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# Empirical evaluation of the 2001 and 2003 tax cut policies on personal consumption: Long Run impact

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**“Empirical evaluation of the 2001 and 2003 tax cut policies on personal consumption: Long Run impact”**

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ABSTRACT

This paper examines the effect of the two tax cuts enacted by President Bush in 2001 and 2003 on consumer spending over time. Our analysis, using macroeconomic variables affecting consumer spending, is based on a sample of 210 time series quarterly data of the U.S. population from 1960 to 2012. The previous studies based on the original consumption model defines consumption depends according to disposable income and autonomous consumption but fail to consider the omitted variables resulting from the negative intercept. This research paper uses an instrumental variable, independent from consumption, incorporated in the different models in order to prevent bias and multicollinearity while analyzing disposable income as a function of consumption. We also study an interaction between disposable income and the tax cuts and we find that the percentage change in consumption derived from the 2001 and 2003 tax policies is not significant. Besides, we control for other variables such as unemployment rate which have significantly affected the level of consumption.

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## 1. Introduction

President George W. Bush, in his attempt to resolve the economic and financial hardship faced by the US population passed two tax cuts: the Economic Growth and Tax Relief Reconciliation Act of 2001 and the Jobs and Growth Tax Relief Reconciliation Act of 2003. These fiscal policies, dealing with individual income tax reductions, tax benefits and tax rebate were supposed to expire in 2010. However, its successor, President Obama, due to the persistence of the national economic insecurity decided to extend them until the end of 2011. Indeed, this decision generated various heated debates among economists and political researchers. The major opinion derived from different critics is in accordance with the argument developed by the supply side theory: An immediate increase in disposable income, created by tax cut, would increase spending without any significant impact on labor productivity and any significant impact, positive, on capital. It would raise nominal wage, which results in inflation. Additionally, it would raise nominal interest rate, which would decrease capital investment.

Thus, as these two tax cuts extension became the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 and still belong to the new economic policy, what could be the new effect of the fiscal policy in the current US economy? How could such decision influence the long run consumption and lifestyle of the American population? Did this tax cut extension benefit the economic growth of the nation in the long run? Hence, some economists such as Hoel (1982) tried to explain its long run effect by supporting that:

“No output effect, real wage and relative price between domestic and imported goods go up, thus lead to the deterioration of the balance trade. In the case of fixed exchange rate, the price level will increase. However the price stays constant if the exchange rate is flexible”<sup>1</sup>. (p.557)

Our research inquiry is to testify whether or not the 2001 and 2003 tax cuts have significantly influenced the changes in consumption. This paper estimates and evaluates the effect of the two tax cuts policies and personal consumption in the long run analyzing the macroeconomic variables affecting personal consumption.

## 2. Overview of the two fiscal policies

The Economic Growth and Tax Relief Reconciliation Act of 2001(EGTRRA) provides individual income tax reductions, tax benefits to children, marriage penalty relief, affordable education provisions, state, Gift, and Generation-Skipping Transfer Tax Provisions, Pension and Individual Retirement Arrangement Provisions, alternative minimum tax to the U.S. population.

The Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) deals with the acceleration of certain previously enacted tax reductions such as the increase \$1,000 child tax credit, the 15 percent bracket for joint filers to twice. In addition, this fiscal program includes growth incentives for business, the reduction in taxes on dividends and capital gains, a temporary state fiscal relief which provides \$10 billion for State and local government assistance and \$10 billion for Medicaid assistance until September 30, 2004 as well as some corporate estimated tax payments for 2003 requiring ¼ payment of September 2003 corporate estimated taxes by October 1, 2003.

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<sup>1</sup> Hoel assumed the sticky wage, which will not always be true

This paper also focuses on the income tax rebates generated after President Bush enacted this policy. Indeed, starting from July to September 2001, eligible households received between \$300 to \$600. The intent of this financial relief additional amount was a short run strategy to assist individual in their spending adjustment which seemed to be hard and insufficient against the economic crisis experienced during this time.

On December 17 2010, President Obama enacted the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, representing the two year extension of the EGTRRA and the JGTRRA. Its provisions include a 13-months extension of the federal unemployment benefits, a temporary one year reduction of the FICA payroll tax, the extensions of the Child Tax Credit, Earned Income Tax Credit, American Opportunity Tax Credit, Small Business Jobs and Credits Act of 2010 until 2011 and many other extensions of the previous tax cut policies.

### 3. Literature review

The previous literature attempted to evaluate of the tax policy effectiveness by analyzing its short term impact and implications on the entire economy. Saigri Kitao (2010) assessed the short-run effects of tax cut policies by making several assumptions about the stimulus funding and developing a model linking household consumption, demographics, endowment, preference, technology, government policy and market structure. His sensitivity analysis<sup>2</sup> supported by the Frisch elasticity<sup>3</sup> suggests that the rebate policy does not have a significant effect on consumption

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<sup>2</sup> Sensitivity analysis is a way to predict the outcome of a decision if a situation turns out to be different compared to the key prediction, Investopedia.

<sup>3</sup> Frisch elasticity measures the substitution effect of a change in the wage rate on labor supply.

in both the short and long run. Johnson, Parker & Souleles (2006) found enough evidences to reject the Permanent Income Hypothesis<sup>4</sup> (PIH) and claimed that households were spending about 2/5 of their rebate in the consumption of nondurable goods. According to Johnson et.al, the 2001 tax cuts have increased household consumption. To some extent, the previous literature presents different results concerning the impact of tax cuts policies. This paper studies the effectiveness of tax cuts on consumption, while controlling for other variables.

#### 4. Data set

We use a set of 212 time series quarterly data starting from 1960 to the second quarter of 2012 of real personal consumption expenditures<sup>5</sup>, disposable personal income<sup>6</sup>, and consumer sentiment index as well as unemployment rate which are measured in billion of US dollars seasonally adjusted . These variables have been taken from the National Income and Product Accounts (NIPA) tables available at the U.S. Bureau of Economic Analysis (BEA) website.

#### 5. Historical trend of consumer spending

Figure (1a) depicts the trend in consumer spending from the 1960s to the second quarter of 2012. The graph shows an increasing trend of consumption over time. Specifically, during the 1970s, consumption was increasing at a very slow rate. Well, this is not surprisingly and might have been related to the economic situation of the U.S. at this time. Indeed, the country experienced

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<sup>4</sup> Permanent Income Hypothesis is a theory developed by Milton Friedman which suggests that a temporary change in income does not affect consumption.

<sup>5</sup> Real personal consumption expenditures represents the goods and services purchased by persons and it is adjusted with inflation, US Bureau of Economic Analysis

<sup>6</sup> Disposable personal income is the total after tax income received by individuals, Bureau of Economic Analysis

stagflation which is characterized by a high level of both unemployment rate and inflation. However, starting from the 1980s, the slope of consumption increased at a very high rate. It might have been the result of the policy of supply side economics adopted by President Reagan who advocated that a decrease in corporate income tax could benefit household with an increase in their earnings. Moreover, during the period where the 2001 and 2003 tax cuts have been introduced, consumption keep an increasing trend except a decrease in the second quarter of 2008 is denoted and can be justified by the 2008 financial crisis. According to the Ricardian Equivalence, the crisis might have led households to save more as a prevention technique and thus reduce their consumption level. Figure (1b) of the appendix defines more precisely the changes in consumer spending starting from 1990 until the second quarter of 2012. The purpose of this second graph is to help us better capture the minor changes that could have occurred between 2001 and 2004, i.e. the state of consumption right after the 2001 and the 2003 tax cuts. The 1990s period follows the previous 1980s trend noticed in figure (1a). Interestingly, a minor but significant kink is observed between the 2000 and the 2004 period. Indeed, the slope described by the third quarter of 2003 seems different from the one of the period before: consumption starts increasing at a higher marginal rate until the third quarter of 2008 as expected (due to the 2008 financial crisis). It might be worth to examine whether the two tax cuts have significantly stimulated the rate of consumer spending during this period. Nevertheless, a more complete analysis of different variables will help us testify this assumption.

## 6. Models

In order to explain consumption with the 2001 and 2003 tax policies, this paper builds four different models derived from the original consumption model<sup>7</sup> developed by John Maynard Keynes. The first model is determined through two stages. In the first stage, disposable income represents our independent variable and is explained by the consumer sentiment index. To avoid endogeneity, we use consumer sentiment index as a proxy of disposable income. The second stage explains consumption explained by disposable income, with consumer sentiment index as an instrument. The first model controls for the 2001 tax cuts in addition to disposable income. In fact, we analyze whether the 2001 tax cuts has a significant effect on consumption or not. The second model controls for the 2003 tax cuts in order to find the effect of the 2003 tax cuts on consumption. Additionally, we are interested in finding other variables that can explain consumption and how those variables might have affected the 2001 and the 2003 tax cuts. To do so, we present a third model in which consumption is explained by unemployment rate in addition to the previous variables. Thus, we estimate each of these models by running a regression which identifies the degree to which each variable might have affected consumer spending.

2SLS estimation is used to capture consumption explained by disposable income using an instrumental variable. Indeed, since consumption and disposable are not independent variables, running a regression directly will increase the probability of getting biased results. Therefore, we

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<sup>7</sup> According to John Maynard Keynes, consumption is a function of autonomous consumption and induced consumption composed of disposable income, and the marginal propensity to consume

insert the consumer sentiment index as instrumental variable which is independent from disposable income and define it as a function of consumer sentiment index as follow:

$$X_{i_t} = \beta_0 + \beta_1 Z_t + \epsilon_t \quad (1)$$

where

$X_{i_t}$  : disposable income

$\beta_0$  : intercept (constant)

$Z_t$  : consumer sentiment index

$\epsilon_t$  : random disturbance term

Independent variable ( $X_{i_t}$ )	Coefficients
Intercept ( $\beta_0$ )	-2436.12 (135.1322)****
Consumer sentiment index ( $Z_t$ )	109.8091 (1.9594)****
R square	0.9373
Adjusted R square	0.9370
Number of observations	212
Regression standard error	910.91

\*\*\*\* $p < 0.001$ , \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ , number in parentheses are standard errors

**Table (1)**

Table (1) shows a significant relationship between consumer sentiment index and disposable income. Indeed, one percent increase in consumer sentiment index lead to 109.8 percent increase in disposable income. In other world, changes in household disposable income are highly related to the changes in consumer sentiment index. Moreover, these results found above are used to develop the second step of the model. This second part incorporates the independent variable (disposable income) of the previous model and derives it to explain consumption. Indeed, we computed  $X_i$  for each year starting from 1960 by using the coefficient results of  $Z_t$  obtained in running the regression of equation (1) multiplied by the corresponding time series value from the original data of disposable income ( $\widehat{\beta}_0 + \widehat{\beta}_1 \times \hat{Z}$ ). We consider this process in order to control dependency between disposable income and consumption. By using an instrument that is indirectly related to consumption, we can reduce correlation between error terms.

Thus, our second step explains consumption as a function of disposable income adjusted from equation (1) regression:

$$y_{i_t} = \beta_0 + \beta_1 X_t + \epsilon_t \quad (2)$$

where

$Y_t$  : consumption

$\beta_0$  : intercept (constant)

$X_t$  : disposable income adjusted ( $\widehat{\beta}_0 + \widehat{\beta}_1 \times \hat{Z}$ )

$\epsilon_t$  : random disturbance term

Independent variable ( $X_{it}$ )	Coefficients
Intercept ( $\beta_0$ )	-4.770519 (0.0193)****
Disposable income adjusted ( $\widehat{\beta}_0 + \widehat{\beta}_1 \times \hat{Z}$ )	0.9993 (0.0015)****
R square	0.9995
Adjusted R square	0.9995
Number of observations	212
Regression standard error	0.0248

\*\*\*\* $p < 0.001$ , \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ , number in parentheses are standard errors

### Table (2)

Table (2) shows a positive and perfectly significant relationship between disposable income and consumption. Indeed, one percent increase in disposable income cause consumption to go up by 99 percentage point, about 1%. The two step process demonstrated that when growth rate of income increases, growth rate of consumption increases.

The first model controls for the 2001 tax cuts in the previous model and explains consumption with disposable income and the 2001 tax policy. The model adds an interaction term between disposable income and the 2001 tax cut to account for the difference in slope for the period before the introduction of the 2001 tax cut and the period after the tax cuts. This interaction term explains the change in consumption after the 2001 tax cut. Dummy 2001 captures any effect in 2001, which might not be captured in 2001 tax cut, such as recession. The model is written as follow:

$$y_{i_t} = \beta_0 + \beta_1 X_t + \beta_2 dummy_{2001t} + \beta_3 X_t * dummy_{2001t} + \epsilon_t \quad (3)$$

where

$Y_{i_t}$  : consumption

$\beta_0$  : constant

$X_t$  : disposable income adjusted ( $\widehat{\beta_0} + \widehat{\beta_1} \times \widehat{Z}$ )

$dummy_{2001t}$  : 2001 tax cuts,  $dummy_{2001}$  equals 1 if year  $\geq$  2001, equals 0 otherwise

$X_t * dummy_{2001t}$ : interaction term between disposable income and 2001 tax cuts

$\epsilon_t$  : random disturbance term

The second model controls for the 2003 tax cuts in the previous model and explains consumption with disposable income and the 2003 tax cut. This model adds an interaction term between disposable income and the 2003 tax cut to account for the difference in slope for the period before the introduction of the 2003 tax cut and the period after the tax cuts. In this model, the interaction term determines whether the 2003 tax cut have influenced consumer spending. The third model is written as follow:

$$y_{i_t} = \beta_0 + \beta_1 X_t + \beta_2 dummy_{2003t} + \beta_3 X_t * dummy_{2003t} + \epsilon_t \quad (4)$$

where

$Y_t$  : consumption

$\beta_0$  : constant

$X_t$  : disposable income adjusted ( $\widehat{\beta}_0 + \widehat{\beta}_1 \times \hat{Z}$ )

$dummy_{2003t}$  : 2003 tax cuts,  $dummy_{2003}$  equals 1 if year  $\geq 2003$ , equals 0 otherwise

$\epsilon_t$  : random disturbance term

Furthermore, the third model controls for unemployment rate expenditures in addition to disposable income and the 2001 tax cuts. This new variables is added to the model to capture the omitted variables that might have affected consumption in addition to disposable income. We believe that its effect on consumption might create significant changes in the marginal effect generated by the 2001 tax cuts. We then define model (5) as follow:

$$y_{it} = \beta_0 + \beta_1 X_t + dummy_{2001t} + X_t * dummy_{2001t} + \beta_4 unemploymentrate_t + \epsilon_t \quad (5)$$

where

$Y_t$  : consumption

$\beta_0$  : constant

$X_t$  : disposable income adjusted ( $\widehat{\beta}_0 + \widehat{\beta}_1 \times \hat{Z}$ )

$dummy_{2001t}$  : 2001 tax cuts,  $dummy_{2001}$  equals 1 if year  $\geq 2001$ , equals 0 otherwise

$unemploymentrate_t$  : unemployment rate

$\epsilon_t$  : random disturbance term

The last model uses the same technique as equation (5) by using the 2003 tax cuts instead:

$$y_{it} = \beta_0 + \beta_1 X_t + dummy_{2003t} + X_t * dummy_{2003t} + \beta_4 unemploymentrate_t + \epsilon_t \quad (6)$$

where

$Y_{it}$  : consumption

$\beta_0$  : constant

$X_t$  : disposable income adjusted ( $\widehat{\beta_0} + \widehat{\beta_1} \times \hat{Z}$ )

$dummy_{2003t}$ : 2003 tax cuts,  $dummy_{2003}$  equals 1 if year  $\geq 2003$ , equals 0 otherwise

$unemploymentrate_t$  : unemployment rate

$\epsilon_t$  : random disturbance term

## 7.Summary of regression results

We firstly run a regression of models (3) and (4) in order to estimate the level of consumption after the introduction of the two tax cuts. The results obtained are summarized in the following table (3).

Coefficients	<u>Model 3</u>	<u>Model 4</u>
<b>Constant</b>	120.2487 (18.65026)****	113.4115 (19.43701)****
<b>X<sub>t</sub></b>	0.008447 (2.11E-05)****	0.008493 (1.94E-05)****
<b>dummy<sub>2001t</sub></b>	207.7191 (70.7163)****	358.205 (103.0689)****
<b>dummy<sub>2001t</sub>* C<sub>t</sub></b>	-6.9E-05 (6.9E-05)	
<b>dummy<sub>2003t</sub></b>		
<b>dummy<sub>2003t</sub>*C<sub>t</sub></b>		-0.00024 (9.46E-05)
<b>unemploymentrate<sub>t</sub></b>	-8.38564 (0.945794)****	-8.49669 (0.984922)****
R square	0.9996	0.9996
Adjusted R square	0.9996	0.9996
Number of observations	212	212
Regression standard error	61.61	64.06

\*\*\*\* $p < 0.001$ , \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ , number in parentheses are standard errors

**Table (3)**

According to table (3), one billion increase in disposable income causes personal consumption to increase by about 8.4 million in both model (3) and (4). Furthermore, one billion increase in unemployment rate lead to a decrease in consumption by about 8.4 billion and the two tax cuts did not significantly changed consumer spending in this analysis as well.

In a second process, we calculated the log of the different variables before running the regression in order to capture the percentage changes in consumption after the tax cuts. Table (4) summarizes the results after running a regression analysis of each of the four models explained in the previous session.

Coefficients	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>
<b>Constant</b>	-4.6658 (0.021)****	-4.6967 (0.0211)****	-4.56503 (0.02147)****	-4.5816 (0.02177)****
<b>X<sub>t</sub></b>	0.9902 (0.0017)****	0.9929 (0.0017)****	0.99277 (0.00149)****	0.9950 (0.0015)****
<b>dummy<sub>2001t</sub></b>	0.4529 (0.31029)		-0.2486 (0.2745)	
<b>dummy<sub>2001t</sub>* c<sub>t</sub></b>	-0.02985 (0.02238)		0.0206 (0.0198)	
<b>dummy<sub>2003t</sub></b>		0.79108 (0.46626)		-0.1847 (0.4072)
<b>dummy<sub>2003t</sub>*c<sub>t</sub></b>		-0.0545 (0.0335)		0.0157 (0.0293)
<b>unemploymentrate<sub>t</sub></b>			-0.04671 (0.0055)****	-0.0497 (0.0054)****
R square	0.9996	0.9995	0.9997	0.9997
Adjusted R square	0.9996	0.9995	0.9997	0.9997
Number of observations	212	212	212	212
Regression standard error	0.0214	0.0226	0.0182	0.0190

\*\*\*\* $p < 0.001$ , \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ , number in parentheses are standard errors

**Table (4)**

Because we are interested in determining those omitted factors observed by this regression, we assume that the tax cuts are parts of the omitted variables and we associate each tax cuts to

disposable income in order to study the change in consumer spending. Basically the reduction of income tax raises disposable income. The results given by (1) show a positive and significant relationship between disposable income and consumption. Thus, the 2001 tax cut was not a major impact in the shift in consumption, it did not influence consumer spending as expected. According to (2) regression results, the changes in the consumption level during the tax cuts period is not related to the implementation of the 2003 tax cuts, similarly to the 2001 analysis.. The results of our two last models give a more realistic understanding of the changes in consumer spending. Indeed, while the two tax cuts do not have a considerable effect on consumption; unemployment rate has significantly decreased the consumption level by 4%. Surprisingly, unemployment rate a high effect on consumption compared to the two tax cuts.

## 8.Conclusion

Our contribution demonstrated that the impact of the 2001 and 2003 tax cuts was not significant both in level and growth rate of consumption in the long run. Rather, other variables such as unemployment rate, as well as disposable income had significantly influenced the consumer behaviors after the implementation of the fiscal policies. Compared to the previous years, consumption did not have a statistically significant positive impact on consumption increase. For the future study, it is recommended to test model of this paper with ARMA to capture time trend in consumption and disposable income.

## 9.Recommendations

Policymakers have introduced tax cuts in order to stimulate consumer spending. However, this goal might not have been achieved yet for some reasons. Indeed, more research should be done at the macroeconomic and microeconomic levels in order to prevent unexpected consequences when implementing a policy. In addition, the financing of the tax cuts enlarge the deficit of the government, which increases the government debt. The government could implement more policies related to the reduction of unemployment rate; since our analysis demonstrated that unemployment rate constitute a major factor that affect consumer spending. Another suggestion is to generate more sources of revenue to balance the deficit generated by the financing of fiscal policies.

10. Appendix

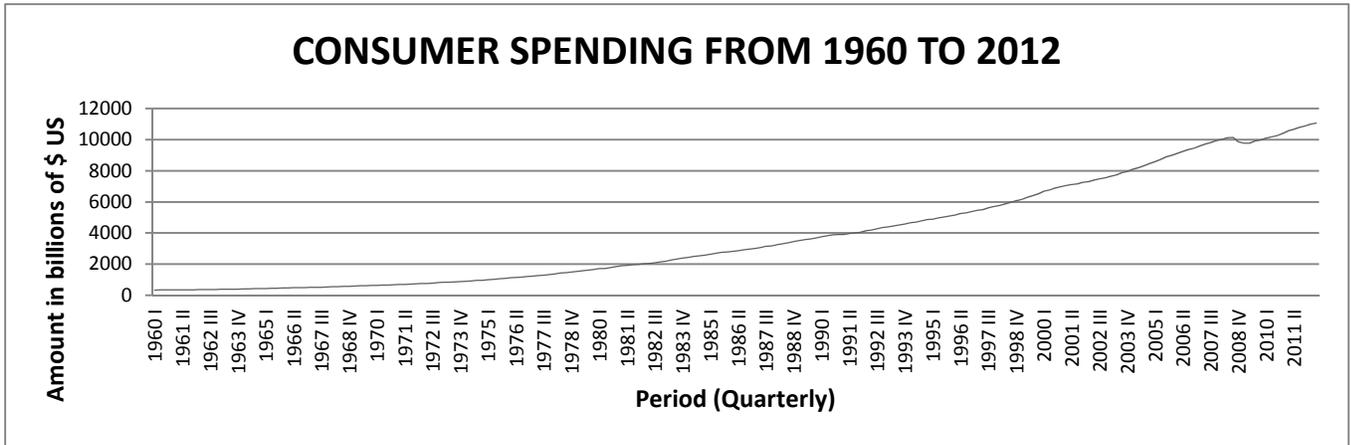


Figure (1a)

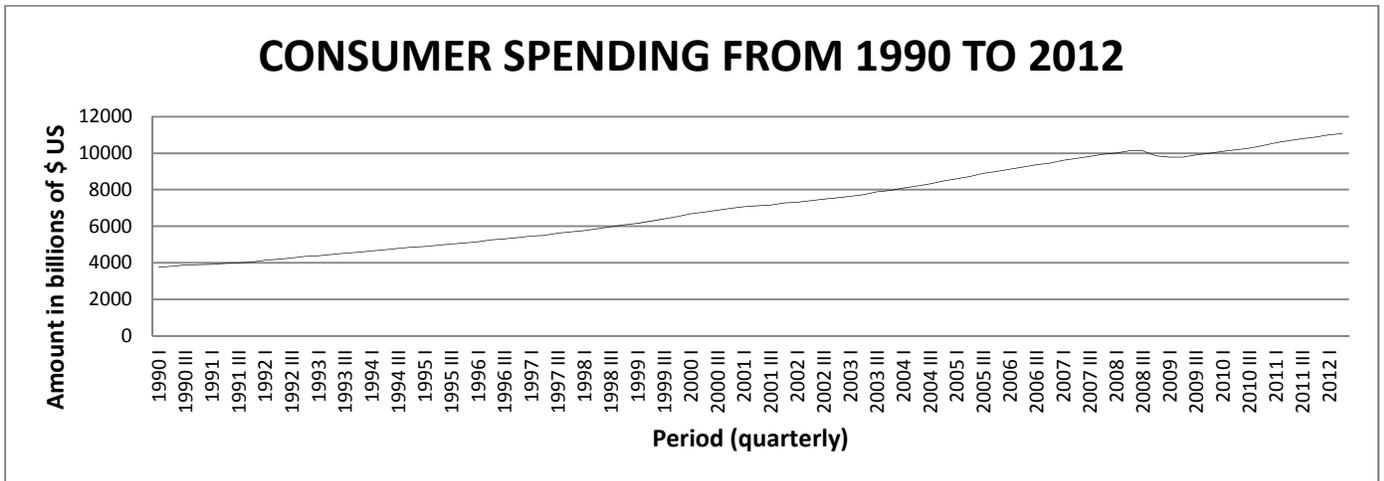


Figure (1b)

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