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# HOW PROGRESSIVE IS THE U.S. TAX SYSTEM?

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## ABSTRACT

The U.S. income tax system is used to collect revenue, and influences the economy. Tax rates have changed many times and have now decreased to a point where many believe the tax system is no longer progressive. The issue of progressivity or lack thereof has become more pronounced since the election to Congress of Tea Party candidates, who insist on cutting spending and lowering taxes. This paper shows that the income tax system has, in fact, become less progressive, and that if nothing is done to balance revenue with expenditures, a long-term budget deficit will result. **JEL Classification:** E6

## INTRODUCTION

The U.S. taxation laws have gone through many changes, as reflected in the U.S. Treasury Fact Sheet (2003). Initially, the governments (states and federal) collected money by imposing taxes on a variety of sources, i.e., excise taxes, tariffs, and custom duties. Later, the federal government was allowed to impose income taxes with the adoption of the Sixteenth Amendment, ratified on February 3, 1913. Since then the tax rates have been changed many times to adjust rates to meet the growing need for revenue. Tax rates also have been adjusted to manipulate the economy by providing incentive to encourage or discourage economic activity. Since the 1950s, the government has manipulated income tax rates to control economic fluctuations, i.e. business cycles. In 1951, the House passed the biggest across-the-board tax increase (12.5 percent) in U.S. history. Then later, in 1954, the taxes were reduced to spur private investment. Other reductions occurred in 1962, 1966, 1969, 1971, 1975, and 1981 and were also implemented mainly to spur investment as unemployment had risen. In 1975, President Ford signed into law a tax refund of \$22.8 billion. In 1977, President Ford proposed a permanent tax cut, and in 1979, he suggested automatic adjustments that would keep the tax rate constant for families. Other tax changes include the Economic Recovery Tax Act of 1981, the Tax Reform Act of 1986, the adjustment of 1993, The Tax Payer Relief Act of 1997, and the Economic Growth and Tax Relief and Reconciliation Act of 2001. All these actions were taken to either lower or raise marginal tax rates, to spur economic activities, and/or to solve budgetary problems.

GDP of the last 50 years indicates that the economy has gone through many business cycles and has required intervention from time to time. Taxation has been one of the tools used by the federal and state governments to manipulate economic activity. As tax changes were made, the federal deficit (Figures 1) and national debt has skyrocketed. On December 31, 2013, the U.S. debt stood at almost 17 trillion dollars or 108 percent of the GDP. Obviously, the new Congress elected in November 2010 and 2012 are trying to control spending while advocating lower taxes. The question most people may ask is, "Who pays

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taxes and has the tax system become progressive or regressive?”

Research consists of analyzing economic and tax data collected from many sources to determine whether a case can be made for progressivity of the tax structure of the United States. Statistical methods were used for analysis as well as other published research on the topic was evaluated to determine the progressivity or regressivity of the tax structure. Based on the analyses and evaluation, the conclusions were reached.

The purpose of the paper is to statistically analyze economic and tax data to determine whether the tax system is progressive or regressive.

## **GDP AND POLICIES AND EFFECTS**

The U.S. economy has gone through many business cycles and has needed a shot in the arm to revive it. The two methods of revival are fiscal policy and/or monetary policy. Fiscal policy has been used by governments in times of crisis, e.g., high unemployment, inflation, budget deficit, or other social and economic problems of the time. To be effective, fiscal policy changes must be timely. The purposes of changing fiscal policy are to temporarily affect economic activity by lowering corporate tax rates or allowing deduction for business investment. Fiscal policy can also be used to boost consumer demand by lowering individual tax rates or giving tax “holidays” for a certain period of time. According to Myles (2000), “through its effect on the return to investment or the expected profitability of research and development, taxation can affect what choices are made and, ultimately, the rate of growth” (p. 145).

In addition to using fiscal policy to influence the economy, fiscal policy is also used by politicians to prove that they are doing something, but monetary policy can also be effective as countercyclical, because “implementation lags are much shorter for monetary policy than for fiscal policy” Taylor (2000, p. 27). Further, monetary policy can be easily rescinded when it achieves its purpose. In addition, tinkering with discretionary fiscal policy makes it harder for the Federal Reserve to determine the need and scope of the monetary policy. Therefore, Taylor (2000) concludes that it is better for fiscal policy to function as an automatic stabilizer while allowing monetary policy to try and keep “the aggregate demand close to potential GDP. [...] Empirical evidence suggests that monetary policy has become more responsive to the real economy, suggesting that fiscal policy could afford to become less responsive” (p. 34).

Fiscal policy can shift aggregate demand and can change real GDP; therefore, fiscal policy should be carefully managed to keep the real GDP close to potential GDP under inflationary conditions, and fiscal policy “reduces deadweight loss and creates greater efficiency.” As Taylor (2000) states, “Running a budget surplus to keep real interest rate down provides for more private investment and higher economic growth. [...] the ] unemployment component, payroll tax policy and other laws affecting the labor market can change the natural rate of unemployment” (p. 26).

Regardless of the purpose, sometimes fiscal policy may involve changing the tax structure, which could favor some sectors of the economy more than others or benefit some people more than others. Discretionary changes in taxes and spending are automatic stabilizers (Taylor, 2000), however. The effect of automatic stabilizers on spending and taxes is much larger “than even the proposed discretionary changes. [...] Both types of changes in taxes and spending impact aggregate demand, but the automatic ones are more predictable and work more quickly than the discretionary ones” (p. 26).

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However, the federal government outlays have increased from less than 2.78 percent of the GDP in 1954 to almost 26.29 percent of the GDP in 2010 (Figure 1). But the receipts have increased from 2.62 percent of the GDP in 1954 to 16.65 percent of the GDP in 2010. Figure 1 shows that receipts remained equal to outlays until 1982, but dropped below the outlays since then except in 2001 and 2002 when receipts exceeded outlays resulting in surplus in 46 years. Since then, the outlays have exceeded the receipts causing large deficits. These deficits have become a basis of political argument over how to cut spending to balance the budget. The questions is whether balancing should be via tax increases, spending reductions, or both. Further, if taxes have to be raised, who should pay more? The overarching question is, “What is the fairest way to increase or decrease taxes?” To answer this question requires knowing who is paying the most taxes now as well as evaluating the history of taxation in the United States.

## **TAXATION IN THE UNITED STATES**

Governments tax people, businesses, or other sources of income to generate revenue. However, governments should be careful not to impose taxes so high that they result in loss of revenue by discouraging economic activities (Fullerton, 1982). Further, even Smith (1776) argued about the inverse relationship between marginal tax rate and tax revenue. In other words, tax receipts and tax rates have a concave relationship. That is, after a certain point, higher tax rates result in decreasing revenue, a point called the “prohibitive” range. Saez (2003) states, “The elasticities of taxable income and adjusted gross income are around 0.4 and significant but the elasticities of wage income are in general insignificant and close to zero” (p. 1231).

Goolsbee (2000) study confirms that “the short-term elasticity of taxable income with respect to the net-the-tax should exceeded one, but taking out the temporary component yield longer-run elasticities between zero and .4” (p. 375). Therefore, Goolsbee (2000) concludes “that taxing the rich can lead to dramatic shifting of taxable income in the years immediately surrounding a tax change. [...] But after the shifting is done, the total changes in taxable income, [...], seem to be more limited” (p. 375). Feldstein (1995) found that “there is very substantial response of taxable income to change in marginal tax rates” (p. 552). However, Feldstein (1995) found that changes in tax rates have less impact on tax revenue. Further, the high marginal tax rate creates significant deadweight losses due to changes in the behavior. Therefore, Feldstein (1995) suggests that governments should keep these behavior and effect in mind when developing tax policies and spending levels.

Tanzi (1969) found that the long-run elasticity is estimated at 1.42, and Blackburn (1967) concluded that for every one percent increase in income of the tax payers, the federal personal income tax revenue will rise about 1.4 percent (p. 168). Tanzi (1969) found the same relationship between taxes and revenue (p. 209).

Table 1 shows that from 1955 to 1960, GDP increased by 13.22 percent while receipts increased by 25.51 percent and outlays increased by 17.33 percent. Change in receipt to change in GDP was 4.89 percent from 1955 to 1960, while change in outlays to change in GDP was 3.46 percent during the same period. The change in outlays to change in receipts was 70.89 percent during the same period. That is, during the five years (1955 - 60), receipts increased by \$16,160 billion compared to outlays which increased by \$11,456 billion. The change in receipts to the change in GDP was 1.55 percent, and the change in outlays to change in GDP was 158.86 percent during 2005 - 2010. The change in outlays compared to

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change in receipt was 10,265 percent. That is, receipt in 2010 was \$2,205 billion in 2010 compared to receipt in 2005 of \$2,196, an increase of \$9 billion. The outlay, on the other hand, was \$3,483 billion in 2010 compared to outlays in 2005 of \$2,518 billion, an increase of \$965 billion, thus resulting in an increase of 10,265 percent of outlays in relation to receipts.

The budget deficit has increased to almost 1.46 trillion dollars in 2011 and accounts for almost 9 percent of the GDP (Figure 1). Figure 1 also indicates the outlays have increased from 2.78 percent of the GDP in 1954 to almost 26.29 percent of the GDP in 2010. The receipts have increased from 2.62 percent of the GDP in 1954 to almost 16.65 percent of the GDP in 2010. As shown in Table 1, outlays have outpaced receipts almost every five years except in 1955-60, 1975-80, 1990-95 and 1995-2000. In most years, tax rate or taxes have been reduced while expenditures have continued to increase every year. As a result, the federal budget has always been in the red.

Figure 1 shows the flow of outlays and receipts of the U.S. Federal government. It indicates either the budget is barely balanced or in deficits. This trend has been in existence since 1945, and shows no end in sight. Under Keynesian philosophy, it is economically justifiable during recessionary periods to deficit spend, and automatic stabilization philosophy suggests that revenue should rise during boom periods. Deficits have persisted almost every year, however, regardless of whether the economy is in recession or in a boom. The discussion in Congress in 2011 was to reduce spending while allowing taxes to remain at the same level as approved by President Bush, even though the budget deficit is at its highest level in history (\$1.45 trillion). The Republicans insist on lower taxes while knowing that during the weak economy, revenue will either remain the same or rise slightly during the 2010 - 2011 recovery years. What is the justification for keeping taxes low without cutting spending to match receipts? Should taxes be raised to cover spending, or should spending be cut to match receipts? The current Congress obviously is insisting on cutting spending, leading some to claim that we are mortgaging the future of our children. They blame spending as the cause of large deficit; however, Manage and Marlow (1986) suggested that "it seems incorrect to focus on hypothesized symptoms of deficit rather than causes of deficits" (p. 620). Therefore, the continued failure to attack causes will have no or little effect on the deficit.

Normally, spending in business should be constrained by income (receipts) and relative cost (price). The same should apply to governments. Government income (receipts) comes from taxes, direct and indirect. However, governments have the ability to overspend by borrowing. Thus, the governments' receipts consist of taxes (direct and indirect) and debt. The urge to overspend is the result of relative costs. These costs are based on the need among politicians to get re-elected. Manage and Marlow (1986) suggested that when the cost of debt increases relative to the cost of re-election, the outcry over deficit becomes loud. The U.S. government has run deficits through most of its history without any real attempt to reduce or eliminate it. However, since the November 2010 and 2012 elections, when the Tea Party showed its power by electing members to Congress, the Republicans are now advocating for the control of spending and Democrats are calling for higher taxes on wealthy. This outcry is based on the assumption that reducing spending will reduce the deficit, thus helping them get re-elected. As Manage and Marlow (1986) stated, "The key, however, is the total funding level which must balance out aggregate spending" (p. 625). Therefore, neither higher taxes nor cutting spending will necessarily solve the deficit problem.

Progressive tax is defined as the marginal rate of tax on the additional dollars and

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which must be higher than the average rate on all income. Thus, “progressive” implies that if revenue increases faster than the total income, then elasticity will be greater than 1. Automatic stabilizers result in increased revenue due to increased income. This increase can be calculated by the average rate of responsiveness (ARR) (Johnson and Lambert, 1989, p. 3), which is the difference between the effective marginal rate (EMR) and the average tax rate (ATR), thus,  $ARR = EMR - ATR$ .

A change in marginal tax rate can cause tax payers to change the way they collect their income. For example, they can change investment strategies, form of compensation, expenses and itemized deduction, and compliance (Feldstein, 1995). It is more likely for people in higher income groups to change the way they collect their income, because they have the wider discretion to bring about a change in their income (Feldstein, 1995). Further, a higher marginal tax rate could encourage taxpayers to take defensive legal or illegal steps to reduce their taxes.

Feldstein (1995) found a substantial response of taxable income to changes in marginal tax rates. He calculated an elasticity of taxable income with respect to the marginal tax rate of at least 1.0 and stated that it “could be substantially higher” (Feldstein, 1999, p. 570). Feldstein and Feenberg (1996) state that “high-income taxpayers would have reported 7.8 percent more taxable income in 1993 than they did if their tax rate had not increased” (p. 90). This conclusion was supported by Long (1999), who noted that “it is not surprising that upper-income tax rate increases legislated in 1993 raised far less revenue than would have been generated had there been no behavioral responses by taxpayers to the higher rates” (p. 686).

Taxes and tax rates are controversial subjects and are constantly debated. As they represent deep, abiding, and contradictory attitudes in this country toward wealth (Kornhauser, 1993, p. 119). As Kornhauser (1993) has stated, “Today it [the problem] is an amalgam of consumption and income provisions, of progressive rates and tax expenditures which undermine progressivity” (p. 116). Progressivity is a contentious issue. Questions are always raised about appropriate tax rates, exemption amounts, and the taxability of certain types of income. Therefore, as Kornhauser (1993) has stated, “the debates show great partiality for preferences, and the tax laws reflect this” (p. 167). The current rates are based on taxing income as well as consumption, earned and unearned income, and progressivity.

## HISTORY OF TAXES

Marginal tax rates and the associated income brackets have changed over the years. The IRS data indicate that in 1941, the minimum marginal tax for “married filing jointly” was 10 percent for income between \$0 - \$2,000, 59 percent for income between \$44,000 and \$50,000 and 81 percent for income over \$5,000,000. The rates and income groups were changed almost every year starting in 1941. These changes continued until 2003. Since 2003, the tax rates remained the same until 2011, but income levels in each bracket were increased every year during those years. The tax rates and income brackets for 2011 are shown in Table 2.

Countries need to tax their citizens to cover the cost of the services provided to them. However, some may resist paying their full share of taxes or may pay none at all. Cummings, Martinez-Vazquez, McKee, & Toggler (2004) found that “compliance behavior and tax morale can be explained by differences in the fairness of tax administration, in the

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perceived equity of the fiscal exchange, and in the overall attitude towards the respective governments across the countries” (p. 2). “Tax morale” is defined as the intrinsic motivation to pay taxes (Alm and Togler, 2004, p. 5).

There is considerable evidence that enforcement efforts can increase compliance. However, compliance has been shown by many studies to be related to the perceived fairness of tax administration, fiscal exchange, and the overall attitude towards the respective government (Cummings, Martinez-Vazquez, McKee, & Toggler, 2006, p. 2).

Tax compliance is a human behavior affected by many factors. As usual, the threat of punishment and increased enforcement are likely to affect compliance. However, some theories (prospect theory and rank-dependent expected utility) suggest that social norms may encourage better compliance than the threat of punishment. But Cummings, Martinez-Vazquez, McKee, & Torgler (2009) found that the perceived fairness of the tax code and government behavior is a major factor in determining the level of compliance with tax laws. Taxpayers in the United States have higher compliance than European countries (Alm, Sanchez, and De Juan, 1995, p. 15).

A tax law is framed to collect taxes from income (e.g., wages, dividends, interest, capital gains, etc.). Legislators pass tax laws, called statutory tax functions, as a basis for income earners to pay a certain amount of taxes. What taxpayers pay, however, is subject to adjusted gross income (effective tax rate), which may result in a different amount of tax than stipulated by the statutory rate.

There are two reasons for the difference between the effective tax rate and the statutory rate: 1) Taxable income and economic income are never the same due to the prevailing tax laws. That is, income is reduced by many deductions or loopholes. 2) Tax law influences tax payers’ behavior by changing either the timing of income received or the form in which it is received (Gouveia and Strauss, 1994, p. 318). Therefore, several questions need to be answered: How close are the statutory and effective rates? What percent of the income in each income group is paid in taxes? What percent of GDP is received by each income group, and what percent of total taxes is paid by each income group? What difference, if any, is there between statutory and effective tax rates in each income group?

Taxes are collected from different sources (Figure 2). The corporate share was 13.94 percent of the total taxes in 1980 and 12.91 percent in 2008. The corporate taxes went down, however, to as low as 8.77 percent in 2001. Individual share was 55.36 percent of the total taxes in 1980 and 51.95 percent of the total taxes in 2008. Employment-tax share was 24.71 percent of the total taxes, and it went up to 32.17 percent of the total taxes in 2008. The share of estate taxes was 1.21 percent in 1980 and .97 percent in 2008. The share of gift taxes was .04 percent in 1980 and .12 percent in 2008. The share of excise taxes was 4.74 percent in 1980 and 1.88 percent in 2008. Interestingly, excise taxes have gone down almost each year.

Table 3 shows the share of different taxes as a percent of gross national income (GNI). The total taxes collected as a percent of GNI was 18.67 in 1980, was 19.25 percent in 2008 and was 18.14 percent in 2009. The share of corporate tax was 2.60 percent in 1980, was 2.48 percent in 2008 and was 7.74 percent in 2009. The share of individual tax as a percent of GNI was 10.34 percent, was 10.00 percent in 2008, and was 9.21 percent in 2009. The share of employment tax as a percent of GNI was 4.61, was 6.19 percent in 2008, and was 6.62 percent in 2009. The share of estate tax as a percent of GNI was .23 in 1980, was .19 percent in 2008, and was .17 in 2009. The share of excise tax as a percent of GNI was .88 percent in 1980, was .36 percent in 2008, and was .36 in 2009.

As Table 3 shows, the share of taxes collected in each taxpayer group has gone down



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except the employment tax which went up in 2008 and then decline in 2009. This obviously indicates that less taxes were collected as a share of GNI than in 1980.

Table 4 shows a breakdown of income groups and taxes as a percent of taxable income. The first row in the table shows the total taxes for all income groups combined as a percent of total taxable income. Obviously, it shows that total taxes (row 1) as a percent of taxable income have been decreasing. It went down from 20.74 percent in 1993 to 19.18 percent in 2009. The table further indicates that taxes as a percent of taxable income have gone down of all income groups.

Figure 3 graphically represents the data in Table 4. However, some income brackets were combined to create four income groups to reduce the clutter of lines. Obviously, taxes as a percent of taxable income have down for all income groups. The difference in percent from 1993 to 2009 indicates that even though taxes for almost every income group have declined, the income group between \$25,000 and \$100,000 has declined the least (4 percent) and the income group between \$500,000 and \$2,000,000 has declined the most (7 percent). Therefore, higher income earners are saving more in taxes than lower income earners.

Figure 4 shows percent of taxes paid as per dollar of taxable income. Taxpayers in the income group between \$500,000 and \$1,000,000 and \$1,000,000 and \$1,500,000 pay more as a percent per dollar of taxable income than the other income groups. Taxpayers in income group of \$100,000 and \$200,000 pay more as a percent of taxable income than the other income groups. The percent of taxes per dollar for all income groups combined varies between 21 percent per dollar in 1993 to 17 percent per dollar in 2009. However, as the figure indicates, percent per dollar dropped in 2002 and rose again in 2007.

IRS publishes data on the number of filers in each income group. The data for years 1990-2009 indicate that the number of filers since 1990 has decreased in lower income brackets (\$500-\$35,000). In 1990, there were 54 percent filers in this bracket, but it dropped to 20 percent of filers in 2009. The number of filers in the income bracket at or below \$55,000 has decreased from 75 percent since 1990 to 52 percent in 2009. Obviously, this change is complemented by change in the number of filers above \$55,000, which has increased from 25 percent to 48 percent. The change indicates a positive economic trend in that more tax payers are moving into the higher income group.

In 1993, the number of returns for taxable income was 91 million, while the total number of people employed was 119 million, the total number of registered businesses was 2.13 million, and the total number potential tax filers was 121.3. But only 76.4 percent of potential taxpayers filed returns in 1993. In contrast, in 2009, the number people employed was 141.2 million, the number of registered business was 3.21 million, and the total number of potential tax filers was 144.4 million. In 2009, 104 million potential taxpayers filed returns, which is only 72 percent of the total number of potential taxpayers. In 1993, a total of \$ 2.45 trillion of taxable income was reported when the GDP was \$ 8.5 trillion or 28.25 percent of the GDP. In 2009, a total of \$5.9 trillion of taxable income was reported when the GDP was \$12.9 trillion or 39.51 percent of the GDP. The percent change in taxable income reported for each group in Table 6.

Table 5 shows change in taxable income. The amount of reported taxable income between \$1- \$5,000 went up 110.81 percent from 1993 to 2000. During the same period, the amount of reported taxable income more than \$1,000,000 went up 489.64 percent. From 1993 to 2009, the amount of reported taxable income between \$1 and \$5,000 went up 20.34 percent, and the amount of reported taxable income of more than \$1,000,000 went up 415.13 percent. However, the amount of reported taxable income between \$1 and \$5,000

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went up 18.36 percent from 2000 to 2009. During the same period, the amount of reported taxable income of more than \$1,000,000 went up 84.78 percent. This trend indicates that more tax payers have moved into higher income bracket and that the bad economy in 2009 decreased the percent change from 2000 to 2009 compared to 1993 to 2000.

Figure 5 shows reported taxable income as percent of GDP for the years 1993, 2000, and 2009. It shows that the share of income for the income group of more than \$1,000,000 as percent of GDP has increased from 1.77 in 1993 to 6.58 percent in 2000 and to 5.60 percent in 2009. Obviously, taxpayers in higher income groups are getting a larger share of the GDP. Unfortunately, taxable income as a share of GDP in all income groups except in income group between \$100,000 and \$200,000 dropped in 2009 due to the country's economic problems.

As Figure 5 indicates, the taxable income as a percent of GDP for income groups below \$50,000 has declined since 1993. But taxable income as a percent of GDP among the \$50,000 and \$75,000 income taxpayers increased (from 6.06 percent to 6.45 percent) from 1993 to 2000, but it has declined from 2000 to 2009 (from 6.45 percent to 5.60 percent). Further, taxable income as a percent of GDP increased in the income group \$75,000 and \$200,000 from 1993 to 2000 and from 2000 to 2009. However, taxable income as a percent of GDP for the income group \$200,000 and higher has gone down from 2000 to 2009 (from 6.58 percent to 4.85 percent).

Figure 7 shows the share of income for the years 1967 to 2009. Share of income in the highest range (top 20 percent, 5<sup>th</sup> fifth) has been increasing every year since 1967. For example, in 1967, the top 20 percent received 44 percent of the total income and they received 50 percent of the total income in 2009. It seems that their share has remained within 44 to 50 percent of the income. In addition, the share of income received by the top 5 percent has increased from 16 percent in 1967 to 21 percent in 2009. On the other hand, the share of income for the bottom fifth has gone down from 4 percent to 3.27 percent. The share of income received by 1st fifth, 2nd fifth, 3rd fifth, and 4th fifth has remained the same or has gone down.

Figure 8 shows how much taxpayers pay in taxes for each dollar increase in income. The change was calculated by calculating a change in taxes paid to change in taxable income. Taxpayers paid more in taxes as they moved from lower income groups to higher income groups. For example, taxpayers with taxable income between \$2,000,000 and \$5,000,000 paid \$.32 per dollar in 2000; subsequently, the rate dropped and then increased to \$.299 per dollar of taxable income in 2009. The same trend can be seen for the taxable income between \$1,000,000 and \$2,000,000. However, the tax paid per dollar dropped for all other taxable incomes groups except for the group \$200,000 to \$1,500,000. As can be seen, the rate dropped but then went up in 2008 and 2009. As all the rates indicate, most of the taxes paid per dollar of taxable income have dropped since 1993 except for those in the income group of \$200,000 to \$1,500,000.

Figure 9 how much tax was paid per taxpayer in each income group. Obviously, taxpayers in higher income groups (\$1,000,000 to \$5,000,000) paid higher taxes. That is, they paid \$810 per taxpayer in 1993 and paid \$213 per taxpayer in 2009. Taxpayers in income group \$500,000 to \$1,000,000 paid \$202 in 1993 and paid \$71 in 2009. Taxpayers in income group \$100,000 to \$500,000 paid \$49 in 1993 and paid \$28 in 2009. Taxpayers in income group between \$30,000 and \$100,000 paid \$7 in 1993 and paid \$5 in 2009. Overall, all taxpayers paid an average tax of \$6 in 1993 and paid \$8 in 2009.

The analyses of taxes presented in this section indicate that the rates of taxes paid and amount of taxes paid by each income group have been going down. However, higher



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income groups have benefitted more than the other income groups. The trend may indicate regressivity. But to prove whether the tax system is progressive or regressive, one needs to analyze the data using many measures commonly used to identify progressivity.

## **IS THE U.S. TAX REALLY PROGRESSIVE?**

Many tax reforms have taken place in the United States over the years. The reforms have resulted in changes in the rate schedule, allowable deductions and exemptions, and exemption of income subject to tax. As a result, progressivity may have been reduced or eliminated (Hayes, Lambert, and Slottje, 1995). Hayes et al. (1995) found these reforms have generally reduced progressivity, and Piketty and Saez (2007) concluded that tax reform “seems to have the federal tax system in the direction of less progressivity” (p. 1).

Major changes in the tax rate occurred in 1964, when the marginal rate of 91% for highest income (\$400,000 or more) was reduced to 77%. It was then reduced to 70% for the highest income level of \$200,000 or more. The marginal rate was changed again to 50% on income over \$85,600 in 1983. In 1983, that rate (50%) was applied to income over \$100,000. Other changes in income were made in 1984, 1985, and 1986. However, drastic changes in the marginal rates occurred in 1987 that finally settled the highest rates at 35% for income over \$379,150. Concurrent with these changes, the tax rates were reduced and income levels were increased, but Social Security and Medicare contributions were increased. Have these tax reforms affected progressivity? Piketty and Saez (2007) have defined a progressive tax as “one in which the share of income paid in taxes rises with income, [and] a regressive tax is one in which the share of income paid in taxes falls with income” (p. 4). They modified the definition somewhat: “a tax system can be defined as progressive if after-tax income is more equally distributed than before-tax income, and regressive if after-tax income is less equally distributed than before-tax income” (p. 5). Duncan and Peter (2010) define progressivity as taxes that are designed to collect a greater proportion of income from the rich relative to the poor.

Tax progressivity is often misunderstood. There are many suggested indexes for measuring progressivity, but there is no single commonly used method. That is, there are methods for measuring the distribution of tax burden, methods for measuring the effect of tax burden, and methods for measuring the effect of taxes on the distribution of income. Some people may not consider the latter as a measure of progressivity.

Many researchers have studied the progressivity of taxes (Silber, 1994; Dunbar and Groff, 2000; Thorensen, 2004; Alm, Lee, and Wallace, 2005; Iyer, Schmidt, and Seetharaman, 2008; and Stroup, 2005) and using a variety of measures, e.g., Kakwani progressivity index, Kakwani distribution index, Standard Tax Rate (STR), Suits S Index, GINI Index, and Lorenz curve. Stroup (2005) has argued that progressivity is often measured by how much taxes are paid by certain income groups but that this measure does not relate tax share to income share. He has proposed that tax progressivity should be determined by calculating the share of income tax paid in relation to income share earned, i.e., marginal taxes.

Table 6 shows the average tax paid by taxpayer in each income group. Taxpayers in the income group between \$15,000 and \$30,000 paid an average of \$2 per taxpayer in 1993 and \$1 in 2008, a drop of 50 percent. Taxpayers in the income group between \$30,000 and \$100,000 paid an average of \$7 per taxpayer in 1993 and \$5 per taxpayer in 2009, a drop of 29 percent. Taxpayers in income group between \$100,000 and \$500,000 paid an average of

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\$49 per taxpayer in 1993 and they paid an average of \$28 per taxpayer in 2009, a drop of 43 percent. Taxpayers making more than a million dollars in 1993 paid an average of \$810 per taxpayer in 1993 and \$169 in 2009, a drop of 79 percent. Obviously, the higher their income, the more people saved in taxes. This indicates regressivity as the rich taxpayers have benefitted more from tax reduction and they pay less in taxes as a share of their income.

If one uses the Piketty and Saez (2007) definition of progressivity, one may conclude that the U.S. tax system is regressive, because, as Table 6 shows, as income increased, taxpayers paid less in taxes. In 1993, the lowest income group was paying \$2 in taxes per tax payer, and highest income group was paying \$810 in taxes per tax payer. In 2009, the lowest income group paid \$1 in taxes per tax payer and the highest income group paid \$213 in taxes per tax payer. Obviously, the higher income taxpayers are paying less in taxes.

Figure 10 shows the average marginal tax paid by each income group for the years 1993 to 2009. Additional dollars paid in taxes for each additional dollar of income is negative for income between \$75,000 and \$100,000. The same trend is true for all income above \$75,000 except those in income groups between \$100,000 and \$200,000 and between \$5,000,000 and \$10,000,000. Filers in income groups between \$5,000 and \$75,000 paid more in taxes for each dollar of income. It indicates that some income groups are paying less in taxes for each dollar of income earned. That means they have benefitted from tax reduction. This also indicates regressivity.

The Gini-coefficient is most often used as measure of inequality. The coefficient varies between a zero and one. A one means complete inequality and zero means complete equality. According to Farris (2010), "the Gini index offers [...] a single number that measures how equitably a resource is distributed in population. [...] It allows us to illustrate how equity has changed in a given situation over time" (p. 851).

Figure 11 shows the Gini index of reported adjusted gross income. Income distribution has become increasingly unequal. In 1993, the Gini index was .189, close to zero indicating more equality of reported gross income. However, in 2009, the Gini index was .3565, indicating a greater inequality of income.

Figure 12 shows the Gini index of the reported average income tax (before credit) declared by tax filers for 1993 to 2009. In 1993, the index was .32 indicating inequality of taxes paid, it went up as high as .4532 in 1999 and then dropped to .38 in 2007. The indices indicate inequality of taxes paid. However, they show that inequality decreased after 2004, i.e., the average reported income tax before credit each year became more equal until 2007 but has edged back up since then. This indicates inequality in taxes.

Other methods of measuring inequality have been proposed. According to Conceicao and Ferreira (2000), "a measure of economic inequality provides, ideally, a number summarizing the dispersion of the distribution of income among individuals. Such a measure is an indication of the level of inequality of a society" (p. 2). Hale (2001) suggested using skewness, dispersion, variance, and coefficient of variation to measure inequality, and these are common statistical measures used to describe the behavior of a distribution, including the spread, and the bigger the spread, the larger the inequality. In contrast, coefficient of variation describes the peakedness of distribution. Therefore, a smaller coefficient of variation indicates more equality.

Figure 13 shows the mean, median, and standard deviation of average reported taxable income from 1993 to 2009. The standard deviation has increased each year, indicating a broader spread of reported taxable income. The average median reported taxable income

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has dropped in 1999 and has continued its decline until 2003, but continued its rise after that. The median taxable income has dropped in 2000 and continued its decline in 2004 and then started income higher. This indicates higher taxes.

Figure 14 shows mean, median, and standard deviation of average taxes paid before credit. The standard deviation has increased each year except it dropped in 1999 and then started its rise in 2003 indicating a broader spread of taxes paid. The median and the average indicate same pattern. All these indicate that share of taxes paid has dropped.

These measures perform well if they are calculated using complete, individual point data (Hale, 2001). However, most available data is aggregate data, which is true of income tax data also. For this type of data, the Theil (T) method (Pedro and Pedro, 2000, p. 3) is more appropriate for measuring inequality. Like the Gini index, the Theil measure goes from zero, which means complete equality, to one, which means complete inequality. Also, the T can be calculated using group rather than individual data (Hale, 2001).

Suits (S) measures progressivity by relating cumulative percent of tax payment to cumulative percent of income (Formby, Seeks, and Smith, 1982). Kakwani (1977) has also developed a method for measuring tax progression. Kakwani's (K) index utilizes a measure of tax concentration. Both Suits (S) and Kakwani (K) measure progressivity. "Both measures are based on the difference between income and taxes, but Suits integrates this difference with respect to income and Kakwani with respect to return (R)" (Fromby, Seeks, and Smith, 1982, p. 1018). According to Fromby, Seeks, and Smith (1982) "the Suits and Kakwani indices, although identical in intent, are fundamentally different measures of tax progression" (p 1019). According to Formby, Seeks, and Smith (1982), "the only difference is [...] simply the slope of the Lorenz curve" (p 3). Thus, it can result in "different estimates of the degree of progressivity," and there is no reason to believe that one gives better results than the other (p. 3).

Table 7 summarizes all the common measures of inequality for readers to compare the outcomes. All the measures indicate inequality of taxes. All of them have shown a constant increase since 1993. Interestingly, all of them, except Gini, show a drop during economic recession (1997 through 1999), but Gini dropped in 2001 and 2002. All measures dropped again in 2006 and 2007, again except Gini, which dropped in 2008 and 2009. Regardless, all the measures indicate increasing inequality of taxes.

Another way to measure inequality is to compare changes in share of income and taxes paid over time (Table 8). In 1993, 77 percent of the tax filers reported taxable income under \$50,000, received 38.04 percent of the total taxable income and paid 28.81 percent of all the taxes; 18.10 percent of the filers reported income between \$50,000 and \$100,000, received 31.78 percent of the total taxable income and paid in taxes 28.74 of the total taxes; 4.44 percent of the filers reported income between \$100,000 and \$1,000,000, received 24.04 percent of the total taxable income and paid 31.88 of the total taxes. Obviously, more filers have moved into higher income brackets i.e. income between \$50,000 and \$100,000 (18.10 (1993) vs. 28.78 (2009) percent), income between \$100,000 and 1,000,000 ((4.44 in 1993) vs. (16.48 in 2009)) and income of more than a \$1,000,000 (.07 in 1993 vs. .23 percent in 2009). The share of taxes paid by these income groups has also changed.

Comparing 1993 with 2009, filers in income group between \$50,000 and \$100,000 received 4.45 percent less in taxable income and paid 8.10 percent less in taxes. Filers in income group between \$100,000 and \$1,000,000 received 21.24 percent more in taxable income and paid 18.95 percent more in taxes. Filers in income group of more than a million received 6.17 more in taxable income and paid 8.46 more in taxes. Comparing 2002 with 2009 (in 2001, the Bush tax took effect), filers in income group between \$50,000 and

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\$100,000 received 3.87 percent less in taxable income and paid 4.42 percent less in taxes. Filers in income group between \$100,000 and \$1,000,000 received 8.94 percent more in taxable income and paid 6.72 percent more in taxes. Filers in income group of more than \$1,000,000 received 1.97 percent more in taxable income and paid 2.37 percent more in taxes.

Comparing change in taxes from 1993 to 1996, income group of \$ 0 - \$ 50000 paid .88 less in taxes for one percent drop in their share of income. Income group \$ 50000 - \$ 100000 paid 7.54 percent less in tax for every one percent drop in their share of income. Income group \$100000 - \$1000000 paid .91 percent more in taxes for one percent increase in their share of income. Income group over \$1,000,000 paid 1.38 more in taxes for one percent increase in their share of income. Comparing change in taxes from 2004 to 2009, income group of \$ 0 - \$ 50000 paid .84 less in taxes for one percent drop in their share of income. Income group \$ 50000 - \$ 100000 paid 1.46 percent less in tax for every one percent drop in their share of income. Income group \$100000 - \$1000000 paid .95 percent more in taxes for one percent increase in their share of income. Income group over \$1,000,000 paid .81 less in taxes for one percent drop in their share of income.

These results may indicate that taxpayers in higher income groups are paying more in taxes. This could be explained that in those years when the higher income groups paid more in taxes is they received a larger share of income, thus putting them in much higher tax rate. However, as Figure 10 indicates, the average marginal tax paid per year has dropped since 2003, and Figure 11 indicates that the average marginal tax by higher income groups above \$75,000 has been either negative or smaller compared to taxpayers with income below \$75,000.

## CONCLUSION

Income tax is a major share of budgeted revenues (Federal or states) that covers many vital services of the society. Obviously, the cost of these services does go up and needs to be covered. To cover the cost, governments must either increase the sources of taxes or increase the tax rate. Failing to generate enough revenue means either cutting the services or running a deficit. In the U.S., a budget deficit has occurred for more than fifty years, and there is no end in sight.

Many politicians are insisting on reducing expenses as well as insisting on reducing tax rates. Unfortunately, the emphasis is on cutting taxes regardless of whether expenses can be reduced. Most of those who advocate cutting taxes argue that the tax rates are unfair to the rich and, if taxes are reduced, the economy will improve. This paper has not dealt with the issue of whether reducing taxes will spur economic growth. However, this paper has dealt with the issue of tax fairness as defined in terms of specific statistical models.

The analyses presented here using four progressivity measures of inequality—i.e. Suits, Kakwani, Gini, and Theil—indicate that taxes are unequal. Other measures such as average marginal tax rate, coefficient of variation, dispersion, median, mean, and other measures discussed in the paper all indicate inequality. Therefore, the results presented here do not support the position of those who say that the rich are paying a higher share than everyone else and that their tax burden should be reduced. However, the claim that spurring economic growth requires cutting taxes for the rich increases economic growth still needs to be proven. That is beyond the scope of this paper but may be pursued in further research.

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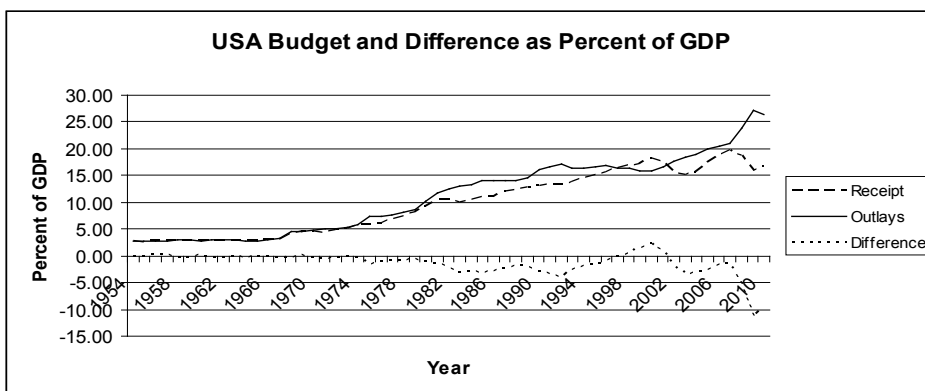
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- Source: <http://www.deptofnumbers.com/blog/2010/08/tax-revenue-as-a-fraction-of-gdp/>

**FIGURE 1: USA FEDERAL GOVERNMENT RECEIPTS, OUTLAYS, AND DIFFERENCE AS PERCENT OF GDP**



**TABLE 1  
CHANGE OVER FIVE –YEAR PERIOD**

Year	% Change in Receipt	Five Year % Change in Outlay	% Change in GDP	% Change in Receipt in r. GDP	% Change in Outlays in r. GDP	% Change in outlays to receipt
1955 - 60	25.51	17.33	13.22	4.89	3.46	70.89
1960 - 65	20.32	30.70	27.53	2.07	3.06	147.37
1965 - 70	99.10	99.14	18.28	14.37	15.23	105.99
1970 - 75	47.34	76.40	14.28	14.80	25.30	171.01
1975 - 80	89.90	67.33	19.66	26.30	24.99	95.02
1980 - 85	39.80	61.23	17.30	21.00	36.12	172.00
1985 - 90	41.18	34.10	17.30	25.90	27.65	106.77
1990 - 95	30.03	17.53	13.19	29.81	21.31	71.48
1995 - 00	49.39	18.13	23.45	31.68	12.87	40.62
2000- 05	7.48	40.79	12.58	10.83	51.65	477.07
2005 - 10	0.43	38.31	4.80	1.55	158.86	10,264.85

**TABLE 2: TAX TABLE FOR 2011**

Percent tax Rate	Income bracket more than	Income bracket less than \$
10	0	17,000
15	17,000	69,000
25	69,000	139,350
28	139,350	212,300
33	212,300	375,150
35	375,150	

FIGURE 2: SOURCES OF TAXES

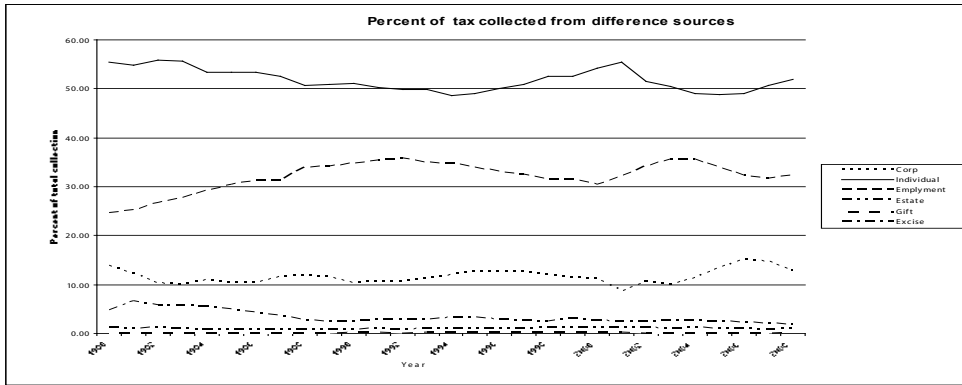
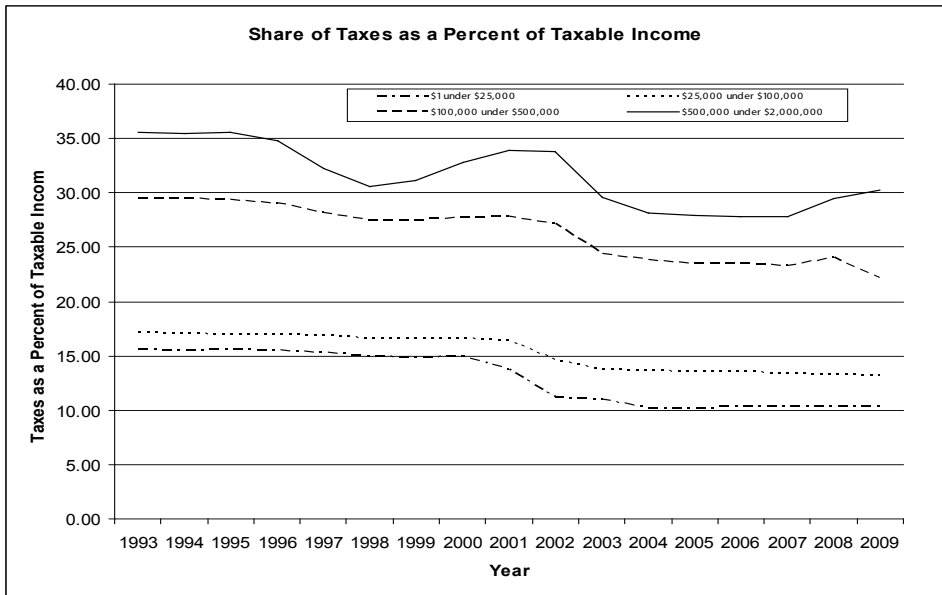


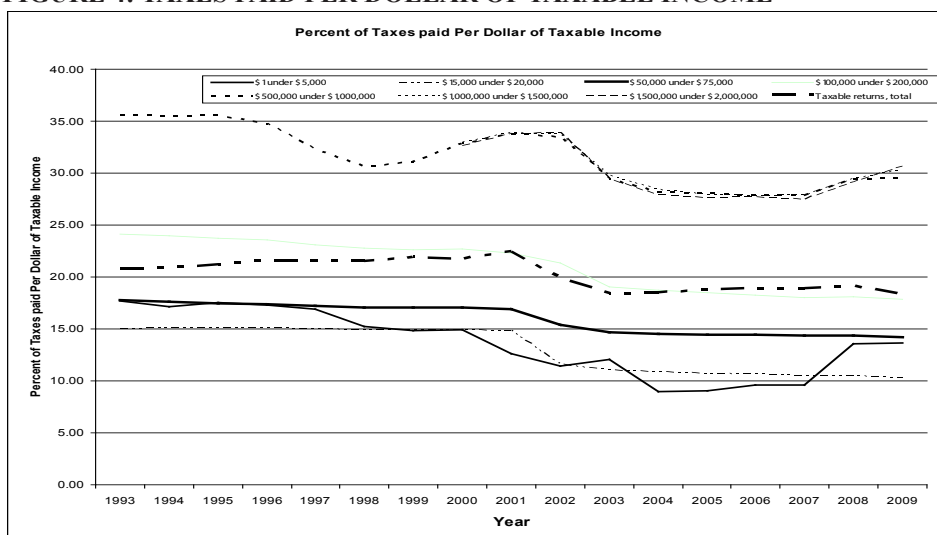
TABLE 3: SOURCES OF TAXES AS A PERCENT OF TOTAL TAXES AND GNI

% of Total Taxes		% of GNI			
Source	1980	2009	1980	2008	2009
Corporate	13.94	9.61	2.60	2.48	7.74
Individuals	55.34	50.12	10.34	10.00	9.21
Employment	24.71	36.59	4.61	6.91	6.64
Estate	1.21	.92	.23	.19	.17
Gift	.04	.13	-	.02	.02
Excise	4.74	1.99	.88	.36	.36
Taxes as share of GNI			18.66	19.25	18.14

FIGURE 3: TAXES AS A PERCENT OF TAXABLE INCOME



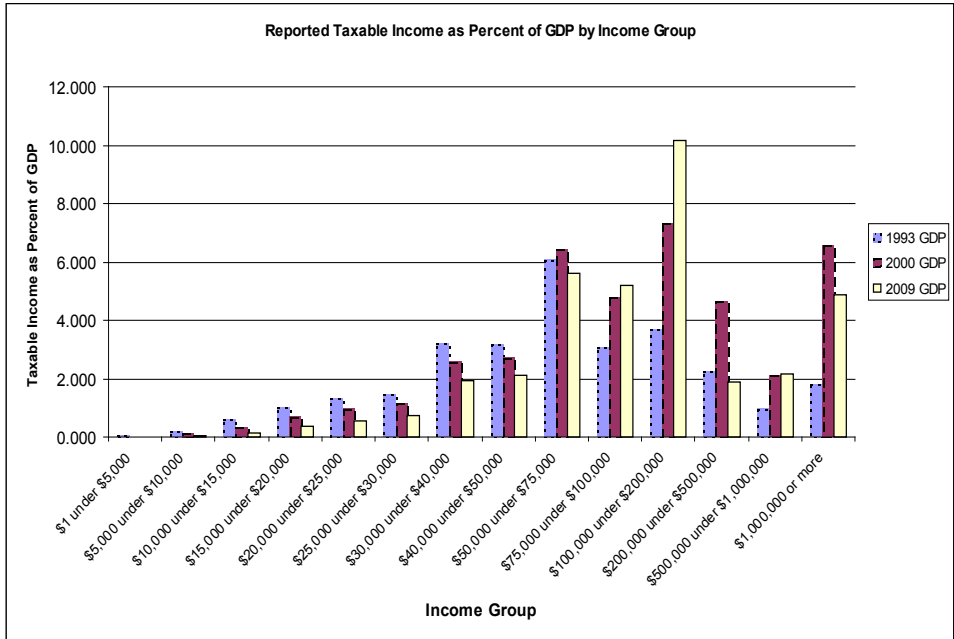
**FIGURE 4: TAXES PAID PER DOLLAR OF TAXABLE INCOME**



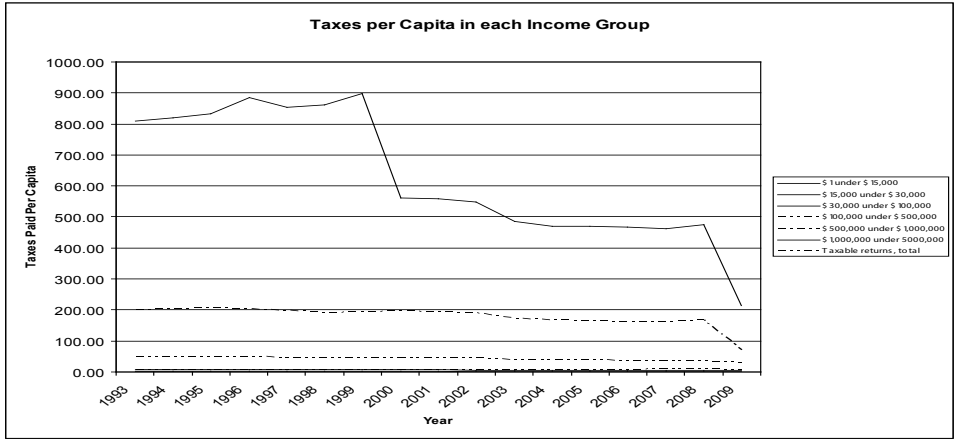
**TABLE 5: PERCENT CHANGE IN INCOME GROUP REPORTING TAXABLE INCOME**

Taxable Income			
Size of adjusted gross income	Percent change 1993 = 2000	Percent change 1993 = 2009	Percent change 2000 = 2009
<b>All returns, total</b>	185.21	207.39	111.97
No adjusted gross income	0.00	0.00	0.00
\$1 under \$5,000	110.81	20.34	18.36
\$5,000 under \$10,000	84.43	24.89	29.48
\$10,000 under \$15,000	77.29	41.42	53.59
\$15,000 under \$20,000	89.40	55.83	62.45
\$20,000 under \$25,000	94.78	63.47	66.96
\$25,000 under \$30,000	102.51	77.85	75.94
\$30,000 under \$40,000	106.10	91.39	86.13
\$40,000 under \$50,000	113.11	102.02	90.20
\$50,000 under \$75,000	140.20	139.46	99.47
\$75,000 under \$100,000	204.62	254.81	124.53
\$100,000 under \$200,000	262.18	416.81	158.98
\$200,000 under \$500,000	269.88	125.48	46.49
\$500,000 under \$1,000,000	288.67	338.34	117.21
\$1,000,000 or more	489.64	415.13	84.78

**FIGURE 5: REPORTED TAXABLE INCOME AS PERCENT OF GDP – 1993, 2000, AND 2009**

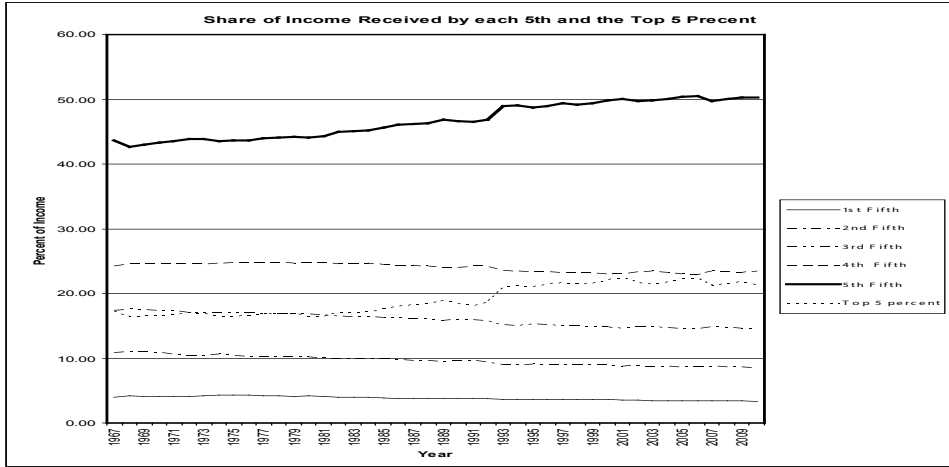


**FIGURE 6: TAXES PAID PER TAXPAYER IN EACH INCOME GROUP**



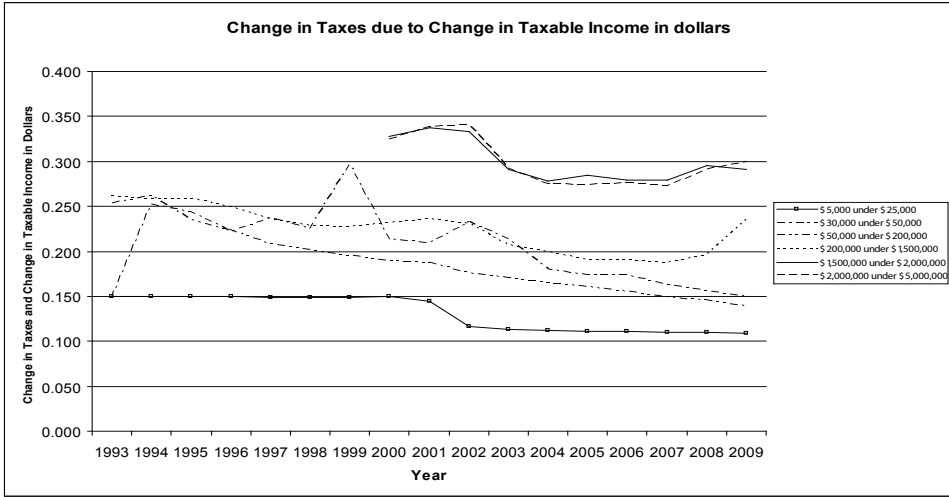


**FIGURE 7: DISTRIBUTION OF INCOME**

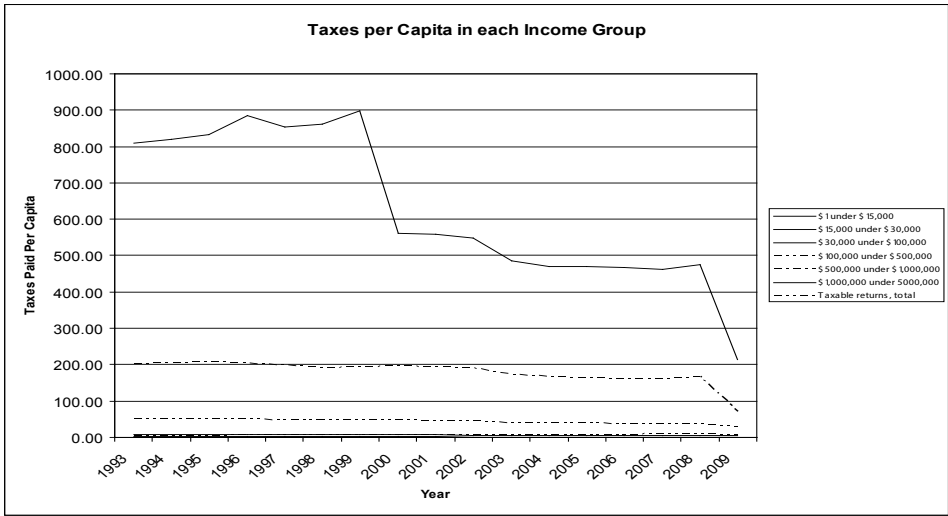


Source: <http://www.census.gov/hhes/www/income/income.html>

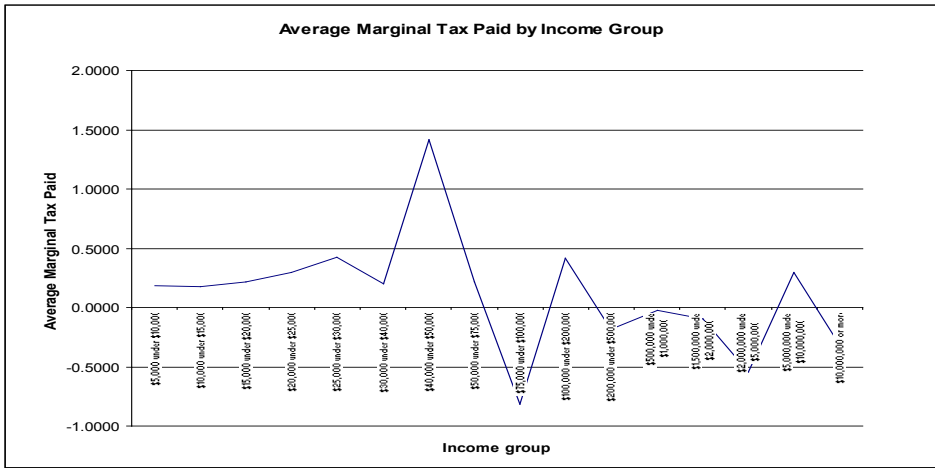
**FIGURE 8: CHANGE IN TAXES PAID PER DOLLAR OF CHANGE IN INCOME**



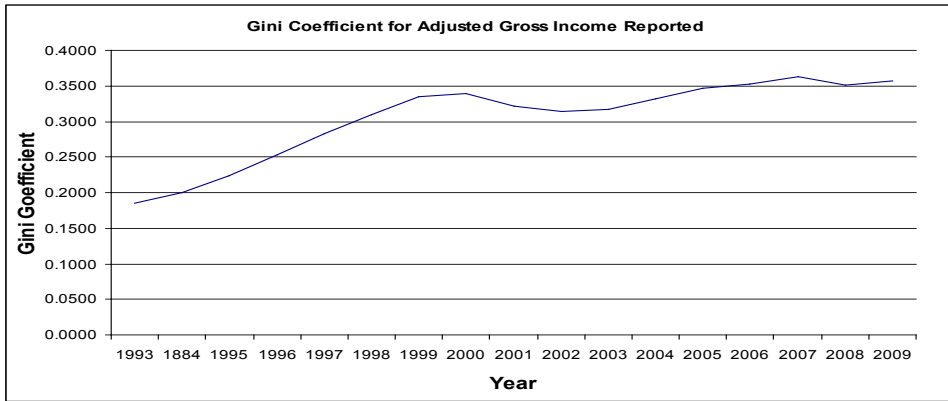
**FIGURE 9: TAXES PAID PER TAXPAYER IN EACH INCOME GROUP**



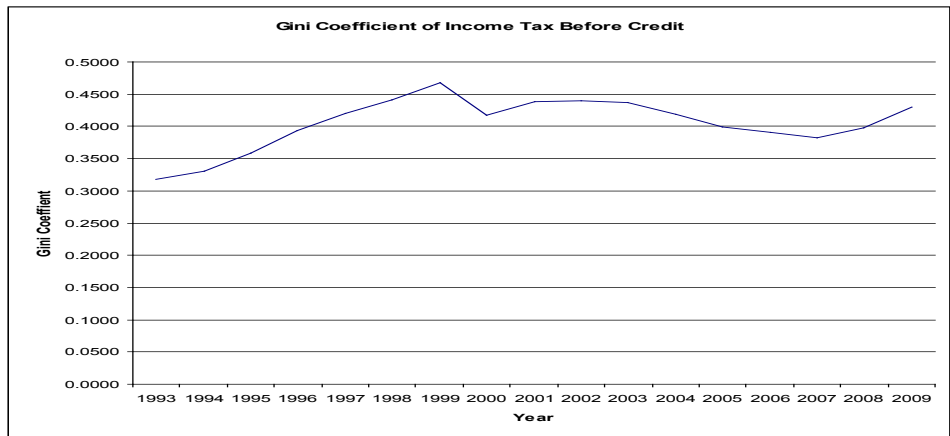
**FIGURE 10: AVERAGE MARGINAL TAX PAID FOR THE YEARS 1993-2009**



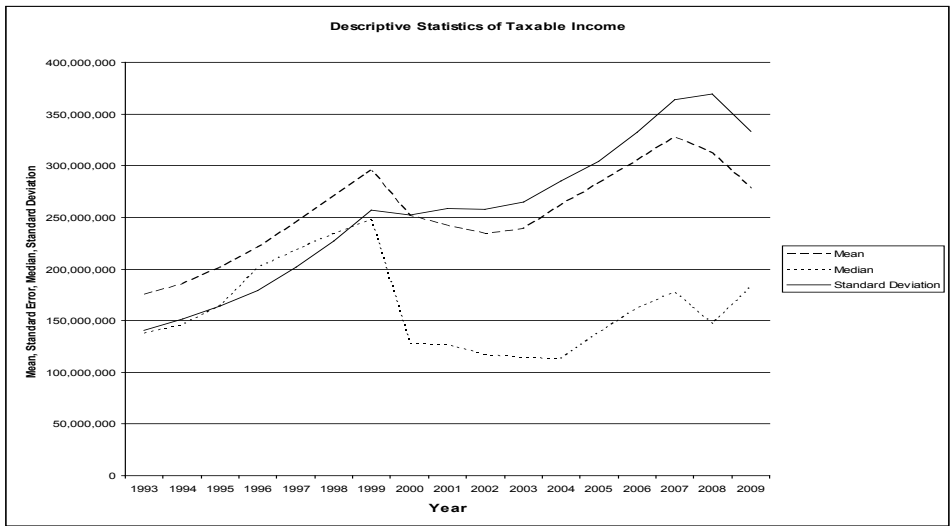
**FIGURE 11: GINI COEFFICIENT OF REPORTED ADJUSTED INCOME**



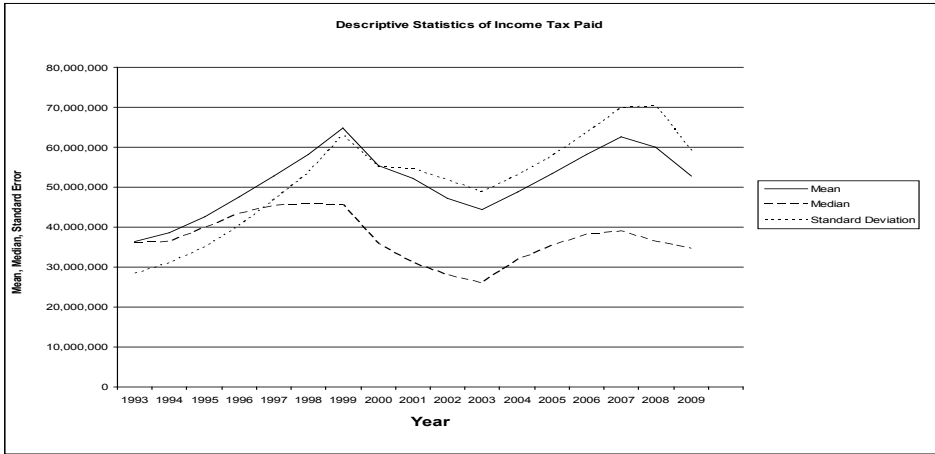
**FIGURE 12: GINI COEFFICIENT OF REPORTED INCOME TAX BEFORE CREDIT**



**FIGURE 13: DESCRIPTIVE STATISTICS OF AVERAGE TAXABLE INCOME**



**FIGURE 14: DESCRIPTIVE STATISTICS OF INCOME TAX PAID BEFORE CREDIT**



**TABLE 6 INCOME GROUP AND SHARE OF TAXES PAID PER TAX FILER**

Size of adjusted gross income	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
\$1 under \$15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
\$15,000 under \$30,000	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
\$30,000 under \$100,000	7	7	7	7	7	7	7	7	7	6	5	5	5	5	5
\$100,000 under \$500,000	49	49	49	49	47	46	46	46	45	44	40	39	39	38	37
\$500,000 under \$1,000,000	202	205	206	205	198	192	193	195	194	192	172	168	165	163	162
\$1,000,000 under \$1,500,000	810	821	832	885	854	862	897	360	363	360	320	305	305	300	299
\$1,500,000 under \$2,000,000	-	-	-	-	-	-	-	515	520	520	460	441	434	428	427
\$2,000,000 under \$5,000,000	-	-	-	-	-	-	-	889	902	900	783	749	745	745	737
Taxable returns, total	6	6	6	7	7	8	9	9	8	8	7	8	8	9	9
\$1,000,000 under \$5,000,000	810	821	832	885	854	862	897	560	558	548	485	469	470	466	463

**TABLE 7: SUITES (S), GINI (G), KAKAWANI (K), and THEIL (T) MEASURES**

Year	S	G	K	T
1993	0.157	0.560	0.096	0.1651
1994	0.157	0.565	0.000	0.1647
1995	0.161	0.574	0.097	0.1622
1996	0.164	0.586	0.099	0.1587
1997	0.156	0.599	0.096	0.1565
1998	0.149	0.603	0.094	0.1606
1999	0.151	0.611	0.095	0.1591
2000	0.151	0.620	0.097	0.1556
2001	0.157	0.590	0.100	0.1687
2002	0.184	0.579	0.121	0.1727
2003	0.166	0.586	0.109	0.1771
2004	0.159	0.603	0.106	0.1757
2005	0.155	0.623	0.104	0.1693
2006	0.152	0.628	0.103	0.1688
2007	0.149	0.635	0.102	0.1676
2008	0.165	0.609	0.110	0.1822
2009	0.177	0.587	0.115	0.2004

**TABLE 8**  
**TAX FILER, SHARE OF INCOME RECEIVED AND SHARE OF INCOME TAX PAID**

Year	Percent Tax Filers	Income Range	Percent of Taxable Income Received	Percent of Income Paid Tax	Change in Income to change in Taxes paid
1993	77.00	0 - 50000	38.04	28.81	
	18.00	50000 - 100000	31.78	28.75	
	4.44	100000 - 1000000	24.07	31.88	
	0.07	over 1000000	6.14	10.56	
1996	72.00	0 - 50000	30.42	22.07	0.88
	20.81	50000 - 100000	31.54	26.94	7.54
	6.23	100000 - 1000000	28.91	36.30	0.91
	0.25	over 1000000	9.13	14.69	1.38
2000	65.37	0 - 50000	21.22	14.59	0.81
	24.33	50000 - 100000	27.70	22.37	1.19
	10.07	100000 - 1000000	34.84	40.60	0.73
	0.23	over 1000000	16.26	22.30	1.07
2004	60.29	0 - 50000	18.35	12.26	0.81
	27.31	50000 - 100000	28.69	22.62	0.25
	12.17	100000 - 1000000	38.70	44.52	1.02
	0.23	over 1000000	14.26	20.60	0.85
2009	54.52	0 - 50000	15.05	9.49	0.84
	28.78	50000 - 100000	27.33	20.64	1.46
	16.48	100000 - 1000000	45.31	50.83	0.95
	0.23	over 1000000	12.31	19.02	0.81



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