Resolving Unpaid Taxes and the Notice of Federal Tax Lien: Evidence from the Fresh Start Initiative

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Introduction

When taxpayers fail to pay Federal tax assessments, a lien is established to give the government certain rights to collect the delinquent amounts. Typically, only the IRS and the taxpayer are aware of the lien. A notice of Federal tax lien (NFTL) can be filed to make the lien public information. The NFTL is an important collection tool in resolving delinquent tax accounts. The NFTL helps to secure the government's right to the value embodied in the taxpayer's assets and provide creditors with important information on the creditworthiness of taxpayers. However, U.S. legislation, Internal Revenue Service (IRS) policy, and IRS budgetary challenges can alter the degree to which this collection tool is used. Over the years, the number of NFTLs filed by the IRS has varied considerably. The obvious question is what impact has this had on the collection of delinquent accounts. It is important to know how changes in policy will affect the resolution of delinquent accounts and what impact the NFTL has on taxpayers with debt.

Numerous studies over the years have looked into the effects of the NFTL on payment compliance behavior (both direct and indirect effects), the resource costs involved in filing and resolving the NFTL, and alternative treatments to the NFTL. Many of these studies have struggled with the endogenous nature of NFTL filing. That is, the NFTL may influence taxpayer behavior, but the determination to file the NFTL may also be *influenced by* the taxpayer's behavior. There have been a limited number of studies using randomized field experiments, but these have lacked breadth in terms of the taxpayer population studied.

In this paper, we used the "Fresh Start" changes in the NFTL filing thresholds for cases being transferred from the IRS Automated Collection System (ACS) to the Field Collection Queue (or "the queue") as a "natural experiment" in NFTL filing. As part of this initiative, the threshold for NFTL determinations was increased from $5,000 to $10,000, and the threshold for NFTL filing was increased for cases systemically[2] transferred from ACS to the queue. Our paper uses this policy change to examine taxpayers' response to the filing of NFTLs. We compare cohorts of cases with unpaid balances within the policy change parameters that were transferred from the ACS sites 6 months before and 6 months after the policy change. We model both the likelihood that the taxpayer will fully or partially resolve their unpaid balances and the expected change in the unpaid balance. We follow case outcomes for 2 years after the transfer to the queue with the NFTL or the forgone NFTL. We use our models to estimate the marginal impact of the NFTL in resolving unpaid taxes and the impact of the Fresh Start NFTL policy change.

Background

In 2011, the Internal Revenue Service introduced several Fresh Start initiatives to help delinquent taxpayers to pay back taxes and avoid tax liens. As part of this initiative, the threshold for NFTL determinations was increased from $5,000 to $10,000, and the threshold for NFTL filing was increased for cases systemically transferred from the IRS's Automated Collection Sites to the Field Collection Queue. Thus, after these policy changes there were more cases in the IRS's collection inventory where an NFTL had not been filed.

[1] The views and opinions presented in this paper reflect those of the authors. They do not necessarily reflect the views or the official position of the Internal Revenue Service.

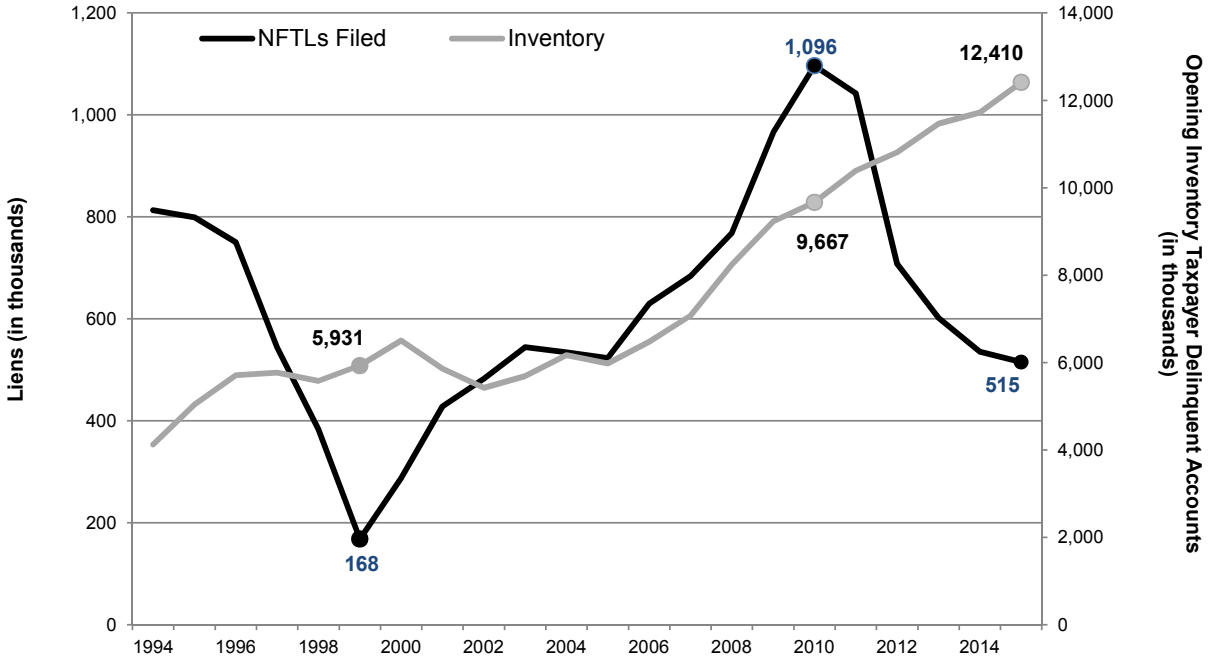
[2] That is, in a generally automated way.

The IRS relies on the NFTL as a means of protecting its security interest in the assets of taxpayers who owe delinquent taxes. Without the protection afforded by the NFTL, the IRS may not adequately establish its priority over financial institutions and other secured creditors for the equity that taxpayers have in their assets and that may be liquidated in order to satisfy their debts. In addition, the NFTL is a public document that can show up on the taxpayer's credit history.

A single NFTL document may list amounts associated with several tax returns or assessments. The NFTL is in force until all the unpaid amounts have been resolved or the collection statute has expired (typically 10 years). Thus, unlike sending a taxpayer a letter or issuing a levy, the NFTL may have a longer and/or delayed effect in terms of facilitating resolution of the unpaid amounts.

Figure 1 shows trends in NFTL filing based on data from the *IRS Data Book*, published by Statistics of Income. The number of NFTLs filed in the last 20 years hit a high of just over 1 million in 2010. The number of NFTLs filed each year has steadily decreased since 2010 to approximately 515,000 in 2015. While the number of NFTLs filed decreased, the inventory of delinquent accounts has continued to increase, with over 12 million delinquent accounts in 2015.

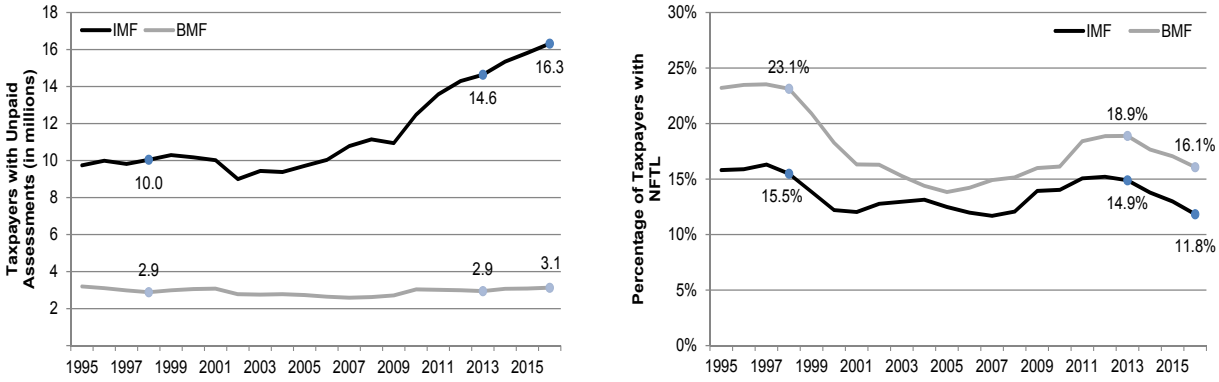
FIGURE 1. Number of Notice of Federal Tax Liens and Taxpayer Delinquent Accounts Per Year



Source: IRS, Statistics of Income Division, *IRS Data Book*, 1994–2015.

Figure 2 provides information on taxpayers with unpaid assessments for Calendar Years 1995–2016 using data from the IRS Accounts Receivable Dollar Inventory. The charts show the number of taxpayers at the beginning of each calendar year with at least one unpaid assessment, along with the percentage of those taxpayers with an NFTL. In 1998, the same year as the IRS Restructuring and Reform Act, the percentage of Business Master File (BMF) and Individual Master File (IMF) taxpayers with an NFTL was at 23.1 percent and 15.5 percent, respectively. The rate of taxpayers with an NFTL dipped after 1998, with a slight upswing until about 2011, but has never rebounded to the levels observed prior to the IRS Restructuring and Reform Act. Recall that in 2011 the IRS introduced the Fresh Start initiative increasing the NFTL filing thresholds. After that change, the percentage of taxpayers with an NFTL decreased for both BMF and IMF taxpayers to 16.1 percent and 11.8 percent, respectively. As of the beginning of 2016, we have observed the number of BMF taxpayers remains relatively stable over time while the number of IMF taxpayers with delinquent accounts is increasing.

FIGURE 2. Taxpayers with Unpaid Assessments and the Percentage with a Notice of Federal Tax Lien, Beginning of Calendar Years 1995–2016



Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory IMF and BMF Module Tables. Data Extracted May 2016.

Previous Research

We organize the discussion of the previous research on the NFTL around the direct and the indirect impacts on resolving unpaid delinquent tax liabilities, the impact of the NFTL on the taxpayer, the impact of the NFTL on IRS resources, and comparing the NFTL treatments.

Impact on Delinquent Tax Liabilities

What impact does the NFTL have on resolving a taxpayer's delinquent tax liabilities both in terms of reducing amounts currently owed and/or reducing additional unpaid assessments? Most of the empirical research has focused on addressing the direct impacts of NFTL filing on resolving delinquent liabilities. Most of the studies have taken an "entity approach," looking at total entity unpaid amounts and estimating the impact that a filed NFTL has on reducing the entity's unpaid balance. An exception is the Taxpayer Advocate Service (TAS) (2012) study, which both estimates and separates the impact of the NFTL on resolving current amounts from the impact on payments of future amounts/accrual of additional unpaid assessments.

The majority of the empirical evidence suggests that NFTL filing increases the number of cases resolved and/or dollars collected or resolved.SB/SE Research—St. Paul (2002) is a broad empirical study. That study looked at the NFTL filing impact on all types of unpaid assessment and did not focus specifically on one treatment status or population segment. The authors use historical data from 1996 to 1999 to estimate the impact of the rate and timing of NFTL filing on all types of unpaid assessments. The study uses an instrumental variable approach to create exogenous measures of the NFTL filing rate and also controls for how early the NFTL is filed in the life of an unpaid account. This study has the advantage that the data used was from a time period when policy and enforcement budgets were controlled at the local district level. This provides variation in the use of the NFTL over time and across the different districts' offices. Thus, the authors use district office and the year as instruments for NFTL filing. The authors find that NFTL filing increases the likelihood of taxpayers resolving their delinquent tax liabilities. The results suggest a larger NFTL impact on business taxpayers and taxpayers with income generated from assets. The study results suggest that the impact of the NFTL is larger the earlier the NFTL is filed. The authors use the estimated models to simulate a 10-percent increase in the NFTL filing rate. Based on the simulation, the authors calculate that filing an additional 100 NFTLs would result in about 11 more taxpayers resolving (fully or partially) their balances and just under an additional $3,000 dollars resolved per additional filed NFTL.

Studies subsequent to SB/SE Research—St. Paul (2002), looking at both historical and experimental data, have, for the most part, been consistent with the hypothesis that NFTLs have a positive impact on resolving delinquent balances. The results from the two previous field studies using randomized NFTL filing have been consistent with the notion that NFTLs have a positive impact on resolution. As typical with field experiments, these studies focus on a narrow population and may not generalize well to other populations.

SB/SE Research—St. Paul (2006) studies the impact of the NFTL on cases identified by a predictive model as likely to be Currently Not Collectible (CNC). The findings support the notion that NFTLs have a larger impact on cases that are more collectible and have a lower balance. Specifically, the authors find a significant impact of NFTL filing on the potential CNC cases with balances under $25,000. The authors found that in IMF cases in the study that had lower CNC scores (i.e., were more collectible) and a balance due between $5,000 and $25,000, the NFTL resulted in 10 percent more cases fully or partially resolving their outstanding balance due, with the average change in balance due decreasing by roughly $160. For BMF employment tax cases, the authors found that 7 percent more cases fully or partially resolved their outstanding balance due, with the average change in balance due decreasing by roughly $500. The study also helps to validate the estimates from the 2002 SB/SE study. The authors used estimated NFTL marginal effects from SB/SE Research—St. Paul (2002) as a predictor variable. The authors found that the higher NFTL estimated marginal effect from SB/SE Research—St. Paul (2002) was associated with a larger impact of the NFTL.

SB/SE Research—Denver (2014) is another field experiment that finds NFTL filing positively affects resolution. This study is relevant (to the ACS cases being transferred to the queue) as it looks at cases that are in the queue and not being actively worked. The results suggest that filing an NFTL on cases generates taxpayer contacts and resolutions. The study finds that, per additional filed NFTL, 2.7 percent more IMF and 0.2 percent more BMF taxpayers fully or partially resolved their outstanding balance due. The study also finds an increase in dollars resolved of roughly $11,000 for IMF taxpayers and a decrease in dollars resolved of roughly $1,100 for BMF taxpayers. However, the study failed to take into account case age for BMF taxpayers (e.g., defunct businesses), biasing the estimates. In addition, these cases had balances in excess of $100,000, and are not as relevant to the cases impacted by the Fresh Start initiatives.

Other studies have shown that the impact of NFTLs on getting taxpayers to resolve their unpaid assessments is, arguably, larger on a case with a smaller balance. This would seem to support the notion that the NFTLs would be effective on those cases in the $10K–$25K range. The field experiment on the queue cases also demonstrates that NFTLs are more effective on taxpayers who have income and/or assets, consistent with the findings from SB/SE Research—St. Paul (2002). Also, the 2014 field study provides evidence that using codes set up to classify the reason for a payment (Designated Payment Codes) will not capture the impact of the NFTL. The authors defined several "NFTL-related" Designated Payment Codes. They found that there were fewer payments with NFTL-related Designated Payment Codes associated with the test cases where the NFTL was filed than with the control group cases where the NFTL was not filed.

There have been additional studies that have used historical data to estimate the direct impacts of the NFTL, each with varying success. SB/SE Research—Denver (2011, DEN0113) re-estimated the models in the 2002 study with new data, but also with a different method of data construction. The endogeneity of NFTL filing was problematic because the authors used data from more recent times where NFTL filing policy and budgets were more centrally controlled and varied less. Thus, finding appropriate instruments for the NFTL filing model was difficult. Also, the data were constructed as a hybrid of a cross section and a cohort study, thus making it more difficult to apply the results to the population of taxpayers with delinquent tax liabilities. The study finds results similar to the 2002 study. However, the variables to control for when the NFTL was filed were not consistently included, so inferences on the impact of delay or acceleration of NFTL filing are incomplete.

The TAS (2011) study provides some evidence for IMF taxpayers that contradicts the historical econometric studies and the field test studies. The authors break the impact of NFTL filing into the impact on the current liabilities and the impact on the taxpayer's accruing additional liabilities, rather than on the total liabilities, as most of the other studies do. The TAS (2011) study finds that NFTL filing decreases the likelihood of resolving the current liabilities, but reduces the taxpayer propensity to accrue new liabilities. The authors don't assess the net effect on payment compliance, so it is difficult to compare this to the other studies that examined resolution at the entity level.

There are a couple of issues with the methodology used in TAS (2011) that should be kept in mind. One is that the propensity score methodology is appropriate to control for selection bias, but may not necessarily ensure that we have an exogenous measure of NFTL filing. This is problematic, as the population studied was

limited to a single cohort of IMF taxpayers who did not have previous unpaid assessments, and thus were new cases. The subsequent accrual of additional modules is likely a major factor in the determination to file the NFTL. Thus, the endogeneity of NFTL filing might be driving the results.

In addition, TAS (2011) defined the resolution of the current liabilities as a reduction in assessed tax, penalty, and interest on the current modules. This implies that if a taxpayer had multiple modules and was making payments, it is possible that the payments were being applied to the older module accruals. One would not see a reduction in the assessed amounts, but the entity unpaid balance could be going down. This is a minor issue in this study since the authors started with a cohort of taxpayers who did not have prior unpaid assessments; thus it is unlikely that this is significantly impacting the result since most taxpayers in this study would not have had multiple modules. However, it would impact the findings if the methodology were expanded to taxpayers with multiple assessments. Also, the impact of the NFTL may not be captured fully if the taxpayer is directing the payments to a specific, more recent module.

A study conducted by the IRS Office of Program Evaluation and Risk Analysis (OPERA) (2013) closely relates to our study as it also looks at the Fresh Start period. This study uses the policy changes that occurred as part of the Fresh Start initiative as a "natural experiment" or pilot regarding NFTL filing. As in our study, the authors use data from ACS transfers to the queue 6 months before and 6 months after the policy change and then compared resolution. Prior to the policy change the majority of ACS cases with balances between $10,000 and $25,000 had NFTLs filed when they were transferred to the queue. After the Fresh Start policy change, almost none of the cases had NFTLs filed. Policy changes were also implemented for the field resulting in fewer NFTLs being filed. However, the data suggest that these NFTLs were filed on (arguably) the more problematic cases. This fact exacerbates the endogeneity problem and makes it difficult to view the field changes as a "natural experiment." However, the results for the ACS cases are relevant.

Table 1 summarizes simple comparisons of pre- and post-Fresh Start for cases that ACS transferred to the queue. The simple comparison shows a decline in the percentage of taxpayers resolving their balances after Fresh Start. Arguably, this decline resulted from a lack of NFTL filings on these cases.

TABLE 1. Summary of Results from Fresh Start Initiative ACS Lien Policy Changes: Percent Fully or Partially Resolving, Pre- vs. Post-Initiative

	Balance Level	Pre-Fresh Start with NFTL	Post-Fresh Start without NFTL
IMF	$5K–$10K	26%	19%
	$10K–$25K	26%	18%
BMF	$5K–$10K	35%	22%
	$10K–$25K	34%	21%

Source: Office of Program Evaluation and Risk Analysis, 2013, *Fresh Start Lien Analysis Executive Summary*, Figures 1 and 2.

In OPERA (2013), the authors use an econometric model to estimate the impact of the forgone NFTLs for the ACS cases. The regression analysis used the percentage change in the balance as the dependent variable. For the BMF cases, the estimates are consistent with the simple comparison: fewer cases are resolving their balances because of not filing the NFTLs. However, they find the opposite for IMF cases. This result is puzzling, as the simple comparison suggest that a higher percentage will resolve when the NFTL is filed. Our analysis helps to reconcile the regression results to the before-and-after comparison. It could be that some cases have very large percentage increases in the pre-Fresh Start era, so that more cases are resolved, but the average percentage increase is larger. We modify this research by backing-out additional assessments stemming from already identified delinquent returns. It could be that filing the NFTL results in the taxpayer making contact, and this can result in additional assessments from secured returns. In such a situation the taxpayer is not accruing additional liabilities. Rather, the balance is going up due to already identified filing noncompliance, and the taxpayer is becoming "more complaint." This narrative is supported by the SB/SE Research—Denver (2014) field test that NFTL generated taxpayer response, especially on cases with "Substitute for Return" assessments. Thus, we don't include new assessments for previous tax periods when we analyze resolution of the balance.

Impact on Payment Compliance Behavior

What impact does NFTL filing policy have on overall payment compliance behavior among taxpayers where the NFTL is not yet filed? There is very little research that has addressed general indirect effects. Most of experimental methodologies essentially preclude the estimation of indirect effects by isolating the impact of the treatment in a small test group. One can argue that SB/SE Research—St. Paul (2002) includes indirect effects. The NFTL filing rate captured through the instrumental variable equation, all else equal, is the same value for cases with or without an NFTL. This arguably captures indirect effects of NFTL filing, and thus direct effects were captured by the age of the case when filing the NFTL. Furthermore, the variation in NFTL filing policy over time and across the district offices is used in the 2002 study to identify the NFTL effects.

Many of the other studies use a single cohort of cases or a very limited sample and have limited variation in filing policy. This makes the indirect effect hard to identify. Clearly this is an area where more research is needed. Variation in NFTL filing over time could be further leveraged to estimate indirect effects, perhaps focusing on the NFTL filing rate in subsequent treatment streams and estimating the impact on resolution "upstream." However, small-scale studies involving randomized test and control groups will not likely be successful in estimating indirect effects since the study design minimizes contamination between test and control groups.

Impact on the Taxpayer

How does the NFTL impact the taxpayer? The filing of an NFTL can impact the taxpayer in many ways. The filing makes the tax debt public information, so it can impact the taxpayer credit report and credit score. Various reports from the National Taxpayer Advocate have referenced an unpublished estimate of as much as a 100-point reduction in a taxpayer credit score due to an NFTL being on file. This reported impact is somewhat large given the range of credit scores (e.g., 300 to 850 for a FICO score). However, OPERA (2014) reports a much smaller impact. OPERA contracted with Experian to calculate the impact of the NFTL on the Experian Advantage score. Experian calculated an average drop of less than 5 points. Those with no previous NFTL had an average drop of just less than 7 points. Also, for the taxpayers with higher scores, there was less of an impact. The larger impacts were for taxpayers in subprime and deep subprime range. These taxpayers would have very little access to credit. Another interesting finding is that Experian reported that for about 40 percent of the cases with an NFTL filing, the NFTL did not show up on the credit report within 90 days. Obviously, the NFTL will not influence the credit score until the NFTL shows up on the credit report. The results of the study also show that cases where an NFTL was filed tended to have lower scores than cases where an NFTL was not filed. In other words, other factors on the credit report are driving the taxpayer credit score irrespective of the NFTL.

A few studies have explored Collection Due Process (CDP) appeals resulting from NFTL filing. Studies find a modest rate of appeal filing, in the neighborhood of 2 to 3 percent. SB/SE Research—St. Paul (2006) finds that in 2.5 percent of cases where NFTLs were filed, the taxpayer filed a CDP appeal. SB/SE Research—Denver (2011) also finds about a 2-percent rate of taxpayers filing a CDP appeal.

One hypothesis that has been explored is that the NFTL limits the taxpayer's ability to earn income in the future and thus reduces the taxpayer's ability to pay delinquent tax liabilities. TAS (2011) estimates the impact of NFTL filing on subsequent income (Total Positive Income) for IMF taxpayers. TAS found the NFTL filing was associated with a 5.2-percent to 7.9-percent decline in income, depending on the period studied. It is not clear if this estimate is an annual rate of decline or aggregate over the years studied. Thus, it is not clear how to interpret this estimate. If it is an annual rate of decline, the estimate seems quite large. Based on the estimates and the assumption that the reported amount is the total impact, the interpretation is that the NFTL is associated with an initial negative impact on income, and then income rises in the later years. This presupposes that the NFTL filing causes the income decline, and not vice versa. It is quite possible that the decline in income preceded or coincided with the NFTL filing.

Costs of Filing the NFTL

What are resource costs of filing the NFTL, and how do those costs compare to the direct and indirect benefits of NFTLs? The NFTL fees average around $25 per NFTL based on data from IRS collection reports. In Fiscal Year 2014, the IRS spent just over $15 million on filing fees. Most NFTLs are generated either systemically or electronically. Filing NFTLs creates the potential for CDP appeals in about 2 percent of the cases.[3] While the total costs have not been fully quantified, average direct resource costs of NFTLs are likely in the "ball park" of $100 per NFTL. The SB/SE Research—St. Paul (2002) study calculates almost an additional $3,000 resolved per NFTL, which would put the direct benefit-to-cost ratio in the neighborhood of 30 to 1. SB/SE Research—St. Paul (2006) estimates that IMF-refiled NFTLs[4] provided an additional $40.6 million in payments while generating an estimated $2.9 million in costs (fees, staff, and overhead). This corresponds to an average return of about 14 to 1. It seems reasonable that the return on investment would be lower for refiled NFTLs than for original NFTLs, as these NFTLs are being refiled to cover a few years of the extended statute, whereas the original NFTL filing covered the majority of the (10-year) collection statute period. Refiling is most often associated with cases in bankruptcy or litigation.

Comparison of the NFTL to Other Treatments

How does the NFTL compare to or complement other treatment alternatives? The NFTL is a tool for various potential treatment streams of unpaid assessments and is used in combination with a multitude of treatment paths through the collection process. The NFTL is different than many other treatments in the sense that, once filed, it remains in place until the underlying balances are resolved or expire. Many other treatments (notices, levies, field visits) have to be periodically "reapplied" if the taxpayer does not respond or the taxpayer's ability to pay changes over time.

SB/SE Research—Denver (2014) tested, for large dollar cases in the Field Collection Queue, the impact of sending an additional letter to taxpayers warning them of a potential NFTL filing. For both IMF and BMF cases, sending the notice before the NFTL resulted in an increase in the number of taxpayers resolving their liabilities (approximately a 1-percentage point difference for IMF and a 3-percentage point difference for BMF). For IMF, there is also a larger percentage reduction in the balance when sending a letter before an NFTL filing (3.5 percent with an NFTL alone vs. 4.8-percent reduction in the balance with a letter sent before an NFTL filing). For BMF, the average balances increased across study groups, but actually increased more with an NFTL alone and the most with a letter sent before an NFTL filing. The cases in this study differed from ACS systemic transfers. ACS would have most likely had a recent attempt to contact the taxpayer with one or more ACS treatments, whereas cases in the queue may not have been contacted recently.

Empirical Model

We develop an empirical model of accounts receivable resolution using an approach similar to previous studies for the purpose of evaluating different policies for NFTL filing.[5] The resolution model is defined as a function of, among other things, characteristics of the NFTLs that are in force on the returns with outstanding balances. The resolution is measured at the taxpayer (case) level, as opposed to the aggregate balance for individual tax years. Modeling the behavior of the entity more accurately reflects the experience of ACS and Collection Field Function personnel as they receive and process their casework. More importantly, a single NFTL can cover a number of outstanding balances for different tax years.

Accounts receivable can be measured in both the dollar value and the number of taxpayers involved. Thus, resolution is defined in two ways for the purpose of this research. First, we define resolution as an ordinal variable representing the change in the entity balance for the given time period. This dependent variable takes on three discrete values that represent: (a) an increase in the entity balance; (b) a decrease in the entity balance that is not sufficient to fully resolve all modules; and (c) a decrease in the entity balance that fully resolves all

[3] Taxpayers can file a CDP appeal only the first time a statutory lien is listed on an NFTL document. An NFTL document can have up to 15 statutory liens listed, and a statutory lien may be listed on multiple NFTLs.

[4] NFTLs are refiled to cover the extended or suspended collection status of a particular lien for an assessment.

[5] SB/SE Research—St. Paul (2002), Turk and Ashley (2002), SB/SE Research—St. Paul (2006), SB/SE Research—Denver (2011), SB/SE Research—Denver (2014), OPERA (2013).

modules. Second, we define resolution as the change in a taxpayer's outstanding balance for a given time period. We model the change in dollar value of the entity balance due in IRS accounts receivable.

Specifications

We specify models for resolution, r_{it}, and the change in the (natural log) entity balance due, Δb_{it}.

Let b_{it} be the natural log of the entity balance for taxpayer *i* at time *t,* and let b_{it-1} be the natural log of the entity balance[6] for taxpayer *i* at time *t-1*. We define the ordinal variable r_{it} as

$$r_{it} = \begin{cases} 0 & if\ b_{it} \geq b_{it-1} \\ 1 & if\ b_{it} < b_{it-1}, b_{it} \neq 0 \\ 2 & if\ b_{it} = 0\ . \end{cases} \tag{1}$$

We assume that the probability of r_{it} is determined by assignment values for r_{it},

$$P(r_{it} = 2) = F(x_{it-1}\alpha), \tag{2}$$

$$P(r_{it} = 1) = F(x_{it-1}\alpha + c) - F(x_{it-1}\alpha), \tag{3}$$

$$P(r_{it} = 0) = 1 - F(x_{it-1}\alpha + c). \tag{4}$$

where x_{it-1} again is a vector of characteristics for taxpayer *i* including an indicator of an NFTL being filed, α is a vector of associated parameters, *c* is a threshold value, and *F* is the logistic cumulative distribution function. The parameters α and *c* are unknown but can be estimated using the logistic model procedure. Since we are treating the change in the NFTL threshold as a natural experiment, we include an NFTL dummy variable to capture the impact of the NFTL, and we don't need to employ methodology to make the NFTL filing measures exogenous (e.g., an instrument variable approach).

We can define the change in entity balance due as

$$\Delta b_{it} = b_{it} - b_{it-1}\ . \tag{6}$$

We assume that the change in the entity balance can be modeled as

$$\Delta b_{it} = x_{it-1}\beta + \varepsilon_{it}\ . \tag{7}$$

The balance at time *t* cannot be less than zero. This results in left censoring of the change in balance at $-b_{it-1}$. In such a situation, the Ordinary Least Squares (OLS) estimates are inconsistent, the slope is upward biased, and the intercept is downward biased. A Tobit estimate using maximum likelihood estimation is consistent.

The parameters β_i reflect the marginal impacts of each variable on the latent variable. The marginal impact on the change in natural log of the balance is given by:

$$\frac{\partial \Delta b_{it,}}{\partial x_{ijt-1}} = \beta_j \Phi\left(\frac{(X_{it-1}\beta)}{\sigma_U}\right)$$

Where x_{ijt-1} is a specific element of the X_{ijt}, $\Phi()$ is the normal distribution function, and σ_U is the scale parameter.

[6] We add $1 to the balance so that the natural log is defined.

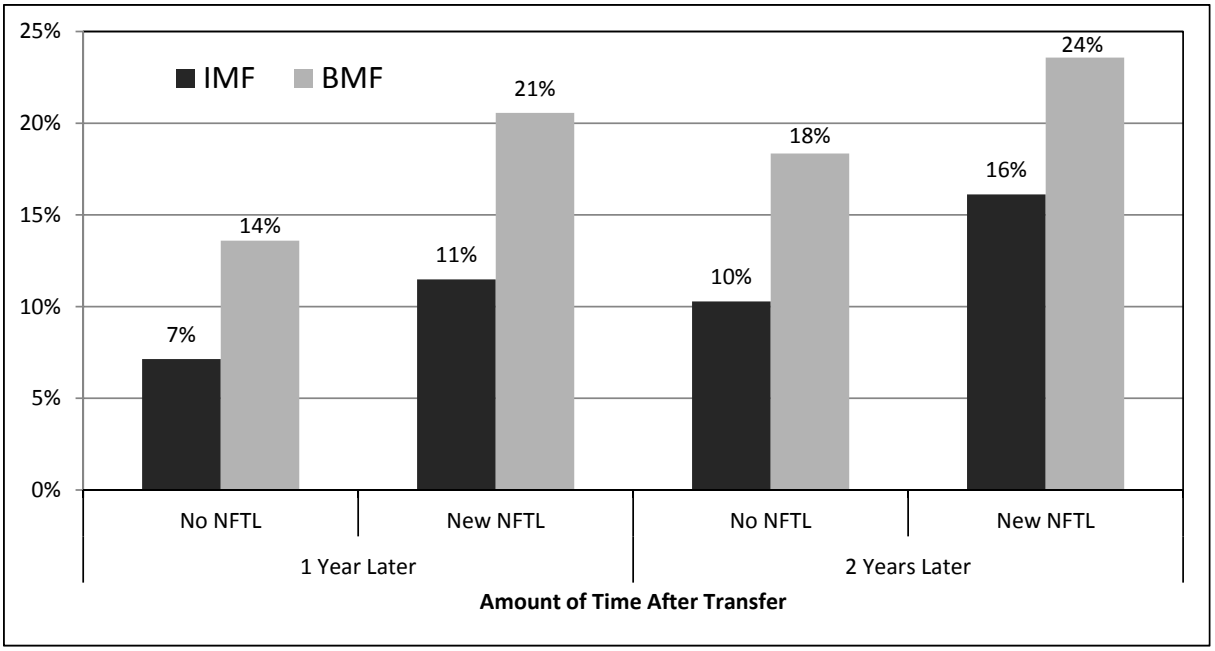
We follow a similar approach to look at the change in the balance over a 2-year time horizon, resolution, and the change in the balance between *t-1* and *t+1*.

Data

The data for this research were constructed from IRS Accounts Receivable Dollar Inventory (ARDI) data. The data were compiled for cases where ACS requested a transfer to the Field Collection Queue within 6 months of the Fresh Start changes. In addition, the cases were limited to those without an existing NFTL at the time of transfer. Using these criteria, we identified 56,116 IMF taxpayers and 4,488 BMF taxpayers. Of these taxpayers, 51 percent of IMF and 62 percent of BMF cases resulted in a new NFTL filed at the time of transfer.

The balance in each subsequent year was merged back to the data to determine the annual amount of change in the total balance. The balance computed at each subsequent year omitted any new assessments after transfer coming from previously delinquent returns (any tax periods ending prior to December 31, 2009). These assessments likely came from noncompliance (delinquent returns) that already existed prior to the transfer. Figure 3 provides the percentage of IMF and BMF cases that had at least one assessment omitted from the calculation of outstanding balance, and Figure 4 illustrates the distribution of the omitted balance due.

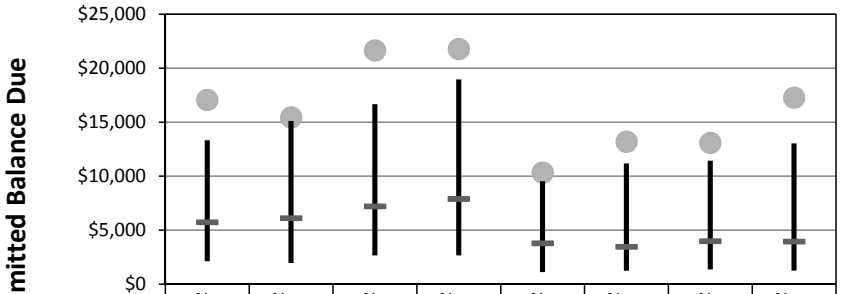
FIGURE 3. Percentage of Taxpayers with New Assessments After Transfer from Previous Tax Years



Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data Extracted May 2016.

The distribution of the omitted balance due is consistent within each population. The average amounts are higher than the median and 75th percentile values, suggesting there are some outliers with large amounts of omitted balance due.

FIGURE 4. Summary of the Omitted Balance Due



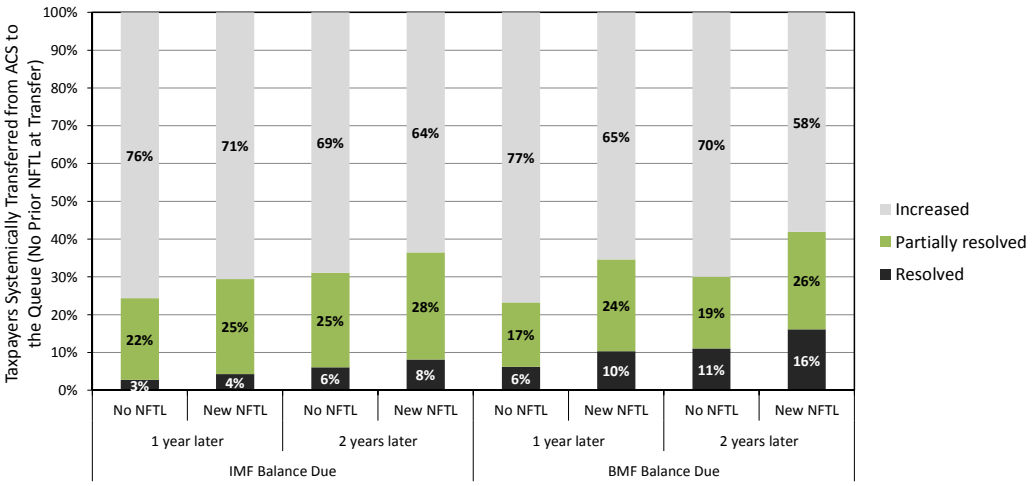
	IMF				BMF			
	No NFTL	New NFTL	No NFTL	New NFTL	No NFTL	New NFTL	No NFTL	New NFTL
	1 Year Later		2 Years Later		1 Year Later		2 Years Later	
Average	$17,069	$15,450	$21,649	$21,776	$10,326	$13,193	$13,090	$17,267
25th Percentile	$2,124	$1,953	$2,664	$2,655	$1,114	$1,246	$1,358	$1,257
Median	$5,720	$6,100	$7,197	$7,873	$3,775	$3,453	$3,971	$3,935
75th Percentile	$13,319	$15,107	$16,666	$18,961	$9,528	$11,175	$11,436	$13,035

Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data Extracted May 2016.

Resolution is defined as decreasing the outstanding balance. The outstanding balance may go up because of any of the following reasons: 1) the taxpayer is making no payments, or the payments don't cover the additional interest and penalties for the year; 2) the tax due on previously filed returns may have been increased as a result of an audit, but not have been fully paid at the conclusion of the audit; or 3) the taxpayer may be filing current returns without paying all the tax reported.

Figure 5 provides the percentage of cases that resolved, partially resolved, or increased their balance due 1 and 2 years after ACS transferred the case to the queue. For both IMF and BMF, cases that received an NFTL at transfer had a higher percentage of cases reducing their balance due. For example, 29 percent of the IMF cases receiving an NFTL reduced their balance due 1 year after transfer, compared to 25 percent without an NFTL. Two years after transfer, the difference for IMF remains the same, with both categories seeing an increase of 7 percent in cases reducing their balance due. We found similar results for BMF; after 1 year, 35 percent of the BMF cases receiving an NFTL reduced their balance due, while only 23 percent without an NFTL reduced their balance due. Similar to IMF, after 2 years, the difference for BMF remains the same, with both categories seeing an increase of 7 percent in cases reducing their balance due.

FIGURE 5. Change in Balance Due After ACS Systemic Transfer to the Queue

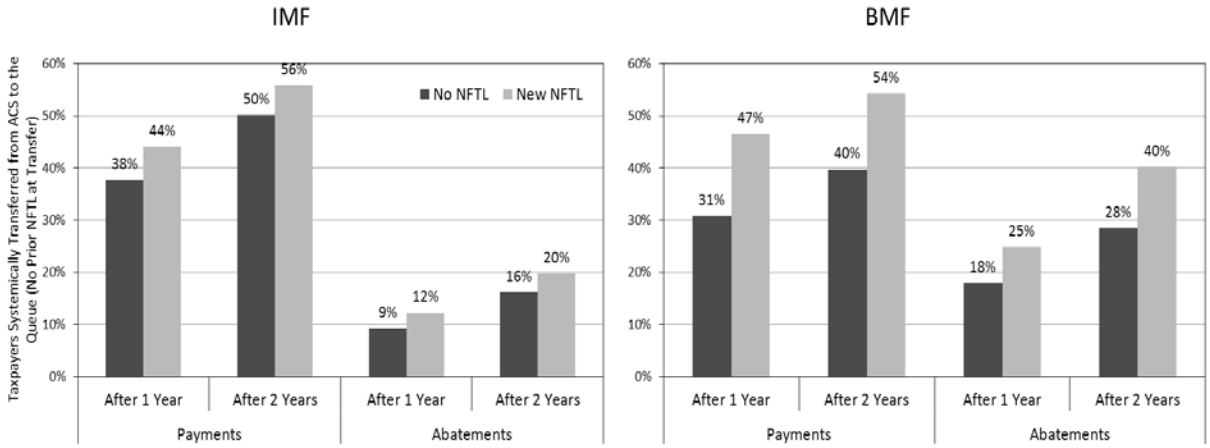


Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data exported May 2016.

NOTE: Percentages may not add to 100 percent due to rounding.

As mentioned before, the balance due may have been reduced after transfer via payments and/or abatements. Figure 6 provides the percentage of cases that made a payment or had an abatement within 1 or 2 years after ACS transferred the case to the queue. Cases receiving a new NFTL had a higher percentage of payments and abatements after transfer. The percentages are higher for all taxpayers within the first year following transfer. Both payments and abatements are important in resolving the outstanding balance, and we treat them equally in our analysis. Abatements are typically the result of the taxpayer corresponding with IRS and providing information that can be used to adjust the tax, interest, and/or penalties on the account (e.g., the taxpayer submits a return for a tax period where the IRS made a "substitute for return" assessment).

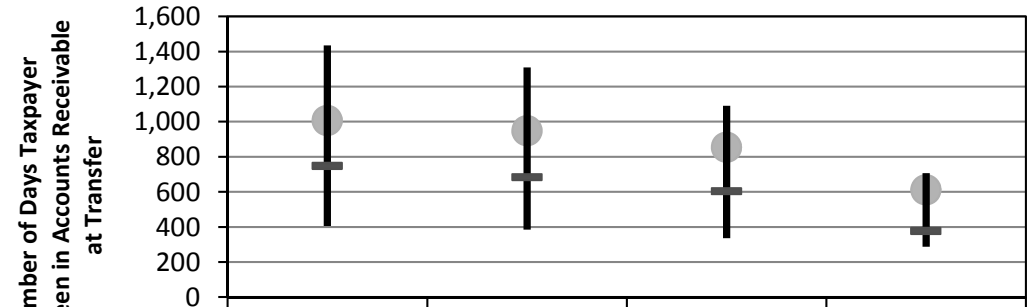
FIGURE 6. Payments and Abatements After ACS Systemic Transfer to the Queue



Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data extracted May 2016.

Cases receiving an NFTL were similar to those that did not. Figure 7 provides the number of days the taxpayer had been in Accounts Receivable at the time of transfer, (with an outstanding balance due) by type of case and NFTL. For IMF, the median and average days in Accounts Receivable are similar, while the BMF cases have a slight difference between those with or without an NFTL.

FIGURE 7. Number of Days in Accounts Receivable at Transfer

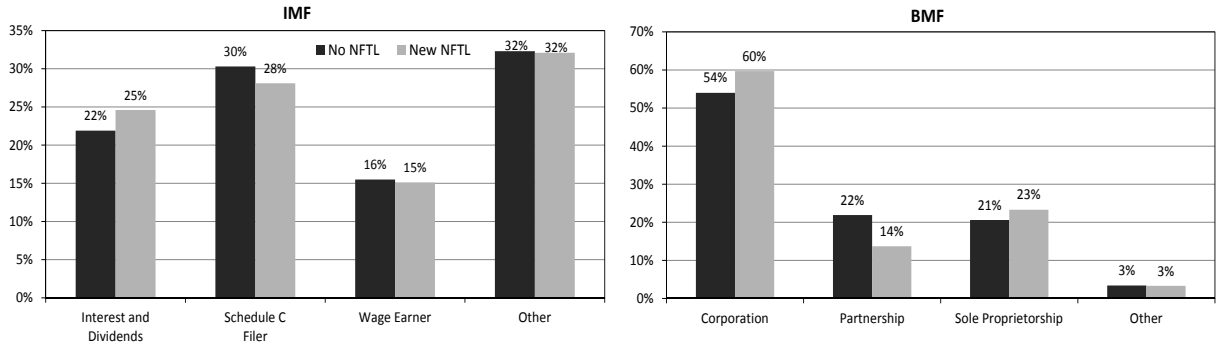


	IMF		BMF	
	No NFTL	New NFTL	No NFTL	New NFTL
Average	1,006	948	854	611
25th Percentile	406	385	336	287
Median	749	686	606	378
75th Percentile	1,435	1,309	1,091	707

Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data Exported May 2016.

In addition, the types of taxpayers or entities across groups were consistent. Figure 8 provides a summary of the types of taxpayers for IMF and BMF along with those with or without a new NFTL. Percentages were similar between those with or without a new NFTL for each type of taxpayer.

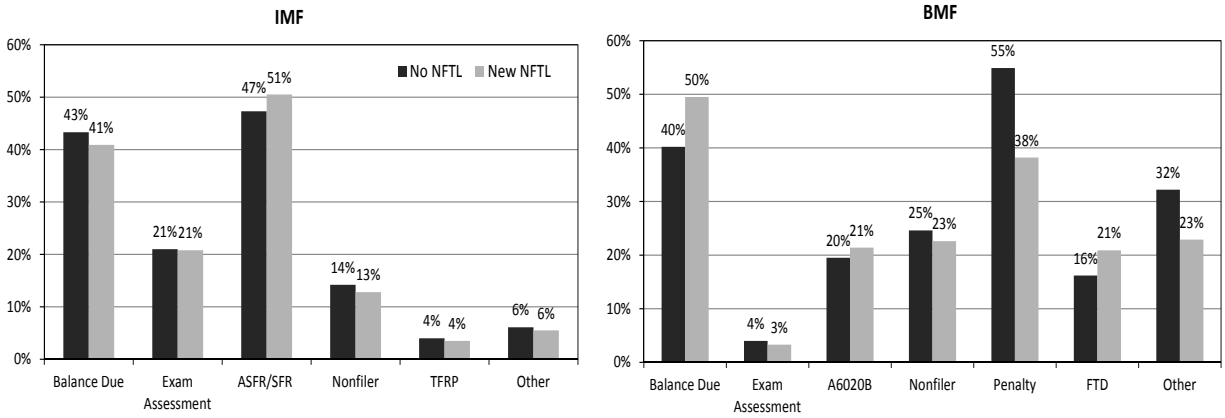
FIGURE 8. Major Source of Income at the Time of Transfer



Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data Exported May 2016.
NOTES: For IMF, "Other" includes taxpayers filing a Schedule F (Farm Income), Schedule D (Capital Gains), and other.
For BMF, "Other" includes Estate/Gift tax, exempt organizations, Federal filers, State or Local Governments, and other.

Along with taxpayer type, we also looked at the variety of major sources of assessment each taxpayer had at the time of transfer. A taxpayer may have one or many types of assessments; therefore, in Figure 9, a taxpayer may be in one or more of the assessment categories. For both IMF and BMF, the rates of each assessment are similar between those with and without a new NFTL. For IMF, Balance Due and ASFR/SFR assessments were most common. We found 47 percent of those with no NFTL and 51 percent of those with a new NFTL had at least one ASFR or SFR assessment. For BMF, Balance Due and Penalty assessments were most common. We found 40 percent of those with no NFTL and 50 percent of those with a new NFTL had at least one Balance Due assessment.

FIGURE 9. Major Sources of Assessment at the Time of Transfer



Source: Compliance Data Warehouse, Accounts Receivable Dollar Inventory Individual and Business Module Tables. Data Extracted May 2016.

Model Estimates

Based on the methodology and the data description provided in the previous sections, we estimate and report the results of Logistic, OLS, and Tobit regressions in this section. The objective of this research paper is to determine the impact of the NFTL on outstanding tax balances for both Individual and Business taxpayers. Therefore, we report the parameter estimates corresponding to the NFTL indicator in the following table. The regression coefficients for other control variables are reported in the appendix.

TABLE 2. Parameter Estimates and Marginal Effects for the Notice of Federal Tax Lien

Model	Time Period	Individual Cases (IMF)		Business Cases (BMF)	
		Parameter Estimate	Marginal Effect	Parameter Estimate	Marginal Effect
Logistic Model of Full, Partial or No Resolution	1 year	0.304 (0.020)	0.056	0.438 (0.074)	0.084
	2 years	0.278 (0.019)	0.059	0.421 (0.069)	0.090
OLS Model of the change in the Ln(Balance)	1 year	-0.224 (0.017)		-0.383 (0.094)	
	2 years	-0.331 (0.023)		-0.597 (0.113)	
Tobit Model of the change in the Ln(Balance)	1 year	-0.231 (0.017)	-0.231	-0.406 (0.103)	-0.404
	2 years	-0.355 (0.025)	-0.355	-0.672 (0.133)	-0.649

NOTES: Standard Errors are provided in parentheses. All estimates significant at the 0.01 level. Marginal effects are calculated as the average marginal effect for the cases in the study.

In Table 2, we find all the regression coefficients corresponding to the NFTL indicator have a positive and significant impact on reducing the balance. These results suggest that an NFTL has a consistent positive impact in reducing or resolving the taxpayer's outstanding balances. These estimates are generally consistent with many of the econometric studies and most of the field experiments relating to NFTL filing. The estimates are directionally consistent with SB/SE Research—Denver (2014), SB/SE Research—St. Paul (2006), and SB/SE Research—St. Paul (2002). The reduction in balance may be due to partial or full payment of the outstanding balance. The estimated magnitude of the effect is consistently larger for BMF cases when compared to IMF across all of the models. Additionally, the impact is greater over the longer time horizon (2 years after filing an NFTL compared to 1 year) for both the IMF and BMF cases.

Based on the logistic regressions, the likelihood of full or partial resolution due to the filing of an NFTL for IMF and BMF cases increases by 6 and 8 percentage points respectively, within the 1-year time frame. In addition, the observed positive impact on the percentage of taxpayers fully or partially resolving their balance for IMF and BMF remains fairly constant between the 1-year and 2-year time frames.

The OLS estimates suggest that the filing of an NFTL reduces the taxpayer's balance by a substantial amount over both time horizons. IMF taxpayer balances are 22 percent lower over 1 year and 33 percent over 2 years. The impact on BMF taxpayers is larger, 38 percent over 1 year and 60 percent over 2 years. While these estimated impacts seem large, they appear to be reasonable given the simple comparison between those with and without an NFTL in Figure 5. Estimated dollar impacts per NFTL are provided in Table 3.

As stated earlier, there is left censoring of the change in balance variable at the initial observed balance. Therefore, we estimate Tobit regressions in addition to the OLS regressions. The marginal effects computed from the Tobit regressions are negative and slightly larger than the OLS estimates.

In general we see a persistent effect of the NFTL over time. However, a small subset of taxpayers may be "robbing Peter to pay Paul": resolving their liabilities where the NFTL is filed by not having appropriate withholding and payments on their current tax years. The 2-year time window more fully accounts for that behavior. It is worth noting, however, that part of the 2011 Fresh Start included provisions for expanding the situations where the NFTL could be withdrawn. Typically, liens are released after the unpaid balances have been satisfied, but the fact that the NFTL was filed may still be public record. A withdrawal essentially removes the NFTL as if it was never filed. Fresh Start included a provision where the NFTL could be withdrawn after the balances were satisfied or if the taxpayer owed less than $25,000 and entered into a direct debit payment

plan (and made three payments).[7] There is the possibility that the new withdrawal provision changed the impact of the NFTL, or possibly changed the dynamics of the taxpayer's response to IRS filing the NFTL. We do see taxpayers who resolve their balances within 1 year but then end up with unpaid taxes by the end of the second year. However, our data do not lend themselves to studying that impact since the NFTLs were filed shortly before the Fresh Start changes.

In order to illustrate the impact of the NFTL, we calculate what would have happened if the NFTLs were filed on cases (in our sample) that were transferred to the queue without an NFTL. These estimates are reported in Table 3. The estimates are derived from the Logistic and Tobit model parameters for the models of the resolution outcomes 2 years after the transfer. The estimates illustrate the marginal effects of the NFTL. We choose the 2-year observation period to display a more complete picture of the impact of the NFTL on payment compliance behavior. We calculate the marginal impact of filing an NFTL for each case without an NFTL and report the average estimated increase in taxpayers fully and partially resolving the balance (per 100 NFTL) and the average estimated increase in the dollars resolved (per NFTL). For IMF, we estimate that for every 100 NFTLs filed, an additional 1.8 taxpayers would fully resolve their balance within 2 years, and an additional 4.1 would have reduced their balance. For BMF, those estimates are 4.4 and 4.5 additional taxpayers fully and partially resolving, respectively. In addition, the dollars resolved would increase on average by $3,379 for IMF cases and $4,103 for BMF cases if the NFTL would have been filed. Although not for the same population, the estimated dollar impacts are very similar to the increase in dollars resolved of just under $3,000 that was reported in SB/SE Research—St. Paul (2002). In addition, the increase in the number of taxpayers fully or partially resolving are only slightly lower than the additional 11 taxpayers fully and partially resolving that were reported in the 2002 study.

TABLE 3. Forgone Liens: Estimated Impact on Cases and Dollars Resolved of Filing the NFTL on the Forgone Lien Cases—Two-Year Models

	Individual Cases (IMF)	Business Cases (BMF)
Increase in Taxpayers Fully Resolving per 100 NFTL	1.8	4.4
Increase in Taxpayers Partially Resolving per 100 NFTL	4.1	4.5
Increase in Dollars Resolved per NFTL	$3,379	$4,103

Source: Logistic and Tobit model estimates for the resolution and the change in the balance 2 years after the transfer to the Collection Field Queue, applied to the forgone lien cases.

Conclusions and Direction for Further Research

The models developed here support the hypothesis that increases in the NFTL filing thresholds (for cases that have not been resolved in the IRS call site, and are being transferred to the field queue for potential contact by a Revenue Officer) have a negative impact on the resolution of unpaid assessments for the individual and business accounts.

The results from this analysis are consistent with the majority of previous research that has reported the NFTL being an effective tool in resolving unpaid balances. The results are also consistent with other studies that suggest the NFTL has a persistent effect over time, but that even within a 1-year time horizon a reasonable estimate of the NFTL impact can be obtained.

While this research does not provide a broad base of evidence about the effectiveness of the NFTL, it provides incremental knowledge of the effectiveness of the NFTL and corroborates previous research. There are broader questions regarding the impact of the other Fresh Start changes and the impact of budget challenges within the IRS collection operations; however, those are beyond the scope of this paper, but are areas where additional research could be fruitful. Additional research on the impact of the withdrawal provisions, in par-

[7] For more information and the complete criteria see "Understanding a Federal Tax Lien" at https://www.irs.gov/businesses/small-businesses-self-employed/understanding-a-federal-tax-lien. Accessed May 2016.

ticular, is probably warranted. A larger-scale econometric study of all collection treatment options would allow the exploration of the relative effectiveness of treatment paths and also estimate direct and indirect effects of policy. Future research will also need to take into consideration that NFTLs are no longer being included on credit reports as of June 2016, which could alter their impact.[8]

The IRS initiated a pilot in March 2016, which will provide additional information regarding the effectiveness of the NFTL as a tool in resolving unpaid balances.[9] The pilot is testing three collection notice approaches in lieu of filing an NFTL in ACS. The pilot results should help to identify which approach produces the greatest impact, and the relative impact of an NFTL compared to the piloted collection notice approaches.

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Appendix

TABLE A1. IMF Parameter Estimates (with Standard Errors in Parentheses)

Model	1 year	2 years	1 year	2 years	1 year	2 years
	OLS		Tobit		Logit	
R-Squared / Log Likelihood	0.037	0.048	(118,001)	(134,698)		
NFTL Requested at Transfer	-0.224**	-0.331**	-0.231**	-0.355**	-0.304**	-0.278**
	(0.017)	(0.023)	(0.017)	(0.025)	(0.020)	(0.019)
Intercept (For Logit, Level 0)	-0.503**	-1.010**	-0.359**	-0.868**	1.461**	1.007**
	(0.028)	(0.038)	(0.030)	(0.043)	(0.048)	(0.044)
Intercept (For Logit, Level 1)					3.886**	3.003**
					(0.053)	(0.047)
Number of Years in Accounts Receivable	0.013*	-0.004	0.009	-0.010	-0.011	-0.040**
	(0.005)	(0.007)	(0.005)	(0.007)	(0.006)	(0.005)
Most Recent Taxpayer Income/ Total Balance Due	-0.010**	-0.010**	-0.054**	-0.073**	-0.035**	-0.035**
	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)
Taxpayer Income at Time of Transfer					0.165**	0.176**
					(0.049)	(0.046)
Net Payments in the Year Prior to Transfer					-0.000**	-0.000**
					(0.000)	(0.000)
Log of Net Payments in the Year Prior to Transfer	-0.062**	-0.095**	-0.060**	-0.097**		
	(0.003)	(0.003)	(0.003)	(0.004)		
Number of Modules Transferred	0.114**	0.218**	0.094**	0.201**	0.063**	0.100**
	(0.007)	(0.010)	(0.007)	(0.010)	(0.009)	(0.008)
Interest & Dividends Major Source of Income	-0.246**	-0.440**	-0.203**	-0.404**	-0.488**	-0.501**
	(0.020)	(0.028)	(0.021)	(0.031)	(0.029)	(0.026)
Schedule C Major Source of Income					-0.125**	-0.106**
					(0.039)	(0.036)
Wages Major Source of Income	-0.129**	-0.264**	0.003	-0.092*	-0.429**	-0.413**
	(0.025)	(0.034)	(0.027)	(0.038)	(0.042)	(0.039)
Sole-Proprietor Indicator	0.062	0.094	0.058	0.096	-0.077	-0.139*
	(0.051)	(0.070)	(0.053)	(0.076)	(0.060)	(0.055)
Self-Reported Balance Due Major Source of Assessment	0.129**	0.231**	0.185**	0.322**	0.010	0.043
	(0.024)	(0.033)	(0.025)	(0.036)	(0.032)	(0.030)
Exam and AUR Major Source of Assessment	-0.015	-0.044	-0.042	-0.085*	-0.120**	-0.116**
	(0.024)	(0.033)	(0.025)	(0.035)	(0.030)	(0.028)
Substitute for Return Major Source of Assessment	0.111**	0.191**	0.005	0.056	-0.012	0.027
	(0.026)	(0.036)	(0.028)	(0.040)	(0.037)	(0.035)
Nonfiler Major Source of Assessment					-0.140**	-0.101**
					(0.031)	(0.030)
Trust Fund Recovery Penalty Major Source of Assessment	-0.429**	-1.012**	-0.500**	-1.164**	-1.622**	-1.546**
	(0.051)	(0.070)	(0.053)	(0.076)	(0.062)	(0.059)
Other Major Source of Assessment					-0.199**	-0.199**
					(0.041)	(0.039)
Entity Had a Defaulted IA at T_0	0.217**	0.269**	0.222**	0.286**	-0.062*	-0.006
	(0.023)	(0.031)	(0.024)	(0.034)	(0.026)	(0.024)
Entity had a module in the Queue prior to T_0	0.001	0.044	0.005	0.054	0.088**	0.113**
	(0.023)	(0.031)	(0.024)	(0.034)	(0.029)	(0.026)
Entity had a module in CFf prior to T_0	0.058	0.078	0.068	0.096	0.060	0.027
	(0.038)	(0.052)	(0.039)	(0.056)	(0.047)	(0.043)
Entity had a Combo Case	-0.031	0.014	-0.037	0.012		
	(0.019)	(0.026)	(0.019)	(0.028)		
Sigma			1.990**	2.843**		
			(0.006)	(0.009)		

NOTES: Sample size: 56,116. Regression coefficients are rounded to the nearest three decimal places.
*Indicates significance at the 0.05 level in a two-tailed t-test.
** Indicates significance at the 0.01 level in a two tailed t-test.

TABLE A2. BMF Parameter Estimates (with Standard Errors in Parentheses)

Model	1 year	2 years	1 year	2 years	1 year	2 years
	OLS		Tobit		Logit	
R-Squared/ Log Likelihood	0.064	0.076	(11,107)	(11,636)		
NFTL Requested at Transfer	-0.383**	-0.597**	-0.406**	-0.672**	-0.438**	-0.421**
	(0.094)	(0.113)	(0.103)	(0.133)	(0.074)	(0.069)
Intercept (For Logit, Level 0)	-1.707**	-2.403**	-1.773**	-2.641**	1.171**	0.802**
	(0.181)	(0.219)	(0.200)	(0.259)	(0.130)	(0.120)
Intercept (For Logit, Level 1)					2.796**	2.187**
					(0.138)	(0.124)
Number of Years in Accounts Receivable	0.059*	-0.038	0.068*	-0.036	-0.007	-0.073**
	0.029	0.035	0.032	0.042	0.022	0.020
Most Recent Taxpayer Income/ Total Balance Due	-0.032**	-0.033**	-0.091**	-0.127**	-0.036**	-0.043**
	(0.005)	(0.006)	(0.013)	(0.019)	(0.008)	(0.009)
Log of Net Payments in the Year Prior to Transfer	-0.080**	-0.140**	-0.082**	-0.157**	-0.123**	-0.118**
	(0.012)	(0.015)	(0.014)	(0.018)	(0.009)	(0.009)
Number of Modules Transferred					0.031*	0.022
					(0.015)	(0.014)
Corporation Major Source of Income	-0.046	0.088	-0.047	0.107		
	(0.114)	(0.138)	(0.125)	(0.162)		
Sole-Proprietor Indicator	-0.297*	-0.420*	-0.338*	-0.517**		
	(0.136)	(0.164)	(0.149)	(0.193)		
Exam Major Source of Assessment	0.991**	1.216**	1.074**	1.381**	0.587**	0.757**
	(0.242)	(0.293)	(0.266)	(0.344)	(0.212)	(0.200)
Fed Tax Deposit Credit Discrep Major Source of Assessment					-0.147	-0.191*
					(0.087)	(0.082)
Nonfiler Major Source of Assessment	0.296**	0.381**	0.295*	0.401**	-0.015	-0.003
	(0.108)	(0.131)	(0.119)	(0.154)	(0.086)	(0.081)
Other Major Source of Assessment	0.208	0.142	0.230	0.164	0.075	0.105
	(0.110)	(0.133)	(0.121)	(0.157)	(0.087)	(0.081)
Penalties Major Source of Assessment	0.350**	0.450**	0.384**	0.528**	0.080	0.166*
	(0.093)	(0.113)	(0.102)	(0.132)	(0.074)	(0.069)
IRC 6020(b) Major Source of Assessment	0.484**	0.426**	0.491**	0.451*	0.133	-0.056
	(0.132)	(0.159)	(0.145)	(0.188)	(0.121)	(0.110)
Self-Reported Balance Due Major Source of Assessment	0.816**	1.143**	0.835**	1.249**	0.313**	0.395**
	(0.104)	(0.126)	(0.115)	(0.149)	(0.086)	(0.080)
Entity Had a Defaulted IA at T_0	0.492**	0.785**	0.508**	0.872**	0.412**	0.478**
	(0.163)	(0.198)	(0.179)	(0.231)	(0.133)	(0.124)
Entity Had a Module in CNC, CFf, or the Queue Prior to T_0	-0.081	-0.135	-0.089	-0.165		
	(0.130)	(0.158)	(0.143)	(0.185)		
Entity Had a Combo Case	0.446**	0.594**	0.459**	0.653**	0.331**	0.341**
	(0.090)	(0.109)	(0.099)	(0.128)	(0.070)	(0.065)
Entity Had a Module with 941 Tax	0.131	0.493**	0.128	0.543**	-0.076	0.035
	(0.132)	(0.160)	(0.145)	(0.189)	(0.109)	(0.100)
Sigma			3.165**	4.073**		
			(0.036)	(0.049)		

NOTES: Sample Size: 4,488. Regression coefficients are rounded to the nearest three decimal places.

*Indicates significance at the 0.05 level in a two-tailed t-test.

**Indicates significance at the 0.01 level in a two-tailed t-test.