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The impact of macroeconomic shocks on SD in Iraq

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Abstract

The Iraqi economy reinter economy that depends on the oil sector, and this led to the neglect of the other sectors and a decline in their contribution, which made its economy vulnerable to economic shocks and low development rates. SD indicators in Iraq witnessed a significant deterioration, especially during the eighties and nineties of the last century as a result of the factors as political, economic and social, as well as the wars that Iraq fought during that period and the economic blockade that Iraq was subjected to, which had a significant negative impact on most SD indicators. After the regime change in 2003 and the start of a new political and economic phase that witnessed Iraq's transformation from following the socialist system to following the free market philosophy, some of these indicators began to gradually improve, but they are still far from the required levels.

Keywords: Macroeconomic, (Sustainable Development) SD, Shocks, Iraqi Economy

The significance of research:

Its ability to enable decision-makers to endorse the principles and objectives of SD, so facilitating progress in all areas.

The research challenge is that the Iraqi economy, despite its abundant resources, continues to experience economic shocks, adversely impacting the attainment of SD objectives. The significance of the study is in illustrating the critical role of decision-makers in endorsing the principles and objectives of SD to enhance various sectors.

Hypothesis for research:

Economic shocks, particularly fluctuations in global oil prices, substantially affect and diminish SD rates. The primary aim of this study is to elucidate and assess the influence of economic shocks, as reflected in several macroeconomic indicators in Iraq, on SD in the country from 2004 to 2019.

Constraints of the research:

Geographical parameters: Iraq (certain macroeconomic indicators and SD)
Temporal constraints: during the span 2004-2019

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Research structure:

The research is segmented into three sections to fulfil its objectives. The first section addresses the theoretical and conceptual framework of economic shocks and sustainable development (SD), while the second section analyses standard tests for select macroeconomic variables in Iraq, illustrating the impact of economic shocks on SD during the period from 2004 to 2019.

The first section: Theoretical and conceptual framework of economic shocks and SD

First: Economic disruptions:

Shock refers to any unforeseen circumstance (Robert C. Guell, 2010, p. 123). A positive shock results in an elevation of the variable's value, while a negative shock causes a reduction in the variable's value (Information and Decision Support Centre, 2004, p. 7). These are referred to be events that impact the economy, originating from either internal or foreign sources (Abdul Hussein Al-Ghalibi, 2011, p. 118). It is characterised by abrupt alterations that result in a shift in either the aggregate supply curve or the aggregate demand curve (Nimat Allah Ibrahim, 2010, p. 310), alternatively it is defined as unforeseen fluctuations in aggregate supply or aggregate demand (Michael Ebdjman, 1999, p. 340).

Shock is seen as the principal catalyst for the emergence of a crisis. The notion of a crisis signifies the existence of a flaw that substantially affects the whole system. This flaw arises from an abrupt occurrence. If not managed initially, a crisis may be classified as a catastrophe, defined as a sudden occurrence stemming from a natural event. A rapid and severe shift denotes an unexpected or arbitrary shock. Some economists assert that shocks are the primary catalysts of crises, positing that an economic shock arises from a rapid, significant alteration in one or more macroeconomic variables, leading to an imbalance that impacts the whole economic system of the affected nation. (Obaid & Obaid, 2023, p. 227). The researchers start their efforts by elucidating the main categories of shocks. Salman (2010, pp. 42-43), Ibrahim and Qasim (2023, pp. 292-294), Shweiti and Hameed (2021, p. 183), Saleh (2021, pp. 81-82).

1- Accidental or random shocks: This type of shock appears as a result of emergency conditions that occur due to natural disasters such as earthquakes or floods, which lead to heavy losses in vital facilities in the country. This type of shock disappears when these disasters end, but they lead to an imbalance in the country's external economic balance.

2- External shocks: These shocks emerge through external events that can be controlled and have strong effects on the income level. The most prominent events that lead to this type of shock are:

A- Change in export revenues: Many countries face external shocks (negative and positive) that lead to a recession due to a decline in export revenues, especially when the country is dependent on exporting only one commodity or a small number of commodities, such as oil, cotton, or copper, as these shocks occur as a result of a decline in foreign currency revenues. These are negative shocks, while when export revenues rise, they are positive shocks as a result of the increase in those revenues.

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B- Imported inflation: Many countries depend mainly on imported goods, especially oil, which increases in price, causing a decline in real income in oil-importing countries because the oil demand is inelastic, which negatively affects the balance of trade and the balance of payments. The same applies to several other commodities.

C- High borrowing costs from abroad: This also happened in 1982 after some countries refused to pay their foreign debts, such as Mexico, which led to the outbreak of the foreign debt crisis and the rise in borrowing costs from abroad.

D- Change in the level of foreign donations and aid: Sometimes the level of aid and donations that a country receives from donor countries changes from its previous level, as happened to Egypt after the First Gulf War, where Egypt received large amounts of aid from the United States of America in exchange for its well-known position.

3- Seasonal shocks: This type of shock is characterized by being short-term and affecting the balance of payments for a specific period of time during the year. These shocks occur in countries that depend on the export of a specific commodity in a specific season.

4- Periodic shocks: This type of shock is concentrated in open economies in which foreign trade constitutes a high percentage of the gross domestic product, and the global economy is exposed to periods of recession and prosperity, affecting the exports of these countries negatively, positively, and significantly.

5- Structural shocks: These shocks occur when the structure of internal or external demand changes and shifts from certain sectors to others, or the demand for foreign exchange shifts instead of the local currency due to internal instability.

6- Real shocks: They occur when a new technology or product is adopted, or fluctuations occur in the prices of raw materials. Many countries are exposed to this type of shock, and these shocks occur when there is an event of Sudden changes in the market for goods and services, which affects the gross domestic product.

7- Monetary shocks: It is one of the most common types, especially in developing countries. These shocks occur when there is a sudden event in the money market, for example, a sudden change in the exchange rate, interest rate, or money supply. However, if the exchange rate system works well, it may be able to isolate the economy is completely immune to these shocks, as the monetary authority deals with the money supply regardless of the extent to which the monetary shock has reached.

The central bank can also, through open market operations, change the money supply to ensure the stability of interest rates and income. In general, it can be said that most of these shocks may be caused by the goods and services market or the money market.

8- Oil shocks: These shocks are considered one of the most dangerous types of external real shocks facing the economy for more than 50 years, and their main reference was the change in the degree of response of the oil markets as a result of the fundamental changes taking place in the global economy.

Second: SD:

A. The notion of SD:

The notion of SD arose from the increasing global consciousness of the environmental catastrophe (Al-Gharibawi, 2020, p. 42). The Earth has begun to experience several environmental issues that jeopardise terrestrial living forms. A new concept for development, termed SD, emerged from the

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persistent efforts of organisations, scientists, and researchers (Nabila and Nisreen, 2021, p. 48). A multitude of international conferences and summits convened to produce texts that marked significant milestones in defining the notion of SD (Ghoul and Dahama, 2022, p. 29). Numerous concepts of SD have arisen (Hakim and Abdul Qader 2022, p. 55) SD is defined as economic activity that enhances societal well-being while prioritizing the conservation of natural resources and minimizing environmental harm and exploitation. SD offers a means to fulfil human needs while safeguarding resource sustainability to uphold the rights of future generations (Klarin, 2018, p. 77). SD is defined as the process of safeguarding opportunities for future generations, emphasizing the interconnectedness of justice across generations. Consequently, the concept lacks a singular definition, leading to various interpretations by scholars. (Mohamed et al., 2015, pp. 341-343).
The condition of SD is one in which benefits do not conflict over time. SD is characterised by a consumption pattern that remains consistent throughout time. SD refers to the management of resources in a manner that safeguards future production potential. The concept of SD pertains to a scenario where natural capital reserves remain non-conflicting throughout time. The condition of SD is characterized by the management of resources to ensure the enduring generation of resource services. SD refers to a circumstance when the essential prerequisites for environmental stability are universally met or attained.

B. The importance of SD

SD has emerged as a global priority due to its association with enhancing human well-being (Al-Hasadi, 2018, p. 168). SD serves as a connection between present and future generations to guarantee the continuation of human existence, and its significance is rooted in diminishing the disparity between developed and developing nations (Abu Al-Nasr, 2017, p. 91).
C. The objectives of SD may be established as follows (Abdul Qader 2022, p. 42):

1- Attaining an enhanced quality of living for the populace.
2- Augmenting public understanding of prevailing environmental issues.
3- Honour the natural environment.
4- Attaining the judicious use and management of resources.
5- Connecting contemporary technology to societal objectives.
6 -Facilitating a suitable transformation in societal demands and priorities.
7- Attaining technological economic advancement.
D. Criteria for SD There exists

A set of general requirements that represent the general framework for SD, which can be explained as follows (Al-Khazaali, 2018, 51) (Hadi, 2022, 44):

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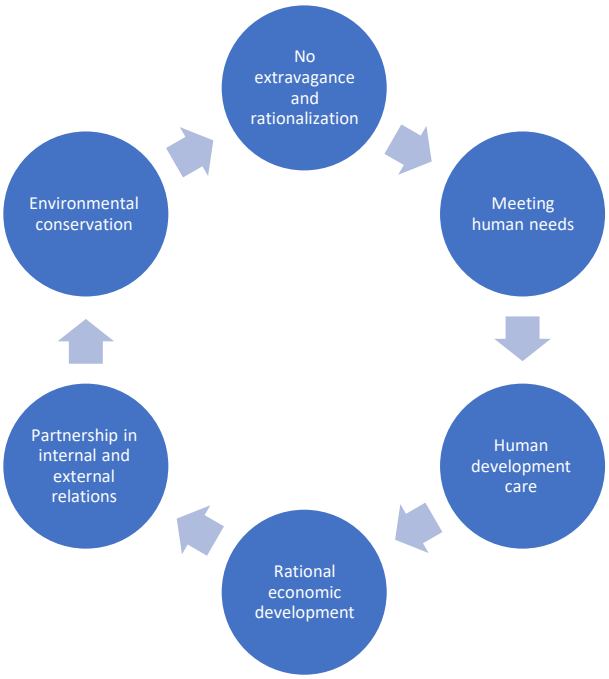

Figure (1) SD requirementsThe second section: Analysis of the results of standard tests

The relationship between some macroeconomic variables and the economic development index in Iraq are covered by the estimated equation that will be constructed to expand the scope of economic development to include the real GDP per capita index as a dependent variable, while macroeconomic variables will be used as an independent variable.

1. Description of the data and model specifications:

This research will apply the ARDL model to ensure the presence of co-integration between the study variables if the conditions for applying the model are met in terms of stationarity of the variables using unit root tests.

2. Data description: The data used in the estimation equation were collected from various sources, including the Central Bureau of Statistics in the Iraqi Ministry of Planning, the Central Bank of Iraq (CBI), and the Ministry of Finance. The data set used in this research is quarterly and covers the period (2004 - 2019).

3. Model Description: In this study, the researchers assume that the index of real GDP per capita (AGDP) as a variable expressing economic development (is the dependent variable), while the official exchange rate EX, the inflation index in, the unemployment index un, and the net budget index bud are the independent variables. Or interpretive. Therefore, the model can be formulated as follows: =f (EX, in, un, bud) AGDP

In a regression model, the model can be written as follows:

$AGDP = \beta 0 + \beta 1\ EX + \beta 2\ in + \beta 3\ un + \beta 4\ bud + \mu t$..... (1)

Where β0 is the constant. β1, the parameters to be estimated. μt Random error term. All of these variables will be tested using stationary tests, and then the result of this test will indicate the

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possibility of applying the ARDL model or not because if one of the variables in the second difference is stationary, the ARDL model will be excluded.
4. Experimental results: This section presents the empirical evidence for the research as well as the results of unit root tests obtained using techniques such as the Phelps-Perron PP test, as well as presenting the results of the cointegration model between the dependent and independent variables.
5. Unit root test to verify static: In the first step, we examine the stationarity of the time series and use the PP test for the unit root, as through this test it is possible to infer whether the variables included in the test suffer from the unit root problem, and then there are sufficient reasons to accept the null hypothesis, or that the variables are free from the unit root problem (static) and then there are sufficient reasons to accept the alternative hypothesis.

Table (1) Phelps-Perron test results

At the first 5% difference the critical value (probability value)			At the level of 5% of the critical value) probability value(			Variable name
No Con. No. Trend	Con. And No Trend	No Con. No. Trend	No Con. No. Trend	Con.s and Trend	Con.	
0.0067	0.1368	0.0563	0.1926	0.7322	0.2533	EX
0.0257	0.0450	0.1981	0.6962	0.7828	0.4392	AGDP
0.0082	0.0215	0.0688	0.1461	0.6959	0.6886	In
			0.0157	0.0078	0.0000	Un
0.0017	0.0954	0.0257	0.0381	0.2525	0.1516	Bud

All variable probability values surpass 5% at level I (0), with the exception of the unemployment variable un, which remains stable at its original level. This signifies that the other variables exhibit non-stationarity at this level, although attain stationarity upon taking their first difference, which is crucial to avert the emergence of The pseudo-regression has a probability value below 5%, demonstrating that the variables have achieved stationarity at the first difference, signifying that these variables are integrated of the first degree (I(1)).

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6. Results of the Autoregressive Distributed Lag (ARDL) Model: After demonstrating that all variables are stable at the initial difference I(1) and at the level, we proceed to cointegration analysis to ascertain the long-term relationship among the variables.
At the outset: Limited test results: The results of the limits test for the F statistic act as a first assessment to determine the existence of a cointegration relationship, signifying a long-term equilibrium among the model's variables. If the F statistic above the crucial upper limit values, signifying a rejection of the null hypothesis in the limits test, then long-run cointegration is established. The existence of a persistent equilibrium relationship among the model variables. If the F-statistic is below the crucial upper limit values, long-run cointegration is not present, resulting in the acceptance of the null hypothesis. This suggests a possible short-term link between the model variables, requiring the termination of further ARDL model study.

Table 2: Test estimation results

The results

I(1)	I(0)	Signif.	Value	Test Statistic
	Asymptotic: n=1000			
3.09	2.2	10%	11.95747	F-statistic
3.49	2.56	5%	4	K
3.87	2.88	2.5%		
4.37	3.29	1%		

demonstrate that the F statistic surpasses the crucial values at both the lower and higher thresholds, so confirming the existence of a long-term relationship between the economic development index and macroeconomic variables. In the limits test, the F statistic reaches a value of 11.9, above the critical values for both the lower and upper boundaries. The highest level denotes cointegration, indicating a long-term equilibrium relationship between the dependent and independent variables.
Second: Results of assessing long-term and short-term ARDL coefficients: Following the boundary test results confirming a long-term cointegration relationship between the independent and dependent variables, the following table displays the long-term ARDL coefficients.

Table 3: Estimation of long-run coefficients

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	4.514183	0.077742	0.350940	BUD

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0.6688	0.430576	10.25507	4.415586	EX
0.8625	0.174224	52.07242	9.072244	IN
0.0004	-3.804777	255.1276	-970.7038	UN
0.1837	1.350242	12070.68	16298.34	C

EC = AGDP - (0.3509*BUD + 4.4156*EX + 9.0722*IN - 970.7038*UN +16298.3410)

Table (3) presented the estimation of long-term coefficients via the ARDL model, revealing that the probability values for both the budget surplus and unemployment variables are below 5%. Consequently, this suggests an influence of the independent variables' coefficients on the dependent variable's coefficient in the long term. An increase in a budget surplus of one unit results in a per capita GDP rise of 0.3 units. This outcome is rational and aligns with economic theory. Nonetheless, a rise of one unit in the unemployment rate results in a decrease of (-970.7) units in the per capita share. The short-term dynamics coefficients derived from the estimated ARDL model are shown in Table (4), where the error correction coefficient indicates the rate of reversion to equilibrium in the long run, and the findings are summarised in the following table.

Table (4): Results of estimating short-run parameters

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0498	2.015553	0.009271	0.018685	D(BUD)
0.0553	-1.967539	0.011203	0.022042	D(BUD(-1))
0.0553	-1.967539	0.011203	0.022042	D(BUD(-2))
0.0032	-3.113760	0.010783	0.033574	D(BUD(-3))
0.0054	2.920434	13.06526	-38.15624	D(IN)
0.0001	-4.241801	43.40849	-184.1302	D(UN)
0.0000	-8.928407	0.012598	-0.112482	CointEq(-1)*

Table (4) presents the outcomes of the short-term dynamic coefficients linked to the long-term connections derived from the ECM equation. The error correction terms in cointegration models are crucial as they signify adjustments to the long-term equilibrium within the dynamic model. The coefficients of the error correction term were (-0.11). This indicates that the fluctuations in macroeconomic variables relative to the average per capita GDP adapt at a sluggish rate of 11% towards long-term equilibrium in the near run. The table above indicates that the short-term coefficients for the unemployment and inflation variables are all significant and negative, while the coefficients for the other variables are positive. Fiscal surplus. Third: Outcomes of statistical

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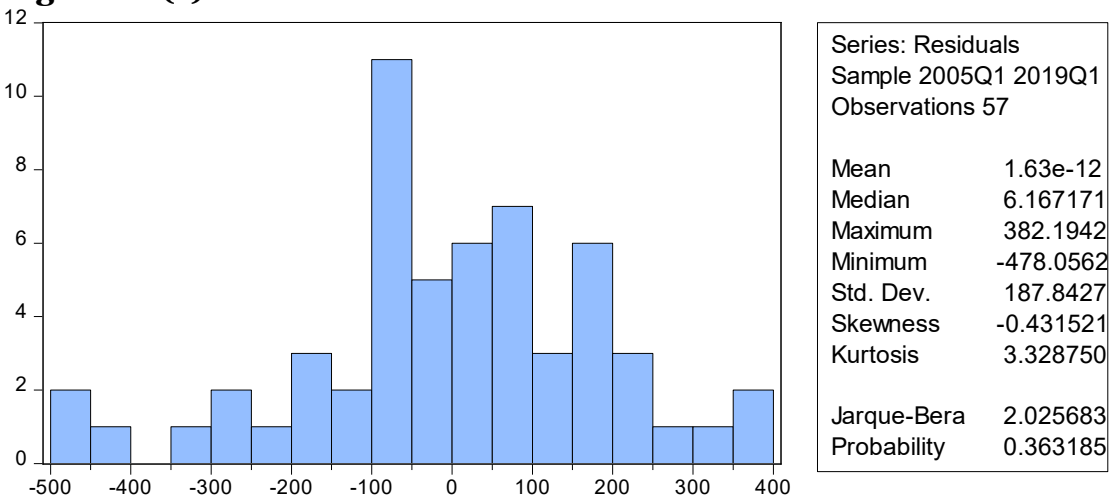
analyses: In the concluding phase, we use diagnostic assessments to appraise the robustness of our empirical ARDL model. The diagnostic test results are shown in Table 5 and Figure 1. The error term or random residuals of the ARDL model have been verified to be devoid of heteroscedasticity and autocorrelation, since they are appropriately distributed. All test probability values naturally surpass 5%, hence augmenting the accuracy of the estimations and the confidence of this model.

Table (5): Results of statistical tests.

Probability	Test
0.2046	Serial correlation test
0.9755	Heteroskedasticity test

Source : From the work of researchers based on the EVIEWS 13 program

Figure (1) The normal distribution test results of the residuals



The cumulative sum of the residuals (CUSUM) is utilized, and if it remains within the secure zone between the two critical lines at a significance level of 5%, we accept the null hypothesis, indicating the stability of the structural regression coefficients. Consequently, the model is structurally stable in the long term. The results depicted in Figure 2 demonstrate that the CUSUM curves lie within the two limits of the 5% confidence interval, thereby affirming the stability and precision of the estimates of the structural parameters of the econometric model assessed in the long run.

Figure (2) The stability test results of the CUSUM formula

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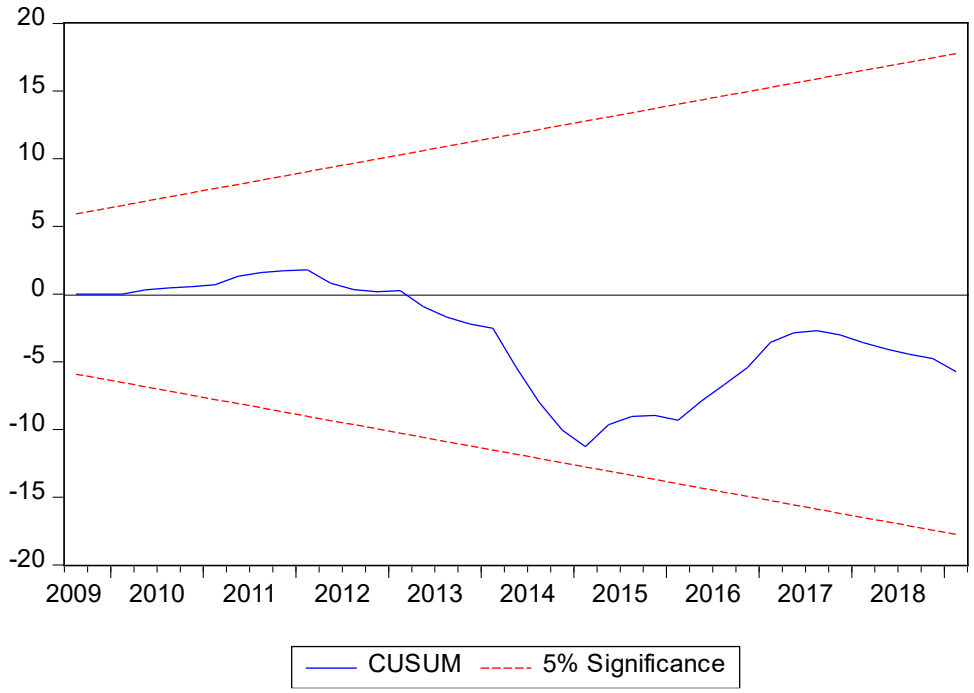

Contusions

1. The Iraqi economy was exposed to internal and external shocks due to its rentier character.

2 .Iraq relied on external financing and caused an external shock.

3 .Oil revenues were not well utilized in developing other sectors.

4 .The existence of a long-term relationship between the economic development index and macroeconomic variables.

5. Increasing the budget surplus by one unit leads to an increase in the per capita GDP by 0.3 units .

Recommendation

1 .Working to increase the contribution of other economic sectors to mitigate the impact of shocks to which the economy is exposed.

2. Benefiting from the high revenues of the oil sector by establishing sovereign funds that contribute to supporting investment and achieving economic stability.

3 .Providing an accurate database based on modern methods that contribute to making the results more accurate.

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4 .Working to increase the per capita GDP contributes to achieving development and well-being for members of society.

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Appendix (1)

AGDP	BUD	EX	IN	UN	
9194.799999999999	871.3587	1462	26.8	26.8	2004Q1
9236	4168.66025	1466	29.375	24.575	2004Q2
9277.200000000001	7465.9618	1470	31.95	22.35	2004Q3
9318.400000000001	10763.26335	1474	34.525000000000001	20.125	2004Q4
9359.6	14060.5649	1478	37.1	17.9	2005Q1
9549.700000000001	13107.6401	1474.25	41.1	17.8	2005Q2
9739.799999999999	12154.7153	1470.5	45.1	17.7	2005Q3

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9929.9	11201.7905	1466.75	49.1	17.6	2005Q4
10120	10248.8657	1463	53.1	17.5	2006Q1
10260	11670.053725	1400.75	47.5500000000000001	16.05	2006Q2
10400	13091.24175	1338.5	42	14.6	2006Q3
10540	14512.429775	1276.25	36.4499999999999999	13.15	2006Q4
10680	15933.6178	1214	30.9	11.7	2007Q1
10898.925	17259.629925	1205.5	26.35	12.6	2007Q2
11117.85	18585.64205	1197	21.8	13.5	2007Q3
11336.775	19911.654175	1188.5	17.25	14.4	2007Q4
11555.7	21237.6663	1180	12.7	15.3	2008Q1
11566.225	15841.701225	1181.25	11.6	14.975	2008Q2
11576.75	10445.73615	1182.5	10.5	14.65	2008Q3
11587.275	5049.771075000001	1183.75	9.4	14.325	2008Q4
11597.8	-346.194	1185	8.3000000000000001	14	2009Q1
11723.075	-248.64	1185	6.85	13.5	2009Q2
11848.35	-151.086	1185	5.4000000000000001	13	2009Q3
11973.625	-53.532000000000001	1185	3.95	12.5	2009Q4

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12098.9	44.022	1185	2.5	12	2010Q1
12280.575	7545.44725	1193	3.275	11.75	2010Q2
12462.25	15046.8725	1201	4.05	11.5	2010Q3
12643.925	22548.29775	1209	4.8249999999999999	11.25	2010Q4
12825.6	30049.723	1217	5.5999999999999999	11	2011Q1
13189.025	26206.704	1214.5	5.725	11.225	2011Q2
13552.45	22363.685	1212	5.85	11.45	2011Q3
13915.875	18520.666	1209.5	5.975	11.675	2011Q4
14279.3	14677.647	1207	6.1	11.9	2012Q1
14338.85	9686.36525000002	1210.75	5.0499999999999999	11.95	2012Q2
14398.4	4695.0835000000001	1214.5	4	12	2012Q3
14457.95	-296.198249999994	1218.25	2.95	12.05	2012Q4
14517.5	-5287.4799999999999	1222	1.9	12.1	2013Q1
14139.575	-7609.0025	1218	1.975	11.725	2013Q2
13761.65	-9930.525	1214	2.05	11.35	2013Q3
13383.725	-12252.0475	1210	2.125	10.975	2013Q4

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13005.8	-14573.57	1206	2.2	10.6	2014Q1
12054.025	-9948.3614999999999	1216.25	2	11.245	2014Q2
11102.25	-5323.153	1226.5	1.8	11.89	2014Q3
10150.475	-697.9444999999996	1236.75	1.6	12.535	2014Q4
9198.70000000001	3927.264	1247	1.4	13.18	2015Q1
9129.025000000001	-219.0932499999999	1254	1.075	12.585	2015Q2
9059.35	-4365.4505000000001	1261	0.75	11.99	2015Q3
8989.674999999999	-8511.80775	1268	0.425	11.395	2015Q4
8920	-12658.165	1275	0.1	10.8	2016Q1
9184.225	-9010.6095	1269	0.125	10.825	2016Q2
9448.450000000001	-5363.054	1263	0.15	10.85	2016Q3
9712.674999999999	-1715.4985	1257	0.175	10.875	2016Q4
9976.9	1932.057	1251	0.2	10.9	2017Q1
10041.425	7873.20375	1240.25	0.25	11.625	2017Q2

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10105.95	13814.3505	1229.5	0.300000000000001	12.35	2017Q3
10170.475	19755.49725	1218.75	0.350000000000001	13.075	2017Q4
10235	25696.644	1208	0.4	13.8	2018Q1
10360.25	18233.3505	1206.425	0.250000000000001	13.7625	2018Q2
10485.5	10770.057	1204.85	0.1	13.725	2018Q3
10610.75	3306.7635	1203.275	-0.050000000000002	13.6875	2018Q4
10736	-4156.53	1201.7	-0.2	13.65	2019Q1