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The Persistent Reduction in Poverty from Filing a Tax Return[†]

By SHANTHI P. RAMNATH AND PATRICIA K. TONG*

Low-income households not required to file often fail to receive benefits provided through the tax code. In 2008, the US government made people with at least \$3,000 in earnings eligible for a stimulus payment if they filed a tax return. Using eligibility for this credit as an instrument for filing, we find with administrative data that filing reduces the probability of living in poverty in future years, which is a result of increases in EITC claiming, workforce attachment, and earnings. These results demonstrate that temporary incentives to participate in the tax system have persistent real effects on economic activity and poverty. (JEL H24, I32, I38)

Over the past 20 years, social policies administered through the tax code have grown dramatically in both size and scope. As a result, many anti-poverty programs, ranging from the Earned Income Tax Credit (EITC) to subsidies for health insurance established by the Affordable Care Act, require that individuals file a tax return to participate. However, low-income households, who comprise the typical targeted demographic for such policies, often do not file if they earn below the filing threshold.¹ This suggests that people with very low income may be excluded from receiving tax-based benefits.² The continued use of the tax code to fund social programs necessitates a deeper understanding of why eligible individuals do not file and what impact that has on their future welfare.

In this paper, we focus on two primary questions: what is the effect of increasing the benefit to filing on the probability of filing a tax return?, and what are the causal effects of filing on economic outcomes? We utilize a regression discontinuity (RD) design to exploit variation in the incentive to file generated by the Economic

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¹Benzarti (2016) finds that the burden of filing is significantly larger than previously estimated, which could help explain the existence of non-filers even when a refund is due.

²A related line of research studies why individuals fail to claim benefits conditional on filing a tax return. See, for example, Dickert-Conlin, Fitzpatrick, and Hanson (2005); Kopczuk and Pop-Eleches (2007); Chetty and Saez (2013); Bhargava and Manoli (2015); and Manoli and Turner (2014).

Stimulus Act of 2008 (ESA08). The ESA08 provided individuals with a stimulus check of at least \$300 if they had a minimum of \$3,000 in earnings. Individuals were generally required to file a 2007 tax return in order to receive a stimulus check generating a differential incentive to file a return for eligible individuals.³ However, the lowest filing threshold in 2007 was \$8,750; thus, about 9.1 million workers⁴ who were eligible to receive a check were otherwise not obligated to file as they had no income-tax liability. As such, the ESA08 provides a unique opportunity to examine the decision to file within a quasi-experimental setting. We find that creating incentives to enter the filing population not only increases the probability that new filers claim tax benefits but also positively impacts longer term earnings and reduces their likelihood of living in poverty. In particular, we find that those induced to file were more likely to file a tax return, work at a job, and claim the EITC in future years.

The timing of the ESA08 allows us to overcome a number of empirical challenges often associated with using RD methods. Each household's 2007 earnings were completely determined by the end of 2007, before the ESA08 was enacted and before the \$3,000 cutoff was first discussed publicly. The policy was enacted in February of 2008, and only those who had earned at least \$3,000 in 2007 were eligible to receive a stimulus check while those with less income would receive nothing. As a result, eligibility was based on predetermined income, so the policy's only effect was to incentivize filing for eligible households. Furthermore, by focusing on a narrow band around the stimulus cutoff, individuals should be similar along all other dimensions that could impact their decision to file, and we demonstrate this fact using taxpayer characteristics. Thus, to the extent that individuals respond to the policy change, stimulus eligibility is a plausible instrument to account for selection into the filing population.

For our analysis, we use administrative tax data from the Internal Revenue Service's (IRS) population files. We identify all individuals who did not file a return in the two years prior to the ESA08 in order to focus on people who were consistently choosing not to file. We then construct a panel dataset for this group spanning 2005 through 2014 that consists of a rich set of income variables and demographic details. We estimate that, among non-filers, eligibility for a stimulus payment increased the probability of filing a 2007 tax return by 2.2 percentage points on a base of roughly 46 percent. This finding is statistically significant and robust to different specifications and bandwidth choices. In addition, we find that the response is present among different demographic groups and is therefore not driven by a subset of the sample.

Given the exogenous filing response generated by the ESA08, we use stimulus eligibility to instrument for selection into the filing population and estimate the effect of filing on various outcomes to understand how participating in the tax system affects economic activity and poverty. Specifically, we find that filing a 2007 return led to an 83.1 percentage point increase in the probability of filing tax returns in 2008–2014. Our results also show that inducing individuals to file a 2007 return

³ Stimulus checks were sent to Social Security recipients regardless of whether they filed a 2007 tax return.

⁴ To construct this number, we used the Internal Revenue Service Statistics of Income Databank. We assume that people with Form W-2 wage earnings between \$3,000 and \$8,750 aged 25–60 in tax year 2007 were eligible for the stimulus and had zero tax liability.

led to increased workforce attachment, where filing causes an estimated reduction in the probability of having zero wage earnings by 28.4 percentage points. In addition, filing a 2007 return led to increased wage earnings of \$5,663.⁵ Furthermore, we find that filing in 2007 increased the probability of claiming the EITC in later years by 26.5 percentage points. Combining the measured earnings and credits, we find that filing a tax return reduces the likelihood an individual lives in poverty in subsequent years by 24.5 to 36.8 percentage points.

This paper contributes to the existing literature in two ways. First, we shed light on the decision to file. Second, we study the effects of filing on long-term outcomes. As more social programs are conducted through the tax code, having a better grasp of filing behavior is an integral step toward understanding the take-up of benefits. To our knowledge, this paper is among the first to causally estimate the economic effects of filing a tax return. Previous research has found that providing filers with more information about the EITC increases EITC take-up rates (Guyton et al. 2016, Bhargava and Manoli 2015, Manoli and Turner 2014). Our results compliment this line of research by providing quasi-experimental evidence on the effects of a one-time monetary incentive for filing that increased interaction with the tax system for those who previously had little contact. Overall, our results show that increasing the benefit to filing causes more individuals to file and that filing has persistent positive economic effects.

The remainder of the paper is organized as follows. Section I provides background on the ESA08 and describes the predicted effects of filing on outcomes. Section II describes the data. Section III contains our estimates of the effect of the stimulus on filing. Section IV contains our analysis of the impact of entering the filing population on outcomes. Section V discusses the implications of our findings. Section VI concludes.

I. Background

A. *The Economic Stimulus Act of 2008*

With hopes of averting an impending recession, Congress passed the ESA08 in February 2008. The ESA08 gave tax rebates to individuals, tax incentives to businesses, and raised the mortgage loan limits that could be taken on by government sponsored agencies. In theory, these actions would lead to an increase in consumer spending and business investment, and as a result, help stimulate the economy. This paper is focused on the ESA08's offer of one-time payments to individuals, which amounted to roughly \$96 billion in government spending.⁶

A key feature of the stimulus rebates was that the rebate amount was based on 2007 earnings, which were earned prior to the policy's enactment. Although negotiations for the ESA08 were mentioned in the press, the details of the specific provisions were unclear as late as January 17, 2008 (Stout 2008). The ESA08 was

⁵ Wage earnings are defined as Form W-2 wage earnings.

⁶ More details on the 2008 stimulus are included in the following report: <http://www.treasury.gov/tigta/auditreports/2009reports/200940129fr.pdf>.

introduced in Congress on January 28, 2008, passed by Congress on February 8, 2008, and signed into law on February 13, 2008. Employers were required to provide their employees with Form W-2s no later than January 31, 2008, making it implausible that those reported earnings could be altered in response to the stimulus. The stimulus rebates were highly publicized and involved extensive outreach to ensure that individuals would actually receive their checks. In February 2008, IRS notices were sent to households who either filed a tax return in 2006, had Social Security benefits, or had veterans benefits and explained that the stimulus checks were in addition to a typical refund and that to receive a payment “individuals who qualify will not have to do anything more than file a 2007 tax return” (IRS Notice 1377 2008). In addition, the IRS encouraged organizations including nonprofit organizations, community groups, and charities to help inform individuals of the stimulus payments.⁷

Stimulus checks generally ranged from \$300 to \$600 (\$600 to \$1,200 for joint filers), though people with qualifying children were eligible to receive higher amounts. To receive a check, individuals were required to file a tax return in 2007, which would generally take place after the ESA08 was enacted.⁸ Also, individuals could not be claimed as dependents and were required to have a valid Social Security number (SSN).⁹ Stimulus checks were partially refundable and therefore available to those with no tax liability. However, stimulus recipients were required to have at least \$3,000 in qualified income. Qualified income included wages, self-employment income, and Social Security benefits, and veterans could additionally include disability, death, and retirement benefits.¹⁰

The following formula determined the amount of an individual’s stimulus check:

$$\text{Stimulus} = \min(\max(\text{Tax Liability}, \text{Min Rebate}), \text{Max Rebate}) + 300 \times N,$$

where Min Rebate was \$300 (\$600 for married filers), Max Rebate was \$600 (\$1,200 married filers), and N was the number of qualifying children.¹¹ Stimulus payments were phased out at a 5 percent rate of adjusted gross income in excess of \$75,000 (\$150,000 for joint filers).¹²

⁷ See the following for more details: <http://www.irs.gov/uac/IRS-Encourages-Organizations-on-Outreach-to-Low-Income-Workers>.

⁸ One exception was Social Security recipients. Although they were also required to file a tax return to receive the stimulus, ultimately, stimulus checks were sent to Social Security recipients who did not file a tax return. As such, we drop individuals with Social Security income in 2007 from our baseline results.

⁹ Taxpayers who were late in filing their 2007 tax returns were still eligible for the stimulus but received their checks later than those who filed on time. For taxpayers filing as married filing jointly, both individuals were required to have a valid Social Security number.

¹⁰ Although the IRS receives Form W-2 data, which contain employer reported wages, and Form 1099-SSA data, which contain Social Security Administration reported Social Security income, the IRS did not have enough information to disburse the stimulus rebate without the individual’s tax return. In particular, the stimulus rebate depended on earnings that were not otherwise reported to the IRS like self-employment earnings. The stimulus rebate also depended on marital status and number of dependents claimed which were unknown to the IRS absent a tax return.

¹¹ A qualifying child is the same definition used for a child tax credit qualifying child.

¹² The IRS also offered a recovery rebate for people who did not receive a stimulus check or who were eligible for a larger stimulus check based on their 2008 tax-return characteristics rather than their 2007 characteristics. The recovery rebate was claimed on the 2008 tax return, and the IRS estimates the total cost of the rebates was roughly \$11 billion.

A number of papers examine the impact of receiving a stimulus payment and find that the additional income had a measurable impact on household behavior. Survey evidence finds that 20–30 percent of the 2008 stimulus payments were mainly spent on consumption (Bureau of Labor Statistics 2015; Shapiro and Slemrod 2009; Sahm, Shapiro, and Slemrod 2010). Furthermore, almost 50 percent of the 2008 stimulus payments were used to pay off debt, while 30–32 percent were put into savings (Bureau of Labor Statistics 2015, Shapiro and Slemrod 2009). Broda and Parker (2014) exploit the random assignment for when checks were mailed out and estimate that household spending rose by 10 percent the week a stimulus check was received. A similar estimation strategy is used in Gross, Notowidigdo, and Wang (2014), who find that stimulus checks were associated with an increase in bankruptcy filings as the checks helped offset the associated administrative fees. Bertrand and Morse (2009) find that the use of payday loans decreased among households who had been using these types of loans prior to receiving the 2008 stimulus, and Evans and Moore (2011) find that mortality rates rose in response to the rebate checks. Overall, the evidence indicates that stimulus payments had a sizable affect on household behavior along a number of different margins. Our paper contributes to this literature by examining how the 2008 stimulus impacts filing behavior and the consequences of that choice.

B. Filing and Low-Income Workers

For most people, filing is a required step for paying taxes; however, for low-income workers with earnings below the filing threshold, filing is a choice. Similar to existing literature that studies the effects of participating in social welfare programs, filing has the potential to generate positive outcomes by causing individuals to learn about potential tax benefits and subsequently their marginal tax rate.¹³

Using the EITC as an example, we illustrate the interaction between the filing threshold and the take-up of social benefits provided through the tax code. Figure 1 overlays the filing thresholds for singles and heads of households, represented by the vertical lines, atop the 2007 EITC schedule for unmarried filers.¹⁴ The figure highlights that a significant portion of the EITC schedule, particularly for childless households, falls below the filing thresholds. This suggests that households at the low end of the income distribution, who must actively choose to file, may be more likely to forgo their EITC as a result. Indeed, Plueger (2009) shows that in 2005, while 16 percent of the EITC eligible population were non-filers, non-filers made up about two-thirds of the eligible EITC nonparticipants.

Beyond redistribution, the tax code is often used to incentivize behavior (e.g., increase work, increase retirement savings, encourage home purchases). The EITC

¹³For those who have a choice over filing, the decision to file can be viewed within the context of a larger literature on the take-up of social benefits. Early models developed by Moffitt (1983) were among the first to incorporate costs to explain nonparticipation in social programs. Subsequent literature examining the take-up of social benefits characterizes barriers to participating as stigma and as opportunity costs in the form of time-intensive or complex application processes (Moffitt 1983, Keane and Moffitt 1998, Manchester and Mumford 2012; see Currie 2006 for a comprehensive summary).

¹⁴In general, single filers are unmarried individuals without dependents while head of household filers are unmarried individuals with dependents.

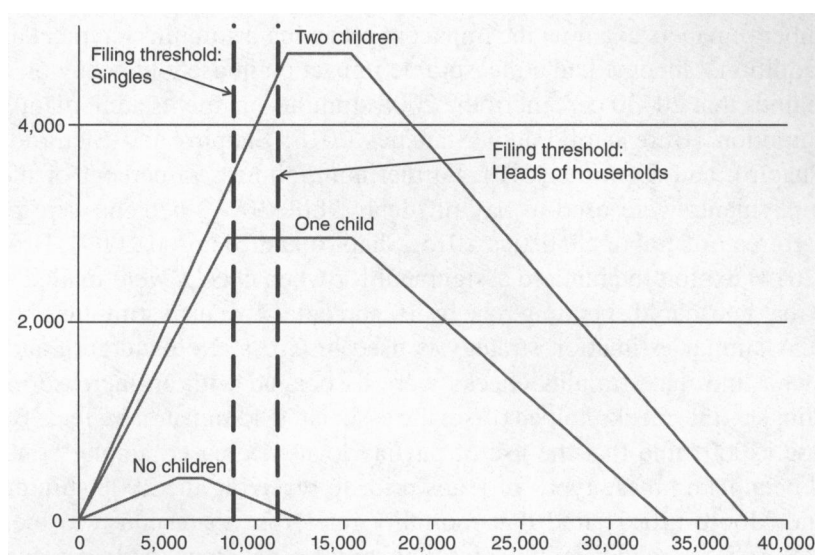


FIGURE 1. 2007 EITC SCHEDULE FOR UNMARRIED TAX FILERS

Notes: Each trapezoid represents the 2007 Earned Income Tax Credit benefit schedule for unmarried individuals with zero, one, and two children. The vertical dashed lines represent the filing threshold for singles and for heads of households, who are unmarried tax filers with dependents.

Source: <https://www.irs.gov/pub/irs-prior/p596-2007.pdf>

example highlights that the filing threshold could impact participation in social programs if they are conducted through the tax code.¹⁵ However, having earnings below the filing threshold could also impact how people perceive their true marginal tax rate. For example, non-filers could assume that they have a positive tax rate when in truth their tax rate would be zero if they filed to receive income that had been withheld from their wages for tax purposes. Individuals who are eligible for tax credits that promote social welfare may be unaware that such credits exist and as such, would misperceive their true marginal tax rate by failing to file and receive their tax benefits. In our sample, which we will discuss further in Section II, 65 percent had federal income tax withheld from their wage earnings in 2007 despite having no tax liability. Furthermore, all individuals used in the RD estimation are located in the phase-in range of the EITC, where additional earnings are incentivized for those who choose to file and claim the credit, making their marginal tax rate at most -7.65 percent.¹⁶ Both of these factors could lead to, upon filing, people learning of their true marginal tax rate and, in turn, that change in perceived marginal tax rate could elicit an earnings response.

The act of filing could allow for an exchange of information whereby individuals learn their true net-of-tax rate. For those who mistakenly believed their tax

¹⁵In a separate strand of literature, Jensen (2016) looks at the impact of employee share on the exemption threshold and finds that as the share of employees increases so too does the income-tax base.

¹⁶The phase in for the childless EITC ends at \$5,590. The EITC phase in for families with children ends at even higher earnings.

rates were higher than their true tax rates, filing would result in an increase in their net-of-tax rate. As a result, we predict that, conditional on being located on the upward sloping portion of their labor-supply curve, individuals should increase their earnings in response to filing.

II. Data

We use administrative tax data for the US population spanning 2005 through 2014. We draw income variables from various tax forms including information on wages, dividend income, interest income, unemployment insurance, miscellaneous income, pension distributions, and gambling winnings.¹⁷ In addition, we merge information on age, gender, and number of children from the Social Security administration. An important advantage of administrative tax data is that we observe income variables even when individuals do not file a tax return, thus we can calculate total earnings at the individual level for non-filers.¹⁸ One drawback to our data, however, is that we only observe marital status and household income for filers since that information is obtained from Form 1040.

We restrict our sample to individuals who are aged 25–60 in 2005 and have W-2 wage earnings greater than zero and less than \$6,000 in 2007. These two restrictions yield about 2.7 million individuals. Next, we restrict the sample to long-term non-filers, which we define as people who did not file a return in 2005 and 2006, which are the two years leading up to the ESA08.¹⁹ We additionally limit the sample to those with valid SSNs since it was a requirement for receiving a stimulus check.²⁰ Finally, we restrict our sample to individuals who have income below the single with no dependents filing threshold in 2005 through 2007. After imposing these restrictions, our final non-filer population consists of roughly 1.2 million people.

Long-term non-filers represent people who systematically earn income below the filing threshold as opposed to people who experience temporarily low income causing them to move in and out of the filing population.²¹ By focusing on long-term non-filers, we may exclude people who already receive large refunds. In particular, if filing a tax return relies on the size of one's refund, then people who are due large refunds will have already selected out of our sample. However, analyzing the behavior

¹⁷ Specifically, we use data from certain information returns including Forms 1099-DIV, 1099-G, 1099-INT, 1099-MISC, 1099-R, W-2, and W-2G, which provide income data for both filers and non-filers. Information returns are forms that are issued to both the individual and to the IRS typically by employers, financial institutions, and government agencies. For example, an employer issues Form W-2 (wages and salary) while the Social Security administration issues a Form 1099-SSA (Social Security and disability benefits).

¹⁸ This measure of earnings is restricted to Form W-2 earnings and does not include self-employment income.

¹⁹ To identify non-filers, we use the Internal Revenue Service Statistics of Income (IRS-SOI) Databank, which contains selected tax characteristics for the population of individuals who ever filed tax returns and/or ever has a tax form like a W-2 or Form 1099 from 1996 through 2014. The databank is organized as a panel, which we then use to identify people who were non-filers in both 2005 and 2006. From this group of non-filers, we drop people who were claimed as dependents in 2005 or 2006 since they are ineligible to receive a stimulus as well as those who were deceased by 2008.

²⁰ About 1 percent of the sample do not have a valid SSN.

²¹ Our definition of a non-filer is derived in part from the IRS definition of people who filed a 2007 tax return only to receive a stimulus check. In our final sample, the average number of years that individuals filed a tax return for earlier years, 1999 through 2004, is about two years. Almost 40 percent of individuals did not file any tax returns between 1999 and 2006.

TABLE 1—SUMMARY STATISTICS, 2007

	US population	2005 and 2006 non-filers	Regression discontinuity sample
Year of birth	1962 (11.8)	1964 (10.2)	1967 (9.32)
Male	0.51 (0.50)	0.56 (0.50)	0.61 (0.49)
Worker	0.60 (0.49)	0.14 (0.35)	1.00 (0.0)
W-2 wages	26,221 (168,089)	2,477 (76,352)	2,105 (1,736)
Filer	0.75 (0.43)	0.14 (0.35)	0.35 (0.48)
Single filer	0.20 (0.40)	0.08 (0.28)	0.23 (0.42)
Married filing jointly filer	0.45 (0.50)	0.04 (0.19)	0.05 (0.22)
Head of household filer	0.09 (0.29)	0.02 (0.13)	0.07 (0.25)
Number of children	0.64 (1.11)	0.07 (0.93)	0.16 (0.56)
Claims EITC	0.13 (0.34)	0.03 (0.18)	0.25 (0.43)
EITC amount	254 (5,126)	46 (939)	215 (661)
Observations	206,479,244	35,665,549	1,246,808

Notes: The first column contains 2007 summary statistics for the US population. The second column contains 2007 summary statistics for the population of 2005 and 2006 non-filers. The third column contains 2007 summary statistics for the sample used in the RD analysis. This sample is restricted to 2005 and 2006 non-filers aged 25–60 in 2005 with 2005–2007 income below the respective year’s single filing threshold, who did not have any Social Security income in 2007, who were not claimed as a dependent in 2005 and 2006, who were not married to a 2005 or 2006 filer in 2007, and who did not live in a US territory in 2007.

of long-term non-filers can provide insight into how people respond to changes in the incentive to file among those on the margin. Furthermore, by imposing the income restrictions in 2005 through 2007, we limit our sample to taxpayers who are not required to file a tax return but instead have a choice over whether or not to file.

To understand how our sample restrictions affect the characteristics of our final sample, we present 2007 summary statistics in Table 1 for the entire US population (column 1), the sample of individuals who did not file a tax return in both 2005 and 2006 (column 2), and our final restricted sample used for the RD analysis (column 3). For the US population, the average year of birth is 1962, about 50 percent are male and 60 percent have positive wages. Wages for the population are much higher than those for 2005 and 2006 non-filers, where average wages are respectively \$26,221 and \$2,477 for the two groups in 2007. Although we require our RD sample to have positive W-2 wages, the average wage earnings for the RD sample of \$2,105 is roughly the same as those who did not file in 2005 and 2006.

Roughly 75 percent of the US population filed a tax return in 2007 compared to the 14 percent of those who had been non-filers in 2005 and 2006 and the 35 percent of the RD sample. Among filers, almost half filed as married within the US population,

while the non-filer and RD samples consisted of primarily single filers. Across the three groups, the average number of children was less than one. EITC claiming rates were higher in the RD sample than both the US population and the non-filer group at 25 percent compared to 13 percent and 3 percent, respectively. The EITC average amounts claimed were more comparable in the US population compared to the RD sample, though the standard deviation for the US population amount is much larger than that of the RD sample. Overall, the RD sample, though not necessarily representative of the US population, is similar to the broader group of non-filers in 2005 and 2006 along a number of dimensions. As a robustness check, we relax our sample restrictions in the online Appendix to look at those between ages 25–60 with wages between 0 and \$6,000 and find similar results to those presented in the main analysis. This suggests that our results are not driven by our sample restrictions.

III. Impact of the Stimulus Act on 2007 Filing

We begin our analysis by first investigating the extent to which non-filers respond to the ESA08. To estimate the impact of the ESA08 on filing behavior, we use a RD design and exploit the sharp discontinuity in eligibility for a stimulus check. By focusing on people within a small band of earnings around the eligibility cutoff, we can control for the potentially endogenous relationship between the probability of filing and earnings.

A. Identifying Assumptions for Regression Discontinuity

As with any RD design, we are concerned that people might manipulate their earnings to receive a stimulus check and possibly bias the estimates. The timing of the policy's enactment mitigates that concern since eligibility depended on the prior year's earnings as discussed in Section A. In particular, wages had already been earned and reported on Form W-2 prior to the policy's enactment in February 2008. As such, W-2 wages could not have been manipulated in response to the stimulus eligibility threshold. However, 2007 tax returns were generally filed between January and April of 2008, which implies that at least some people knew about the ESA08 prior to filing their return. Because tax-return wages are self-reported and can include wage income that is not subject to W-2 verification, an individual who has \$2,000 in W-2 wages could have reported \$3,000 on his/her tax return and received a stimulus check. Thus, some people may have manipulated their self-reported tax-return wages in response to the policy.

We check for manipulation in Figure 2, which separately plots histograms for employer verified W-2 wages and tax-return wages around the stimulus eligibility cutoff. Panel A of Figure 2 shows that W-2 wages appear to be smooth through the \$3,000 cutoff.²² Panel B gives the histogram of tax-return reported wages among

²² Results from performing the test of the running variable, outlined in McCrary (2008), suggest that there is, in fact, a significant break in the running variable of W-2 wages. However, the test may be more sensitive to finding a significant break due to the large size of our sample. In fact, there are small spikes around wage amounts divisible by \$1,000 ranging from 1–16 percent for wage amounts less than \$7,000. The 6 percent spike at \$3,000 is well within this range. More importantly, 2007 wages were earned and employers issued W-2s prior to the announcement

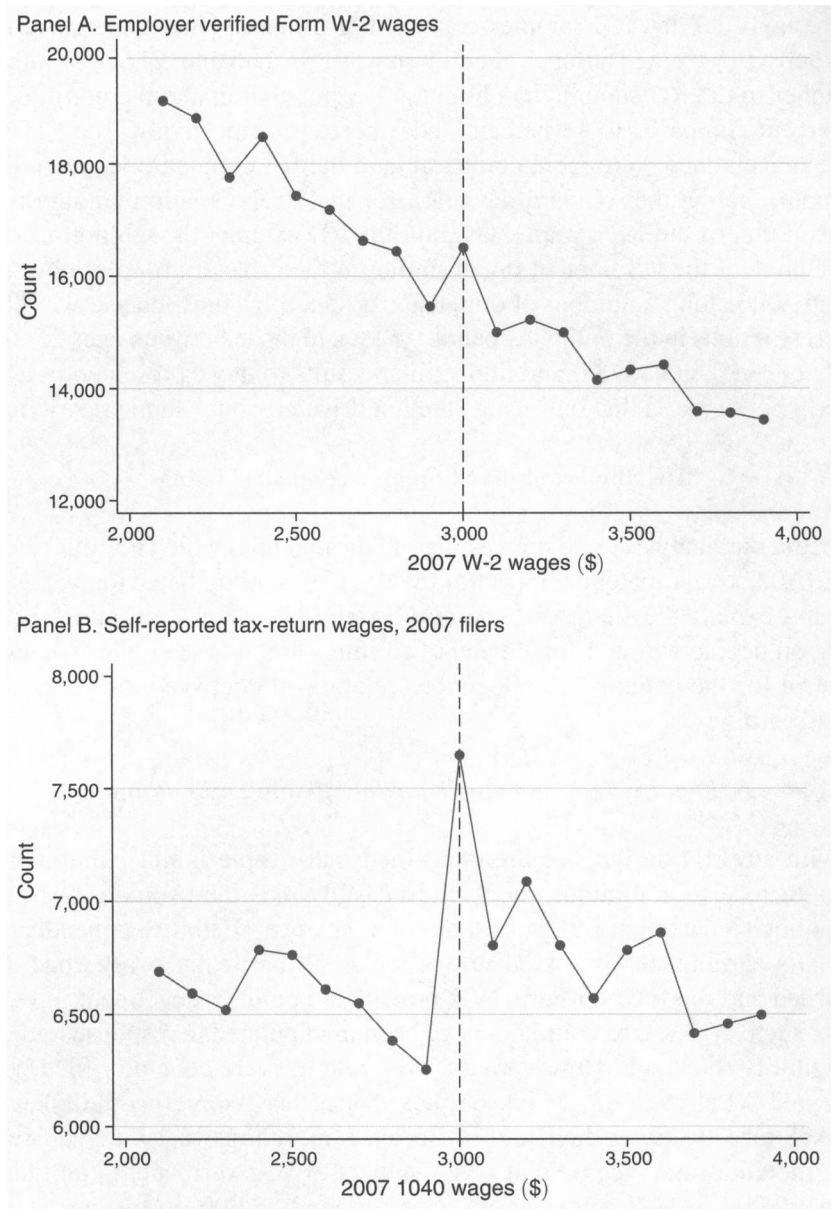


FIGURE 2. HISTOGRAM OF 2007 WAGES: EMPLOYER VERIFIED VERSUS SELF-REPORTED

Notes: Form W-2 wages are reported by employers, while tax-return wages are self-reported by the taxpayer. Counts of filers are calculated in \$100 bins.

2007 filers. The large spike at \$3,000 suggests that some people may have manipulated their self-reported tax-return wages in order to receive a stimulus check.

of the ESA08, making it unlikely that W-2 wages could have been manipulated in response to the stimulus rebate. In addition, we conduct numerous placebo tests detailed in the online Appendix to demonstrate that our results are not the result of round number bunching at wages divisible by \$1,000.

Given that bunching is found in self-reported wages, we use W-2 wages rather than self-reported 1040 wages as the running variable in our RD estimation. The treated group consists of individuals who have at least \$3,000 in W-2 wages. The control group consists of individuals with less than \$3,000 in W-2 wages, which includes those who qualify for the stimulus based on their tax-return reported wage earnings.²³ By including people who qualify based on self-reported wages but not W-2 wages in the control group, we introduce attenuation bias into our results since these individuals are characterized as being ineligible even though they receive a stimulus rebate.²⁴

From this point forward, wages will refer to W-2 wage earnings unless otherwise noted. To the extent that those just above the threshold are similar to those just below except for their eligibility status, we can control for factors other than the stimulus payment when comparing the behavior of individuals around the cutoff. Before turning to the results, we provide evidence that the two groups are in fact comparable by estimating age, 2004 filing, 2004 EITC claiming, and the probability of working and wages in 2004 through 2006 as outcome variables using the same RD design. We focus on outcomes in 2004–2006 as they represent behavior prior to the treatment, with the 2004 outcomes having the added advantage of also occurring before our non-filer sample restriction. Figure 3 depicts the mean of each outcome variable and the predicted effect within \$100 bins of 2007 wages above and below the \$3,000 threshold. Each figure contains the estimated coefficient at the break and the corresponding standard error.²⁵

It is potentially worrying that three of the four placebo coefficients are significant. In order to further investigate the influence of this imbalance on our key results, we conduct additional tests to alleviate any concern that these differences in pretreatment characteristics by stimulus eligibility are driving any measured responses in our outcome variables. For each outcome variable of interest, we regress its mean value from 2008–2014 on all of the pretreatment variables used in the balance tests (including those only reported in the online Appendix). The predicted values from these regressions then serve as a proxy for the explanatory power that the pretreatment variables have on outcomes in later years. As a placebo test, we use these predicted values as the left-hand-side variable in the reduced-form equation (1) and in the IV equation (2), given respectively in Sections IIIB and IV. Using these predicted means as the outcome variables of interest allows us to show the extent to which pretreatment imbalances are driving our main results. The estimated placebo coefficients for stimulus eligibility and for filing in 2007 are not statistically significant and more importantly, these coefficients are an order of magnitude smaller than the main effects described in Section IV. Intuitively, the reason why our overall placebo coefficients are not significant despite a number of pretreatment variables experiencing a significant break at \$3,000 is because these pretreatment characteristics are generally both positively and negatively correlated with the mean

²³ For example, if someone has \$2,000 in W-2 wages but reported \$3,500 in wages on their tax return, they are still included in the control group.

²⁴ We cannot determine which individuals who qualify for the stimulus based on their tax-return earnings, but do not qualify based on their W-2 earnings are truly eligible for the stimulus or are misreporting their tax-return earnings to receive the stimulus. Including both types of people in our control group will downward bias our results.

²⁵ We select a bandwidth based on methodology outlined in Calonico et al. (2017) to estimate the break at \$3,000.

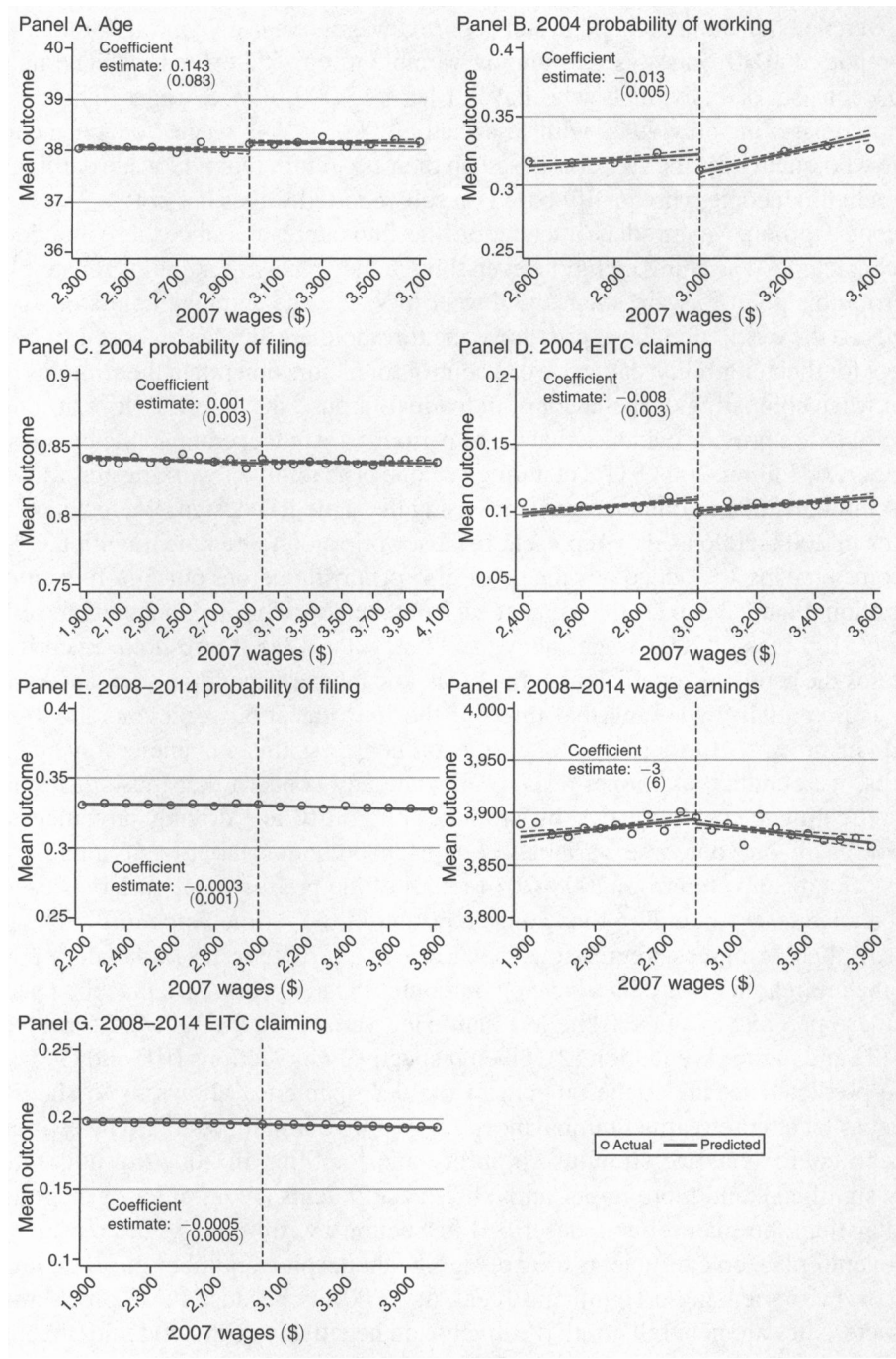


FIGURE 3. BALANCE TESTS

Notes: Estimates are derived using weighted least squares with triangle weights. The predicted estimates are the solid lines and the standard errors are the dashed lines. The circles represent the mean outcome in \$100 bins of 2007 W-2 wages. Wage earnings are top coded to the ninety-fifth percentile. Eligibility for the stimulus is defined strictly by wages. For panels E–G, we regress the mean value of each outcome variable from 2008–2014 on all of the pre-treatment variables used in the balance tests listed in the online Appendix. We then use the predicted variable from that regression as the outcome variable in the reduced-form equation (1) and for the IV equation (2), given, respectively, in Sections IIIB and IV in the paper.

outcomes between 2008 and 2014, thereby offsetting one another. In addition, the magnitudes of these correlations are often small and, in some cases, precisely zero. As a result, we conclude that these small imbalances do not drive bias in our results.

B. Results

Panel A of Figure 4 plots the probability of filing and shows clear evidence of the ESA08's impact on filing behavior with a jump in the probability of filing at the stimulus eligibility cutoff. Additionally, panel B of Figure 4 shows that the expected refund excluding the stimulus check is smooth through the \$3,000 threshold, which implies that the discontinuity in the relative benefit to filing is due to the stimulus payment alone.²⁶

To measure the impact of stimulus eligibility on the probability of filing, we estimate the following equation:

$$(1) \quad File_{i,2007} = \alpha + \beta(X_i - c) + \theta D_i + \gamma[D_i \times (X_i - c)] + \epsilon_i,$$

where X_i represents wages, D_i is an indicator for eligibility status, and c is the cutoff amount that determines eligibility. The coefficient, θ , gives the difference in the probability of filing between eligible and ineligible people at the cutoff.

For estimating equation (1), we choose a bandwidth using the optimal bandwidth selection method developed by Calonico et al. (2017). We find that the probability of filing a 2007 return increases by 2.2 percentage points off of a base of about 46 percent due to stimulus eligibility. This jump is statistically significant. For illustrative purposes, panel A of Figure 4 plots the results from the RD estimation along with the actual probability of filing for people within \$1,000 of the stimulus eligibility cutoff.

As a specification check, we estimate an augmented version of equation (1) that includes p higher order terms of the distance to the cutoff along with the corresponding interaction terms:

$$(2) \quad File_{i,2007} = \alpha + \sum_{j=1}^p \beta(X_i - c)^j + \theta D_i + \sum_{j=1}^p \gamma[D_i \times (X_i - c)^j] + \epsilon_i.$$

These estimates are given in the online Appendix along with results that vary the bandwidth for the linear specification. The findings from estimating equation (1) are robust to these alternative specifications.

Our results suggest that providing an extra \$300 (or more for married couples and filers with children) through a rebate allowed some people to overcome the barriers of filing a tax return. Overall, we find a measurable and statistically significant effect of stimulus eligibility on filing. However, roughly 50 percent of those just above the cutoff remain non-filers despite being eligible for a stimulus payment. That such a

²⁶The estimated 2007 refund and stimulus-rebate amounts are calculated assuming that each taxpayer is unmarried and claims all of their children under age 19 as identified using Social Security administration data.

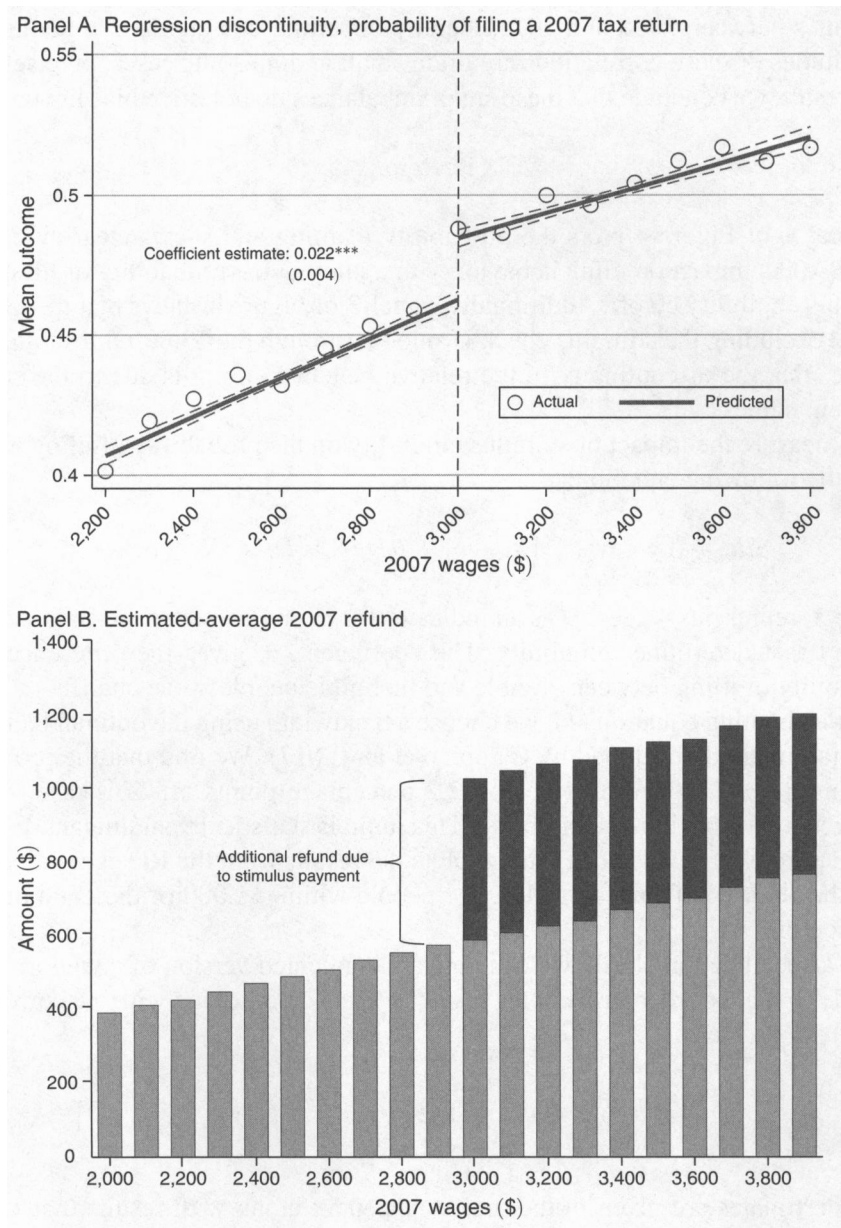


FIGURE 4. PROBABILITY OF FILING AND ESTIMATED-AVERAGE REFUND IN 2007, BY 2007 WAGES

Notes: In panel A, the estimates are derived using weighted least squares with triangle weights. The predicted estimates are the solid lines, and the standard errors are the dashed lines. The circles represent the fraction of individuals filing a 2007 tax return in \$100 bins of 2007 W-2 wages. In panel B, the estimated 2007 refund and stimulus-rebate amounts are calculated assuming that each taxpayer is unmarried and claims all of their children under age 19 as identified using Social Security Administration data. Mean refund and stimulus amounts are calculated in bins in \$100 of 2007 wages.

large fraction remain out of the filing population is in line with Benzarti (2016), who finds that the burden of filing can be quite substantial.

To investigate whether there exists a heterogeneous response in filing, we divide our sample into smaller subgroups based on age and gender. We also expand our sample to demonstrate that the estimated response is not an artifact of the sample restrictions we imposed. Overall, we find that the filing response is similar among different age categories and by gender, and the coefficient estimates on stimulus eligibility are not statistically different from one another. In addition, when we expand our sample to all workers with wages less than \$6,000 who are ages 25 to 60, we once again find that a significant and positive effect of stimulus eligibility on filing in 2007 is roughly the same magnitude as that found in the baseline estimate. These results suggest that the filing response exists broadly among different demographic groups and that our sample restrictions are not driving the results. Both sets of results are presented in the online Appendix.

IV. The Causal Impact of Filing on Economic Outcomes

To estimate the causal effect of filing on economic outcomes, we instrument for the probability of filing a 2007 return using stimulus eligibility. In general, there is selection into the filing population making it difficult to identify changes in behavior caused by filing. However, the ESA08 exogenously induced individuals into the filing population, making the sharp cutoff associated with receiving a stimulus payment a valid instrument for filing a 2007 return.²⁷ We once again focus on a small window around the cutoff to ensure the control group is comparable to the treated group and select the optimal bandwidth using methodology outlined in Calonico et al. (2017). The first stage of the instrumental variables (IV) regression is given by equation (1).²⁸ We estimate the following equation for the second stage:

$$(3) \quad Y_i = \alpha + \pi \widehat{File}_{i,2007} + \phi(X_i - c) + \psi[D_i \times (X_i - c)] + \omega_i,$$

where $\widehat{File}_{i,2007}$ is the predicted probability of filing a 2007 return from equation (1) and Y_i is the outcome of interest. For the IV regressions, we pool the data across future years to estimate the overall effect of filing a 2007 tax return on outcomes, and we also divide the data by early (2010 and earlier) and later years (2011 through 2014) to examine both immediate and longer term effects of filing.²⁹ Reduced-form and IV coefficient estimates by year are reported in the online Appendix.

We are unable to separately measure the joint effect from both filing a 2007 tax return and from receiving a stimulus rebate using this identification strategy. However, the estimated responses among our outcome variables are more likely attributable to participation in the tax system rather than to a one-time rebate. To

²⁷This estimation strategy, where there is a sharp eligibility cutoff but less than 100 percent participation, is also called a "fuzzy regression discontinuity" design.

²⁸The Calonico et al. (2017) method predicts a different optimal bandwidth for each outcome variable, thus the first stage coefficients will change accordingly.

²⁹To make the coefficient estimates comparable across time periods, we impose the optimal bandwidth derived from Calonico et al. (2017) to estimate the early and later year effects from filing a 2007 tax return.

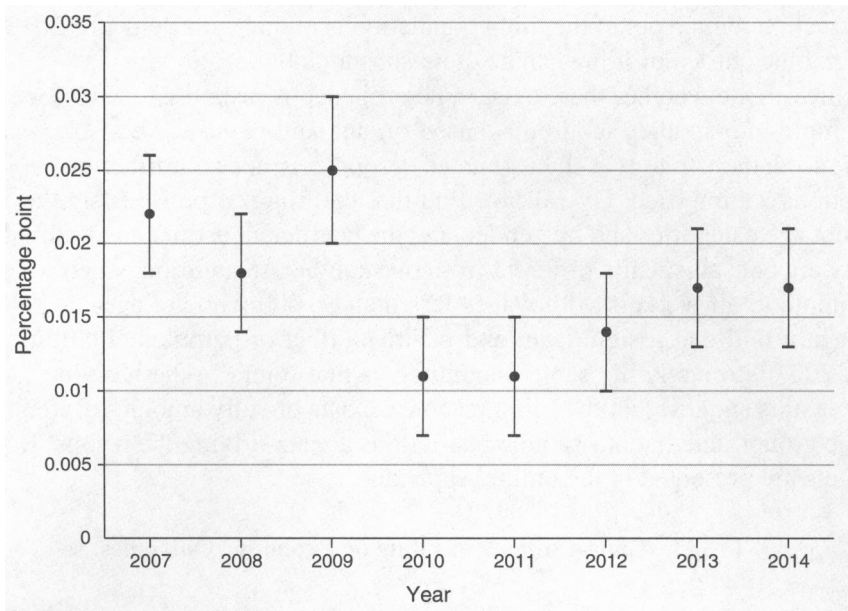


FIGURE 5. REDUCED-FORM COEFFICIENT ESTIMATES FOR FUTURE FILING, 2007–2014

Notes: The reduced-form coefficient estimates are graphed with standard-error bars. Estimates are derived using the optimal bandwidth selection approach by Calonico et al. (2017).

help bound the possible effect of the additional infusion of cash from the stimulus, we look at cross-sectional correlations between income and the outcomes of interest for income ranges outside of our main specification.³⁰ We find that the correlations are much smaller than all of our estimated coefficients on filing lending support to filing as the main driver of the responses.³¹

A. Future Filing

We first examine whether filing is a persistent behavior. Whether or not an individual continues to file a tax return is inherently linked with the extent to which filing is burdensome in future years and, for those induced to file by the ESA08, future costs associated with filing could have been impacted. For example, individuals who join the filing population could also experience a reduction in the cost of filing in future years if learning takes place making it easier to file again. However, if people face an annual cost due to the time it takes to complete each form, then a one-time monetary incentive will not necessarily ease that burden the next time an individual files.

Figure 5 depicts the reduced-form coefficients by year, demonstrating that those above the eligibility cutoff of \$3,000 in 2007 were more likely to file in future

³⁰We estimated cross-sectional correlations between 2007 income and the outcome variables of interest for the sample with 2007 income between \$1,000 and \$2,000 and the sample with 2007 income between \$4,000 and \$5,000. Income was constructed using information returns.

³¹We also estimated cross-sectional correlations between 2007 Form W-2 wage earnings and the outcome variables of interest, and find that these correlations are much smaller than the estimated effects of filing a 2007 tax return.

TABLE 2—IMPACT OF FILING ON FUTURE FILING BEHAVIOR

		Independent variable	Full sample 2008–2014 (1)	Early 2008–2010 (2)	Late 2011–2014 (3)	Early versus late <i>p</i> -value on diff. (4)
Probability of filing						
Reduced form	Stimulus eligible		0.017 (0.004)	0.017 (0.004)	0.017 (0.004)	0.934
Bandwidth			713	713	713	
IV		Filed in 2007	0.831 (0.187)	0.834 (0.188)	0.828 (0.210)	0.967
Bandwidth			626	626	626	
Observations			8,727,656	3,740,424	4,987,232	

Notes: The reduced-form estimates show the impact of stimulus eligibility on the outcome variable. The IV estimates, where stimulus eligibility is used to instrument for filing a 2007 tax return, are reported only for the second stage. The first-stage regression results (not shown) estimate the impact of stimulus eligibility on filing a 2007 tax return. Standard errors are in parentheses. Reduced form and IV are estimated using the optimal bandwidth selection approach by Calonico et al. (2017). Eligibility for the stimulus is defined strictly by Form W-2 wages. The running variable is W-2 wages. Standard errors are clustered by individual.

years than those who were not eligible for the stimulus. Our IV estimates reported in Table 2 show that filing a 2007 tax return significantly and positively affects filing in future years, suggesting that non-filers who entered the filing population in 2007 were far more likely to stay filers even after accounting for idiosyncratic factors.³² The estimated effect when combining all years between 2008 and 2014 is an increase of 83.1 percentage points in the probability of filing a tax return. When we split the data into early and later years, we find statistically significant and positive effects of filing a 2007 tax return on future filing, where the estimates from the two subsamples are not statistically different from each other.

B. Employment and Wage Responses

The ESA08 incentivized filing, and we find that those who were induced to file were more likely to remain filers. In Section IB, we discussed the relationship between an individual’s decision to file and his/her net-of-tax rate. In particular, all else equal, two people who differ only by whether or not they file a tax return could face two different marginal tax rates. For non-filers who misperceive their tax rate as being positive, they experience a positive net-of-tax rate change upon filing and, as a result, have an incentive to increase their labor supply. As we mentioned earlier, we have evidence that the low-income workers overestimate their tax rate. Individuals selected by the optimal bandwidth procedure all have incomes in the phase-in range of the EITC. If an individual files and claims the EITC, then his/her marginal tax rate would be equal to a maximum of –7.65 percent or negative the EITC phase-in

³²Whether or not people stay in the filing population could also be dependent on using a paid preparer. We restrict the sample to those who did not use a paid preparer in 2007 and while the estimated effect of 2007 filing on filing in later years is positive, the coefficients are generally not statistically significant. These estimates are reported in the online Appendix. This provides suggestive evidence that the use of a paid preparer is a contributing factor to the observed increase in filing in subsequent years.

rate for childless filers. For those with children who file and claim the EITC, their marginal tax rate would be even smaller. Furthermore, a majority of our sample have positive income withheld even though their incomes are below the filing threshold. Therefore, if these individuals file a tax return, then they would get their withholdings back, could claim the EITC, and would receive a stimulus rebate. This finding of individuals responding to learning their true tax rate has been documented by Chetty, Friedman, and Saez (2013), who find that taxpayers increase their wage earnings in part due to an increase in the marginal incentive to earn provided by the phase-in region of the EITC. Similarly, we look at whether inducing people to file, thereby granting them access to the EITC and their withholdings and revealing their true marginal tax rate, also has an effect on wage earnings in subsequent years.

We start by examining the causal impact of filing on wage earnings. We then look at how filing impacted the distribution of wage earnings by defining a set of indicator variables that take on a value of one if an individual's wage earnings lie within a certain range. Additionally, we define a similar set of indicators using adjusted gross income (AGI) in place of wage earnings to capture broader changes in income that would include, for example, changes in net self-employment income.

Figure 6 depicts the year-by-year reduced-form coefficients measuring the effect of stimulus eligibility on wage earnings. We find that stimulus eligibility increased future wage earnings relative to those who were ineligible. In addition, the standard-error bars overlap, showing that the effects are of comparable magnitude by year. Table 3 provides the reduced-form and IV results combining all years as well as subsamples spanning early years (2008–2010) and late years (2011–2014). We find that filing a 2007 tax return increased wage earnings by \$4,875 in 2008–2010 and by \$6,255 in 2011–2014, though these coefficients are not statistically different from each other. Pooling across all years between 2008 and 2014, we find that filing increased wage earnings on average by \$5,663. Overall, our results suggest that those induced into the 2007 filing population had significantly higher wages than 2007 non-filers in future years.

Table 4 provides the reduced-form and IV results on distribution changes capture by indicators for having wage earnings or AGI within a given bin. Panel A shows that filing a 2007 tax return decreases the likelihood of having less than \$2,000 in wage earnings. Specifically, filing a 2007 tax return decreases the probability of having wage earnings equal to 0 by 28.4 percentage points and decreases the probability of wage earnings that are greater than 0 but less than or equal to \$2,000 by 20.4 percentage points. These reductions are offset by increases in the probability of having \$2,000 to \$4,000 in wage earnings (12.2 percentage points) and increases in the probability of having at least \$10,000 in wage earnings (23.4 percentage points). Taken together, these results show that filing a 2007 tax return shifts people from the bottom of the wage earnings distribution to the top. Panel B of Table 4 gives the comparable results for AGI. We find similar changes to the AGI distribution where filing a 2007 tax return reduces the probability of having zero AGI³³ by 71.7 percentage points and increases the probability of having at least \$10,000 in AGI by 61.5 percentage points. Taken

³³This category includes individuals with zero or negative AGI.

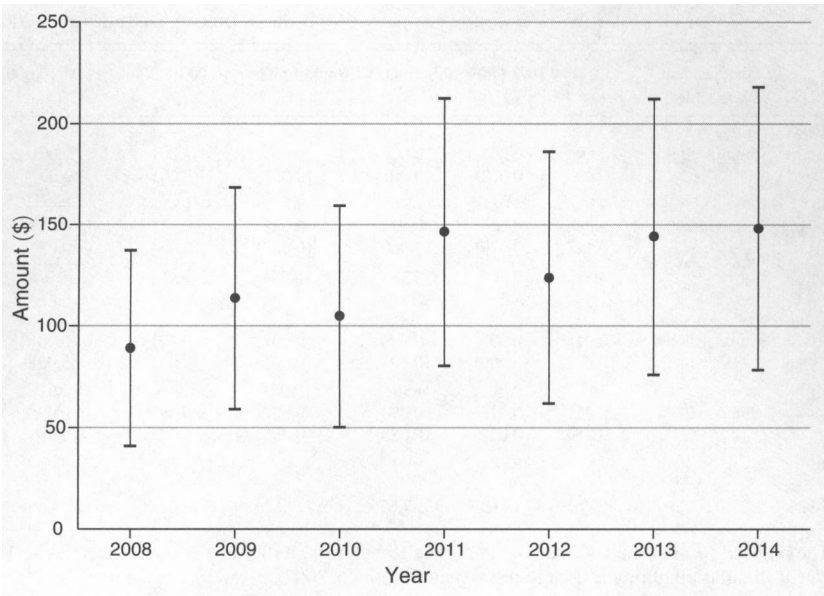


FIGURE 6. REDUCED-FORM COEFFICIENT ESTIMATES FOR WAGE EARNINGS, 2008–2014

Notes: The reduced-form coefficient estimates are graphed with standard-error bars. Estimates are derived using the optimal bandwidth selection approach by Calonico et al. (2017).

TABLE 3—IMPACT OF FILING ON WAGE EARNINGS

		Full sample 2008–2014 (1)	Early 2008–2010 (2)	Late 2011–2014 (3)	Early versus late <i>p</i> -value on diff. (4)
Wage earnings					
Reduced form	Stimulus eligible	128 (50)	110 (48)	142 (60)	0.485
Bandwidth		880	880	880	
IV	Filed in 2007	5,663 (2,301)	4,875 (2,147)	6,255 (2,764)	0.504
Bandwidth		906	906	906	
Observations		8,727,656	3,740,424	4,987,232	

Notes: The reduced-form estimates show the impact of stimulus eligibility on the outcome variable. The IV estimates, where stimulus eligibility is used to instrument for filing a 2007 tax return, are reported only for the second stage. The first-stage regression results (not shown) estimate the impact of stimulus eligibility on filing a 2007 tax return. Standard errors are in parentheses. Reduced form and IV are estimated using the optimal bandwidth selection approach by Calonico et al. (2017). Eligibility for the stimulus is defined strictly by Form W-2 wages. The running variable is W-2 wages. Standard errors are clustered by individual.

together, these results demonstrate that not only were those induced to file in 2007 more likely to continue working in later years, but that they tended to have higher total wage earnings and experienced higher wage growth. Overall, our estimates demonstrate that filing leads to an increase in workforce attachment.

To gain a better sense for the mechanism driving the observed wage changes, we look at whether people induced to file are more likely to take on new or additional

TABLE 4—IMPACT OF FILING ON WAGE EARNINGS AND ADJUSTED GROSS INCOME DISTRIBUTION, 2008–2014

Independent variable		0 (1)	(0,2,000] (2)	(2,000,4,000] (3)	(4,000,6,000] (4)	(6,000,8,000] (5)	(8,000,10,000] (6)	> 10,000 (7)
<i>Panel A. Wage earnings</i>								
Reduced form	Stimulus eligible	−0.006 (0.003)	−0.007 (0.002)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	−0.001 (0.001)	0.006 (0.002)
Bandwidth		719	419	684	804	985	962	940
IV	Filed in 2007	−0.284 (0.142)	−0.204 (0.073)	0.122 (0.060)	−0.006 (0.032)	0.032 (0.034)	−0.053 (0.036)	0.234 (0.107)
Bandwidth		806	713	757	1,422	932	767	1,033
<i>Panel B. Adjusted gross income</i>								
Reduced form	Stimulus eligible	−0.015 (0.003)	0.000 (0.000)	−0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	−0.001 (0.001)	0.015 (0.003)
Bandwidth		790	825	856	1,108	1,205	756	611
IV	Filed in 2007	−0.717 (0.162)	0.015 (0.022)	0.000 (0.028)	0.029 (0.025)	0.099 (0.037)	−0.036 (0.033)	0.615 (0.152)
Bandwidth		716	837	909	1,442	673	975	725
Observations		8,727,656	8,727,656	8,727,656	8,727,656	8,727,656	8,727,656	8,727,656

Notes: The reduced-form estimates show the impact of stimulus eligibility on the outcome variable. The IV estimates, where stimulus eligibility is used to instrument for filing a 2007 tax return, are reported only for the second stage. The first-stage regression results (not shown) estimate the impact of stimulus eligibility on filing a 2007 tax return. Standard errors are in parentheses. Reduced form and IV are estimated using the optimal bandwidth selection approach by Calonico et al. (2017). Eligibility for the stimulus is defined strictly by Form W-2 wages. The running variable is W-2 wages. Standard errors are clustered by individual.

jobs. These labor-supply decisions are proxied for by looking at whether an individual is issued a W-2 from an additional employer identification number (EIN) to measure a job addition, or whether an individual receives a W-2 from a new EIN to measure a job change. Looking at one-year changes, we find no evidence that filing a 2007 return causes individuals to increase the number of jobs they hold or to change jobs. This suggests that the increase in wage growth is likely due to increases in wage rates and/or increases in hours worked at the current jobs held by those induced to file.

When put in the context of past literature looking at labor-supply responses, we find relatively large, extensive margin effects. Our distributional analysis shows that filers are less likely to have zero wage earnings in future years relative to non-filers, where filing causes a reduction in probability of 28.4 percentage points. For example, Eissa and Liebman (1996) estimate that there was a 2.8 percentage point increase in work participation among single mothers as a result of the 1986 EITC expansions. Meyer and Rosenbaum (2001) determine that the EITC and other tax changes accounted for more than 60 percent of the 8.7 percentage point employment increase among single mothers between 1984 and 1996. Our larger estimates could be explained, however, by the fact that we are measuring a different aspect of the extensive margin since our empirical specification requires that individuals were working in 2007. Consequently, we measure the propensity to stay in the working population as opposed to the previous literature that measures the propensity to enter the working population. In addition, our sample covers a different time period and consists of a different segment of the population, mainly childless, unmarried workers. However, our intensive margin findings of positive wage-earnings responses are in line with findings from Chetty, Friedman, and Saez (2013).

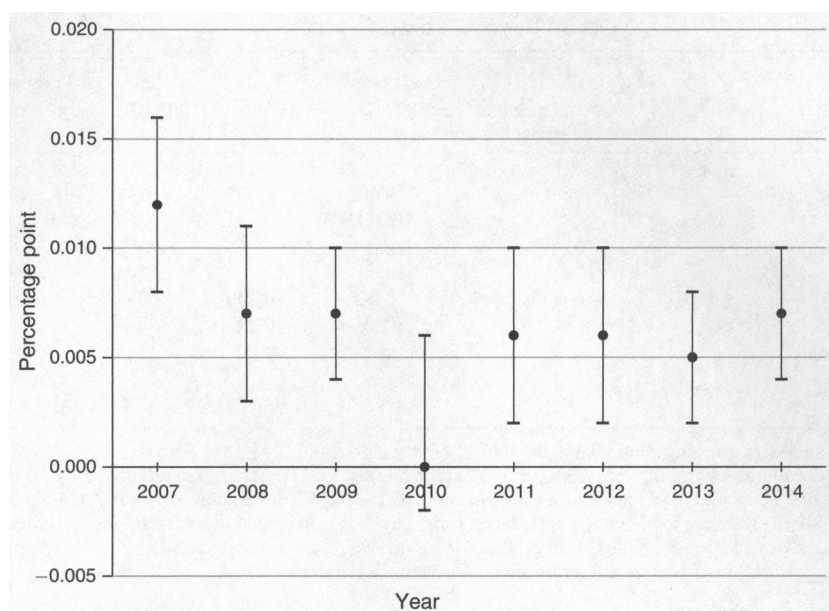


FIGURE 7. REDUCED-FORM COEFFICIENT ESTIMATES FOR EITC CLAIMING, 2007–2014

Notes: The reduced-form coefficient estimates are graphed with standard-error bars. Estimates are derived using the optimal bandwidth selection approach by Calonico et al. (2017).

C. EITC Claiming

Filing a tax return is a crucial step toward receiving tax-based benefits. Individuals must first file a tax return and then provide additional information needed to claim various tax benefits. Through the highly publicized offer of a stimulus check, we show in Section III that the ESA08 helped many to overcome that first hurdle for receiving tax benefits by incentivizing filing a 2007 tax return. In addition, we find that filing a 2007 tax return increases the probability that individuals file in future years and causes increases in wage earnings. Next, we examine to what extent the act of filing caused some people to learn of and subsequently claim various credits offered by the tax code. We focus specifically on EITC claims in years 2007 through 2014.

Figure 7 depicts the reduced-form coefficients by year. In accordance with Manoli and Turner (2014), who find that the largest effect on EITC claims is seen closest to the intervention when they examine the impact of EITC reminder notices, we find that the largest estimate effect from stimulus eligibility occurs in 2007. From 2008 onward, stimulus eligibility generally has a positive effect on claiming the EITC.

The IV results in Table 5 demonstrate that filing a 2007 return significantly increased the likelihood that an individual claims the EITC by 26.5 percentage points for the pooled sample spanning 2008 through 2014. Comparing earlier to later years, we find that filing a 2007 tax return increases the probability of claiming the EITC more in years 2007–2010 than in years 2011–2014 (29.0 versus 24.0 percentage points); however, these coefficient estimates are not statistically different from one another. We find no statistically significant effect of filing in 2007 on the EITC amount (estimates reported in the online Appendix), which suggests

TABLE 5—IMPACT OF FILING ON EITC CLAIMING

		Full sample	Early	Late	Early versus late
		2007–2014	2007–2010	2011–2014	<i>p</i> -value on diff.
		(1)	(2)	(3)	(4)
Probability of claiming the EITC					
Reduced form	Stimulus eligible	0.006 (0.003)	0.007 (0.003)	0.005 (0.003)	0.639
Bandwidth		827	827	827	
IV					
	Filed in 2007	0.265 (0.092)	0.290 (0.097)	0.240 (0.114)	0.632
Bandwidth		994	994	994	
Observations		9,974,464	4,987,232	4,987,232	

Notes: The reduced-form estimates show the impact of stimulus eligibility on the outcome variable. The IV estimates, where stimulus eligibility is used to instrument for filing a 2007 tax return, are reported only for the second stage. The first-stage regression results (not shown) estimate the impact of stimulus eligibility on filing a 2007 tax return. Standard errors are in parentheses. Reduced form and IV are estimated using the optimal bandwidth selection approach by Calonico et al. (2017). Eligibility for the stimulus is defined strictly by Form W-2 wages. The running variable is W-2 wages. Standard errors are clustered by individual.

that those induced to file by the stimulus on average claim roughly the same EITC amount as those who would have filed in the absence of the stimulus.

V. Discussion

Low-income workers with earnings below the filing threshold are among those targeted by anti-poverty tax transfers like the EITC; yet, many of these individuals might only learn of the existence of such benefits through the act of filing a tax return. The ESA08, by incentivizing filing through a one-time stimulus payment, provided an opportunity to measure the impact of filing on an individual’s propensity to fully utilize the benefits afforded to them through the tax system. Our results demonstrate that filing a 2007 return enabled individuals to obtain additional tax transfers beyond the stimulus payment that they otherwise would not have received. We find that once individuals are induced to file they tended to remain in the filing population, on average earned higher annual wages, and continued to receive annual tax benefits.

Heim, Lurie, and Pearce (2014) show that between 2001 and 2011 the number of non-filers who earned wages grew by 12.0 percent while, in comparison, the number of filers grew by 8.5 percent. Assuming relatively low evasion, the authors’ findings imply that on average each year roughly nine million people comprise the population of non-filers with earnings.³⁴ If real wage growth remains stagnant as it has over the past few decades (Desilver 2015), then this population is likely to continue to grow over time, which in turn could impact the future efficacy of tax transfer programs. Our results suggest that inducing these individuals into the filing population could positively impact their economic situations through higher wages and additional transfers.

³⁴These statistics are based on the authors’ calculations and statistics on nondependent non-filers who received the W-2 and nondependent filers presented in table 1 of Heim, Lurie, and Pearce (2014).

As a metric for assessing overall changes in economic well-being due to filing, we look at the impact of filing a 2007 tax return on the probability of living above the federal poverty line. We use two measures of income where the first is akin to that used in official poverty-line calculations and as such excludes certain government transfers like the EITC, while the second incorporates net transfers made through federal income and payroll taxes as part of total income. The first income measure is constructed from information return forms that are issued to both filers and non-filers, including wage income, dividends, capital gains, unemployment benefits, interest income, nonemployee compensation, and Social Security income. The second income measure for non-filers is measured as the income from information returns minus payroll taxes and withholdings, and for filers, is measured as the tax-return income minus payroll taxes and the tax return's balance.³⁵ Figure 8 shows the reduced-form coefficients year by year and depicts an upward sloping trend in the fraction of people above poverty when taxes are included in the income measure. By contrasting our results using the two different measures, we show the importance of tax transfers for delivering benefits from anti-poverty programs as well as their effectiveness, as evidenced by both larger and more consistently significant coefficient estimates.

Results reported in Table 6 show that inducing individuals to file a tax return in 2007 via the stimulus rebate increased their likelihood of living above the federal poverty line in future years. Under our first income measure, which does not account for federal income or payroll taxes, those who are induced to file in 2007 are more likely to earn above the federal poverty line with an overall increase of 24.5 percentage points across all years. After accounting for federal income and payroll taxes, the increased probability of earning above poverty is even larger. In particular, we find that those who are induced to file in 2007 are 36.8 percentage points more likely to live out of poverty in future years than those who did not file. When comparing the estimated effects of filing a 2007 tax return on poverty by early and later years, we do not find that the effects are statistically different.

We next look at the aggregate costs associated with inducing individuals into the filing population. We calculate this cost as the change in total tax revenue, defined as the sum of federal income and payroll taxes between 2007 and 2014. Payroll taxes are calculated based on Form W-2 wages. Federal income-tax revenue comes from the balance reported on an individual's tax return for filers and the total withholdings reported on all information returns for non-filers. Note that withholdings made by non-filers, because they are not reconciled through filing, can be seen as payments made to the government and therefore count as positive tax revenue. The year-by-year cost is then calculated as the total tax revenue among those induced to file in 2007 minus the total tax revenue among non-filers in 2007, where the non-filers effectively serve as a measure of the counterfactual revenue for the induced filers.³⁶

³⁵For the tax exclusive measure of poverty, we assume that each individual is unmarried and that he/she lives in a household with his/her biological children. An individual's biological child is defined as any person under age 19 who lists the individual as a parent. We identify biological children using administrative data from the Social Security administration. For the tax-inclusive measure of poverty, each non-filer's size is defined in the same way as in the tax-exclusive income measure where we assume that each individual is unmarried and claims their biological children. For filers, household size is defined by the number of exemptions claimed on the tax return.

³⁶To ensure that our treatment and control groups are similar, we utilize the same optimal bandwidth from our first-stage regression and compare individuals within \$834.30 of the stimulus eligibility cutoff.

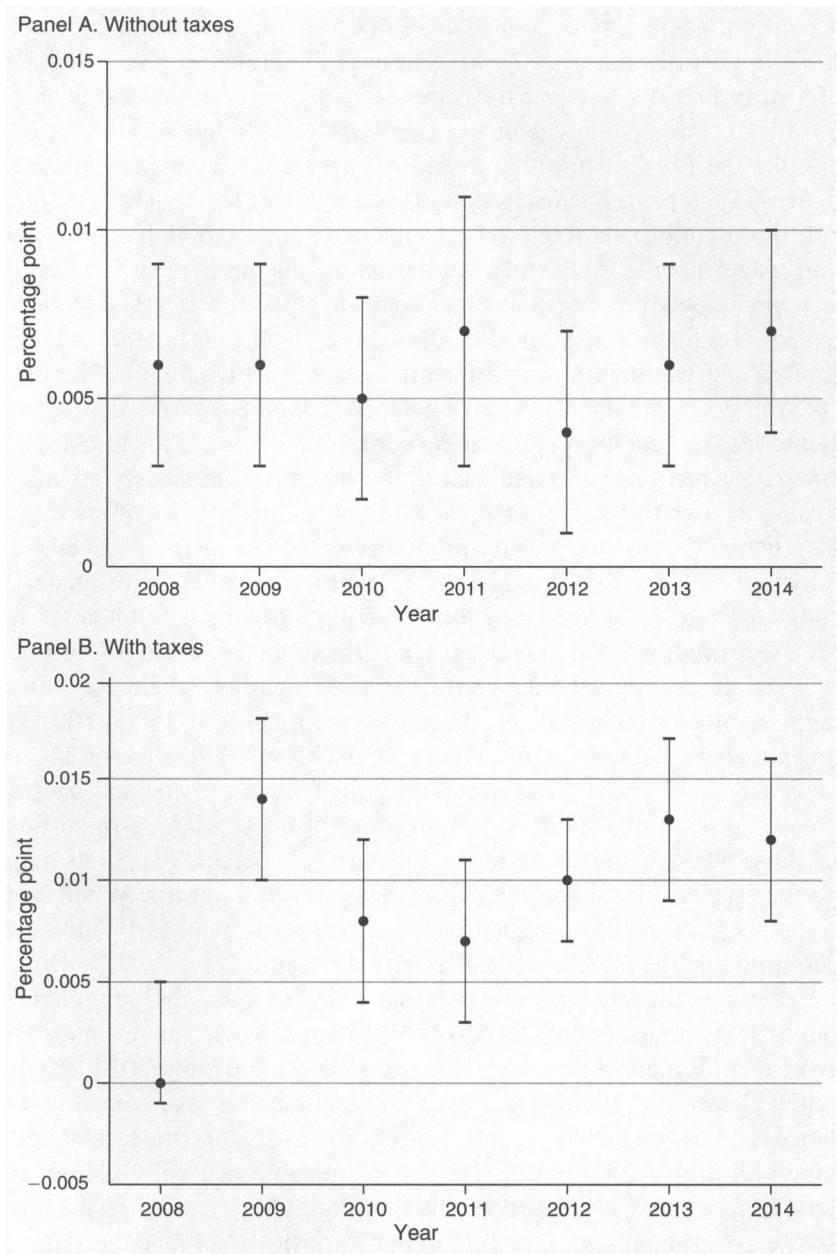


FIGURE 8. REDUCED-FORM COEFFICIENT ESTIMATES FOR BEING ABOVE POVERTY, 2008–2014

Notes: The reduced-form coefficient estimates are graphed with standard-error bars. Estimates are derived using the optimal bandwidth selection approach by Calonico et al. (2017).

Table 7 shows the total loss in federal tax revenue from inducing individuals to file where the largest loss occurs in 2007 and then decreases each year thereafter. Breaking out the cost by payroll and income taxes shows that the generated revenue from increased payroll taxes was completely offset by reductions in federal income-tax revenue. In particular, the payroll tax revenue from inducing individuals

TABLE 6—IMPACT OF FILING ON POVERTY

Independent variable		Full sample 2008–2014 (1)	Early 2008–2010 (2)	Late 2011–2014 (3)	Early versus late <i>p</i> -value on diff. (4)
<i>Panel A. Probability above poverty (without taxes)</i>					
Reduced form	Stimulus eligible	0.006 (0.002)	0.006 (0.003)	0.006 (0.003)	0.983
Bandwidth		1,019	1,019	1,019	
IV	Filed in 2007	0.245 (0.100)	0.266 (0.109)	0.229 (0.112)	0.704
Bandwidth		1,366	1,366	1,366	
<i>Panel B. Probability above poverty (with taxes)</i>					
Reduced form	Stimulus eligible	0.010 (0.003)	0.008 (0.003)	0.011 (0.003)	0.298
Bandwidth		731	731	731	
IV	Filed in 2007	0.368 (0.116)	0.296 (0.122)	0.422 (0.135)	0.272
Bandwidth		1,064	1,064	1,064	
Observations		8,727,656	3,740,424	4,987,232	

Notes: The reduced-form estimates show the impact of stimulus eligibility on the outcome variable. The IV estimates, where stimulus eligibility is used to instrument for filing a 2007 tax return, are reported only for the second stage. Reduced form and IV are estimated using the optimal bandwidth selection approach by Calonico et al. (2017). Eligibility for the stimulus is defined strictly by Form W-2 wages. The running variable is W-2 wages. Probability of being above poverty (without taxes) is constructed from information return forms including wage income from Form W-2 and dividends, capital gains, unemployment benefits, interest income, nonemployee compensation, and Social Security income from Form 1099s. Probability of being above poverty (with taxes) for non-filers is constructed using information return income minus payroll taxes and withholdings and, for filers, is measured as tax-return income minus payroll taxes and the tax-return balance. For the tax-exclusive measure of poverty, we assume that each individual is unmarried and that he/she lives in a household with his/her biological children, which is defined as any person under age 19 who lists the individual as a parent. We identify biological children using Social Security Administration administrative data. For the tax-inclusive measure of poverty, each non-filer's size is defined in the same way as in the tax-exclusive income measure. For filers, household size is defined by the number of exemptions claimed on the tax return. Standard errors are in parentheses and clustered by individual.

to file in 2007 is roughly \$1 million per year between 2008 through 2014 while the income-tax losses range from −\$2.5 million in 2008 to −\$1.8 million in 2014. In 2007, the total cost was about \$3.6 million, or about \$1,300 per individual induced to file, which includes the cost of the stimulus rebate. Between 2008 and 2014, the cost decreases from about \$1.4 million to \$0.7 million per year with an average cost per individual falling from about \$518 to \$259. The total cost over the 8 year period spanning 2007 through 2014 is \$11.0 million or on average roughly \$4,070 per person.³⁷ The total payroll tax revenue raised between 2007 through 2014 was \$7.3 million while the total income-tax revenue lost was \$18.3 million.

The behavioral changes that occurred as a result of filing a tax return contributed to lowering the likelihood that an individual lives in poverty in the years following

³⁷This estimate is likely an upper bound for the overall expenditure cost because cost savings from reducing participation and benefits paid out by other social programs, like temporary assistance to needy families (welfare), supplemental nutrition assistance program (food stamps), or Medicaid, are not included in our estimate.

TABLE 7—COST ESTIMATES

Year	Payroll taxes in millions	Income taxes in millions	Total cost in millions	Per person cost in dollars
2007	0	−3.6	−3.6	−1,332
2008	1.1	−2.5	−1.4	−518
2009	1.1	−2.5	−1.4	−518
2010	1.0	−2.1	−1.1	−407
2011	1.0	−2.0	−1.0	−370
2012	1.0	−1.9	−0.9	−333
2013	1.0	−1.9	−0.9	−333
2014	1.1	−1.8	−0.7	−259
Total	7.3	−18.3	−11.0	−4,070

Notes: Payroll taxes are calculated based on Form W-2 wages only. Federal income-tax revenue comes from the balance reported on an individual’s tax return for filers and the total withholdings reported on all information returns for non-filers. The year-by-year cost is then calculated as the total tax revenue among those induced to file in 2007 minus the total tax revenue among non-filers in 2007, where the non-filers effectively serve as a measure of the counterfactual revenue for the induced filers if they had not filed in response to the stimulus. To ensure that our treatment and control groups are similar, we utilize the same optimal bandwidth from our first-stage regression and compare individuals within \$834.30 of the stimulus eligibility cutoff.

entry into the filing population. In particular, entering into the filing population caused increases in EITC claiming, future filing, and the likelihood of working. Furthermore, filing increased future wages by an average of \$5,663. These changes reduced the likelihood of living in poverty by up to 36.8 percentage points in future years. The federal income and payroll tax cost associated with these positive behavioral changes was \$11 million or about \$4,070 per person.

VI. Conclusion

In this paper, we estimate the causal effects of filing on outcomes of low-income households. We find that providing individuals with a stimulus rebate of at least \$300 increases the probability that they file a 2007 tax return by 2.2 percentage points. We also find that incentivizing the working population with low earnings to participate in the tax system induces behavioral responses that reduces the likelihood that they live in poverty in future years. In particular, filing a 2007 return increases the likelihood of filing future tax returns and increases the likelihood of having wages in subsequent years, meaning that filing prevents individuals from dropping out of the working population. Filing a 2007 return also causes wages to be higher relative to those who do not file. Our results also show that filing a 2007 return increases the likelihood that individuals claim the EITC, suggesting that once people enter into the filing population, they are more likely to claim benefits. Overall, we show that providing a temporary incentive to participate in the tax system has persistent and positive effects on economic activity and poverty. These results underscore the importance of factoring in the filing margin when using the tax code to conduct social policies that are targeted to low-income households.

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