Analyzing the effects of Gross Permanent Investment on commerce business periods

Razie Golpayegani[1], Rokhsareh Hazrati[2]

[1]*Amin Higher Education Institute, Fooladshahr, Iran*
[2]*Iran Sepehr Carpet University of Applied Sciences and technology(UAST), Esfahan, Iran*

Abstract
Investment is regarded as one of the most fluctuating components of total demand in the economy. The purpose of this study is to investigate the influence of the fluctuation in investing on the commerce business periods in the economy of Iran. The data used in this paper are of chronological type related to the period between 1983- 2006. In this study, after de-processing the chronological series of all variables in the target model, using filters in a press-cut, and considering correlation coefficient among variables, the co-relation among them has been analyzed. In the next step, to investigate the effects of Gross Permanent Investment on commerce business periods in the economy of Iran, a model in the frame of simultaneous equations system has been utilized which has been analyzed using the method of 3-stage squares minimum. The results showed the variable of investment has positively effected on the commerce business periods in the economy of Iran, and this is in accordance with the theory of commerce business periods.

Keywords:

1.   Introduction

The nature of Economical variables is accompanied with required dynamics to be flexible for the other variables. These changes result in the variables be in imbalanced condition and during time have some changes and fluctuations. Deviation and alternation in long time equilibrium scale can be represented as volatility, fluctuation and business cycle. Understanding the reasons economical fluctuation is significant to recognize the flexibility of variables in macroeconomic level for economical policy making. These reasons are different from the view point of various economists and include an expanded scope of variables such as economical policies, investment and exchange rate. Total factor productivity shocks, investment productivity shocks and the wage shocks are among the effective factors influencing on economical fluctuations, each of which can be influential on marginal productivity of production factors and in this way to change the production level. (Justiniano et.al, 2009).

The features of business fluctuations are in a way that firstly, doesn't show a systematic pattern and secondly, the fluctuations are formed asymmetrically around the equilibrium scale of long time variable. If the deviations from the direction of long time balance are systematic and cyclic, these alternations can be called business cycles. Business cycles involve systematic fluctuation patterns of macroeconomic variables such as production, consumption, investment, employment and the price and the rate of interest which includes economic prosperity and recession which happen in the path of economical long term growth. The investment by the private sector can be regarded as one of the most significant factors effecting on the business cycles(in Keynesian view the fluctuation in

investment is of the important factors resulting in business cycles.) ,so that its fluctuation can be the source of regressions and prosperities resulted by business cycles.

Analyzing the business cycles , different economists have generally worked on two main subjects, first , recognizing the effective factors in emerging the recession and prosperity cycles in economic, second, discussing statistical indexes in business cycles such as , domain, territory, and duration. Therefore, analyzing the reasons of the emergency of business cycles in every economy will be of great importance. Because, these factors should be recognized and be left to economic policy makers and programmers in order to use them as a tool to make appropriate discussions. Although, the overall variables of macroeconomic, such as inflation, economical growth and unemployment, etc, all are involved in cyclic movements. Hence, having proper understanding of business cycles can lead us to an appropriate recognition of available relations among the variables of macroeconomic.

The method used for researching in this paper is applicable to find and collect data , we have used a documentation approach and to analyze the data , econometric and statistical methods have been used. The purpose of this study is to investigate the potential effects of investment on the business cycles in Iran, via simultaneous exchange system and three-stage least square(3sls) estimation method. The estimation of pattern was done using Eviews 5 software, data gained from census office and central bank of Iran for the period between 1984 and 2007, have been utilized.

2. Theoretical bases for business cycles

Business cycles can be defined as the change in economical and commercial activities such as the economical prosperities and recession over a time. The economical prosperity is characterized through low rate of unemployment, high economical growth, the abundance of different goods together with the welfare. On the other hand, high rate of unemployment, life pressure, sharp decrease in interest and increase in the amount of bankruptcy can be signs of economical recessions.

Each of the different economic schools has emphasized on special types of shocks. The classic pattern can be regarded as the first view on business cycles which has investigated the patterns of economical growth, the ideas expressed by Adam Smith are the most important ones. According to this pattern, the fluctuation occurring in production level is reciprocal result of variables effective on Market process, and the potentiality of this fluctuation rises from mutual relation between the production and market. Keynes is one of the theorists in business cycles context, who has focused on the role of monetary and credit policies in economical development.

According to this view monetary and credit policies are effective on business cycles, and can control economical crisis , and can reduce the domain of the fluctuation of economical cycles.

The theorists of monetarism view , stating the money illusion in short time, rejected any long term substitution between unemployment and inflation, and rejected any long term relation between real payments and inflation. To their believe the real payment can adapt to any level of inflation,, and its amount depends on the volume of money and economical status.

In rational expectations pattern, when monetary and financial policies are unexpectedly established ,the real prices will differ from the expecting prices, and just these

policies can pave the way for production fluctuation through destroying the balance in labor force market.

Kydland and presscut have reformulated the real business fluctuation hypotheses in the frame of neo-classic theories. According to presumptions of this pattern, people and enterprises in the micro –level are looking for maximizing their own benefits and utilities, and in macro-level, these factors are active to dedicate activity sources effectively. This theory has been realized because it has counted on the real shocks (technology, government expenses, employments money savers and consumers decisions) as the main sources for economical fluctuations.

According to the Neo-kyenesians, the existence of the inflexibility in the real payments due to the long term nominal payments contracts can weaken the immediate balancing of expectations in regulating the nominal payments. Although, in contrast to nominal inflexibility, the real inflexibility of goods market is not the result of decisions made by enterprising and both occur simultaneously, this phenomenon brings about an incomplete settlement of markets.

Several studies have investigated the significance of business cycles and factors effecting on it.

3. Studies in Iran

Hadian and Hashempoor(2003) have tried to recognizes and diagnose the causes of business cycles occurring in the economical status of Iran. They also have focused on macro variables of economic and their co-movement. To predict these variables, the ARIMA patterns have been employed. The results show that cyclic partial behavior in the economy of Iran is equal to the concept of business cycles and also the high volume of changes in investment and export are main signs of occurrence of business cycles.

Samadi and Jalaee (2004) have investigated business cycles in the economy of Iran, using sequential test. Also, in their study, they examined the existence of serial correlation in business cycles and using the Q statistics introduced by Box Piers and the analysis of auto correlation gained through this method, they showed that the highest coefficient of auto correlation is related to the pauses 1, 24, 12 and 35.

The statistics and economical indexes in Iran during the studied period showed that business cycles are systematically and regularly formed in Iran, and the related data own a strong serial correlation. Dargahi and Parkhide (2006) in the frame of a multiple business cycles have analyzed the relative importance of sources of production fluctuation in different industries. In their paper, they have investigated the effects and relative significance of macro and micro shocks on the growth value added in 6 sub parts of industry using a multiple sector model for business cycles by estimating apparently disorganized regressions (SUR). Furthermore, variance analysis process has been used to measure the relative importance of shocks in describing the fluctuations in growth rate in industrial sub parts. The results of this study show that macro-shocks play vital role in establishing business cycles of industry, so that 85% of the fluctuation in industry part is justified by macro- shocks.

4. Studies out Iran

Bulir(1996) has searched the relation between bank credit and business cycles in Czech under a central programming. For this purpose, co-accumulation and Vectorial auto-correlation techniques have been used to test long term relation and direct Grenjery causality between different factors of monopoly bank credits and industrial return. Co-accumulation test showed a long term relation among financial real sectors in programmed economy.

In a study, **Hoffmyster and Rudloos** (1997) have compared the features of business cycles in Asia(15 countries) and Latin America(17 countries). This paper gives a broader view on the relative significance of different shocks and factors which result in commercial changes in developing countries. Using VAR method, the dynamic effect of production shocks, real rate of exchange and balance of payments an global shocks effect(global interest rate and exchange relations) and the effect of domestic shocks(financial and nominal supply) on the Key variables of economy are identified . The results related to Asia showed that the fluctuation in the production growth is almost totally justified by domestic shocks and partially (10%) by foreign shocks. The results related to Latin America indicate that the domestic shocks have the most important effects on production growth in Latin America.

Justiniano et.al (2009) in a research, aiming at finding the source of economical fluctuations , present the analysis of the source for business cycles through motivational forces for fluctuations in a proximate model of Neo classical synthesis of America economy which is estimated using Basin methods. In this study, the effects of change in investment on the variations in production level have been investigated. The results showed that the shocks of marginal efficiency of investment are the key motivational forces, and also, neutral technological shocks have an undeniable role in the fluctuation of production and consumption.

5. Business cycles indicators (BCI)

Business cycles are the principles of the costs on modern economy and the purpose of governments is to minimize the side effects of recession and to hasten economical improvement. To do so, the business cycles indicators, i.e. volatility , co-movement and persistence should be recognized, first. Volatility indicates the instability degree and the degree to which the variable tends to change. It also , shows the capability of variable in creating a cycle. The volatility degree of variables is calculated through approximate standard deviation. Stability means a variable tends to keep its fluctuation state. Stability index is calculated with self-correlation in the first stage. Co-movement means the fluctuations of a variable moves simultaneously along with real GDP fluctuations, this index is measured by mutual co-relation coefficient in which L indicates inhibition, C_{XX} shows variable variance , C_{XY} stands for two variables co-variance. (Leitner 2005).

$$\rho_{XY} = \frac{C_{XY}(L)}{\sqrt{C_{XX}(0)C_{YY}(0)}} \qquad\qquad L=\pm1, \pm2, \dots, \pm n$$

$$C_{XY}(L) = \begin{cases} \sum_{t=1}^{T-1} \left((X_t - \bar{X})(Y_{t+1} - \bar{Y})\right)/T & L = 0,1,2,\dots \\ \sum_{t=1}^{T+1} \left((Y_t - \bar{Y})(X_{t-1} - \bar{X})\right)/T & L = 0,-1,-2,\dots \end{cases}$$

To be mentioned , in this study, we would focus on the co-movement that contributes to recognition of leading , coincident and lagging variables concerning the business cycle.

5.1 the strategy of national Bureau of economic research (NBER) for co-movement index

Identification of business cycle indicators plays a significant role in predicting the economical fluctuations. The method utilized in this study is in accordance with NBER method which has been used since 1930s, and along with scientific development, it has undergone necessary modifications. This strategy suggested by Henry Morgenthau, the

secretary of federal state treasury , has been founded to investigate a system of indicators, which is known as NBER strategy (Dargahi 2004). in general the identification of business cycles indicators by strategy of NBER is done first by selecting a reference time series representing business cycles such as gross domestic product. Then the macro economic variables in which there may be hidden business cycles , are collected. The variables are called basic variables. In the next step, all variables are filtered to extract their cyclic components which are deviation from the trend. After that , cyclic components in reference time series are compared to each of the basic series through their mutual co-relations coefficient , and thus, the most vital feature of business cycle i.e. co-movement is identified. The desired variables in the present study include the variables of gross domestic product(GDP) , private consumption (PRC), government costs (GC) , investment (INV), Interest rate (R) , export of goods and services (EXO) , import of goods and services (IM), monetary volume (M1), private profit (PRO), capital stock (K) , oil revenue of government (OILR), inflation rate (INF) . in this paper , gross domestic product has been considered as the reference variable , and as an index to measure the business cycles of economical activities. After de-processing all variables by filters in a Hodrick – presscott(HP), their deviation from their trend has been compared and analyzed to the production deviation. Then , using aforementioned co-movement index , the business cycles in Iran have been compared to the variables of macro economy for the period between 1984 and 2007. table 1 shows the calculated results for mutual correlation coefficient between the mentioned variables fluctuations and gross domestic product.

Mutual correlation coefficient ρ_{xy}							Vvariables
-2	-2	-1	0	1	2	2	
-	-	-	1000000	-	-	-	GDP
0.372621	0.693753	0.913400	0.967234	0.266023	0.169792	0.144952	PRC
0.143926	0.580904	0.871737	0.942375	0.830282	0.563968	0.225526	GC
0.615603	0.724439	0.778280	0.768438	0.579015	0.240723	-0.113980	INV
0.370762	0.630150	0.837964	0.924572	0.814416	0.510262	0.097232	K
0.338684	0.557321	0.656528	0.632838	0.556586	0.400201	0.213716	IM
0.224443	0.595773	0.863379	0.927464	0.842851	0.620810	0.302727	M1

0.583700	0.786236	0.274090	0.869918	0.717928	0.424160	0.065083	ILR	O
0.163711	0.593243	0.208089	0.992186	0.882489	0.583965	0.197092	RO	P
-0.543520	-0.604646	-0.604803	-0.560612	-0.508570	-0.393678	-0.236083		R
-0.147847	0.080521	0.244818	0.309840	0.370223	0.320506	0.264331	XO	E
-0.454493	-0.255928	-0.055969	0.000101	0.288695	0.431585	0.446150	NF	I

Table 1. the calculation of the values of mutual correlation coefficient between the research variables period between 1984 and 2007

Considering the factor of time, variables can be leading, coincident and lagging. The leading variables are the ones whose change in movement in cyclic points is done before the change of reference. Similarly, coincident variables move simultaneously along with gross domestic product, and lagging variables move after reference variable. Variables are divided into 3 groups based on orientation and direction: pro cyclical, counter cyclical and A cyclical. If the variable moves in the same direction and orientation as the reference variable , it is called pro cyclical variable , if it moves in an opposite direction to the reference variable , it is called counter cyclical, and finally if I moves with no specific pattern and randomly during time, it is called A cyclical variable.

In short, we can analyze co-movement index among variables in this way , the positive mutual correlation coefficient indicates the co-orientation. Of the movement of the desired variable along with the production, and the negative coefficient shows that the variable moves in an opposite direction. Furthermore, variable X has a high co-relation if $|\rho_{XY}(L)| \geq 0.4$, and has a low co-relation if $0.3 \leq |\rho_{XY}(L)| \leq 0.4$ and is not correlated if $|\rho_{XY}(L)| \leq 0.3$. also , if mutual correlation coefficient for the amounts before the inhibition L=0 , has the highest volume, it will be regarded as leading variable and if for the amounts after the inhibition L=0 , takes the highest volume, it will be considered as lagging variable , and if the maximum coefficient is at the inhibition L=0 , it is called coincident variable , which has been shown in table 2 below.

Correlation				
Correlation with reference variable	Leading\lagging	Time to cycle	direction	variable
up	-	Coincident	Pro cyclical	HPPRC
up	-	Coincident	Pro cyclical	HPGC
up	1	Leading	Pro cyclical	HPINV
up	-	Coincident	Pro cyclical	HPK
up	1	Leading	Pro cyclical	HPIM
up	-	Coincident	Pro cyclical	HPM1
up	-	Coincident	Pro cyclical	HPOILR
up	-	Coincident	Pro cyclical	HPPRO
up	1	Leading	Counter cyclical	HPR
down	1	lagging	Pro cyclical	HPEX
up	1	leading	Counter cyclical	HPINF

Table 2 : analysis of co-movement index between the variables of research and business cycles in the economy of Iran

6. Data Stability

Applying the traditional and conventional methods of econometric in determining pattern coefficients using time series data is based on this assumption that pattern variables are Stable . The process of a time series variable is stable when its average and variance remains constant during the time. If time series variables used are not stable in the determining the pattern , although there may be no relation or concept among the Pattern variables , the acquired R^2 determination coefficient can be very high , and pushes the researcher towards some misunderstandings about the relation between the variables . in such conditions, the occurred regressions are not real, the are fake. Meanwhile, when the variables of a pattern are not stable , the critical value of common statistics F& t are no longer in use (Gujarati 1995). Unit root test is used to investigate the Stability of the variables ; Augmented Dicky Fuller (ADF) is one of the tests.

7. Illustrating the research model and estimation method

Utilizing an expanded Klein's first model which has focused on the business cycles in the economy of America, the present study has tested the desired hypothesis and has concluded some results from them. The introduced pattern includes both theoretical bases of business cycles and the variable effecting on them, and also , matches with the economical features of Iran .

EQUETION	STRUCTURAL EQUATIONS
1	$I = \alpha_{10} + \alpha_{11}I(-1) + \alpha_{12}K(-1) + \alpha_{13}R + \alpha_{14}Y + e_1 \qquad \alpha_{13} < 0$
2	$G = \alpha_{20} + \alpha_{21}G(-1) + \alpha_{22}OILR + \alpha_{23}Y + e_2$
3	$Y = \alpha_{30} + \alpha_{31}PRO + \alpha_{32}M1 + \alpha_{33}I + \alpha_{34}G + \alpha_{35}EX + \alpha_{36}PRC(-1) + \alpha_{37}IM(-1) + e_3 \quad \alpha_{37} < 0$
4	$PRO = \alpha_{40} + \alpha_{41}PRO(-1) + \alpha_{42}Y + \alpha_{43}INF + e_4 \qquad \alpha_{43} < 0$

Table 3: the introduction of structural pattern

7.1 investigating the Stability of variables

To estimate the pattern coefficient using time series , the variables of pattern should be stable. The statistics applied in the pattern research for finding the Stability of variables , is the augmented Dickey fuller (ADF), which has been assessed for all endogenous variables of pattern , both non-processed and intercepted, in this test hypothesis Zero (H_0) indicates the unit root, and alternative hypothesis(H_1) is the Stability of the variables . if calculated date is larger than McKinnon critical value, the null hypothesis(H_0) or non-stable will be rejected. The results from this study have been shown in table 4.

variable	statistic ADF With intercept and without trend (in surface)	statistic ADF with intercept and without trend(difference of the first time)
HPGDP	0.1654-	9.1844-
HPINV	1.4766-	6.2871-
HPPRO	1.6440-	3.2918-
HPK	1.6374-	14.7591-
HPR	0.0615-	6.2600-
HPGC	0.5499	5.2191-
HPOILR	0.1044	5.1540-
HPM1	1.6706	14.4063-
HPEX	0.9708-	13.4674-
HPIM	0.0448-	9.4924-
HPINF	1.6295-	4.7152-

Table 4: the results of the unit root test of variables levels with intercept and without trend in the period of 1984-2007

- the critical value ADF for the confidence level of 95% for variable in surface with intercept and without trend is -2.998
- the critical value ADF for the confidence level of 95% for variable in difference of the first time with intercept and without trend is -3.0048

The above shown results in table 4 show that in the surface all variables are non-stable, but the first time difference of all variables are stable, therefore, all variables are of the same total order I (1).

7.2 Model Estimation Method

After investigating the conditions of recognizing of simultaneous system equations , we can determine its estimation method. To recognize each of the simultaneous system equations, two qualifications of rank and order have been used. Regarding their conclusions, we can state that the considered total equations system has been more than specific limit and has come to an answer.

Depending on different statistical features and the conditions of equations to solve the simultaneous equations system, there are different method foe estimation, which are divided into two general groups.

The first group is single-equation with limited information. This group , in turn, includes single -equation estimations using the methods of ordinary list square (OLS) , indirect list square (ILS) and two-stage least square (2SLS) .

In single-equation methods, each of the simultaneous system equations is estimated individually regarding all constraints applied on that equation , (including the elimination of some variables), and disregarding all the constraints applied on the other system equations. And that is why these methods are called methods with limited information. (Guajarati 1995).

The other group includes the systematic estimation methods. This group of methods estimates all the pattern equations, taking all constraints applied on all system equations, simultaneously. And that's the reason why we call them methods with full information which include the methods with three-stage least square (3SLS), and maximum likelihood with full information (FILM).

To estimate the simultaneous equations, first, the equations should be recognized, so that we can decide about the method of estimation. Because the selection of estimation method depends on the recognition of simultaneous equations . Therefore, in this study the desired simultaneous equations system is estimated using 3SLS method. The results have been shown in table 5.

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Coefficient title	α_{11}	α_{12}	α_{13}	α_{14}	α_{21}	α_{22}	α_{23}	α_{31}	α_{32}
Estimated value	.46	0.07	-4612.65	.19	0.09	.009	.66	.05	0.08
Statistic T	8.68	12.1	-42.09	4.20	3.84	.99	2.14	2.46	32.32
Coefficient title	α_{33}	α_{34}	α_{35}	α_{36}	α_{37}	α_{41}	α_{42}	α_{43}	
Estimated value	.12	.96	0.40	.13	0.33	.04	.99	470.15	
Statistic T	1.75	8.65	8.67	.77	17.82	.98	3.83	13	

Table 5: the results of estimation of behavioral equations of pattern

The estimation results in the first step shows that all co-efficient are relatively meaningful, and the co-efficient marks indicate the agreement between the obtained results and theoretical expectations.

7.3 Co-Accumulation test

After the pattern estimation through three-stage least square method, to avoid the spurious regression phenomenon , the unit root test is ran for every single error term in each one of the behavioral equations of pattern . this is known as Angle-Grenjer Augmented Co-Accumulation test (AEG). If all estimated error terms of all equations are persistent in the surface, it indicates that there is no spurious regression , and we can conclude that all estimated equations are persistent in long time duration, and therefore, there will be a balanced long term relation between depending variables and their explanatory variables. As stated in the pattern .

Based on the results gained from statistics (ADF) related to the equations error terms , it is understood that the obsolete value of this statistics is larger than McKinnon critical value. Therefore, the error terms have been stable, and the variables of the research pattern functions are Co-Accumulated , too. Table 6 shows the Co-Accumulation test results for the variables of behavioral equations :

Error terms	**e1**	**e2**	**e3**	**e4**
statistic **ADF**	-2.9844	-1.9077	-2.0711	-2.8815

Table 6 : Structural pattern Co-Accumulation test

- the critical value ADF for the confidence level of 10% is -1.6081(without intercept and trend)

8. Conclusion

The results obtained from the estimation of coefficients of model show that the variable coefficient of constant investment is positive, and the estimated value indicates that this variable effects on the business cycles in the economy of Iran positively, therefore, the increasing changes in this variable, results in the increase in gross domestic production gap and intensifies the business cycles. on the other hand, we can conclude that the movement of business cycle in Iran changes along with the changes inconstant investments. It means, by increasing this variable , the economy faces prosperity and by decreasing it , the economy encounters regression. This shows that investment has a determining role in both the analysis of business cycles and the structure of the economy in Iran. Also, by investing , the private sector contribute to development of these cycles . because the economy system in Iran is governmental, the private sector plays a great role in production changes in Iran. The obtained results, also, show the co-movement of available variables in the model , and the variables of investment , import, interest rate and inflation are the leading variables in the economy of Iran.

9. Suggestions

First, based on the obtained results in this study, it is recommended to the economy policy makers , recognizing the leading variables in economy of Iran, remove the unnecessary shocks through a concise planning , so that the economy moves toward a constant development and growth.

Second, regarding the positive effect of investment of private sector on the business cycles in Iran, the authorities are advised to pave the ground for increasing and creating new investments in the country, by establishing appropriate economic policies.

Last, since the effect of investment on the production, fluctuation has been investigated in the present study, the impact of other macro economy variables on the business cycles in Iran can be studied as well.

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