DOES THE DISTRICT OF COLOMBIA 2012 INCOME TAX POLICY REFORM INCREASE TAX REVENUE? EVIDENCE FROM REGRESSION DISCONTINUITY DESIGN

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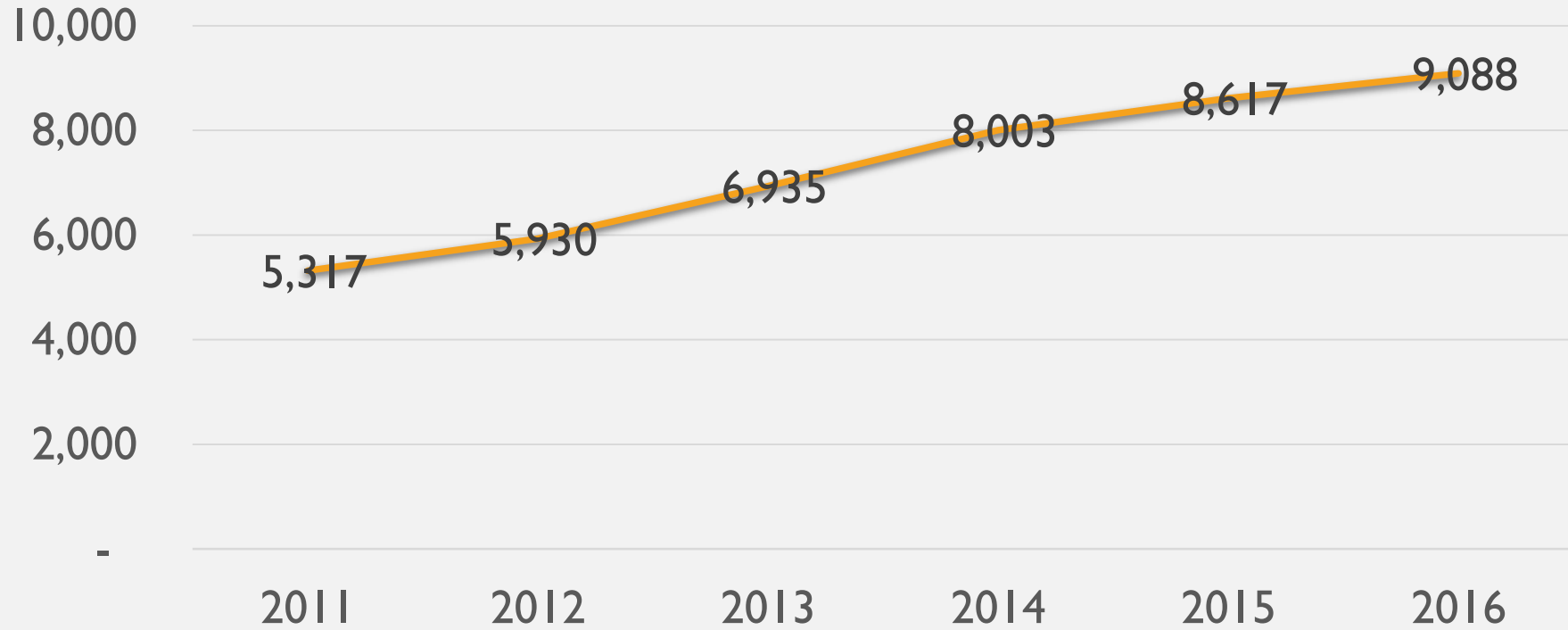Office of Revenue Analysis

January 5, 2019

RESEARCH OUTLINE

- Introduction of D.C. Income Tax Policy

- Literature Review & Preview of Results

- Methodology why RDD?
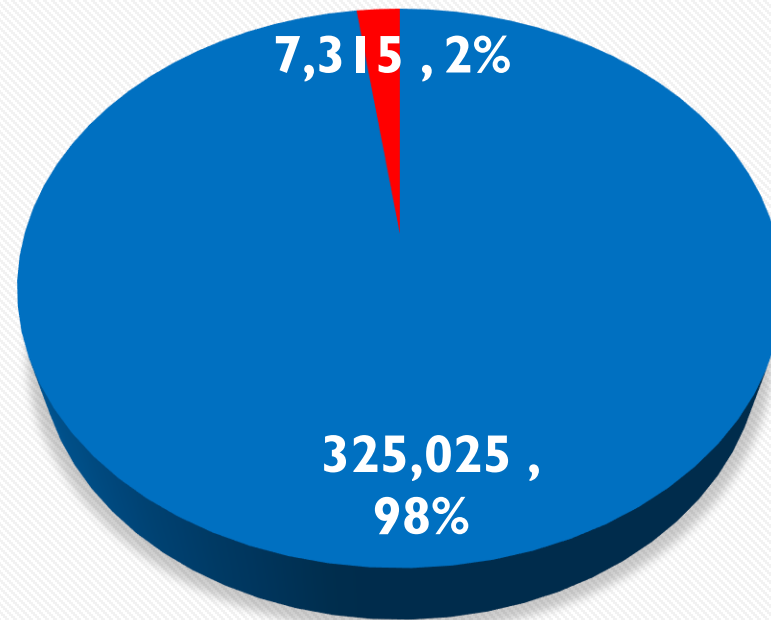
- Data

- Results

- Conclusion

I. INTRODUCTION

- How D.C. Operates as a City, State, and local government?

- The importance of D.C. income tax revenue in the millennial as the largest and primary source of income.

- Washington, D.C.'s (DC) income tax now is the second largest government sources of tax revenue that comes after real property. It accounts for about 25 percent of the city's tax revenue.

- In (DC) the income tax is progressive because higher income residents pay a larger share of their income in taxes than lower income residents do.

- Over the past six years, in 2012, the (DC) has experienced a rise of income tax in high income bracket of $350,000 and up.

- The number of taxpayers from this income group has increased dramatically.

- Individuals in this income level are required to pay additional 0.45 percent of their income. Their income tax rise from 8.5 to 8.95%

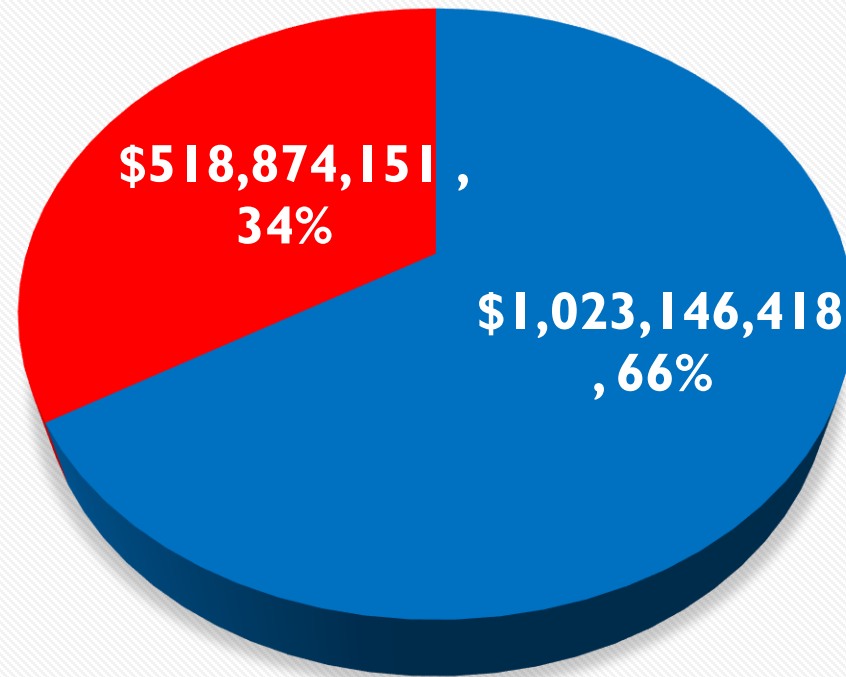NUMBER OF TAXPAYERS WHO EARN OVER $350,000 OVER TIME 2011-2016

Year	Value
2011	5,317
2012	5,930
2013	6,935
2014	8,003
2015	8,617
2016	9,088

THE SIZE OF TOP INCOME TAX FILERS

7,315 , 2%

325,025 , 98%

■ N<350k   ■ N>350k

SHARE OF TAX REVENUE

Share of Tax Paid to Government

$518,874,151 , 34%

$1,023,146,418 , 66%

■ Total Tax<350k ■ Total Tax>350k

II. LITERATURE REVIEW AND REVIEW OF RESULTS

- (Jung, Snow, & Trandel, 1994; Kesselman, 1989; Pestieau & Possen, 1991, 1992; Watson, 1985; although see Parker, 2003, for a critique).

- (Slemord and Auerbach, 1997) reductions in reported income largely reflect timing and other tax avoidance strategies.

- Gale, W. and Samwick, A. 2014. Effects of Income Tax Changes on Economic Growth

THEORETICAL FOUNDATION

- Consumer behavior

III. RESEARCH QUESTIONS

1. Is the District of Columbia 2012 Income Tax Policy Reform Effective?

2. How this Income Tax Policy affect the way Income Taxpayers Pay their Taxes?

3. What is the Impact of the Income Tax Policy Reform on Top Income Taxpayers' Behaviors?
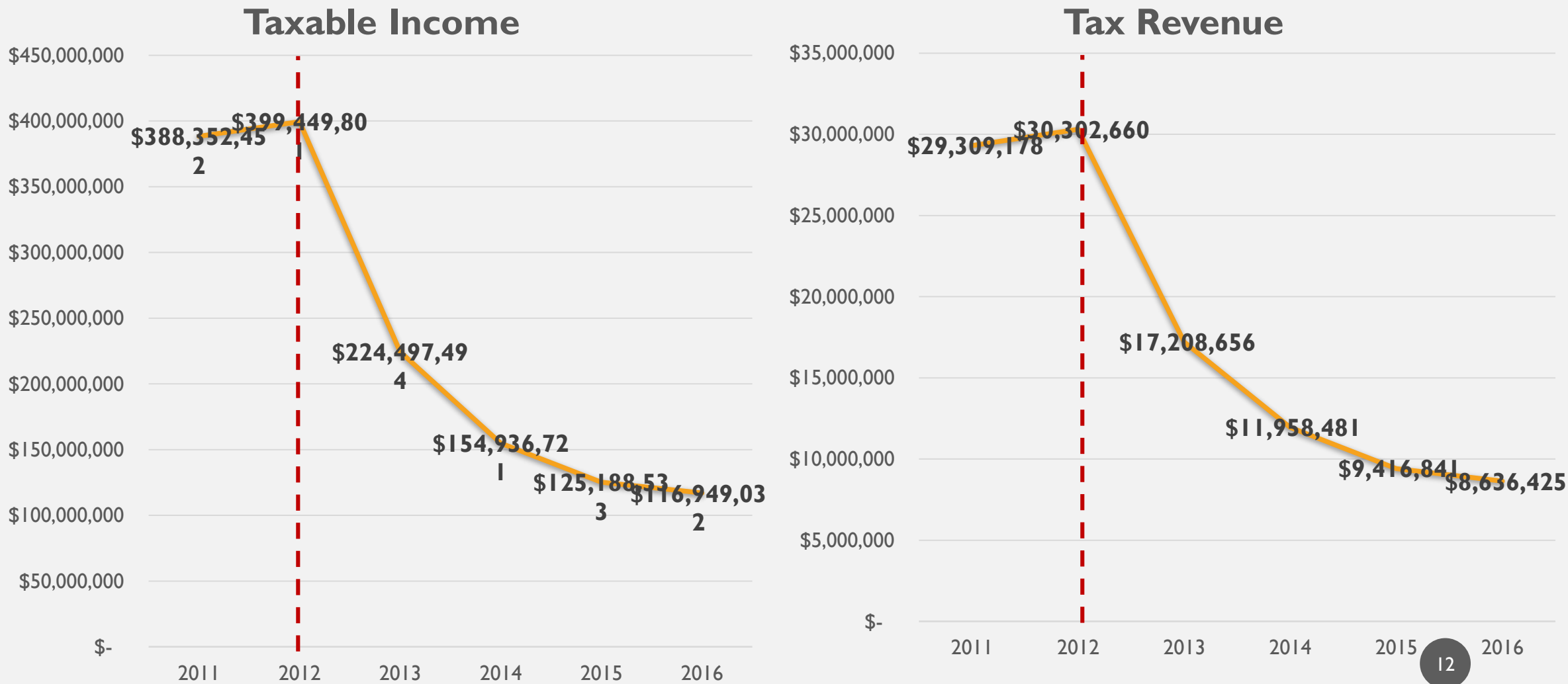
V. REGRESSION DISCONTINUITY DESIGN

- Why Regression Discontinuity Design? Why it is the best to answer the research question?

- Following the literature we use only one year.

- The theoretical foundation is based on consumer behavior act rationally when tax rate increases.

- A threshold in a continues forcing variable (modified adjusted income) generates a large change in a policy variable (the amount of education tax credit for which a student qualifies);

- The threshold is strictly enforced;

- There are very dense data near the threshold for the forcing, policy, and outcome variables;

- Other factors that might affect tax revenue do not change discontinuously at the threshold;

- People do not manipulate the forcing variable near the threshold in an attempt to make themselves eligible

V. DATA

- This study uses the OCFO-ORA administrative city level individual income tax (IIT) 2011-2012.

- This study focus on income tax filers who earn over $350,000.

- All tax data is adjusted to 2016 dollars.

- Tax data used is based on Washington, D.C. city.

VI. METHODOLOGY:
REGRESSION DISCONTINUITY DESIGN

Taxable Income

$388,352,452
$399,449,80
$224,497,49 4
$154,936,72 1
$125,188,53 3
$116,949,03 2

2011 2012 2013 2014 2015 2016

Tax Revenue

$29,309,178
$30,302,660
$17,208,656
$11,958,481
$9,416,841
$8,636,425

2011 2012 2013 2014 2015 2016

THE MODEL

Regression Discontinuity Design:
1. Average Treatment Effect (ATE) (global treatment **2011-2012**)

$$\hat{T}\text{SRD} = ATE = \beta + \lim_{d\downarrow c} E[\varepsilon|d] - \lim_{d\uparrow c} E[\varepsilon|d]$$

$$Y_{iht} = \beta_0 + \beta_1 f(d_{ht}) + \beta_2.tax\_rate_{ht} + \beta_3 f(d_{ht}).tax\_rate_{ht} + \varepsilon_{iht}$$

Where:
- t, is the year in which the income tax policy implemented.
- $f(d_{ht})$ is a continues function
- tax_rate_{ht} is a binary variable
- β_3 is the ATE

2. Doughnut-hole Regression (Taxpayer **just above and below the threshold** of **$350,000** with the **bandwidth of $150,000**. 2011-2012)

$$Y_{iht} = \beta_0 + \beta_1 f(d_{ht}) + \beta_2.tax\_rate_{ht} + \beta_3 f(d_{ht}).tax\_rate_{ht} + \varepsilon_{iht}$$
$$\{h : r < d_{ht} < b\}$$

Where:
- r is the radius of the doughnut-hole in either side of the cut-off.
- b is the bandwidth in either side of the bandwidth.

VII. RESULTS. GLOBAL 2011-2012

	Parameter estimate	Standard Error	t-Value	Pr>|t|	Pr>F	R-Square
Average Treatment Effect	**-0.04**	**0.001**	**-37**	**<.0001**	**<.0001*****	**0.81**

RDD ON VARIOUS INCOME GROUPS

Variables	Parameter estimate	t-Value	Pr >|t|	R-Square
ATE(350-375K)	52.060 (1079.14)	0.05	0.9616	0.02
ATE(375-400K)	-3840.40 (1176.89)	-3.26	0.0012***	0.04
ATE(400-450K)	-4854.89 (1176.13)	-4.13	<.0001***	0.1375
ATE(450-500K)	-8511.38 (1765.32)	-4.82	<.0001***	0.1010
ATE(500K-∞)	4612.48 (623.84)	7.39	<.0001***	0.6770

DONUT-HOLE RDD

	Parameter estimate	Standard Error	t-Value	Pr>|t|	Pr>F	R-Square
Average treatment effect on Tax Payers who earn over $500,0000	**.035**	**.0004**	**74**	**<.0001*****	**<.0001**	**0.6**

TAX SHELTER

Business income(Self-employment Income)				
Variables	**Parameter Estimate**	**t-Value**	**Pr >|t|**	**R-Square**
ATE (350-500K)	**-127,208**	**-2.00**	**0.08***	**0.6**
ATE (500K-∞)	**-224.96**	**-0.01**	**0.99**	**0.003**

DEDUCTION

Deduction				
Variables	**Parameter Estimate**	**t-Value**	**Pr >|t|**	**R-Square**
ATE (350-500K)	**-2,818.539**	**-3.39**	**0.0007**	**0.6**
ATE(500K-∞)	**-3,266.78069**	**-0.19**	**0.0944**	**0.0009**

VIII. CONCLUSION

- Income tax policy on the top 2 percent taxpayers in 2012
- Increasing income tax rate from 8.50 to 8.95 percent in D.C. of individuals who earn over $350,000
- The share of tax paid to the government represents one third.
- City level income tax policy impact on tax revenue.
- Causal inferences from RDD designs are potentially more credible and transparent.
- Income tax policy reform increased the city level income tax revenue.
- Tax-payers of income level that earn less than $500,000 significantly use tax shelter to reduce their tax liability.
- It seams that the 2012 income tax policy be more effective on the tax payers that earn over $500,000.
- Tax revenue increase was born primarily of group earning over $500,000.

THANK YOU

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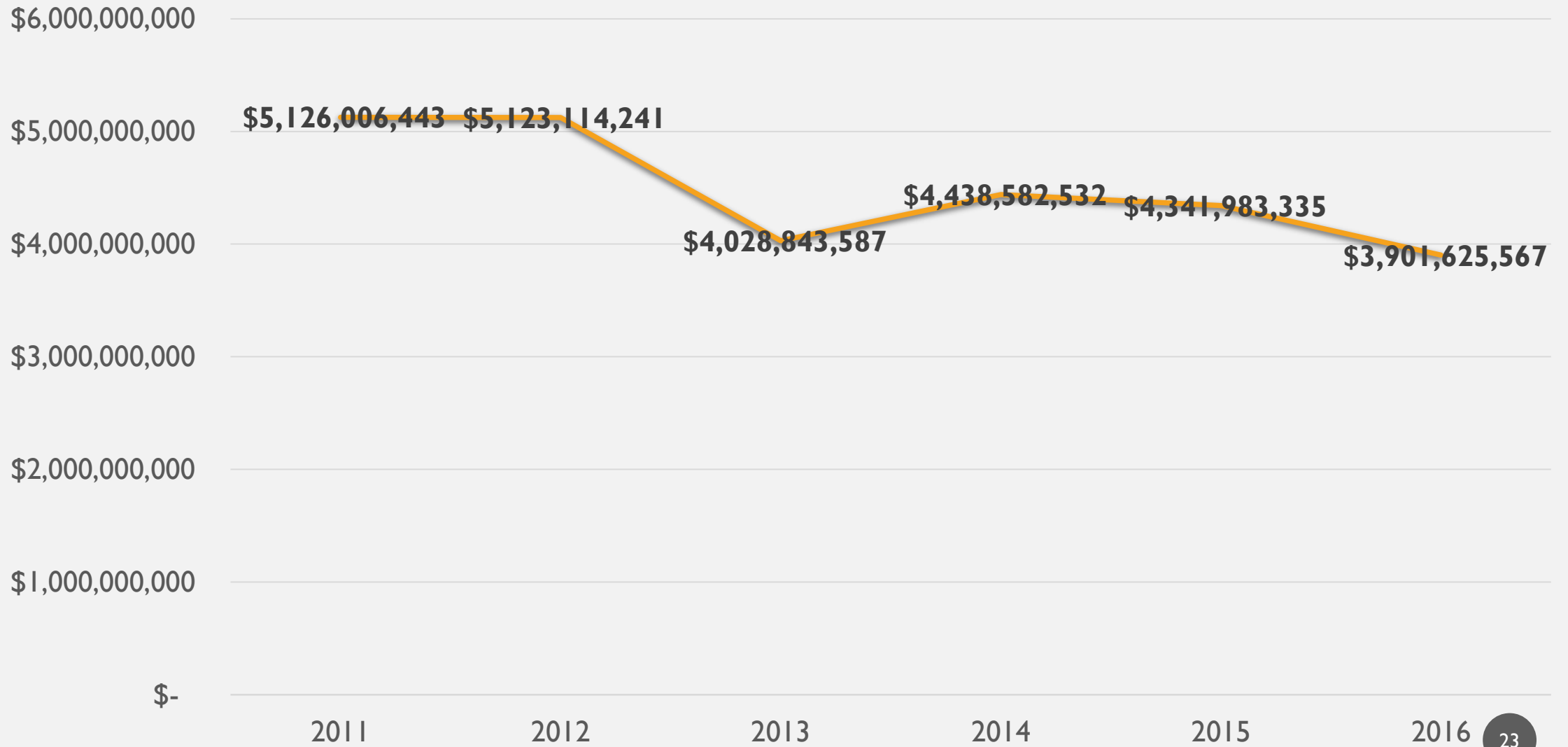CAPITAL LOSS OR GAIN FOR TAXPAYERS WHO EARN $350,000-$500,000

Capital Loss or Gain

$8,000,658

$8,829,149

$6,854,732

$5,062,607

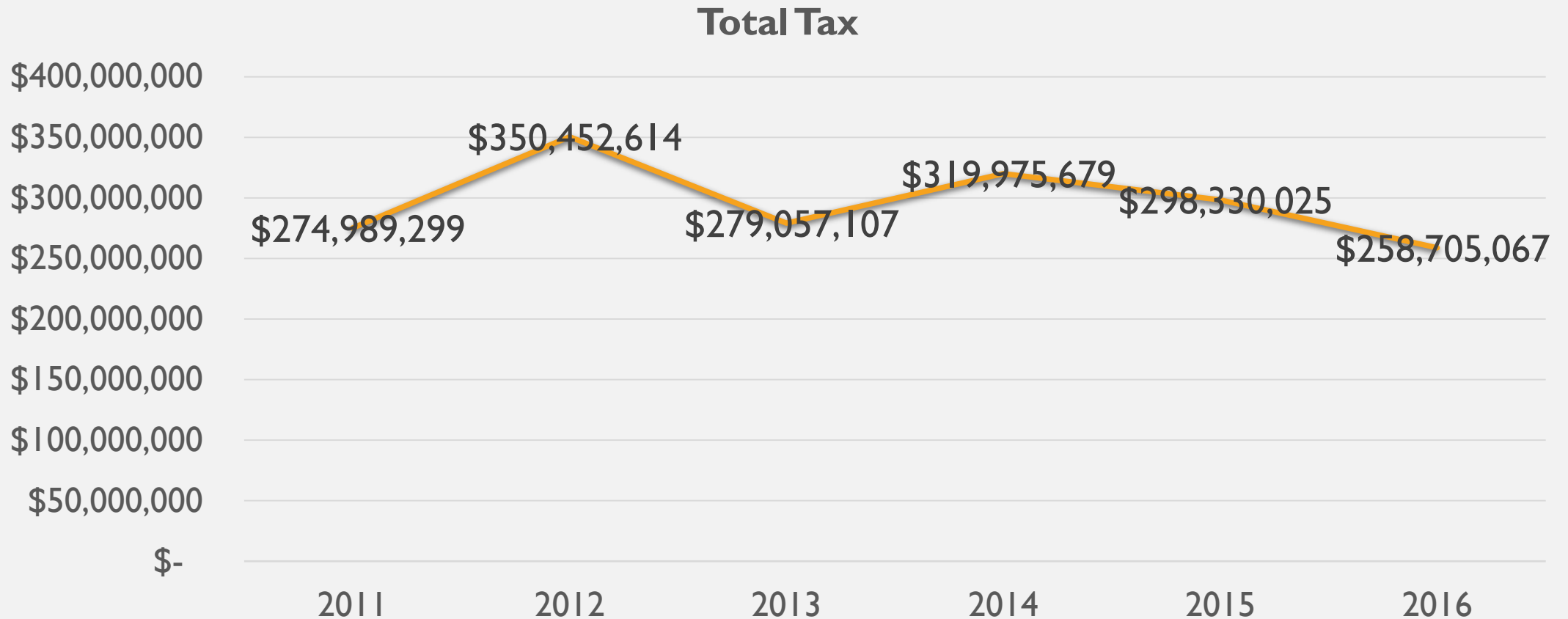$5,271,196

$4,036,118

2011   2012   2013   2014   2015   2016
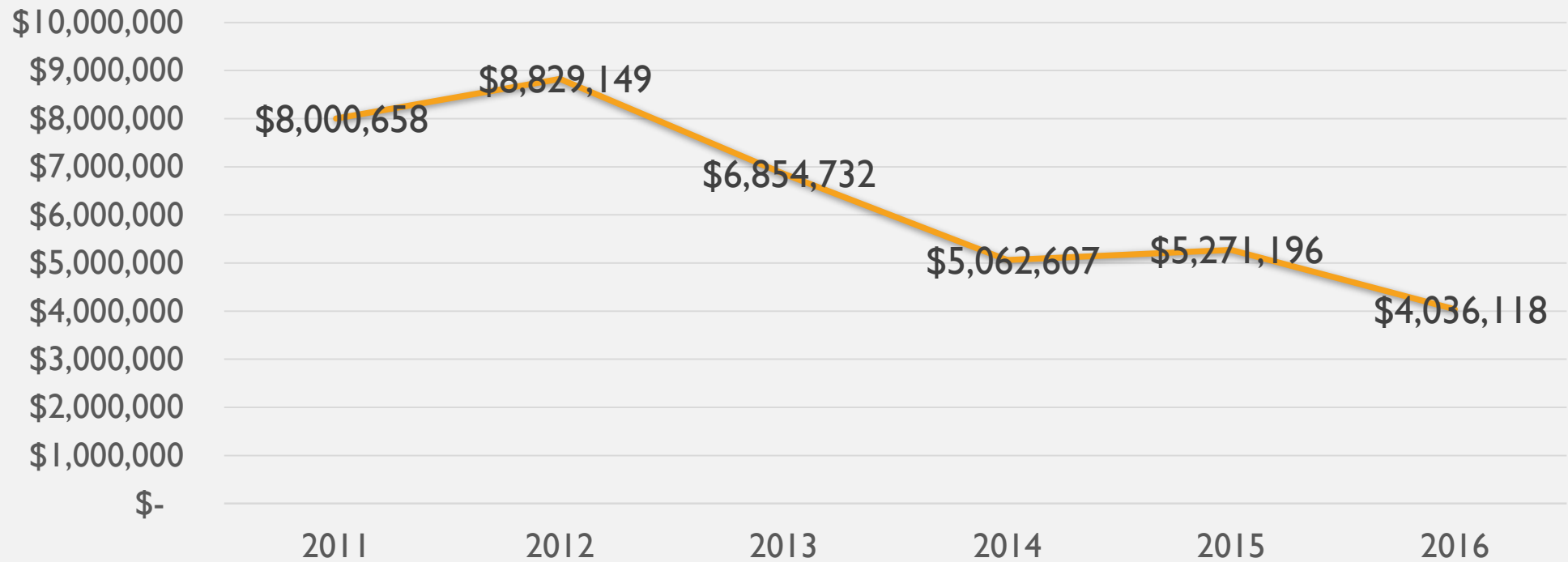
NUMBER OF TAXPAYERS WHO EARN OVER $350,000 (BALANCED DATA)
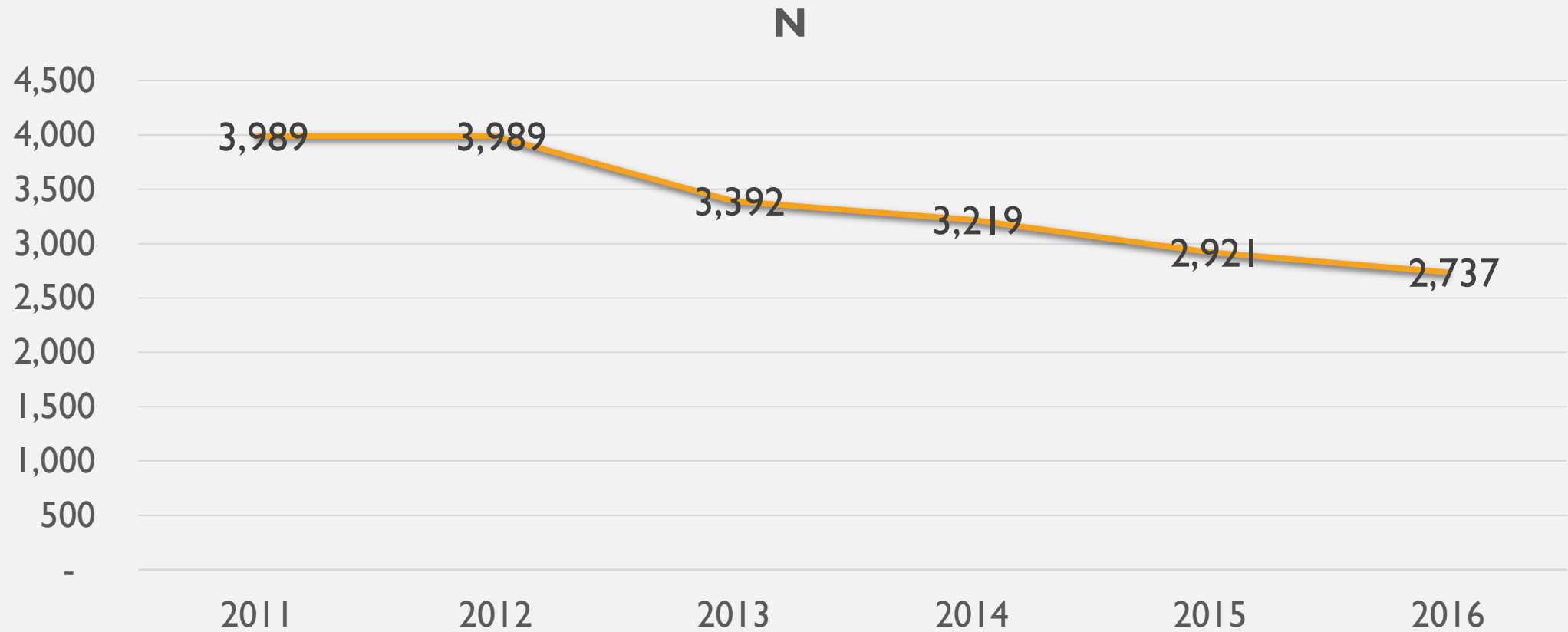
TAXABLE INCOME FOR TAXPAYERS WHO EARN OVER $350,000

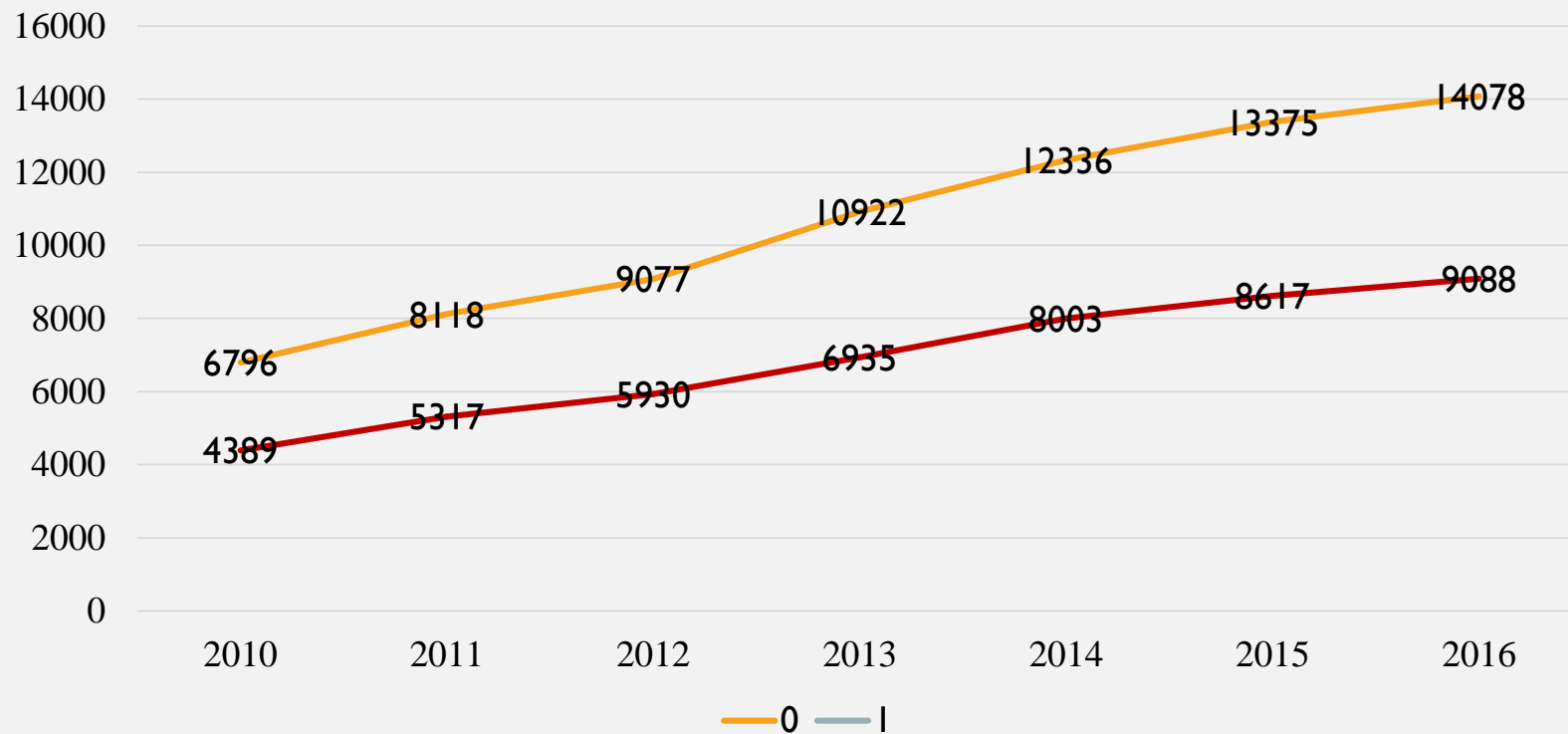TOTAL TAX REVENUE FROM TAXPAYERS WHO EARN OVER $350,000 (BALANCED DATA)

THE SIZE OF TOP INCOME TAX FILERS

Number of Tax Filer Over Time 2010-2016
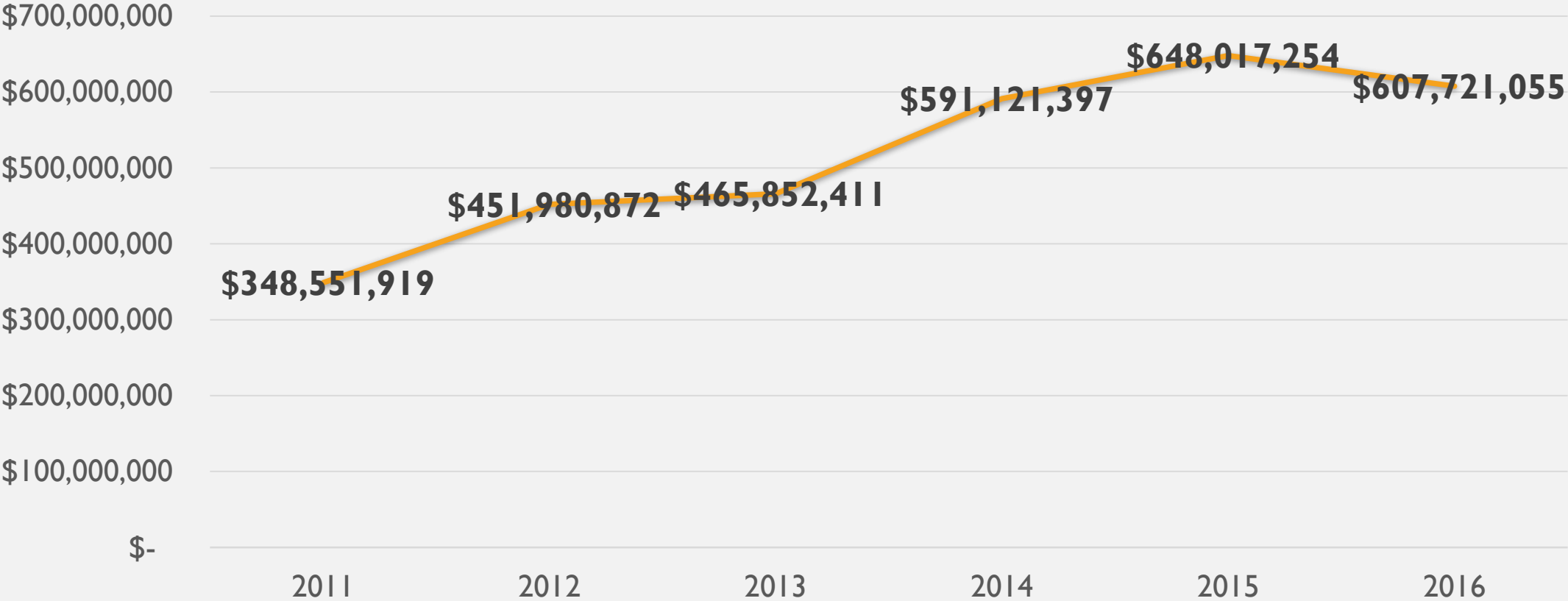
AVERAGE TREATMENT EFFECT OF INCOME TAX POLICY REFORM IN 2016 ON TAXABLE INCOME OF OVER $1MILLION ON GOVERNMENT TAX REVENUE.

	Parameter estimate	Standard Error	t-Value	Pr>|t|	Pr>F	R-Square
Average treatment effect	**8.7**	**2.14**	**4**	**<.0001*****	**<.0001**	**0.24**