The Effect of Dividend Taxation on Work Hours: Evidence from state tax deductions

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Introduction

Taxation in the United States is mildly progressive when measured against tax-concepts of income[1], but regressive when measured against taxpayers' wealth.[2] This is because wealth is much more highly concentrated than either income or consumption, and because, as a general matter, federal and state governments tax wages, income, and consumption rather than wealth.[3]

[1] The federal income tax is progressive except at very high levels of income, where the income tax starts to becomes regressive because of lower tax rates on capital gains and dividends. See IRS SOI Tax Stats, Historical Data Tables, Table 3: Number of Individual Income Tax Returns, Income, Exemptions and Deductions, Tax, and Average Tax, by Size of Adjusted Gross Income, Tax Years 2001-2016 (showing that average effective tax rates as a share of Adjusted Gross Income peak at incomes of $2 to $5 million and decline as income levels increase above $5 million such that that average tax rates are typically lower for those with incomes above $10 million than for those with incomes of $500,000 to $1 million). The income tax would likely appear to be more regressive if unrealized gains were included in Adjusted Gross Income. Including state and local taxes reduces the progressivity of the overall tax system further because sales taxes are regressive and property taxes are less progressive than income taxes. Emmanuel Saez & Gabriel Zucman, *Progressive Wealth Taxation*, *in* BROOKINGS PAPERS ON ECONOMIC ACTIVITY, 1 (2019), https://www.brookings.edu/wp-content/uploads/2019/09/Saez-Zucman_conference-draft.pdf (last visited Sep 21, 2019); EMMANUEL SAEZ & GABRIEL ZUCMAN, THE TRIUMPH OF INJUSTICE: HOW THE RICH DODGE TAXES AND HOW TO MAKE THEM PAY (1 edition ed. 2019).

[2] John Talbott, The Argument for a Wealth Tax (unpublished manuscript, 2019 on file) (analyzing data from the Federal Reserve Survey of Consumer Finances, Tax Policy Center, & Institute on Taxation and Economic Policy).

[3] State governments do tax real property, but real estate accounts for only a fraction of household wealth, particularly for high-net worth households. For the very wealthy, financial assets (stocks, bonds, etc.), intellectual property, and ownership interests in private businesses tend to be important asset classes, whereas for middle class households, home equity tends to be a more important source of wealth. *See* James M Poterba, *Stock Market Wealth and Consumption*, 14 J. ECON. PERSP. 99–118, 102, Table 2 (2000) (finding based on analysis of the Survey of Consumer Finances that the top 0.5 percent owns 10.2 percent of housing equity but 37 percent of commons stock and 24 percent of non-financial assets, whereas the bottom 80 percent owns 29 percent of housing equity, but only 4.1 percent of common stock and 14 percent of non-equity financial assets); Lisa A. Keister & Hang Young Lee, *The One Percent: Top Incomes and Wealth in Sociological Research*, 1 SOCIAL CURRENTS 13–24, 16–18 (2014) (finding evidence from the Survey of Consumer Finance that asset classes that comprise a large percentage of the top 1 percent's wealth include business ownership, stocks, and pooled investment vehicles, and that for the bottom 90 percent home equity accounts for over 5 times as high a percent of assets as it does for the top 1 percent) .

Recent scholarship has highlighted the extent of income and wealth inequality in the United States,[4] and has suggested that extreme wealth may lead political and economic systems to reflect the preferences and priorities of a small minority of the population while de-emphasizing the preferences of the majority.[5] Highly concentrated wealth and power may have negative effects on public health,[6] economic growth and innovation,[7] social mobility,[8] social cohesion and civil society,[9] and the role of science and data in driving policy.[10]

Concerns about the extent of inequality and its possible negative effects have led to a variety of policy proposals to try to reduce inequality through increasing the progressivity of taxation. Many of these proposals focus on increasing taxation of wealth or income from capital.[11]

The progressivity of the tax system, particularly at the high end, is limited by the choice of tax base: if tax rates are equal across bases or if tax rates are capped at a

[4] THOMAS PIKETTY, CAPITAL IN THE TWENTY-FIRST CENTURY 311–312 (Arthur Goldhammer tran., 2017).

[5] M. Gilens, *Inequality and Democratic Responsiveness*, 69 PUBLIC OPINION QUARTERLY 778–796 (2005); Benjamin I. Page, Larry M. Bartels & Jason Seawright, *Democracy and the Policy Preferences of Wealthy Americans*, 11 PERSPECTIVES ON POLITICS 51–73 (2013); George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3–21, 11–14, 17–18 (1971).

[6] Gopal K. Singh & Mohammad Siahpush, *Widening Socioeconomic Inequalities in US Life Expectancy, 1980–2000*, 35 INT. J. EPIDEMIOL. 969–979 (2006); Margo Wilson & Martin Daly, *Life Expectancy, Economic Inequality, Homicide, and Reproductive Timing in Chicago Neighbourhoods*, 314 BMJ 1271 (1997) (discussing possible links between life expectancy and inequality). Benjamin I. Page, Larry M. Bartels & Jason Seawright, *Democracy and the Policy Preferences of Wealthy Americans*, 11 PERSPECTIVES ON POLITICS 51, 56-58,61 (2013) (finding less support among the very wealthy for anti-poverty and healthcare programs and environmental protection).

[7] Benjamin I. Page, Larry M. Bartels & Jason Seawright, *Democracy and the Policy Preferences of Wealthy Americans*, 11 PERSPECTIVES ON POLITICS 51–73, 56, 59 (2013) (finding less support among the very wealthy for public investment in education at all levels).

[8] Marianne Nordli Hansen, *Self-Made Wealth or Family Wealth? Changes in Intergenerational Wealth Mobility*, 93 SOCIAL FORCES 457–481 (2014).

[9] Ichiro Kawachi & Bruce P. Kennedy, *Socioeconomic determinants of health : Health and social cohesion: why care about income inequality?*, 314 BMJ 1037 (1997); David Coburn, *Income inequality, social cohesion and the health status of populations: the role of neo-liberalism*, 51 SOCIAL SCIENCE & MEDICINE 135–146 (2000).

[10] Martin Gilens & Craig Hertzman, *Corporate Ownership and News Bias: Newspaper Coverage of the 1996 Telecommunications Act*, 62 J. POL. 369–386 (2000) (media organizations bias news coverage in ways that are favorable to their owners' interests); MICHAEL SIMKOVIC, THE STATE OF INTELLECTUAL FREEDOM IN AMERICA 1–26, 5-16 (2018), https://docs.house.gov/meetings/JU/JU10/20180927/108458/HHRG-115-JU10-Wstate-SimkovicM-20180927.pdf (discussing cash-for influence arrangements at think tanks, public relations firms, and newspapers; donor pressure on universities; and efforts to suppress science when it challenges the interests of wealthy or politically powerful interests);George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3–21, 10–12 (1971) (discussing the importance of an uninformed or misinfored public to regulatory capture).

[11] These proposals include new ultra-high net worth wealth taxes or variations that may be less vulnerable to constitutional challenges, mark-to-market or retrospective accrual taxation of capital gains, equalization of tax rates on capital gains and dividends to those on ordinary income, elimination of step-up-basis at death on capital gains, reductions in estate tax exemption amounts and increases in estate tax rates and enforcement, increases in effective corporate tax rates and reduction of income shifting opportunities, and a financial transactions tax. See LILY L. BATCHELDER & DAVID KAMIN, *Taxing the Rich: Issues and Options* (2019), https://papers.ssrn.com/abstract=3452274; EDWARD D. KLEINBARD, CAPITAL TAXATION IN AN AGE OF INEQUALITY (2017), https://papers.ssrn.com/abstract=2838532; Ari D. Glogower, *A Constitutional Wealth Tax*, MICH. L. REV. (2019), https://papers.ssrn.com/abstract=3322046; Michael Simkovic, Billionaire Taxes (2019); Michael Simkovic, *The Knowledge Tax*, 82 U. CHI. L. REV. 1981 (2015) (discussing equalization of tax rates on labor and investment income).

maximum percentage of a base,[12] then the choice to tax wages or consumption rather than wealth or income from investment will make taxes relatively flat.[13] For example, for a consumption tax to raise as much revenue as a 1 percent annual wealth tax from a taxpayer with a net worth of $10 billion who consumes $10 million annually, it would be necessary to tax consumption at approximately one thousand percent.

Thus far, few reforms have been enacted that would enhance the progressivity of federal tax systems. To the contrary, the general trend over the last 40 years has been toward a less progressive federal tax system with relatively higher taxation of labor income and relatively lower taxation of income from capital.[14] These trends are broadly consistent with recommendations based on the traditional optimal tax literature.

The optimal tax literature has generally argued in favor of a regressive tax base[15] on two grounds—first, capital should be taxed more lightly because capital is more mobile than labor and capital can therefore more readily flee taxation;[16] and second, the tax base should consist exclusively of labor income because taxing labor income only creates a single

[12] J. A. Mirrlees, *An Exploration in the Theory of Optimum Income Taxation*, 38 REV. ECON. STUD. 175, 206 (1971) ("Under the optimum [tax] regime . . . [income] tax rates are [surprisingly] low. This means, in effect, that the income tax is not as effective a weapon for redistributing income . . . as one might have expected").

[13] See Table 2 below.

[14] Thomas Piketty & Emmanuel Saez, *How Progressive is the U.S. Federal Tax System? A Historical and International Perspective*, 21 J. ECON. PERSP. 3–24, 13, 21–23 (2007); LOUIS KAPLOW, THE THEORY OF TAXATION AND PUBLIC ECONOMICS 1 (2010) (describing "labor income taxation [or consumption taxation equivalents]" as "the backbone of modern fiscal systems.").

Changes include higher taxes on labor income such as payroll taxes, lower taxes on income from capital wealth and inheritance, and flatter income taxes with a broader base. For example, as a share of total federal revenues, from 1945 to 2018, corporate taxes have fallen from 35 percent to 6 percent, while payroll taxes have increased from 8 percent to 35 percent. Michael Simkovic, *The Knowledge Tax*, 82 U. CHI. L. REV. 1981, 2027 (2015); Budget of the United States Government: Historical Tables Fiscal Year 2020, Table 2.2 — Percentage Composition of Receipts by Source: 1934–2024. During this time period, corporate profits have remained stable as a share of national income. *See* U.S. BUREAU OF ECONOMIC ANALYSIS, SHARES OF GROSS DOMESTIC INCOME: CORPORATE PROFITS WITH INVENTORY VALUATION AND CAPITAL CONSUMPTION ADJUSTMENTS, DOMESTIC INDUSTRIES: PROFITS AFTER TAX WITH INVENTORY VALUATION AND CAPITAL CONSUMPTION ADJUSTMENTS [W273RE1A156NBEA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/W273RE1A156NBEA, June 3, 2019. Payroll tax rates have increased from around 2 percent in the 1940s, to over 15 percent today, while maximum taxable wages for social security have increased from around $43,000 in 1945 (in inflation adjusted 2018 dollars) to $133,000 as of 2019.

Similarly, estate tax exemption amounts have grown, rates have fallen, and audit rates have declined. Emmanuel Saez & Gabriel Zucman, *Progressive Wealth Taxation*, *in* BROOKINGS PAPERS ON ECONOMIC ACTIVITY , 13, 29 (2019), https://www.brookings.edu/wp-content/uploads/2019/09/Saez-Zucman_conference-draft.pdf (last visited Sep 21, 2019).

[15] LOUIS KAPLOW, THE THEORY OF TAXATION AND PUBLIC ECONOMICS 5 (2010) ("optimal income tax analysis suggests that high marginal rates at low income levels are attractive even though they lead the lowest-ability individuals not to work"); J. A. Mirrlees, An Exploration in the Theory of Optimum Income Taxation, 38 Rev. Econ. Stud. 175, 208 (1971) ("An approximately linear [flat] income-tax . . . is desirable . . . The income-tax is a much less effective tool for reducing inequalities than has often been thought").

[16] Reuven S. Avi-Yonah, *Globalization, Tax Competition, and the Fiscal Crisis of the Welfare State*, 113 HARV. L. REV. 1573–1676 (2000). The optimal tax literature tends to take the greater mobility of capital as a given. However, the greater mobility of capital is in part the result of a set of policy choices that encourage capital mobility, restrict labor mobility, and that have focused tax administration and third-party reporting efforts on tracking and withholding wages rather than income from capital. Progressive wealth tax policy proposals such as those of Senator Warren would limit capital mobility through the imposition of steep exit taxes.

economic distortion that discourages work, whereas taxing wealth or income from investment leads to a double-distortion which discourages both work and savings.[17]

Simple optimal tax models suggest that taxation produces both a substitution effect, which discourages work, and an income or wealth effect which can encourage work.[18] Although analyses of the productivity implications of taxing capital typically assume that the substitution effect is large and the wealth effect is relatively small,[19] this assumption has rarely been considered in light of the empirical evidence.[20] More recent theoretical models suggest that taxation of capital can be efficient under certain assumptions about taxpayer behavior, for example regarding complementarity between consumption and leisure,[21] or in a dynamic setting.[22] Competing assumptions that underlie various optimal tax models have rarely been tested empirically.[23]

This article contributes to the literature by examining the double distortion argument empirically. In particular, this article investigates the prediction that taxing investment income more (less) heavily would reduce (increase) work hours. We investigate the

[17] LOUIS KAPLOW, THE THEORY OF TAXATION AND PUBLIC ECONOMICS 6, 221–248 (2010) ("Atkinson and Stiglitz [1976] [demonstrate] that capital taxation is equivalent to differential commodity taxation, in this instance of commodities in different time periods, and thus is inefficient"); *Id.* at 2–3 (arguing in favor of distribution-neutral tax and spending reforms because they can be made to have "no effect on labor supply" under certain conditions and assumptions); *Id.* at 10, 391–405 (criticizing normative approaches to tax policy that incorporate concerns about "inequality, poverty, progressivity, and redistribution [and] ability to pay"). JAMES BANKS & PETER A. DIAMOND, THE BASE FOR DIRECT TAXATION 14–15 (2008); A. B. Atkinson & J. E. Stiglitz, *The Design of Tax Structure: Direct Versus Indirect Taxation*, 6 J. PUB. ECON. 55–75, 57, 74 (1976) ("if the government had no distributional objectives and was concerned solely with efficiency, it may employ only direct taxation and this would take the form of a poll tax").

The empirical evidence that taxing capital more heavily reduces investment is mixed. See Danny Yagan, *Capital Tax Reform and the Real Economy: The Effects of the 2003 Dividend Tax Cut*, 105 AMERICAN ECONOMIC REVIEW 3531–3563 (2015).

[18] Richard Blundell & Thomas Macurdy, *Chapter 27 - Labor Supply: A Review of Alternative Approaches*, 3 *in* HANDBOOK OF LABOR ECONOMICS 1559–1695, 1589 (Orley C. Ashenfelter & David Card eds., 1999), http://www.sciencedirect.com/science/article/pii/S1573446399030084 (last visited Jun 10, 2019) ("income and substitution effects work in opposite directions in Marshallian demand").

[19] LOUIS KAPLOW, THE THEORY OF TAXATION AND PUBLIC ECONOMICS 70 (2010), ("the optimal nonlinear income tax problem is more analytically tractable when income effects are thus eliminated . . . some offer the further justification that empirical evidence suggests that income effects on labor supply are small. [However] Empirical work does not clearly rule out the significance of income effects."). Some optimal research suggests that optimal taxation could reduce labor force participation, but argues that this could nevertheless optimize utility. See, e.g., J. A. Mirrlees, *An Exploration in the Theory of Optimum Income Taxation*, 38 REV. ECON. STUD. 175, 206 (1971).

[20] One well-known limitation of such analyses is that only work hours, not effort or productivity, are directly observable. Working more hours could be associated with higher productivity per hour if more hours leads to more rapid accumulation of skill and experience. However, marginal productivity may decline with hours of work. With declining marginal productivity, productivity *per person* would only increase if hours increase by more than the decline in average productivity per hour.

[21] Louis Kaplow, *Chapter 10 Taxation*, 1 *in* HANDBOOK OF LAW AND ECONOMICS 647–755, 681 (A. Mitchell Polinsky & Steven Shavell eds., 2007), http://linkinghub.elsevier.com/retrieve/pii/S1574073007010109 (last visited Jun 30, 2014) (reviewing literature suggesting that capital taxation could be efficient with assumptions about complementarity between consumption and leisure, excessive precautionary savings, or that patterns of investment determine wage rates).

[22] Mikhail Golosov, Narayana Kocherlakota & Aleh Tsyvinski, *Optimal Indirect and Capital Taxation*, 70 REV. ECON. STUD. 569–587, 571, 579 (2003); Daron Acemoglu, Mikhail Golosov & Aleh Tsyvinski, *Political economy of Ramsey taxation*, 95 J. PUB. ECON. 467–475, 468 (2011).

[23] At least one recent empirical study raises questions about the extent to which taxation of income from capital affects real investment by corporations. Danny Yagan, *Capital Tax Reform and the Real Economy: The Effects of the 2003 Dividend Tax Cut*, 105 AMERICAN ECONOMIC REVIEW 3531–3563 (2015).

individuals most likely to be affected by such changes in taxation and check if their responses differ from the sample as a whole.

The primary data sources used in the analysis, the American Community Survey and the Decennial Census, are nationally representative household surveys with large samples and detailed demographic information. This permits an investigation of the relationship between income, taxation, and work hours not only on average for a nationally representative sample of individuals, but also for specific sub-groups. These data have an important advantage over administrative data in that the Census data include self-reported work hours, whereas administrative data typically only includes income.

The main analysis in this paper exploits a large, ostensibly permanent change to federal income taxation which dramatically reduced tax rates on dividends. The Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA) substantially reduced federal income tax rates on qualified dividend income by recharacterizing such income as long-term capital gains rather than ordinary income. Federal income tax rates on qualified dividends fell by half for most taxpayers, and by more than half for those in the top two tax brackets. JGTRRA also reduced tax rates on long term capital gains and slightly reduced tax rates on ordinary income.

Changes to JGTRRA under federal tax law did not affect residents of all states equally. Some states permit residents to deduct their federal income tax payments from their income for state income tax purposes. For residents of states permitting such deductions, JGTRRA provided a smaller reduction in effective tax rates than for residents of states that do not permit such a deduction. This is because the federal rate cut was partially offset by the loss of state tax deductions. The loss of the deduction effectively increased state income tax rates in states offering the deduction, without any change to state law.

This pre-existing variation in state law predates JGTRRA by decades and is plausibly exogenous to policy considerations that led to changes to federal income taxation in 2003. Thus JGTRRA can be interpreted as randomly assigning residents of some states to receive larger reductions in effective tax rates than residents of neighboring states. We use this state-by-state variation to infer the causal effect of changes to taxation on work hours. We also briefly explore the possible effects of such taxation on total personal income across different income classes and employment sectors, allowing for the possibility that increased taxation may indirectly affect the incomes of individuals not subject to the increased tax burden, for example through labor complementarity externalities or increased public spending.

Part I of this article briefly reviews prior empirical literature on labor supply, including experimental and quasi-experimental studies which can provide evidence of a causal link between changes in either wages or wealth and resulting changes in work hours. Part II of this article describes our data and presents descriptive statistics and correlations between income sources and work hours. Part III of this analysis presents our main analysis using state-by state variation in the effects of the 2003 tax cuts.

Preliminary results suggest that in aggregate relative tax increases on investment income (smaller tax decreases) increased work hours among high income and wealthy groups who were most directly affected by the tax changes, or at least did not decrease work hours. However, for the population as a whole, who were less directly exposed to the tax changes, there was no significant effect on work hours.

We also find evidence that although work hours increased for wealthy and high-income groups, total income of these groups did not significantly increase, and for our high-

income group may have decreased. This potentially suggests that the increase in work hours at least partially offset the decrease in after-tax income induced by the law change.

At a minimum, the data suggest that overall income for the full population did not decrease following tax increases on dividends toward the top of the distribution.

To the contrary, we find preliminary evidence suggesting that average total income for the remainder of the population increased after the law change, suggesting an increase in spending by state and local governments or economic spillovers from the increased work hours of the affected groups. Consistent with the latter explanation we find that income increased for private sector workers, but did not significantly change for those working for state or local governments, the federal government, or non-profit organizations. The income increase does not appear to be due to an increase in welfare or other transfer payments, but rather to an increase in earnings (business and wage income) and investment income. The increase in income is concentrated toward the upper middle of the income distribution, with no apparent effect toward the bottom.

Several possible interpretations of these results are discussed.

I. Review of experimental evidence on the effects of changes in wealth and wages on work hours

Quasi-experimental evidence suggests that increasing wealth reduces work hours, especially at very high levels.[24] Studies of sudden increases in wealth have generally focused on lottery winners. These studies compared changes in work hours for those who win the lottery after they win to changes in work hours for similar individuals who did not win the lottery. Because winning the lottery is random conditional on playing the lottery, this design resembles an experiment in which lottery winners are selected at random for the treatment of having their wealth increased, while non-winners function as a control group. Studies can also compare those who win large amounts to those who win small amounts to get a better sense of the marginal effects of different increases in wealth.[25] The results of these studies consistently find that increases in wealth reduce work hours by a substantial amount, with a larger effect on those near retirement age.

However, it is unclear to what extent these findings are broadly generalizable. The population of lottery players is not necessarily representative of the U.S. population as a whole or to high income, wealthy individuals. It is also unclear whether the result that increasing wealth reduces work hours would apply to annual taxation and not just to sudden windfalls. Another potential challenge is that responses to unearned income may differ by type of unearned income.

Studies in other contexts have found similar results, finding for example that the receipt of a large inheritance reduces labor force participation and work hours, and that the effect is larger for larger inheritances.[26] Similarly, receipt of windfall profits from natural gas mineral rights may increase "leisure entrepreneurship," defined as self-employment

[24] Guido W. Imbens, Donald B. Rubin & Bruce I. Sacerdote, *Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery Players*, 91 AMERICAN ECONOMIC REVIEW 778–794 (2001); *see also* David Cesarini et al., *The Effect of Wealth on Individual and Household Labor Supply: Evidence from Swedish Lotteries*, 107 AMERICAN ECONOMIC REVIEW 3917–3946 (2017).

[25] Guido W. Imbens, Donald B. Rubin & Bruce I. Sacerdote, *Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery Players*, 91 AMERICAN ECONOMIC REVIEW 778–794 (2001).

[26] Douglas Holtz-Eakin, David Joulfaian & Harvey S. Rosen, *The Carnegie Conjecture: Some Empirical Evidence*, 108 Q. J. ECON. 413–435 (1993).

that provides a lower income than previous or subsequent wage labor and that is not sustained when royalty payments end.[27]

In contrast to wealth, evidence on the effect of wages on work hours is more mixed, with recent field experiments (on bike messengers) finding that temporary increases in wages cause a large increase in work hours, likely due to large substitution effects.[28] Previous non-experimental studies had often found relatively low changes to work hours among men in response to permanent changes in wages, or sometimes even a *reduction* in work hours in response to wage increases.[29] By contrast, studies of women have generally found increased workforce participation or increased work hours in response to increased after-tax wages.[30] However, workers may not always be able to choose how many hours they work; naturally observed changes in wages might correlate with reduced opportunities to work during economic slowdowns.[31]

Some studies have therefore focused on cab drivers, who can choose how much to work on particular days when it is likely to be easier or harder to find fares.[32] Such studies find that drivers work fewer hours on days when wages are higher. However, a limitation of these studies is that wages for cab drivers might vary for reasons related to the unpleasantness of work at certain periods, for example because it falls on a holiday when most cab drivers prefer not to work.[33] Thus both the increase in wages and the reduction in hours could be caused by the same factors rather than the increase in wages causing a decline in work hours. This intuition corresponds to the generally observed tendency for employers to pay wage premiums for overtime work and other compensating differentials.[34] More recent evidence from field experiments in which changes in wages are truly randomized and increased wages are found to induce more work may therefore offer stronger evidence regarding the relationship between wages and work hours, at least in the short run.

Overall, the empirical evidence suggests that large sudden increases in wealth reduce work hours. The evidence is ambiguous with respect to changes in wages. This may imply that reductions in wealth (or after-tax investment income) caused by taxation could *increase* rather than decrease work hours of those who were taxed more heavily.[35] However, it remains unknown whether findings regarding the effects of changes in wealth

[27] Aymeric Bellon et al., *Personal Wealth and Self-Employment* (2019).

[28] Ernst Fehr & Lorenz Goette, *Do Workers Work More if Wages Are High? Evidence from a Randomized Field Experiment*, 97 AMERICAN ECONOMIC REVIEW 298–317 (2007).

[29] John Pencavel, *Chapter 1 Labor supply of men: A survey*, 1 *in* HANDBOOK OF LABOR ECONOMICS 3–102, 94 (1986), https://linkinghub.elsevier.com/retrieve/pii/S1573446386010040 (last visited Jun 7, 2019); Colin Camerer et al., *Labor Supply of New York City Cabdrivers: One Day at a Time*, 112 Q. J. ECON. 407–441 (1997).

[30] Richard Blundell & Thomas Macurdy, *Chapter 27 - Labor Supply: A Review of Alternative Approaches*, 3 *in* HANDBOOK OF LABOR ECONOMICS 1559–1695, 1615–1617, 1667 (Orley C. Ashenfelter & David Card eds., 1999), http://www.sciencedirect.com/science/article/pii/S1573446399030084 (last visited Jun 10, 2019).

[31] Mankiw, Julio Rotemberg & Lawrence Summers, *Intertemporal Substitution in Macroeconomics*, 100 QUARTERLY JOURNAL OF ECONOMICS 225–251, 249–250 (1985).

[32] Colin Camerer et al., *Labor Supply of New York City Cabdrivers: One Day at a Time*, 112 Q. J. ECON. 407–441 (1997).

[33] Ernst Fehr & Lorenz Goette, *Do Workers Work More if Wages Are High? Evidence from a Randomized Field Experiment*, 97 AMERICAN ECONOMIC REVIEW 298–317, 299–300 (2007).

[34] Ronald G. Ehrenberg & Paul L. Schumann, *Compliance with the Overtime Pay Provisions of the Fair Labor Standards Act*, 25 J. LAW & ECON. 159–181 (1982); Robert A. Hart & Yue Ma, *Wage–hours contracts, overtime working and premium pay*, 17 LABOUR ECON. 170–179 (2010); Peter F. Kostiuk, *Compensating Differentials for Shift Work*, 98 J. POL. ECON. 1054–1075 (1990).

[35] That is, it may imply that wealth effects dominate substitution effect, at least when changes in wealth are large, sudden and positive.

on work hours—based on specific populations receiving sudden large one-time windfalls—are generalizable to broader populations, especially high income, high-skilled workers. It also remains unknown whether these results would hold in the context of relatively small changes in annual taxation of investment income or wealth that would have a long-term effect on the ability to accumulate wealth through work and savings.

II. Data and descriptive statistics

To help provide insight into these questions, this paper uses data from the U.S. Census Bureau's American Community Survey from 2000-2012 and the Decennial Census from 2000.[36] The data provides a high quality, large, nationally representative sample which offers information on work hours and sources of income, as well as detailed individual and household characteristics.[37] We end the analysis in 2012 because of a 2013 increase in federal tax rates.

We begin with all individuals that appear in the 2000-2012 ACS data files and the 2000 Census. We then eliminate all individuals outside of 'prime working age' which we define as between 25 and 65 years of age. We further eliminate any observations where the total individual income is less than zero (i.e., total individual income is negative), or that are missing any variables necessary to complete the main analysis (described in Section III below). We treat values imputed by the Census and therefore flagged for potential data quality issues as missing. We further removed individuals living in group quarters to increase consistency of the sample in early and later years.[38]

Our main analysis is concerned with the effect of taxes on work hours. We compute annual work hours as the product of two census variables: usual work hours per week and weeks worked per year. Because a key variable of interest, weeks worked per year, is only available as a continuous variable through 2007—after which weeks worked per year are reported within intervals— for purposes of analysis of the effects of taxation on work hours, we exclude observations in 2008 and later. We later reinstate the years after 2008 in our subsequently discussed income analysis. As described in Table 1 below, the remaining sample consists of over 10 million observations.

Table 2 below displays means and distributions for key variables including work hours, different sources of income, and demographics. Detailed variable definitions are available in the appendix. ACS winsorizes income levels within each income source,

[36] In particular, we use the IPUMS recode, which increases variable consistency across years and as between the Census and ACS. Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas and Matthew Sobek. *IPUMS USA: Version 9.0 [dataset*]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D010.V9.0

[37] The 2000 Census sample is 5% of the United States population. The 2000 ACS included an additional 0.13%. From 2001 to 2004, the ACS sample each year is between 0.38% and 0.43% of the population, and the smallest geographic unit identified is the state. From 2005 forward, the ACS sample size expands to 1% of the U.S. population.

[38] Besides size, the samples are substantially similar, except that the ACS did not include individuals living in group quarters (such as military barracks, college dormitories, and nursing homes) from 2001 through 2005, inclusive. The 2000 Census and ACS in 2006 and beyond include individuals living in group quarters. Results are robust to inclusion or exclusion of individuals living in group quarters, who were mostly already cut from the sample by age restrictions.

generally above the 99.5th percentile.[39] Both work hours and income refer to the past 12 months for ACS samples, and to the previous calendar year for the decennial census.

Over 80 percent of the sample worked at least some hours. Although around 37 percent of the sample reports usually working 40 hours per week, and similarly 36 percent of the sample reports working 2080 hours per year (40 hours per week x 52 weeks per year), there is substantial variation above and below this level.

Over 90 percent of the sample reports having some individual income, and over 99 percent reports some household income. However, investment income—which includes dividends, interest and rents—is highly concentrated toward the top of the distribution. Only around 20 percent of the sample has any investment income, and investment income is highly concentrated in the top 5 and top 1 percent of the sample. This concentration of investment income toward the top of the distribution is broadly consistent with administrative data from the IRS Statistics of Income.[40] Somewhat greater concentration in ACS data could be explained by underreporting of investment income in ACS relative to administrative data.[41]

Based on demographics, the sample appears to be broadly representative of the U.S. as a whole: it is split roughly evenly between men and women and around 80 percent white. Around 30 percent of the sample has a bachelor's degree or above, with around 11 percent possessing advanced degrees.

As an initial step before our main analysis, we first examine the relationship between income source and reported annual work hours. As discussed later the intent is not to establish any kind of causal relationship, but only to explore associations between work hours and income sources. In particular, we are concerned with the general relationship between investment income and work hours. To do so we use the following OLS regressions:

$$Annual\ Work\ Hours_{it} = \alpha_{it} + \beta_1 Total\ Individual\ Income_{it} + \sum_{j=1}^{K} \beta_k CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_i \quad (1)$$

$$\begin{aligned} Annual\ Work\ Hours_{it} = {} & \alpha_{it} + \beta_1 Wage\ Income_{it} + \beta_2 Business\ Income_{it} + \beta_3 Investment\ Income_{it} \\ & + \beta_4 Retirement\ Income_{it} + \beta_5 Welfare\ Income_{it} + \beta_6 Social\ Security\ Benefits_{it} \\ & + \beta_7 Supplemental\ Social\ Security\ Benefits_{it} + \beta_8 Other\ Individual\ Income_{it} \\ & + \beta_9 Other\ Householde\ Income_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t \\ & + \varepsilon_i \quad (2) \end{aligned}$$

As previously noted, the main dependent variable, *Annual Work Hours,* is calculated by multiplying usual work hours per week times total weeks worked per year. Specification 1 tests the relationship between

[39] In the appendix showing variable definitions, we show the points at which each variable in winsorized in each year.

[40] See infra note 44.

[41] See John M. Abowd & Martha H. Stinson, *Estimating Measurement Error in Annual Job Earnings: A Comparison of Survey and Administrative Data*, 95 REV. ECON. & STAT. 1451–1467 (2013); Jonathan L Rothbaum, *Comparing Income Aggregates: How do the CPS and ACS Match the National Income and Product Accounts, 2007-2012* (2015).

annual work hours and total income (*Total Individual Income)*. We expect that total income will be positively related to annual work hours. Specification 2 examines how the different components of total income relate to annual work hours. We expect that the two categories of income that constitute earnings— income from wages and salary (*Wage Income)* and from operating a business (*Business Income)*—will each be positively related to work hours. We further expect that retirement income (*Retirement Income)* and income from government support programs (*Welfare Income, Social Security Income, Supplemental Social Security Benefits)* will be negatively related to work hours as these income sources are generally attributable to individuals who are not working full time. The income source we are most interested in, *Investment Income,* could be either positively or negatively related to work hours. We also control for individual demographic characteristics (Gender, Age in years, Age-squared, Race, Ancestry, and Highest Degree of Educational attainment), state of residency, and year.

Table 3 below presents the results. Column 1 shows that total individual income is positively related to work hours. For every additional $1,000 of annual total individual income, a respondent works an additional 6.18 hours more per year. In Column 2 we see that this relationship is driven by earnings, including both wage and salary income and earnings from working in a self-owned business.

In contrast to earnings, the relationship between Investment Income (dividends, interest, and rents) and work hours is negative. For every additional $1,000 in annual investment income, respondents work 3.67 fewer hours per year. There is also a negative association between work hours and other sources of passive income such as retirement income, disability income, government support programs, and income from other household members. In unreported analysis, we also find substantially similar results for subsamples restricted to those with non-zero work hours, all male or all female, and all with an advanced degree. For all groups, greater income from investment predicts fewer work hours, all else being equal.

As mentioned earlier, we view these results as mainly descriptive, and acknowledge that reverse causation could help explain the negative relation between work hours and government support programs, some of which are restricted to those who cannot currently work.[42] However, it seems less likely that reverse causation explains the negative relation between work hours and investment income, particularly given controls for lifecycle indicators such as age and human capital indicators such as education. Importantly, it seems less likely that not working *causes* one to have investment income than having investment income causes one not to work. Another explanation could be that some unobserved variation in human capital somehow causes people to both have investment income and not work long hours, but that it is not the investment income itself which causes the reduction in work hours. We further investigate causation using a quasi-experimental variation in tax rates on dividends and capital gains, described in Part III below.

Finally, because of our interest in changes in taxation of investment income that are likely to most affect those toward the top of the income and wealth distribution, we focus on high income and wealthy subsamples. Descriptive statistics comparing these groups to the full sample appear in Table 4. As expected, the high-income group (top 5 percent of annual income each year), the wealthy group (top 10% of investment income each year among those with investment income), and the wealthy and young group (top 10% of investment income among those with investment income each year and who are below the age of 40) all have total personal incomes and investment incomes that are much higher than the full sample, both at the mean and at most points in the distribution. The high-income group and the

[42] However, the robustness of these results to inclusions of controls for disability and involuntary unemployment make reverse causation somewhat less likely as a full explanation.

wealthy group are older than the full sample, while the wealthy and young group is younger.

The high-income group works far more hours than the full sample at the mean (2400 hours versus 1600) and at most points in the distribution, and indeed works more hours than any other group in Table 4. Around 4 percent of the high-income group works zero hours. By contrast, on average, the wealthy group works fewer hours than the full sample (1500 vs. 1600), and also works fewer hours than any other group. A much larger share of the wealthy work zero hours (approximately 28 percent for the wealthy versus 20 percent for the full sample and 4 percent for the high-income group). However, the wealthy group has a wider distribution of work hours than the full sample. Thus, toward the top of the distribution of work hours, at the 75th percentile and above, the wealthy generally work more hours than individuals at the same point in the distribution of the full sample.

The wealthy and young group has only slightly lower levels of investment income and total income than the wealthy group. However, the young and wealthy group works more hours than either the wealthy group or the full sample, both on average and at most points in the distribution. Less than 14 percent of the young and wealthy group works zero hours.

In Table 3 Columns 3, 4, and 5, we see that the positive relation between earnings and work hours and the negative relation between investment income and work hours holds for subsamples of high income and wealthy individuals. Column 3 displays results for a subsample of individuals in the top 5 percent of total income within each year, i.e., a high-income group. Column 4 displays results for a group consisting of those within the top 10 percent of investment income each year among those with investment income, i.e., a wealthy group. Column 5 considers a group that is wealthy (top 10% of investment income among those with investment young), and also young, that is, below the age of 40. We see that for the high-income group, an extra $1,000 in annual income is associated with working 4 fewer hours per year. For our wealthy and young and wealthy groups, an extra $1,000 in investment income is associated with working approximately 1.5 fewer hours per year. In general, the results suggest that for all groups having more investment income is associated with working less. As such, this might suggest that increasing the tax burden on investment income could increase the amount of work hours as the individuals attempt to maintain their current after-tax income levels.

III. Difference-in-Difference results

To better understand the causal effects of changes in taxation on work hours, we consider quasi-experimental evidence from a large shock to federal income taxation. This shock affected residents of different states differently because of plausibly exogenous variation in state tax law.

A. Quasi-random changes in effective tax rates on Qualified Dividends

1. 2003 Federal tax cuts under JGTRRA

The Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA) substantially reduced federal income tax rates on qualified dividend income by taxing such income at long-term capital gains rates rather than ordinary income rates. Federal income tax rates

on qualified dividends fell by half for most taxpayers.[43] This had a particularly large effect on taxpayers in the top 4 brackets because they account for the overwhelming majority of qualified dividend income.[44] Marginal tax rates on qualified dividends for taxpayers in the top 4 income brackets fell from between 27 and 39.6 percent before JGTRRA to at most 15 percent after—a dramatic drop of as much as 24.6 percent.[45] For taxpayers in the bottom two tax brackets, federal tax rates on qualified dividends fell from 10 to 15 percent before JGTRRA to 5 percent after, and later zero—a drop of 5 to 15 percent.[46]

JGTRRA also reduced tax rates on long term capital gains, from 20 to 15 percent for most taxpayers, i.e., a drop of 5 percent. It also slightly reduced marginal tax rates on ordinary income for the top 4 brackets, by between 2 and 4.6 percent. For the top bracket, marginal tax rate on ordinary income fell from 38.6 to 39.6 percent in 1999 to 2002 to 35 percent after JGTRRA. Marginal tax rates on ordinary income in the next 3 brackets fell by a total of between 2 and 3 percent.[47] The dividend tax cut was presumptively permanent—and persists over a decade and a half later—but the cuts to ordinary income and capital gains rates expired in 2012.[48] Because JGTRRA dramatically reduced taxation of dividend income and capital gains but also simultaneously slightly reduced tax rates on ordinary income, isolating the effects of the cuts to investment income is challenging, as we discuss in greater detail below.

[43] In 2003 to 2012, Qualified Dividends accounted for between 20 and 30 percent of total investment income, including taxable and tax-exempt interest, ordinary and qualified dividends, and net rental income. INTERNAL REVENUE SERVICE, STATISTICS OF INCOME, INDIVIDUAL INCOME TAX RETURNS FILED AND SOURCES OF INCOME, TABLE 1.4 INDIVIDUAL INCOME TAX, ALL RETURNS: SOURCES OF INCOME AND ADJUSTMENTS, BY SIZE OF ADJUSTED GROSS INCOME, INDIVIDUAL COMPLETE REPORT (PUBLICATION 1304), TABLE 1.4 *available at* https://www.irs.gov/statistics/soi-tax-stats-individual-statistical-tables-by-size-of-adjusted-gross-income#_grp1

[44] In 2003, taxpayers in the top 4 tax brackets accounted for roughly one third of tax returns with taxable income, 70 percent of taxable income, and 75 to 85 percent of qualified dividends. INTERNAL REVENUE SERVICE, STATISTICS OF INCOME (2003), INDIVIDUAL STATISTICAL TABLES BY TAX RATE AND INCOME PERCENTILE, TABLE 1. RETURNS WITH MODIFIED TAXABLE INCOME: TAX CLASSIFIED BY MARGINAL TAX RATE, TAX YEAR 2003, available at https://www.irs.gov/pub/irs-soi/03in01tr.xls; TABLE 1.4 INDIVIDUAL INCOME TAX, ALL RETURNS: SOURCES OF INCOME AND ADJUSTMENTS, BY SIZE OF ADJUSTED GROSS INCOME, *available at* https://www.irs.gov/pub/irs-soi/03in01ar.xls

[45] See TAX FOUNDATION, FEDERAL INDIVIDUAL INCOME TAX RATES HISTORY, NOMINAL DOLLARS, INCOME YEARS 1913-2013, *available at* https://files.taxfoundation.org/legacy/docs/fed_individual_rate_history_nominal.pdf. TAX FOUNDATION, FEDERAL CAPITAL GAINS TAX RATES, 1988-2013 (2013), https://taxfoundation.org/federal-capital-gains-tax-rates-1988-2013/.

[46] In 2003 and beyond, the rate was cut to 5 percent. Starting in 2008, the tax rate on dividends for taxpayers in the bottom two income brackets was further reduced to 0 percent. TAX FOUNDATION, FEDERAL CAPITAL GAINS TAX RATES, 1988-2013 (2013), https://taxfoundation.org/federal-capital-gains-tax-rates-1988-2013/.

[47] The immediate effect of JGTRRA was a reduction of 3.6 percent for the top bracket and 2 percent for the next 3 brackets. However, ordinary income tax rates for the top 4 brackets also declined slightly in the years leading up to JGTRRA—by 0.5% in 2001 and an additional 0.5% in 2002. We use 1999 to 2002 as our pre-JGTRRA period.

[48] Commentary and analysis contemporaneous with JGTRRA's passage anticipated that the dividend tax cut would be made permanent. William G. Gale & Peter R. Orszag, *Bush Administration Tax Policy: Introduction and Background*, TAX NOTES, Sept. 13, 2004. However, the rate cuts were originally officially set to expire in 2009 to provide a lower cost in foregone revenue for purposes of estimates mandated under legislative budgetary rules. As expected by many tax policy experts, the dividend tax cut was extended indefinitely, and the capital gains and ordinary income tax cuts were extended for several more years, only partially expiring in 2013. James A. Beavers, *EGTRRA and JGTRRA Tax Rates Extended for Two Years in Lame Duck Session,* TAX ADVISER, Jan. 31, 2011, *available* at https://www.thetaxadviser.com/issues/2011/feb/taxtrends-feb2011-story-01.html; TAX FOUNDATION, FEDERAL CAPITAL GAINS TAX RATES, 1988-2013 (2013), https://taxfoundation.org/federal-capital-gains-tax-rates-1988-2013/.

2. State-by-state variation in the effect of 2003 federal income tax cuts

The above-mentioned changes to federal tax law did not affect residents of all states equally. Some states permit residents to deduct their federal income tax payments from their income for state income tax purposes. For residents of states permitting such deductions, JGTRRA provided a smaller reduction in effective tax rates on qualified dividends and other income than for residents of states that do not permit such a deduction. These state tax deductions were enacted decades before JGTRRA and remained in effect for years after.

This pre-existing variation in state law is plausibly exogenous to policy considerations that led to changes to federal income taxation in 2003. Thus, JGTRRA can be interpreted as randomly assigning residents of some states to receive larger reductions in effective tax rates than residents of neighboring states. In effect, some states were randomly assigned to increase their effective tax rates. This state-by-state variation can be used to infer the causal effect of changes to taxation of income on work hours.

States offering an uncapped deduction[49] during the relevant period[50] include:

- Alabama[51]
- Iowa[52]
- Louisiana[53]
- Utah (through 2007 inclusive)[54]

We consider residents of these states in years when the deduction was available to have been "treated" to receive a smaller tax cut in 2003 than residents of other states. In other words, residents of treated states received a *relative tax increase* compared to residents of other states.

State income tax rates in the treated states that offer deductions for federal taxes paid were typically between 5 and 9 percent in relevant years.[55] Assuming a state tax rate of 7

[49] Several other states offered deductions that were capped. However, because the deductions in these states were capped at relatively low levels, federal tax cuts in 2003 are less likely to have affected the amount that could be deducted by many taxpayers. We therefore do not treat residents of such states as treated and drop them from the analysis. States offering capped deductions include Oregon, Montana and Missouri.

[50] Oklahoma ended its deduction in the start of 2006. 68 OKL. ST. ANN. § 2358 (2019), *amended by* 2006 Okla. Sess. Law Serv. Ch. 16 (H.B. 3139) to eliminate the deduction for tax years beginning January 1, 2006. We therefore do not count Oklahoma as a treatment state and exclude Oklahoma from the differences-in-differences analysis.

Starting in 2009, North Dakota offered a deduction for state income tax purposes equal to 30 percent of qualified dividends or capital gains income. This deduction was increased from 30 percent to 40 percent in 2013. N.D. Cent. Code § 57-38-30.3 (2009), *amended by* Taxation, 2013 North Dakota Laws Ch. 449 (S.B. 2325). We do not treat North Dakota as a treated state because the state tax deduction was not available when JGTRRA was enacted. We drop North Dakota from the analysis in 2009 and later.

[51] ALA. CODE § 40-18-15 (2019). This provision remains substantially unchanged since its introduction in 1965.

[52] IOWA CODE § 422.9 (2019). This provision remains substantially unchanged since its introduction in 1934.

[53] LA. STAT. § 47.55 (2019). This provision remains substantially unchanged since its introduction in 1974.

[54] UTAH CODE § 59-10-114(b) (2000), a*mended by* TAX CHANGES, 2008 Utah Laws Ch. 389 (H.B. 359) to eliminate the deduction for tax years beginning January 1, 2008. For purposes of the analysis of changes in income, which includes data through 2012, we exclude Utah

[55] The marginal tax rate in Alabama on individual taxable income above $3,000 was 5% in 2004-2012. In Iowa, the top marginal tax rate was 8.98% on taxable incomes above $56,000. In Louisiana, the top marginal tax rate in 2004 was 6 percent on individual or married couple's incomes greater than $50,000 (the threshold increased with inflation). In Utah, the top tax rate was 7% on incomes above $4,000 from 2004 through 2006,

percent and a reduction in federal dividend tax rates of 24 percent implies that JGTRRA reduced tax rates on dividends in treatment states by only around 22 percent instead of 24 percent in control states—i.e., effective rates would have fallen by 1.7 percent less in treatment states than in control states. Effective tax rates on capital gains and ordinary income would only have fallen by 0.2 to 0.35 percent less in treatment states than in control states.

Thus our treatment group is individuals in states that offer uncapped deductions for federal taxes and our control group is individuals in states that do not offer such deductions. We expect to see a larger response in the high-income, wealthy, and wealthy and young subsamples than in the full sample, because the tax changes directly affected high income and wealthy groups more.

3. Pre- and post- treatment periods

Because the ACS reports hours and income for the trailing 12 months, and because respondents are surveyed in various months of the year, we consider both 2003 and 2004 ACS years as partially treated years which are excluded from our analysis. Our pre-treatment period (i.e. pre-JGTRRA) consists of the 2000 Census and 2000 through 2002 ACS. Our post-treatment period when annual work hours is our dependent variable consists of 2005 through 2007 ACS. After these restrictions we are left with approximately 9 million observations.

In addition to examining the full sample, we focus on the previously discussed 'high income' and 'wealthy' subsamples that are likely to be most directly affected by the tax changes under JGTRRA. To recap, our 'high-income' group consists of individuals in the top 5 percent of total individual income nationally each year. Most of these individuals will fall within the top two federal income tax brackets and, as mentioned previously, were most likely to recognize a tax benefit from the JGTRRA. We also consider a 'wealthy' group consisting of those in the top 10% of investment income each year among those who had investment income, and a 'wealthy and young' group which is the subset of the 'wealthy' group who were below the age of 40 in the year they were surveyed.

Table 5 partitions the sample based on whether the individual is in a state that allows for a deduction of federal taxes. Our high-income group consists of approximately 461,000 observations. Of this group, approximately 15,000 are from states that allow for the deduction of federal income taxes. Our wealthy group consists of approximately 183,000 observations. Of this group, approximately 7,400 are from states that allow for the deduction of federal income taxes. Our wealthy and young group consists of approximately 25,000 observations. Of this group, slightly fewer than 1,000 are from states that allow for the deduction of federal income taxes. Thus, approximately 3% to 4% of the sample is considered treated for the purposes of this test.

Unsurprisingly, there are differences between the individuals in the Deduction and Non-deduction states. . In particular, individuals in Non-deduction states earn significantly more total income across all groups, and more investment income in two of them. In addition, deduction state residents on average work more hours, particularly in the 'wealthy and young' group, though not all differences are statistically significant. This suggests the important of controlling for individual demographic characteristics in our main regression.

and between 5.35 and 7% on incomes above $5,500 in 2007. TAX FOUNDATION, STATE INDIVIDUAL INCOME TAX RATES, 2000-2014, *available at* https://taxfoundation.org/state-individual-income-tax-rates/ .

B. Main results: Effect on annual work hours

We adopt a differences-indifference research design to examine the relation between the passage of the JGTRRA and annual work hours. Specifically, we use the following OLS regression:

$$Annual\ Work\ Hours_{it} = \alpha_{it} + \beta_1 Treatment\ X\ Post_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_{it} \quad (3)$$

Where *Treatment* is a dummy variable equal to 1 if the individual is a resident of a state that allows for the deduction of federal income taxes against the state income tax liability, and zero otherwise. *Post* is a dummy variable equal to one if the observation year is after 2004 and zero if it is before 2003. All other variables are the same as in equation (2). Following the literature, we include state and year fixed effects and cluster standard errors by state.[56] We do not include *Treatment* and *Post* main effects because they are perfectly co-linear with the state and year fixed effects. Our main variable of interest is β_1. If higher taxes on dividends reduce the incentive to work, then we would expect $\beta_1$to be significantly negatively related to work hours. If higher taxes incentivize more work, than β_1 should be positive. Alternatively, if the actual effect of the increase is immaterial to overall decision making, we will observe a value for β_1 that is not significantly different from zero.

In addition, we test whether the effects are different for the previously discussed 'wealthy' sub-groups, who we consider to be the individuals most directly affected by JGTRRA. We predict that each of these groups will be more affected by the JGTRRA than the broader full sample. We further predict that the biggest effects will be in the wealthy and young group because tax changes that affect the annual return on investment will have the largest cumulative effect on those with a longer investment horizon.[57] In addition, prior literature suggests that labor supply elasticities vary with age.[58]

DID analysis assumes parallel trends, or that absent the passage of the JGTRRA, the average change in work hours between treated and non-treated states would have remained roughly the same across the sample period. This assumption would be violated if there were some other factor that varied between states offering deductions and those not offering deductions (e.g. other economic shocks), that varied systematically with the federal law change, and which our regression specification doesn't control for even with controls for race, sex, ancestry, age and education as well as state and year fixed effects. To assess whether this is the case we regress annual work hours on an indicator variable for each year equal to 1 if the individual is in a treatment state, and zero otherwise, along with all other controls.[59] If the setting satisfies the parallel trends assumption then we should only

[56] Marianne Bertrand, Esther Duflo & Sendhil Mullainathan, *How Much Should We Trust Differences-In-Differences Estimates?*, 119 Q .J. ECON. 249–275 (2004).

[57] This implicitly assumes that taxpayers place greater weight on their lifetime consumption than on transmission of wealth to their heirs.

[58] Kim B. Clark & Lawrence H. Summers, *Labour Force Participation: Timing and Persistence*, 49 REV. ECON. STUD. 825, 841 (1982); Matthew Weinzierl, *The Surprising Power of Age-Dependent Taxes*, 78 REV. ECON. STUD. 1490–1518 (2011); Martin Gervais, *On the Optimality of Age-Dependent Taxes and the Progressive U.S. Tax System*, 36 J. ECON. DYNAMICS & CONTROL 682–691 (2012).

[59] Matthew Serfling, *Firing Costs and Capital Structure Decisions: Firing Costs and Capital Structure Decisions*, 71 J. FIN. 2239–2286 (2016).

see significant differences in period after the adoption of the law. We note that, unlike the rest of our analysis, this test includes the 2003 and 2004 years in order to maintain a complete time series. However, given the measurement issues noted previously, we focus on the differences in trends after the 2004 period.

Figure 1 plots the coefficients and confidence intervals for each of the sub-groups. We first notice that in the full sample (Panel A) being in a deduction state is associated with significantly lower work hours in all pre and post period. However, when we turn to the sub-groups predicted to be most affected by the law change we find the expected relationships (Panels B-D). For all three groups there are no significant differences in the years prior to the law change, and only after 2004 do we start seeing a significant difference in work hours, with the individuals in the treatment states exhibiting a positive trend. This suggests parallel trends prior to treatment and divergence after, and that pre-treatment trends do not drive our results.

Table 6 shows the results of our main analysis. Consistent with our expectations, in the full sample (Column 1), which includes primarily individuals who were not directly affected much by the relative tax increase, the treatment group shows no significance change in work hours relative to the non-treatment states in the period after the law change. Also consistent with our expectations, in the three wealthy sub-groups most directly affected by the tax change (Columns 2-4) we see significant differences. For all of the high income or wealthy groups the *Treatment X Post* variable is significantly positively related to work hours. In Table 6 Column 2, we find evidence that for our high-income group, the relative tax increase in 2003 increased work hours by approximately 57 hours per year. In Column 3, we see some evidence that the relative tax increase may have increased work hours among the wealthy (those with investment income in the top 10 percent each year) by around 70 hours per year. In Column 4, we see evidence that for the young and wealthy, the relative tax increase increased work hours by around 233 hours per year. The results suggest that for individuals most likely to be effected by the law change, the relative tax increase caused them to increase their work hours, partially offsetting the loss in after-tax income.

To get some sense of the economic significance of the increase in work hours for the largest high income group that responded (the top 5% by total income), we estimate the dollar value of the additional pre-tax income that these individuals would likely earn because of the additional work hours. In untabulated results we find that on average in the pre-period, these individuals earned $230,000 of non-investment income and worked approximately 2,400 hours a year. This translates into hourly earnings of approximately $95. An increase of 57 annual work hours represents a 2% increase in work hours. Assuming compensation at the average hourly rate, this comes to approximately $5,400. These individuals also reported an average of $24,000 in investment income in the pre-period. Thus, they increased their total pre-tax income by approximately 2 percent. If we control for labor force participation (untabulated) and focus just on the effects of workers who report non-zero work hours, the effects are more modest. For example, the high income group only shows an increase of 51 hours a year, which translates into an increase of about 1.9% in work hours and total pre-tax income. Assuming a marginal tax rate of 40%, this would imply an increase in after tax income of about 1.1% from the additional work hours.

[Note to discussant: This is an initial example as an outline going forward. There are still empirical issues we hope to work out before the conference, especially improving balance between treatment and control groups. Comments on whether this is a good shock to use and what would be the most convincing treatment and control groups would be helpful.]

C. Exploration of effects on income

We next consider the effect of a relative increase in dividend taxation on income. Our wealthy and high income groups are the most directly affected by the tax change. We expect a tax increase on these groups to reduce their after-tax incomes,[60] with some offsetting effects from increased work hours. Consistent with these expectations in Table 7 Columns 2, we see evidence of a possible decline in incomes of as much as $5,700 per year per member of our high income group, although the effect is only marginally significant. Effects on income of our remaining wealthy and high income groups who responded with larger increases in work hours are indistinguishable from zero. This suggests that some wealthy groups increased work hours by enough to offset the tax increase, consistent with theories of consumption targeting or precautionary savings.

There may also be indirect effects on other groups from an increase in dividend taxation on the wealthy. Increased work by high income and wealthy individuals may increase productivity of middle skilled or low skilled workers who perform tasks that are complementary to high skilled workers. Firms may respond to increased taxation by paying out less in dividends and increasing internal investment, which could increase earnings and productivity for private sector workers. Alternatively, increased revenue for state and local governments could lead these governments to increase transfer payments, to increase salaries for state and local government workers, or to expend more on public investments that could raise productivity.

In Table 7 Column 1, we see evidence that for the full sample, the relative tax increase increased average annual income per person by around $1,700 in the years after the relative tax increase. Thus, in spite of a decline in income for those toward the top, overall income per capita increased. In Table 8, we attempt to identify the type of income that increased. We see evidence of increases in business earnings and investment income, consistent with increases in productivity. We find no evidence that government support or retirement income increased.

In Table 9, Panel A we consider which classes of worker (by sector) saw increases in their incomes. We see that the increase in incomes is concentrated in the private sector. Employees of the federal government and non-profit organizations did not see an increase in their incomes. The coefficient for employees of state and local governments is positive, but indistinguishable from zero. Thus, incomes increased only in the private sector, consistent with the indirect effects of dividend taxation increasing private sector productivity.

[60] ACS and Census ask about pre-tax incomes. However, studies comparing matched census income data to administrative data from the IRS and social security administration have found significant under-reporting of income by high income respondents. See supra note 41. This underreporting is consistent with high income individuals reporting take home or after-tax income rather than pre-tax income.

In Table 9, Panel B, we consider the effects of dividend taxation on the income distribution. We see that the largest beneficiaries were those with upper middle incomes between the 35th and 95th percentile. Lower income individuals, in the bottom 35 percent, did not see any change in income, while those in the top 5 percent saw a large decline in their incomes. Thus, the evidence suggests that dividend taxation compressed the income distribution, decreasing the difference between the top 5 percent and those below them, while raising average incomes for most of the population.

IV. Conclusion

The results suggest that relative tax increases on investment income (smaller tax decreases) increased work hours among high income and wealthy groups who were most affected by the tax changes, or at least did not decrease work hours. However, for the population as a whole, who were less exposed to the tax changes, there was no significant effect on work hours. In addition, we find suggestive evidence that the relative tax increases on dividends also appear to reduce average income for those in the top 5 percent of income, but to increase average income, especially for those between the 35th and 95th percentile and for private sector workers. These results suggest that increased dividend taxation helps to increased productivity while reducing inequality.

These results should be interpreted in light of several qualifications. First, although the 2003 tax changes dramatically reduced tax rates on qualified dividends, and also reduced tax rates on capital gains, the 2003 changes also slightly reduced tax rates on ordinary income. For most taxpayers, ordinary income will be a larger fraction of total income than either capital gains or dividends. We therefore cannot rule out the possibility that the result could be driven by changes in tax rates on ordinary income rather than changes in tax rates on dividends or capital gains.

Second, the difference in tax rates between the treatment and control group is on the order of 2 percent for dividends and less than half a percent for ordinary income. We cannot rule out the possibility that the effects of taxation could be non-linear and that a larger change in tax rates could have a different effect.

Nevertheless, the results overall suggest that a mild increase in tax rates on dividends and capital gains would be unlikely to reduce work hours among those taxed, and might increase work hours. This result is consistent with the income effect of taxation being larger than the substitution effect for high income and wealthy individuals at income tax rates prevailing in the U.S. since the 1980s. Evidence from changes in income suggests that tax increases on dividends could increase average incomes for most of the population while compressing the income distribution.

Appendix: Variable Definitions

Variable Name	Definition
Annual Work Hours	The total number of hours worked last year (uhrswork_an). This variable is calculated as the product of weeks worked last year (WKSWORK1) and usual work hours per week (UHRSWORK). For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. This variable is only available in years from 2000 through 2007 because a continuous version of Weeks Worked Last Year (WKSWORK1 is only available in those years. Because ACS top codes usual hours worked per week at 99, annual work hours have a maximum value of 5148 (99 hours per week x 52 weeks per year). Only 0.07 percent of the sample is topcoded at 5148.
Weeks Worked Last Year	Weeks worked last year (WKSWORK1). For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. This continuous variable is only available in 2000 through 2007 inclusive. In 2008 and beyond, an intervalled version of this variable is available (WKSWORK2).
Usual Work Hours Per Week	Usual hours worked per week (UHRSWORK) over the previous year, during weeks when the person worked. This variable is constrained to not exceed 99 hours a week. Top coded values for usual work hours per week account for 0.11 percent of the sample. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year.
Total Individual Income	Total personal income earned from all sources (INCTOT). INCTOT reports each respondent's total pre-tax personal income or losses from all sources for the previous year. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. In the 2000 Decennial Census, INCTOT is top-coded at $999,998. INCTOT itself is not top-coded in the ACS, but the component variables are already top-coded. Component variables include: INCWAGE; INCBUS00; INCSS; INCWELFR; INCSUPP; INCINVST; INCRETIR and INCOTHER. INCTOT

<table>
<tr><td></td><td>
<table>
<tr><th>Census</th><th>Bottom Code</th><th>Top Code</th></tr>
<tr><td>2000</td><td>-$20,000</td><td>$999,998</td></tr>
<tr><td>ACS</td><td>-$19,998</td><td></td></tr>
</table>
</td></tr>
<tr><td>Total Household Income</td><td>Total income from all sources for individuals in the same household (HHINCOME)

HHINCOME reports the total money income of all household members age 15+ during the previous year. The amount should equal the sum of all household members' individual incomes, as recorded in the person-record variable INCTOT. The persons included were those present in the household at the time of the census or survey. People who lived in the household during the previous year but who were no longer present at census time are not included, and members who did not live in the household during the previous year but who had joined the household by the time of the census or survey, are included.

HHINCOME itself is not top-coded in the ACS, but the component variables of INCTOT are already top-coded.

<table>
<tr><th colspan="3">HHINCOME</th></tr>
<tr><th>Census</th><th>Bottom Code</th><th>Top Code</th></tr>
<tr><td>2000 (US)</td><td>-$19,998</td><td>-</td></tr>
<tr><td>ACS</td><td>-$19,998</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Wage Income</td><td>Total Wage and Salary Income (INCWAGE).

INCWAGE reports each respondent's total pre-tax wage and salary income - that is, money received as an employee - for the previous year. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. Sources of income in INCWAGE include wages, salaries, commissions, cash bonuses, tips, and other money income received from an employer. Payments-in-kind or reimbursements for business expenses are not included.

INCWAGE is Top-Coded at the 99.5th percentile. Amounts above the Top Code value are coded the state means of values above the listed Top Code value for that specific Census year. Specific Top Codes are listed below:

<table>
<tr><th>Census</th><th>Top Code
(current dollars)</th></tr>
</table>
</td></tr>
</table>

	2000 | $175,000** ACS (2000-2002) | $200,000** ACS (2003-onward) | 99.5th Percentile in State**
Business Income	Total Business and Farm Income (INCBUS00). INCBUS00 reports each respondent's net pre-income-tax self-employment income from a business, professional practice, or farm, for the previous year. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. The figure is the amount earned after subtracting business expenses from gross receipts. It includes any money earned working for one's own concern(s). No distinction was made between incorporated and unincorporated businesses. Amounts above Top Code levels are expressed as state means of values above these cutoffs. INCBUS00 Census | Bottom Code | Top Code 2000 | -$10,000 | $126,000* ACS (2000) | -$9,999 | $75,000* ACS (2001) | -$9,999 | $76,000* ACS (2002) | -$9,999 | $78,751* ACS(2003-onward) | -$9,999 | 99.5th Percentile in State*
Investment Income	Total Interest, Dividend, and Rental Income (INCINVST). INCINVST reports how much pre-tax money the respondent received or lost during the previous year in the form of income from an estate or trust, interest, dividends, royalties, and rents received. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. Amounts above Top Code levels are expressed as state means of values above these cutoffs. INCINVST Census | Bottom Code | Top Code

	<table><tr><td>2000</td><td>-$10,000</td><td>$50,000**</td></tr><tr><td>ACS (2000-2002)</td><td>-$9,999</td><td>$60,000**</td></tr><tr><td>ACS (2003-onward)</td><td>-$9,999</td><td>99.5th Percentile in State**</td></tr></table>
Retirement Income	Retirement income Other than social security (INCRETIR). INCRETIR reports how much pre-tax retirement, survivor, and disability pension income, other than Social Security, the respondent received during the previous year. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. <table><tr><td colspan="2">INCRETIR</td></tr><tr><td>Census</td><td>Top Code</td></tr><tr><td>2000</td><td>$52,000**</td></tr><tr><td>ACS (2000)</td><td>$41,000*</td></tr><tr><td>ACS (2001)</td><td>$42,000*</td></tr><tr><td>ACS (2002)</td><td>$44,953*</td></tr><tr><td>ACS (2003-onward)</td><td>99.5th Percentile in State**</td></tr></table> * Higher amounts are expressed as the state medians of values above the listed Top Code value for that specific Census year. ** Higher amounts are expressed as the state means of values above the listed Top Code value for that specific Census year
Welfare Income	Welfare or other public assistance income (INCWELFR). INCWELFR reports how much pre-tax income (if any) the respondent received during the previous year from various public assistance programs commonly referred to as "welfare." Assistance from private charities was not included. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. The following are included within INCWELFR: • Aid to Families with Dependent Children (AFDC); and • General Assistance (GA). (This does not include separate payments for hospital or other medical care.)

<table>
<tr><td></td><td></td></tr>
<tr><td>Social Security Benefits</td><td>Social Security income (INCSS)

INCSS reports how much pre-tax income (if any) the respondent received from Social Security pensions, survivors benefits, or permanent disability insurance, as well as U.S. government Railroad Retirement insurance payments, during the previous year. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year. INCSS does not include Medicare reimbursements.

<table>
<tr><th colspan="2">INCSS</th></tr>
<tr><td>Census</td><td>Top Code</td></tr>
<tr><td>2000</td><td>$18,000**</td></tr>
<tr><td>ACS (2000)</td><td>$18,000**</td></tr>
<tr><td>ACS (2001)</td><td>$19,000**</td></tr>
<tr><td>ACS (2002)</td><td>$19,464**</td></tr>
<tr><td>ACS (2003-2004)</td><td>99.5th Percentile in State**</td></tr>
<tr><td>ACS (2005-onward)</td><td>-</td></tr>
</table>

** Higher amounts are expressed as the state means of values above the listed Top Code value for that specific Census year.</td></tr>
<tr><td>Supplemental Social Security Benefits</td><td>Supplemental Social Security Income (INCSUPP)

INCSUPP reports how much pre-tax income (if any) the respondent received from Supplemental Security Income (SSI) during the previous year. For ACS samples, the previous year refers to the previous 12 months. For Decennial Census, previous year refers to previous calendar year.

<table>
<tr><th colspan="2">INCSUPP</th></tr>
<tr><td>Census</td><td>Top Code</td></tr>
<tr><td>2000</td><td>$13,800*</td></tr>
<tr><td>ACS (2000)</td><td>$6,684*</td></tr>
<tr><td>ACS (2001)</td><td>$6,724*</td></tr>
<tr><td>ACS (2002)</td><td>$7,000*</td></tr>
<tr><td>ACS (2003-2005)</td><td>99.5th Percentile in State*</td></tr>
<tr><td>ACS (2006-onward)</td><td>-</td></tr>
</table>

* Higher amounts are expressed as the state means of values above the listed Top Code value for that specific Census year .</td></tr>
</table>

<table>
<tr><td>Other Individual Income</td><td>Other income generated by the individual in the previous year not in any other category (INCOTHER)

<table><tr><td colspan="3">INCOTHER</td></tr><tr><td>Census</td><td>Bottom Code</td><td>Top Code</td></tr><tr><td>2000</td><td>$0</td><td>$37,800**</td></tr><tr><td>ACS (2000)</td><td>$0</td><td>$16,126**</td></tr><tr><td>ACS (2001)</td><td>$0</td><td>$24,636**</td></tr><tr><td>ACS (2002)</td><td>$0</td><td>$25,000**</td></tr><tr><td>ACS (2003-onward)</td><td>$0</td><td>99.5th Percentile in State**</td></tr></table>
** Higher amounts are expressed as the state means of values above the listed Top Code value for that specific Census year.</td></tr>
<tr><td>Other Household income</td><td>Other income generated by other members of the household. Calculated as Total Household Income (HHINCOME) minus total individual income (INCTOT)</td></tr>
<tr><td>Total House Value</td><td>Estimated Market Value of the home (VALUEH)

VALUEH reports the value of housing units in contemporary dollars. From 2008 onward, VALUEH is a continuous variable. The other years report the midpoint of an interval.

<table><tr><td colspan="2">VALUEH</td></tr><tr><td>Census</td><td>Top Code</td></tr><tr><td>2000</td><td>$1,000,000</td></tr><tr><td>ACS (2000-2007)</td><td>$1,000,000</td></tr></table></td></tr>
<tr><td>Age in years</td><td>Age in year of response (AGE)</td></tr>
<tr><td>Female</td><td>Indicator variable equal to 1 if the respondent identifies as female and zero otherwise (SEX).</td></tr>
<tr><td>White</td><td>Indicator variable equal 1 if RACE equals WHITE or zero otherwise</td></tr>
<tr><td>African American</td><td>Indicator variable equal to 1 if RACE equals BLACK/AFRICAN AMERICAN/NEGRO and zero otherwise.</td></tr>
<tr><td>Asian</td><td>Indicator variable equal to 1 if RACE equals CHINESE, JAPANESE, or OTHER ASIAN OR PACIFIC ISLANDER and zero otherwise.</td></tr>
<tr><td>Other Ethnicity</td><td>Indicator variable equal to 1 if RACE equals American Indian or Alaska Native, Other Race, Two Major Races, or Three or More major races and zero otherwise.</td></tr>
</table>

Ancestry	ANCESTR1 provides the respondent's self-reported ancestry or ethnic origin. In all years except 1990 and 2000, respondents could give as many ancestries as they saw fit. ANCESTR1 records the first response.
High School Degree or less	Indicator variable equal to 1 if EDUC equal to: No schooling completed Nursery school to grade 4 Nursery school, preschool Kindergarten Grade 1 Grade 2 Grade 3 Grade 4 Grade 5 or 6 Grade 5 Grade 6 Grade 7 or 8 Grade 7 Grade 8 Grade 9 Grade 10 Grade 11 12th grade, no diploma High school graduate or GED Regular high school diploma GED or alternative credential And zero otherwise
Associated Degree or some college	Indicator variable equal to 1 if EDUC equal to: Some college, but less than 1 year 1 or more years of college credit, no d Associate's degree, type not specified And zero otherwise.
Bachelor's degree	Indicator variable equal to 1 if EDUC equal to Bachelor's degree and zero otherwise
State Deduction	Indicator variable equal to 1 if the individual resides in state that allows for the unlimited deduction of federal income taxes for the determination of state taxable income. In our sample this : Alabama (STATEFIP 01), Iowa (19), Louisiana (22) and Utah (49) (through 2007 inclusive). This variable is equal to zero for all other states except for Oregon (41), Montana (30), and Missouri (29), North Dakota (38), and Oklahoma (38). These states either cap the deduction for federal taxes or only allow a partial amount. They are left out of our analysis when examining the effect of the change in the dividend tax rate.
Post	Indicator variable equal to 1 if the year is after 2004. Equal to zero (the Pre period) if the year is prior to 2003.
High Income	Indicator equal to 1 if respondent's total income was in the top 5% of total income within the year of the survey.

Wealthy	Indicator equal to 1 if respondent had investment income and if respondent's investment income was in the top 10 percent of those with investment income within the year of the survey.
Wealthy & Young	Indicator equal to 1 if respondent had investment income and if respondent's investment income was in the top 10 percent of those with investment income within the year of the survey and if respondent's age was less than 40.
Treatment	Indicator variable equal to 1 If 'State Deduction' = 1 and zero otherwise.

All variables are measured in the year of the census response. IPUMS ACS data items indicated in CAPS. ACS and Census originally reports dollar values in current dollars, which we adjust to 2018 thousands of dollars in all analyses and tables.

Table 1: Sample Construction

All individuals in the 2000-2012 ACS data files	43,270,107
Less:	
Individuals younger than 25	(14,164,476)
Individuals older than 65	(5,984,820)
Observations with negative total income	(38,014)
Observations housed in group quarters	(796)
Observations missing data for analysis	(6,327,900)
Observations after 2008	(6,286,174)
Final Sample	10,467,927

We begin with all individuals that appear in the 2000-2012 ACS data files and the 2000 Decennial Census. We then eliminate all individuals outside of 'prime working age' which we define as being between 25 and 65 years of age. We further eliminate any observations where the total income is less than zero, and missing any variables necessary to complete the main work-hours analysis. We treat imputed values as missing. We reinstate the observations after 2008 for our supplementary income analysis described in Tables 8 and 9.

Table 2: Descriptive Statistics (all dollar amounts in thousands of 2018 dollars).

Variable	Mean	Std Dev	Min	P25	P50	P75	P95	P99	Max
Annual Work Hours	1,576	1,019	-	576	2,080	2,080	3,120	3,640	5,148
Usual Work Hours Per Week	33	19	-	23	40	42	60	72	99
Total Individual Income	$49	$62	$0	$15	$36	$62	$135	$309	$1,565
Total Household Income	98	90	-	46	78	122	242	499	3,870
Wage Income	42	55	-	1	31	57	120	251	801
Business Income	3	21	(15)	-	-	-	10	74	736
Investment Income	2	14	(15)	-	-	-	4	33	417
Retirement Income	1	8	-	-	-	-	2	37	340
Welfare Income	-	1	-	-	-	-	-	1	41
Social Security Benefits	1	3	-	-	-	-	3	18	68
Supplemental Social Security Benefits	174	1,373	-	-	-	-	-	8,690	40,529
Other Individual Income	1	5	-	-	-	-	3	18	100
Other Household Income	49	66	(55)	5	34	66	148	321	3,705
Demographic Variables									
Age in years	43	11	25	34	43	52	62	64	65
Percentage of Sample:									
Female	52%								
White	79%								
African American	10%								
Asian	5%								
Other Ethnicity	7%								
Less than High School	12%								
High School/GED	27%								
Associates Degree or some college	30%								
Bachelor's Degree	19%								
Master's Degree	8%								
PhD/Professional degree	3%								
Number of Observations	10,467,927								

See table 1 for sample construction and the appendix for variable definitions.

Table 3: Test of the association between levels of income and work hours

	Dependent Variable: Annual Work Hours				
	(1)	(2)	(3)	(4)	(5)
Independent Variable	**Full Sample**	**Full Sample**	**High Income**	**Wealthy**	**Wealthy & Young**
Total Individual Income	6.18***				
	(0.01)				
Wage Income		7.28***	1.06***	3.48***	3.27***
		(0.01)	(0.01)	(0.02)	(0.05)
Business Income		4.85***	0.64***	2.80***	1.89***
		(0.01)	(0.01)	(0.04)	(0.11)
Investment Income		-3.67***	-4.01***	-1.53***	-1.44***
		(0.02)	(0.02)	(0.03)	(0.07)
Retirement Income		-11.71***	-6.74***	-7.63***	-2.79**
		(0.03)	(0.06)	(0.12)	(1.27)
Welfare Income		-84.12***	-32.76***	-26.32***	-35.75**
		(0.36)	(2.80)	(4.51)	(14.28)
Social Security Benefits		-57.33***	-34.38***	-33.24***	-33.66***
		(0.08)	(0.40)	(0.42)	(2.28)
Supplemental Social Security Benefits		-0.10***	-0.04***	-0.04***	-0.08***
		(0.00)	(0.00)	(0.00)	(0.01)
Other Individual Income		-15.64***	-7.01***	-8.83***	-11.87***
		(0.05)	(0.15)	(0.24)	(0.89)
Other Household Income		-1.73***	-0.27***	-0.48***	-0.90***
		(0.00)	(0.01)	(0.02)	(0.05)
Female	-400.93***	-362.56***	-182.37***	-437.28***	-573.73***
	(0.56)	(0.52)	(2.46)	(4.36)	(12.00)
Age	76.87***	30.68***	29.09***	58.79***	155.14***
	(0.21)	(0.19)	(1.00)	(1.98)	(22.87)
Age-squared	-1.05***	-0.42***	-0.41***	-0.83***	-2.31***
	(0.00)	(0.00)	(0.01)	(0.02)	(0.35)
Intercept	-198.46***	808.33***	1978.69***	635.30***	-465.78
	(46.09)	(41.90)	(102.04)	(204.80)	(669.03)
Controls Included:					
Year	yes	yes	yes	yes	yes
Race	yes	yes	yes	yes	yes
Educational attainment	yes	yes	yes	yes	yes
Ancestry	yes	yes	yes	yes	yes
Number of Observations	10,467,927	10,467,927	526,574	209,207	27,779
Adjusted R-squared	0.29	0.41	0.29	0.45	0.36

***,*,* - significantly different from zero at the 1%,5%,10% level. Standard errors in parenthesis.
See Table 1 for sample construction and the appendix for variable definitions.

This table presents the results of the following OLS regressions with standard errors clustered by state:

Column 1: $Annual\ Work\ Hours_{it} = \alpha_{it} + \beta_1 Total\ Individual\ Income_{it} + \sum_{j=1}^{K} \beta_k CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_i$

Columns 2-5: $Annual\ Work\ Hours_{it} = \alpha_{it} + \beta_1 Wage\ Income_{it} + \beta_2 Business\ Income_{it} + \beta_3 Investment\ Income_{it} + \beta_4 Retirement\ Income_{it} + \beta_5 Welfare\ Income_{it} + \beta_6 Social\ Security\ Benefits_{it} + \beta_7 Supplemental\ Social\ Security\ Benefits_{it} + \beta_8 Other\ Individual\ Income_{it} + \beta_9 Other\ Householde\ Income_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_i$

Where CONTROLS are: Female, Age in years, Age in years squared, Race, Ancestry, and Highest degree of educational attainment

Table 4: Descriptive statistics for various sub-groups based on wealth

Variable	Mean	Std Dev	Min	P25	P50	P75	P95	P99	Max
Panel A: Full Sample									
Estimated Annual Work Hours	1,576	1,019	-	576	2,080	2,080	3,120	3,640	5,148
Total Individual Income	49	62	-	15	36	62	135	309	1,565
Investment Income	2	14	(15)	-	-	-	4	33	417
Age in Years	43	11	25	34	43	52	62	64	65
Number of Observations	10,467,927								
Panel B: High Income (Top 5% of Annual Income)									
Estimated Annual Work Hours	2,398	798	-	2,080	2,500	2,860	3,640	4,160	5,148
Total Individual Income	252	133	135	160	202	279	529	700	1,565
Investment Income	22	58	(15)	-	-	7	197	254	417
Age in Years	47	9	25	40	47	54	62	64	65
Number of Observations	526,574								
Panel C: Wealthy (Top 10% of investment income)									
Estimated Annual Work Hours	1,482	1,188	-	-	1,872	2,400	3,120	3,900	5,148
Total Individual Income	185	170	4	68	127	243	556	792	1,565
Investment Income	77	76	16	27	39	80	238	278	417
Age in Years	51	10	25	45	53	59	64	65	65
Number of Observations	209,207								
Panel D: Wealthy & Young (Top 10% of investment income and less than 40)									
Estimated Annual Work Hours	1,854	1,097	-	1,080	2,080	2,600	3,380	4,160	5,148
Total Individual Income	177	160	4	72	123	231	531	763	1,565
Investment Income	73	73	16	26	37	70	233	278	417
Age in Years	34	4	25	31	35	37	39	39	39
Number of Observations	27,779								

See table 1 for sample construction and the Appendix for Variable Definitions. This table omits all observations from the years 2003-2004 in order to be consistent with the DID analysis in Tables 5 and 6.

Table 5: Means and Standard Deviations (in parentheses) for various sub-groups based on wealth partitioned on whether the individual is located in a state that allows for the deduction of federal income taxes against their state income tax liability.

	(1)		(2)		(3)		(4)	
Variable	**Full Sample**		**High Income**		**Wealthy**		**Wealthy & Young**	
	Deduction	*No Deduction*	*Deduction*	*No Deduction*	*Deduction*	*No Deduction*	*Deduction*	*No Deduction*
Annual Work Hours	1,574.66	1,582.05	2,400.72	2,396.16	1,594.14	1,489.54	1,955.25	1,877.57
	(1,039.59)	(1,018.07)	(831.02)	(800.06)	(1,182.52)	(1,189.35)	(1,049.12)	(1,096.63)
Total Individual Income	42.29	50.17	249.64	255.49	170.00	192.90	167.69	184.77
	(51.08)	(63.92)	(123.65)	(141.86)	(147.35)	(178.31)	(132.29)	(169.16)
Investment Income	1.32	1.81	24.57	23.22	72.90	79.22	75.53	73.98
	(11.50)	(14.72)	(58.20)	(60.13)	(68.40)	(78.23)	(74.28)	(75.09)
Age in Years	43.30	43.31	47.67	46.89	51.30	51.39	34.34	34.00
	(11.07)	(10.92)	(9.12)	(9.15)	(9.60)	(9.70)	(3.79)	(3.98)
Number of Observations	487,129	8,520,260	15,036	446,091	7,419	175,823	958	23,808

See table 1 for sample construction and the Appendix for Variable Definitions. All means, except for age, are significantly different at the 1% level in columns 1 and 3. All means are significantly different at the 1% except work hours in Column 2. In column 4 only total individual income is significantly different.

Table 6: Test of association between the law change reducing the federal tax cost on dividends and work hours based on whether the individual is a resident of a state that allows for a deduction of federal taxes in the determination of state income tax liability.

	Dependent Variable: Annual Work Hours			
	(1)	(2)	(3)	(4)
Independent Variable	**Full Sample**	**High Income**	**Wealthy**	**Wealthy & Young**
Treatment X Post	13.42	56.60***	70.43*	233.20**
	(10.14)	(17.07)	(37.03)	(96.03)
Female	-593.42***	-314.32***	-696.15***	-884.82***
	(8.82)	(17.16)	(20.67)	(33.18)
Age	103.50***	94.73***	174.15***	169.58**
	(1.43)	(7.28)	(4.28)	(69.21)
Age-Squared	-1.32***	-1.23***	-2.18***	-2.32**
	(0.02)	(0.08)	(0.05)	(1.05)
Intercept	-636.40***	676.18***	-1439.91***	-1181.48
	(105.13)	(242.22)	(321.98)	(1,457.85)
Controls Included:				
Year	yes	yes	yes	yes
State	yes	yes	yes	yes
Race	yes	yes	yes	yes
Educational Attainment	yes	yes	yes	yes
Ancestry	yes	yes	yes	yes
N	9,007,389	461,127	183,242	24,766
Adjusted R squared	0.18	0.11	0.26	0.21

***,**,* - significantly different from zero at the 1%,5%, 10%, level. See the appendix for variable definitions and table 4 for how this sub-sample is constructed.

This table shows the results from the following OLS regression with standard errors clustered by state:

$$Annual\ Work\ Hours_{it} = \alpha_{it} + \beta_1 Treatment\ X\ Post_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_{it}$$

Where the controls are: *Age, Age squared, Female, Race, Ancestry and Highest degree of educational attainment.*

Table 7: Test of association between the law change reducing the federal tax cost on dividends and total income based on whether the individual is a resident of a state that allows for a deduction of federal taxes in the determination of state income tax liability.

	Dependent Variable: Total Individual Income			
	(1)	(2)	(3)	(4)
Independent Variable	**Full Sample**	**High Income**	**Wealthy**	**Wealthy & Young**
Post X Treatment	1.71**	-5.66*	-2.44	3.43
	(0.70)	(2.85)	(3.87)	(7.13)
Female	-29.30***	-27.45***	-84.64***	-77.47***
	(0.60)	(1.86)	(2.90)	(6.06)
Age	4.35***	6.81***	19.40***	8.31
	(0.15)	(0.45)	(0.79)	(7.27)
Age-Squared	-0.04***	-0.07***	-0.21***	-0.02
	(0.00)	(0.01)	(0.01)	(0.11)
Intercept	-67.79***	80.54***	-292.87***	-191.66
	(5.62)	(24.78)	(54.48)	(123.35)
Controls Included:				
Year	yes	yes	yes	yes
State	yes	yes	yes	yes
Race	yes	yes	yes	yes
Educational Attainment	yes	yes	yes	yes
Ancestry	yes	yes	yes	yes
N	14,818,080	758,860	266,655	31,804
Adjusted R squared	0.24	0.06	0.18	0.17

***,**,* - significantly different from zero at the 1%,5%, 10%, level. See the appendix for variable definitions. This sample includes all observations with non-missing observations between 2000-20012.

This table shows the results from the following OLS regression with standard errors clustered by state:

$$Total\ Individual\ Income_{it} = \alpha_{it} + \beta_1 Treatment\ X\ Post_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_{it}$$

Where the controls are: *Age, Age squared, Female, Race, Ancestry and Highest degree of educational attainment.*

Table 8: Test of association between the law change reducing the federal tax cost on dividends and different components of income based on whether the individual is a resident of a state that allows for a deduction of federal taxes in the determination of state income tax liability.

	Dependent Variable: Income Source					
	Income Source					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variable	**Wages**	**Business**	**Investment**	**Government Support**	**Retirement**	**Other**
Post X Treatment	1.38	0.13**	0.18***	0.66	0	-0.02
	(0.84)	(0.06)	(0.05)	(11.09)	(0.04)	(0.04)
Female	-24.34***	-2.87***	-1.00***	28.22***	-1.05***	0.06***
	(0.57)	(0.13)	(0.04)	(3.46)	(0.07)	(0.01)
Age	5.34***	0.44***	-0.17***	1.67	-0.73***	-0.01***
	(0.14)	(0.03)	(0.02)	(1.77)	(0.02)	(0.00)
Age-Squared	-0.06***	-0.00***	0.00***	0.05*	0.01***	0.00***
	(0.00)	-	-	(0.02)	-	-
Intercept	-87.28***	-8.48***	2.55*	867.47***	13.97***	-0.06
	(4.91)	(1.58)	(1.36)	(95.76)	(1.53)	(0.18)
Controls Included:						
Year	yes	yes	yes	yes	yes	yes
State	yes	yes	yes	yes	yes	yes
Race	yes	yes	yes	yes	yes	yes
Educational Attainment	yes	yes	yes	yes	yes	yes
Ancestry	yes	yes	yes	yes	yes	yes
N	14,818,080	14,818,080	14,818,080	14,818,080	14,818,080	14,818,080
Adjusted R squared	0.22	0.03	0.02	0.02	0.08	0

***,**,* - significantly different from zero at the 1%,5%, 10%, level. See the appendix for variable definitions.
This sample includes all observations with non-missing observations between 2000-20012.

This table shows the results from the following OLS regression with standard errors clustered by state:

$$Income\ Source_{it} = \alpha_{it} + \beta_1 Treatment\ X\ Post_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_{it}$$

Where the controls are: *Age, Age squared, Female, Race, Ancestry and Highest degree of educational attainment.*

The Dependent Variables in each column are as follows:

Column	Dependent variable
(1)	Wage income

(2)	Business Income
(3)	Investment Income
(4)	Government Support. Equal to welfare income plus social security benefits plus supplemental social security benefits.
(5)	Retirement Income
(6)	Other income

Table 9: Test of association between the law change reducing the federal tax cost on dividends and total individual income based on whether the individual is a resident of a state that allows for a deduction of federal taxes in the determination of state income tax liability.

Panel A: Partitioned on job sector

	Dependent Variable: Total Individual Income			
			Job Sector	
	(1)	(2)	(3)	(4)
Independent Variable	**State & Local**	**Federal**	**Private Sector**	**Non-Profit**
Post X Treatment	1.41	-0.84	2.35***	-1.21
	(1.04)	(1.01)	(0.76)	(0.79)
All Other Controls	yes	yes	yes	yes
N	1,733,603	448,700	9,359,132	1,011,666
Adjusted R squared	0.3	0.35	0.25	0.25

Panel B: Partitioned on placement in the income distribution

	Dependent Variable: Total Individual Income		
		Income Class	
	(1)	(2)	(3)
Independent Variable	**Lower Income**	**Upper Middle Income**	**High Income**
Post X Treatment	0.08	1.17***	-5.66*
	(0.10)	(0.37)	(2.85)
All other Controls	yes	yes	yes
N	5,143,151	8,916,069	758,860
Adjusted R squared	0.06	0.23	0.06

***,**,* - significantly different from zero at the 1%, 5%, 10%, level. See the appendix for variable definitions. This sample includes all observations with non-missing observations between 2000-20012.

This table shows the results from the following OLS regression with standard errors clustered by state:

$$Total\ Individual\ Income_{it} = \alpha_{it} + \beta_1 Treatment\ X\ Post_{it} + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_{it}$$

Where the controls are: *Age, Age squared, Female, Race, Ancestry and Highest degree of educational attainment.*

Panel A partitions the sample based on job type based on the work classification variable the ACS data file (CLASSWRKD).

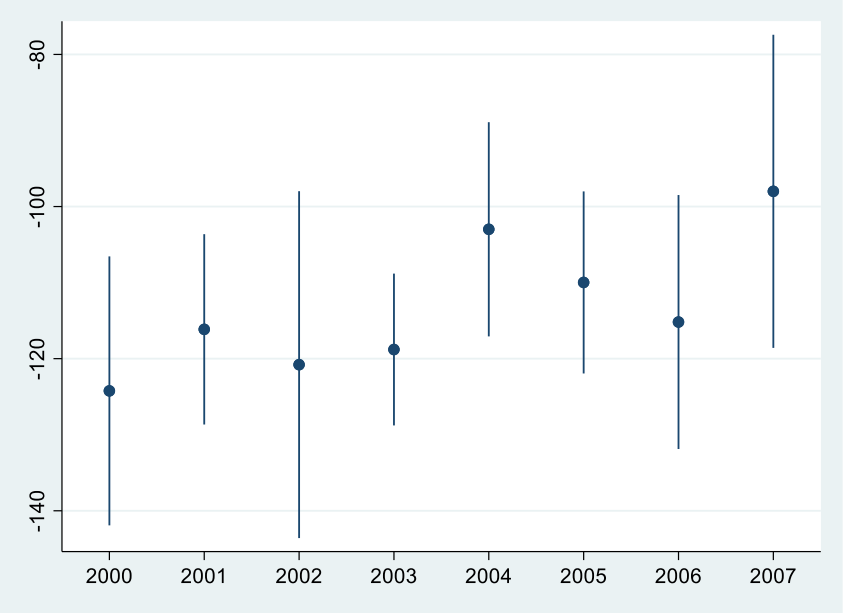
Column	Employee Type	CLASSWRKD
(1)	State and Local	27, 28
(2)	Federal	25
(3)	Private Sector	13,14,22
(4)	Non-Profit	23

Panel B: The sample is partitioned into 20 quantiles based on total individual income for each year. The income class groups are then defined as follows:

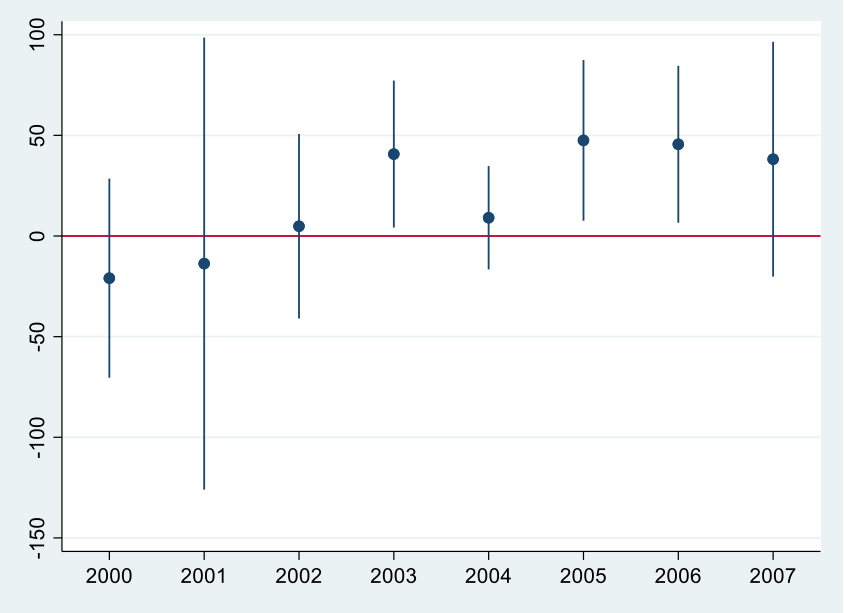
Column	Income Class	Quantile
(1)	Low	1-7
(2)	Upper Middle	8-19
(3)	High	20

Figure 1: Test of Parallel Trends in Annual Work Hours

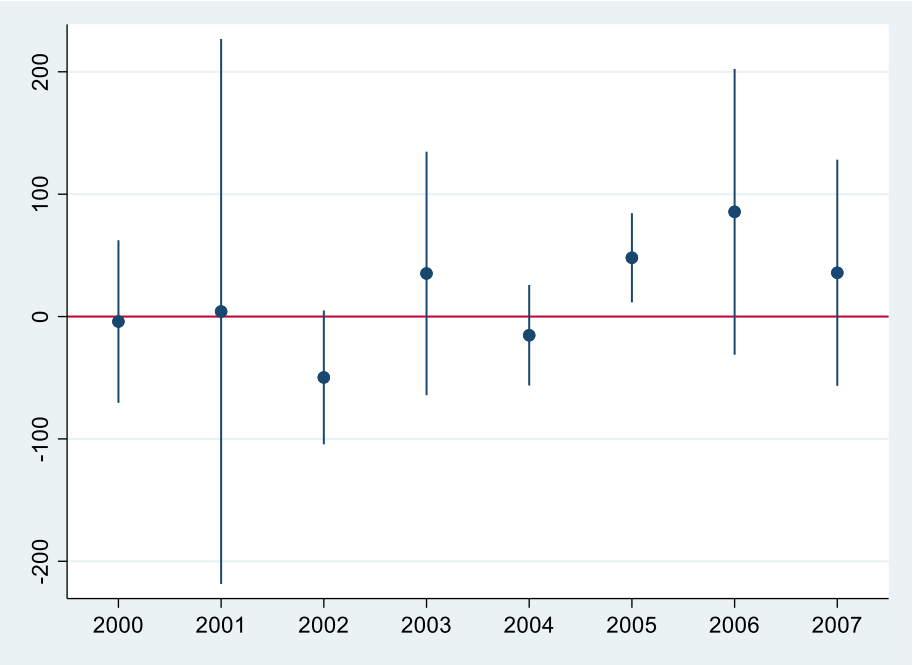
Panel A: Full Sample (N= 9,964,859)



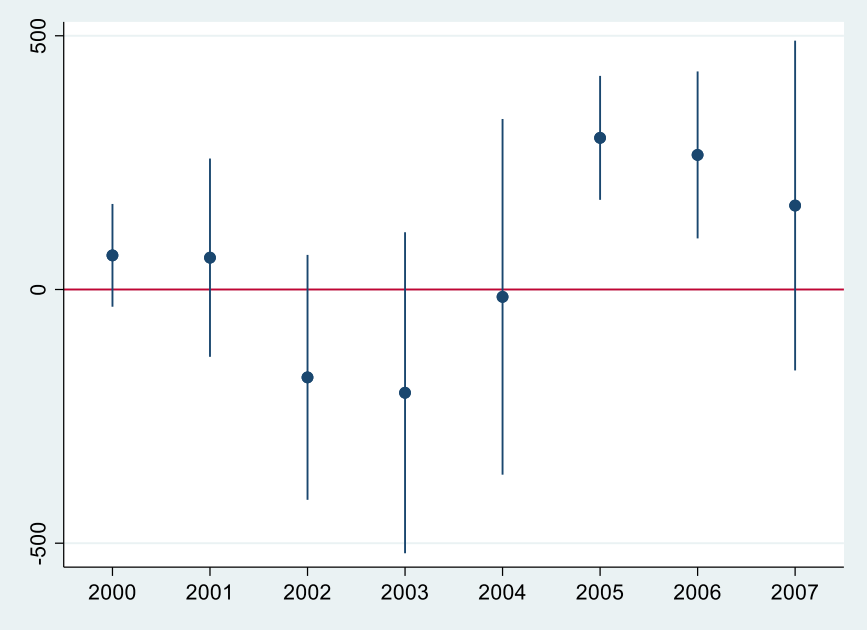
Panel B: Top 5% of Income (N= 509,887)



Panel C: Top 10% of investment Income (N = 200,273)



Panel D: Young and In top 10% of Investment income (N=26,793)



This figure shows the coefficient estimates and 95% confidence interval from the following OLS regression:

$$Estimated\ Annual\ Work\ Hours_{it} = \alpha_{it} + \beta_h \sum_{t=2000}^{2007} \beta_h Treatment_i\ X\ YEAR_t + \sum_{j=1}^{K} \beta_j CONTROLS_{it} + \beta_k STATE_i + \beta_l YEAR_t + \varepsilon_i$$

Where the controls are: *Age, Age squared, Female, Race, Ancestry and Highest degree of educational attainment.* Standard errors are clustered by state.