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ARTICLE

COMMODITY PRICE SHOCKS AND BUSINESS CYCLE

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ABSTRACT

In recent years, commodity price shocks have been destabilizing the country's economy in different ways and they have extended to capital markets, foreign exchange, and Tehran Stock Exchange as well which have slowed economic growth. In this paper, we study factors affecting commodity price shocks and business cycle through SVAR in the period 1987-2014. Regression method and SVAR econometric model will be used for analysis. It can be concluded that the commodity price shocks of the prior period have a significant and positive impact on the commodity price shocks of the current period, moreover, factors such as increased ratio of export to import and the food and energy price index increase the probability of commodity price shock. In addition, by an increase in investment share and growth in labor productivity, the probability of commodity price shock in business cycle will decrease.

KEY WORDS
commodity price shocks, business cycle, SVAR econometric method

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INTRODUCTION

In this paper, we will investigate the effect of different economic factors on commodity price shocks. After targeted subsidies, Iran is dealing with price shock in goods and services and since in global markets the price of Iranian goods has raised, other parties no longer have tendency to trade with Iran. Here, through a different perspective, we relate the resulting inflation in the country to other economic indicators but targeted subsidies.

The research variables are listed in the [Table 1] below:

Table 1: The introduction of variables

Variable
Growth in labor productivity
Capital
Inflation rate
Nominal interest rate
Employment rate
CPI
Consumption share
Share of investment
Point-to-point inflation
Food and energy price index
Rate of export to import
Continuous commodity index

Research background

MajidSabaghKermani and VahidShaghaghiShahri studied factors affecting real exchange rate in Iran during the period 1959-2001; they employed the vector autoregression model and found determining factors of the long-term and short-term behavior of real exchange rate in Iran. Their results suggested that during this time, increased federal deficit, trade relation and the volume of money enhanced real exchange rate of Iran's economy. The increase in variables including import taxes, net foreign assets and also oil prices reduces real exchange rate. Therefore, by improving public finance – which leads to increased national savings – real interest rate will decrease and consequentlyreal price of oil will fall as well. An increase in real oil price will enhance the value of the domestic currency, therefore, prices of traded goods and state budget deficit would affect exchange rate. The implementation of monetary policy in real fixed exchange rate regime, increases non-commercial prices in comparison with prices of imported goods at a faster rate, consequently, there will be low current account and foreign reserves but high exchange rate. Variables such as foreign assets and import restrictions also decrease Iran's exchange rate.

ParvizMohammadzadeh had an article named "The relationship between budget deficit and demand for money in the period 1959-2002 in Iran"; he studied budget deficit issue. He considered Keynesian, Ricardian equivalence, and neoclassical theories. Regarding Iran's macroeconomic data in that time, there is a long-term equilibrium relation between budget deficit and demand for money and Keynesian theory works well for Iran's economy and also the issue of budget deficit in Iran's economy has important and key effects on real variables.

Mahmoud Khataei and YounesGharbaliMoghadam [1] studied the dynamic relationship between exchange rate and gross domestic product of Iran's economy during the period 1959-2000. According to the results, there is a negative relationship between real exchange rate and GDP in a long term.

Dr. SeyedKomeylTabibi and Dr. KhadijehNasallahi [2] studied the role of key variables in the determination of the behavior of Iran's long-term equilibrium exchange rate and analyzed factors provided by supply and demand in the economy including changes in state fiscal policy, changes in international finance situation, the difference in the growth rate of the efficiency of commercial and non-commercial sectors, changes in exchange relation, and changes in trade policies. In this research, variables such as total efficiency of productivity factors, the current cost of government construction as government financial policy index, internal exchange relation, the central bank's foreign exchange reserves to the monetary base, and investment exchange intensity index explain the behavior of Iran's real exchange rate. Through econometric methods their long-term effects on the behavior of real exchange rate were determined then evaluated. Due to the structure of Iran's foreign exchange market in which at least five real effective exchange rates in the shape of real effective rate of official exchange, real effective exchange rate of the parallel market, real effective exchange rate of the final export, real effective foreign exchange rate, and real effective exchange rate of foreign exchange payments in the currency market are dominating there, the results suggest that directions of the impacts of mentioned variables depend on REER and the short-term imbalance of all the effective rates – except for parallel market – will be adjusted slowly in a long term.

Matthias Gubler, et al [3] investigated the impact of business cycles on commodity price shocks and considered all unforeseen changes in commodity prices of America's market as shocks. They concluded that unexpected price shocks are under the influence of many macroeconomic variables.

Stationary and stability

The easiest way to determine the stationary of a variable is by looking at its vector. However, this method is not accurate enough and we should test the stationary of a time series variable. Unit root test is a common test which is used for determining the stationary of a time series variable. For clarification, consider the following first-order vector auto-regression process:

$$Y_t = \varphi y_{t-1} + \varepsilon_t$$

Where coefficient φ is estimated by ordinary least squares method (OLS) and is equal to 1, we can study the stationary and non-stationary status of a time series process. Therefore, when $1 \geq |\varphi|$,Y is a non-static time series and its variance will increase over time and approach infinity. If$|\varphi| < 1$, Y is a static time series (or a static difference). Hence, when the value of φ is strongly less than 1, the stationary or difference of a time series can be estimated. Null hypothesis (H_0: φ = 1) vs. alternative hypothesis (H_1: $\varphi < 1$).

Dicky-Fuller (DF) and Augment Dicky-Fuller (ADF) tests

By estimating the following equation after subtracting $Y_{t-1}$from both sides of the equation, standard DF test will be done as follows:

$$(Y_t - Y_{t-1} = (\varphi - 1) Y_{t-1} + \varepsilon_t$$

Where δ = φ – 1. Therefore, null hypothesis and alternative hypothesis for the reliability of time series would set out as follows:

$$\begin{cases} H_0 = \delta = 0 \\ H_1 = \delta < 0 \end{cases}$$

T statistic is the obvious statistic of hull hypothesis and it is calculated as follows:

$$t = \frac{\hat{\delta}}{se(\hat{\delta})}$$

Where $\hat{\delta}$ is δestimation and*se($\hat{\delta}$)* is the standard deviation of the coefficient. The main problem of this test is that the t statistic provided by ordinary least squares method has a unit root regarding the null hypothesis but is not distributed normally and it does not have a standard shape. Dicky and Fuller (1979) suggested that regarding null hypothesis, the unit root of this statistic does not follow normal t distribution, therefore, t critical quantity cannot be used for this test. They offered a practical solution in which τ test is used instead of t test because it has a limiting distribution. The critical values of τ for tests and different sample sizes have achieved through Dicky-Fuller simulation methods and are listed in tables. When the absolute value of τstatistic is more than the absolute critical value of τ suggested by Dicky and Fuller, the stationary condition of time series cannot be denied and the time series is static. However, when the absolute value of τstatistic is less than the absolute critical value, null hypothesis regarding the existence of unit root is accepted and hence the time series possesses random walk process and therefore is not static. In addition, in order to test the stationary status of a time series, Dicky and Fuller (1979) extracted the limiting distribution of τstatistic based on some models that estimate the above equations by considering both intercept and process, intercept without process, and without any intercept or process.

Normal Dicky-Fuller unit root test that was mentioned earlier is valid if only there is a first-order autoregressive process. When this assumption is not applicable and time series is correlated at higher intervals (i.e. it has pth-order autoregressive process) $\varepsilon_t$interval white noise is rejected. When there is autocorrelation among intervals, Dicky-Fuller test no longer can be used for stationary testing. Because limiting distribution and critical values are correspond to Dicky-Fuller test. ADF test provides a parametric correction for higher-order correlation and assumes time series X follows a AR(p) process and then adds differential components with lag P of dependent variable Y to the right side of the equation:

$$Y_{t-1} + \varepsilon_t \Delta Y_{t-1} + \sum_{i=1}^{p} \beta Y_t = \delta\Delta$$

Afterwards, this generalized correction will be used for stationary testing. Dicky and Fuller (1981) realized a very important matter and that is the limiting distribution of statistic for stationary testing depends on the first differential intervals of ADF regression. Three criteria including Akaik (AIC), Schwartz- Baizian (SBC), and Hanan-Quinn (HQ) as well as criteria with augmented values of these three criteria determine the number of lagged, differential components (number of optimal lags) to remove successive correlation in residuals.

Philips-Perron unit root test

Philips and Perron suggested a statistic based on the limiting distribution of Dicky-Fuller's different statistics, however, they ignored assumption on alike and separate $\varepsilon_t$intervals. Philips and Perron indicated that when $\varepsilon_t$intervals are not distributed similarly and separately, statistic has a limiting distribution as follows:

$$\lim_{n\to\infty} \frac{\sum_{t=1}^{n} E(\varepsilon_t^2)}{n} = \sigma_\varepsilon^2$$

$$\sigma^2 = \lim_{n\to\infty} \frac{\sum_{t=1}^{n} E(\varepsilon_t^2)}{n}$$

When $\varepsilon_t$intervals are distributed similarly and separately, σ_ε^2 and σ^2 are equal and Philips and Perron's results are similar to Dicky and Fuller's results. But usually they are not equal and tests that have been done through τ statistic are not valid enough (Noforesti, 1999: 50).

Results achieved by Philips and Perron's unit root test for the model variables are listed as follows [Table 2].

Table 2: Philips and Perron test

Result	Significance level	Statistic	variable
Stationary	0/000	11/42 -	Δa
Stationary	0/004	-4/67	Δq
Non-stationary	0/78	-1/55	H
Non-stationary	0/84	-1/39	π
Non-stationary	0/26	-2/65	R
Non-stationary	0/10	-3/17	N
Non-stationary	0/12	-3/09	P
Non-stationary	0/73	-1/67	C
Non-stationary	0/59	-1/96	I
Non-stationary	0/07	-3/42	Ci
Non-stationary	0/99	0/05	Fe
Non-stationary	0/17	-2/90	D
Non-stationary	0/67	-1/79	CCI

Null hypothesis of Philips-Perron's test is based on the non-stationary status of variables and they can be considered as follows:
H0: the variable is not stationary.

H1: the variable is stationary.
Significance level should be less than 0.05 to reject the null hypothesis.
Since most of the variables are non-stationary, we should repeat stationary test with a single differential.

Table 3: Philips-Perron's test with a single differential

Result	Significance level	Statistic	Variable
Stationary	0/006	-2/84	H
Stationary	0/000	-4/02	π
Stationary	0/000	-5/27	R
Stationary	0/000	-8/23	N
Stationary	0/000	-7/87	P
Stationary	0/000	-4/05	C
Stationary	0/000	-4/58	I
Stationary	0/000	-8/009	Ci
Stationary	0/001	-3/14	Fe
Stationary	0/000	-6/42	D
Stationary	0/000	-6/41	CCI

Since most of the variables are static after one differential, co-integration test should be done.

Co-integration test

It is said that if a time series has been d times differenced to be static, it possesses d unit roots and it would be total of d or $I(d)$. When we have two time series (x_t and y_t) which are both$I(d)$, normally each linear combination of x_t and y_t are$I(d)$ as well. However, when we have constant coefficients such as α and β, total disturbing regression regarding xt and yt:

$$xt - \beta ut = yt - \alpha$$

Has co-integration order less than d, for example$I(d-b)$ is assumed ($b > 0$). Angel and Granger (1987) believe co-integrations x_t and y_t have (d, b) order. Therefore, two time series namely xt and yt have b and d-order co-integration which means$CI(d, b)$. If co-integration is equal to$I(d)$, there will be $b > 0$. Given the above definition, when xt and yt have both $I(1)$ co-integration and ut$\sim I(0)$, both time series have$CI(1,1)$ co-integration order; this definition also applies to more than two time series (Angel and Granger, 1987). When error-level of regression equation is$I(0)$ (i.e. stationary), common econometric methods and data of time series can be used to estimate parameters and t and F statistics (Noforesti, 1998).

Results of Johansen co-integration test are listed in [Table 4] below:

Table 4: Results of Johansen co-integration test

Johansen co-integration test			
Result	Significance level	statisticTRACE	No. of relations
Rejected	0/000	153/32	No relation
Rejected	0/04	105/25	Maximum one relation
Approved	0/70	64/12	Maximum two relations
Approved	0/06	29/24	Maximum three relations

Null and alternative hypotheses of this test could be considered as follows:
H0: the variables are not co-integrated.
H1: the variables are co-integrated.
Significance level should be below 0.05 to reject the null hypothesis.
Since the model's co-integration is approved, it can be estimated at the level.

Correlation between the variables

Pearson correlation coefficient: Pearson correlation coefficient which is also called moment correlation coefficient or zero-order correlation coefficient is introduced by Sir Karl Pearson. This coefficient is being used for determining the intensity of a relationship, type or direction of the relation between two distance and relative variables or one distance and one relative variable. In fact it parametrically correspond to Spearman correlation coefficient. Some computational methods can be applied to calculate this coefficient.

In this paper, the following formula is being used:

$$r = \frac{n(\sum xy) - \sum x \sum y}{\sqrt{[n(\sum x^2) - (\sum x)^2][(\sum y^2) - (\sum y)^2]}}$$

Pearson correlation coefficient varies from -1 to 1. r = 1 means there is a completely direct relationship between two variables; direct or positive relationship indicates whenever one of the variables increases (or decreases), the other one increases (or decreases) as well. r = -1 suggests a completely inverse relationship between two variables. Inverse or negative relationship suggests whenever a variable increases, the other one decreases and vice versa.

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Before the estimation of correlation vector, model variables might be appropriate. Correlation indicates the linear of model components. When Pearson correlation is higher than 0.7 and is significant, there is a possibility of linear in the model. Through Pearson correlation method, the correlation among variables are achieved and listed in the [Table 5] below.

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Table 5: Pearson correlation between variables

Correlation Probability	R	PT	P	N	I	H	ODI	CI	CT	DG	DK	ST	FE	PPI
R	1.000000 -----													
PT	[illegible]	1.000000 -----												
P	[illegible]	[illegible]	1.000000 -----											
N	[illegible]	[illegible]	[illegible]	1.000000 -----										
I	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----									
H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----								
ODI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----							
CI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----						
CT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----					
DG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----				
DK	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----			
ST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----		
FE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----	
PPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.000000 -----

Correlation coefficient is in row 1 and significance of correlation is in row 2. When the number in row 2 is less than 0.05, correlation is significant.

All correlations of above table are below 0.7 and the possibility of linear in model is minimal.

Model estimation

The following regression will be estimated:

$$p_t = \alpha^p - \beta^p_{a,0}\Delta a_t - \beta^p_{h,0}h_t + \sum_{j=1}^{M}\beta^p_{x,j}x_{t-j} + \varepsilon^p_t$$

The model estimation is summarized in [Table 6] below:

Table 6: the impact of different variables on commodity price shocks

Significance	t-statistic	Effect	Variable
***	3/15	0/56	Commodity price shock of prior period
---	-0/52	-0/08	Commodity price shock of two prior periods
---	-1/43	-3/78	Intercept
**	-2/18	-0/47	Growth in labor productivity
---	0/99	0/14	Capital
*	-1/82	-1/05	Investment level

---	-0/26	-0/04	Employment rate
---	-0/88	-0/62	Inflation rate
---	0/76	3/72	Nominal interest rate
**	-2/36	-0/36	The rate of export to import
***	3/04	8/78	Food and energy price index
---	1/59	0/39	Continuous commodity index

***: significant with the possibility more than 99%

**: significant with the possibility more than 95%

*: significant with the possibility more than 90%

---: not significant

Significance test of research variables

To test the significance of independent variable coefficients of both models, t-statistic was employed. The null hypothesis of t-test is as follows:

$$\begin{cases} H_0 : \beta_1 = 0 \\ H_1 : \beta_1 \neq 0 \end{cases}$$

Where the following statistic validates it:

$$T = \frac{\hat{\beta}_1 - \beta_1}{SE(\hat{\beta}_1)} \sim t_{\frac{\alpha}{2}, N-k}$$

To whether approve or reject the null hypothesis, T statistic will be compared to t (in the table) with N-K degree of freedom and at a 95-percent significance level. When the absolute value of T is more than t in the table ($|T| > t_{\frac{\alpha}{2}, N-k}$), the numerical value of the test function is in the critical area and H0 is rejected. In this case, $\beta_1$at a 95-percent significance level will be significant which indicates the relationship between independent and dependent variable.

Model significance test

F-statistic is used for the model significance test. The null hypothesis of F test is as follows:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = ... = \beta_k = 0 \\ H_1 : \beta_1 \neq \beta_2 \neq .... \neq \beta_k \neq 0 \end{cases}$$

The following

statistic validates it:

$$F = \frac{ESS/(K-1)}{RSS/(N-k)}$$

To decide whether the H0 is approved or rejected, F statistic will be compared to F (in the table) with N-K and K-1 degree of freedom and at a 5-percent error level (α). When the F is more than F in the table ($F > F_{\alpha(K-1, N-K)}$), the numerical value of the test function is in the critical area and H0 is rejected. In this case, at a 95-percent significance level, the model will be significant overall. When the value of F is less the value of F in the table, null hypothesis is accepted and the significance of model will be rejected at 95-percent significance level.

The main details of estimation are listed below:

Table 7: Main characteristics of the estimation

Result	Value	Characteristic
Model explains dependent variable properly	0/97	**The coefficient of determination**
Goodness of fit	52/21	**F-statistic**

CONCLUSION

Regarding the estimation and explanations it can be concluded that:

- Commodity price shocks of the prior period have a positive and significant effect on commodity price shocks of the current period.
- Growth in labor productivity influences commodity price shock in a negative and significant manner (increase in labor productivity equals decrease in commodity price shocks).
- Investment level has a significant, negative effect on commodity price shocks (when investment level enhances, commodity price shocks falls).
- Increased export to import leads to a decrease in commodity price shocks (export to import rate has a significantly negative influence on commodity price shocks).
- Food and energy price index has a significant, positive impact on commodity price shocks.

Suggestions

Given the results, following suggestions for decreasing the probability of price shock in Iran are offered:

- Methods designed for enhancing labor productivity should be studied because by enhancing it, the possibility of commodity price shocks will lessen.
- Increasing exports and reducing imports should be placed on the agenda of Iran's economic ministries; according to the research results, increased exports leads to decreased commodity price shocks.
- We recommend statesmen and economic decision-makers to consider solutions for decreasing inflation rate especially in food and energy sector, because by decreasing inflation rate in a long term, the possibility of commodity price shocks will be lessened.

CONFLICT OF INTEREST
There is no conflict of interest

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None

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Attachments and appendices

CCI	INV	RPI	ffi	EMP	OUT	HOU	IMP	EXPp	CONn	gov	ENE	PPI	Foo	cpi	pop	
TM.VAL.M	NE.GDI.FP	NE.CON.T	BX.KLT.DI	SL.EMP.M	AG.PRD.C	IC.TAX.DU	BM.GSR.MR	TX.VAL.FC	NE.CON.G	AG.PRD.C	TX.QTY.MI	TX.VAL.MI	AG.PRD.F	FP.CPI.TO	EG.ELC.AC	year
78.94391	11.95929	5.34E+10	-3.1E+08	3.2	12193218	121	5540406421	3.28785	1.66E+10	47.2	65.30314	42.03916	46.59	1.725194	91.07548	1987
69.75735	14.09115	5.36E+10	60540000	4.2	12116749	121	5513944960	6.303123	1.65E+10	45.55	68.54613	37.78091	45.21	2.219818	91.57548	1988
88.43296	14.87563	5.45E+10	-1.9E+07	3.5	10786652	121	5275353324	3.81605	1.58E+10	45.04	78.97249	46.14923	45.95	2.715939	93.03774	
120.5366	15.54434	5.63E+10	-3.6E+08	2.6	13683863	121	5482343665	2.59425	1.64E+10	55.11	82.21548	68.10725	54.06	2.923102	93.53774	
165.6474	23.03117	6.12E+10	22590000	1.4	14447266	121	5849532899	3.500157	1.75E+10	56.13	92.64183	65.83524	55.03	3.423788	95	
153.0479	20.30426	6.29E+10	8500000	4.4	15810824	121	5797732502	3.432709	1.74E+10	62.98	95.88482	70.09349	62.13	4.30739	95.5	
126.8297	11.81956	6.67E+10	2.08E+08	3.7	16287213	121	6915767430	6.447982	2.07E+10	66.61	106.3112	63.7855	65.72	5.22067	95.6	
82.96837	10.60729	6.75E+10	2000000	3.5	16691094	121	6980799823	3.960909	2.09E+10	68.76	109.5542	68.56236	68.23	6.862415	96.1	
99.88488	10.53373	6.62E+10	17000000	3.2	17031706	121	6776821217	2.739109	2.03E+10	70.35	119.9805	63.88531	69.29	10.27001	96.2	
117.096	15.12768	6.76E+10	26000000	4	16082847	121	6671858950	3.645016	2E+10	74.89	123.2235	77.91155	73.08	13.24188	96.7	
102.1442	18.24484	6.93E+10	53000000	7	15822990	121	6425496425	3.577568	1.93E+10	76.2	133.6499	63.95838	75.23	15.53925	96.8	
103.058	19.18443	7.36E+10	24000000	6.3	18979267	213	6683327135	6.592841	2E+10	80.58	136.8929	45.64529	78.58	18.31551	97.3	
95.86991	18.04645	7.42E+10	35000000	6.1	14186048	344	6247839240	4.105768	1.87E+10	81.68	147.3192	73.17582	80.28	21.99156	97.4	
100	17.55549	8.03E+10	39000000	5.8	12873964	344	6998813971	2.883968	2.1E+10	76.49	100	100	77.84	25.17523	97.9	
120.2259	19.2068	8.36E+10	4.08E+08	6.6	14946548	344	7179148816	3.789875	2.15E+10	81.56	99.74774	89.38724	82.42	28.01355	95.2	
148.3451	17.70028	9.18E+10	3.52E+09	6.7	19861000	344	7337740136	3.722427	2.2E+10	91.92	109.1094	98.25324	89.81	32.02955	95.7	
178.4286	17.97479	9.58E+10	2.88E+09	6	20941778	344	7382475039	4.218373	2.21E+10	95.13	114.3356	117.4362	93.47	37.30418	96.1	
230.0763	19.00028	1.03E+11	3.04E+09	5.8	21986351	344	7478504483	3.053767	2.24E+10	93.67	110.2347	145.0886	94.33	42.81084	96.6	
288.1062	17.9028	1.1E+11	2.89E+09	5.5	21906732	344	8348988744	3.510299	2.5E+10	103.83	108.9097	195.734	102.99	48.56167	97	
293.366	15.67161	1.17E+11	2.32E+09	6.3	22407082	344	8970068213	4.251745	2.69E+10	102.5	124.7977	267.9704	102.68	54.35972	97.5	
323.3703	15.5136	1.25E+11	2.02E+09	6.4	24025766	344	8581649488	4.708277	2.57E+10	108.04	130.9044	308.7547	107.2	63.71668	97.9	
413.0163	13.28241	1.32E+11	1.98E+09	5.7	13475497	344	9202727935	5.449723	2.76E+10	99.03	124.7412	395.5183	99.13	79.99619	98.4	
365.29	13.12439	1.4E+11	2.98E+09	5.5	20835765	344	8814309206	5.906255	2.64E+10	107.1	127.3016	274.2963	107.04	90.79589	98.3	
470.6001	10.8932	1.47E+11	3.65E+09	5.2	22246967	344	9435387665	6.179093	2.83E+10	110.69	132.5122	352.5384	107.42	100	98.4	
444.3805	10.73519	1.55E+11	4.28E+09	6	20695843	344	9046968933	3.671056	2.71E+10	111.19	131.75	459.3062	108.53	120.6283	99.5	
410.7929	8.504	1.62E+11	4.66E+09	6.1	22010000	344	9468047358	3.943895	2.9E+10	115.65	103.4986	361.8776	112.34	153.6291	100	
352.5687	8.345988	1.7E+11	3.05E+09	6.4	22650100	344	9279628607	1.435858	2.78E+10	116.84	83.45675	285.3266	113.29	213.9536	101	
318.9811	6.114797	1.77E+11	3.43E+09	5.9	23964257	344	9700707031	1.708696	2.97E+10	121.3	55.20532	187.898	117.1	250.8293	101.2	