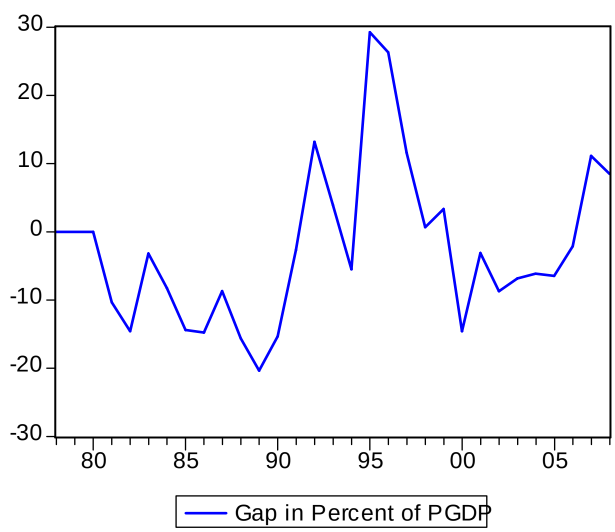


Figure 8: Estimated output gap in percent of potential output by SVAR



4. The Results

Now, we want to compare numerical and graphical results of these three methods in following table and Figures (9) and (10).

Table 2: numerical results of estimated potential output (Million Dollars)

Range	GDP*	HP	Production Function	SVAR	Range	GDP*	HP	Production Function	SVAR
1978	77278	77686	78887	77278	1994	56221	75721	67830	59484
1979	78489	77742	82443	78489	1995	76330	77318	66644	59045
1980	76641	77794	84571	76641	1996	93845	79606	99240	74296
1981	72543	77846	85616	80897	1997	91492	82591	91437	81989
1982	73889	77888	83232	86487	1998	84260	86430	88433	83695

Table 2: numerical results of estimated potential output (Million Dollars) - continued

1983	83454	77858	85846	86192	1999	91094	91412	93824	88161
1984	84636	77652	89570	92272	2000	83545	97884	94956	97821
1985	86355	77222	85767	100862	2001	102146	106300	99366	105420
1986	79039	76587	74484	92726	2002	103576	117092	119362	113478
1987	76569	75854	74927	83855	2003	118135	130789	136353	126811
1988	70592	75150	66199	83647	2004	142635	147916	156561	151955
1989	67968	74603	65600	85325	2005	167676	168956	164919	179242
1990	70442	74295	63347	83196	2006	198749	194353	178088	203055
1991	80430	74234	69716	82655	2007	257362	224484	207163	231613
1992	95577	74396	80779	84427	2008	297562	259640	241859	274314
1993	71014	74816	67792	68310					

Figure 9: Estimated Potential output by three methods

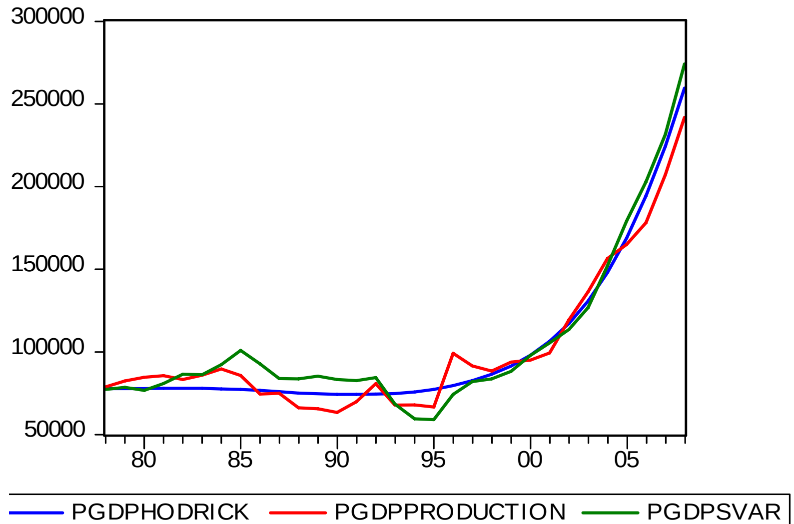
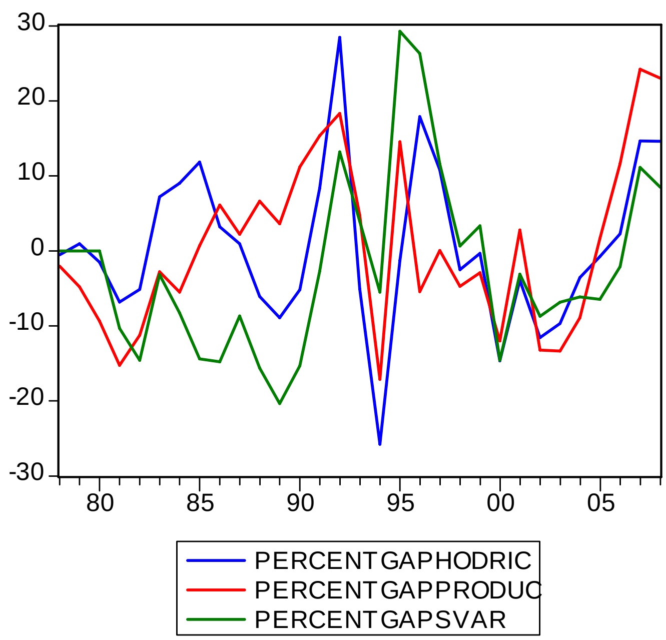


Figure 10: Estimated output gap by three methods in one figure



Looking at Figure (10), the graph shows that each method almost produces almost a similar result for output gap and also the turning points for these methods look similar but the magnitude of the volatility varies between the methods with SVAR method having the highest magnitude as we explained in previous sections. At first we calculate correlation for obtained output gaps from three methods. The correlation coefficient shows how closely the results from each method are related to each other. Since the different measures point to different turning points and different degrees of downturn in the economy, they also signal for the need for different policy responses, both in terms of the timing and magnitude of policy changes. But because of our results are approximately similar in three methods, therefore these problem will be less important. So, we obtain correlation between output gaps from these methods and study them. The results shown in table (3) and also in the table we added maximum and minimum magnitude of output gap in percent level between these methods.

Table 3: Comparison between methods

	Hodrick Prescott	Production Function	SVAR
Hodrick Prescott	1.00	0.60	0.52
Production Function		1.00	0.35
SVAR			1.00
Descriptive Statistics			
Max.	28.47	24.23	29.27
Min.	-25.75	-17.12	-20.34
Standard Deviation	10.66	11.14	11.78

In Table (3) the most correlation looks to be between Production Function and HP methods and also between HP and SVAR while SVAR and Production Function are also poorly correlated. The poor correlation of the different gap measures raises questions about the suitability of using any one measure to assess the extent of excess or deficit capacity in the economy.

In the second part of the table (3) SVAR having highest maximum (29.27 in 1995) and Production Function having minimum estimated amount of output gap (-17.12 in 1994). HP method has the most difference between maximum and minimum output gap in percent as its maximum amount equal 28.47 in 1992 and its minimum amount equal -25.75 in 1994. As results show in period 1992-96, the output gap has been faced with severe fluctuations and almost three methods show the same process.

4.1. Analysis of the Results

We want analyze the obtained results in previous sector. Although results are almost near together but we have to select one method for this target. Therefore we select SVAR method for annually data because of reasons described in previous section that SVAR has several advantages. Finally we use potential output and output gap estimated from this method for our analysis.

Figure (8) presents output gap for Iranian economy by using annual data for the period 1978-2008. We defined output gap equal actual output minus potential output. In other hand, output gap is positive when actual output more than potential and it is negative when actual output is less than potential output. The maximum positive output gap is 29% in 1995, while the maximum negative gap is 20% in 1989 which reflect the severe recession that hit the country in the late 1970s and 1980s because of the war period during 1980-89. As Figure (8) shows, the Iranian economy output gaps were largely negative in most of the period.

Therefore the first period is late 1970s and 1980s, which has negative effect on output gap. In the beginning years of war, in 1980 and 1981, output gap has decreased. Early years of war, there were recession. In these years, because of economic sanctions, war expenditures, reducing production and therefore decreasing GDP, output gap decreased so that it got lowest level in year 1989.

The second period is corresponding to years after war. Iran economy has better condition during 1991-97 because of stability in political, social and economic conditions and doing great economic projects and five year development programs called “constructiveness period” and therefore output gap were positive in most of the period.

Third period is 1997-2002. In these years, there was a recession because of reducing oil price. Reason of this recession was the crisis in South East Asia in late 1990s. It is clear in figure (8) in these years; Iranian economy has been faced with negative output gap and therefore a severe recession. Reducing of oil price is an unfavorable shock because it affects on GDP, national income and ultimately output gap negatively. It is important that oil shocks have two difference effects on the Iranian economy, favorable and unfavorable effect.

The fourth period is end of the studied period. It has shown in figure (8) after 2005, output gap has better condition and is positive after 2006. This is because of rising oil price in recent years. It is clear in figure after 2005, gap trend is uprising and amount of it from 2005 is positive. Output gap in 2005 was about -11566 million dollars but this amount in 2007 and 2008 is around 25749 and 23248 million dollars respectively. In this period because of the oil shock, the price of oil increased and this event cause positive output gap in the period. This shock was positive, that is, oil price increased and therefore it has positive impact on output gap. Since Iran is an oil exporter economy, so the long run effect is a possible rising in the level of potential output. Thus, the long-run aggregate supply curve line may shift to the right in response to a supply shock. If policies are aimed at the restoration of the pre-shock level of GNP, inflation will accelerate even more since $Q > Q^*$ as we can see in figure (8) so that the oil shock in recent years causes increasing potential output in the next years. We can conclude that Iranian economy has firm dependency with oil income. We could see in all studied periods, Iranian economy situation is dependent on oil price fluctuations.

5. Summary and Concluding Remarks

We estimated potential output and therefore calculated output gap. The results show that each method almost produces almost a similar result for output gap and also the turning points for these methods look similar but the magnitude of the volatility varies between the methods.

Also we faced to two types situations: In some years, for example after 2005, actual output is more than potential output, that is, output gap is positive. This situation can be an important reason for existing inflation in that period and policy maker must do plans and policies for control of inflation.

And in some periods, for example in late 1990s, actual output is less than potential output and therefore output gap was negative. This situation is a reason for unemployment in these years and policy makers must do expansionary policies.

We suggest that potential output and therefore output gap are estimated every year. Policy makers must have more attention to potential output level and output gap and estimation output gap . Attention to potential output level can help to perform better economic plans. We suggest that policy makers notice to potential output in planning special in five years plans. This can help to reduce unemployment and inflation.

In positive output gap, government must apply contractionary policies; this means that government must reduce money supply and its spending and increase tax rate. If output gap is negative, government must apply expansionary policies.

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