

ENFORCEMENT REVENUE IDENTIFICATION AND MODELING

*OREGON DEPARTMENT OF REVENUE
RESEARCH SECTION*

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EXECUTIVE SUMMARY

Through a 2011 Budget Note, the Ways and Means Committee of the Oregon State Legislature directed the Oregon Department of Revenue (DOR), in conjunction with the state's Office of Economic Analysis (OEA) and Legislative Revenue Office (LRO), to develop a methodology of identifying tax receipts which result from DOR's enforcement activities such as audits and collections. Addressing this task, the Research Section at DOR conducted a research project in consultation with OEA and LRO to formally examine the nature of and factors affecting the agency's enforcement revenue.

Categorizing tax receipts into those received due to enforcement efforts versus those which would have been received without DOR's audit or collections efforts is not a straightforward task. Every tax payment has some degree of direct or indirect influence by DOR's enforcement efforts. Since there exists no straightforward method of categorizing payments, DOR's research team developed a process to specify the tax receipts considered to be received as a direct result of activity performed by DOR personnel. This specification process is the primary deliverable of the project, and it is a significant contribution to existing research on the subject.

The research team looked to the agency's business processes as a conceptual foundation for the development of the specification; the examination of the working audit and collections processes gave clues as to which characteristics of individual financial transactions would be most suitable for use in the specification. The framework of the specification is represented visually with a matrix; each tax receipt is sorted into a specific category of the matrix according to a series of questions and rules. This framework is based on DOR's current computer systems and business processes and will evolve as processes or systems change.

The specification can be used to identify and examine components of enforcement revenue, to stimulate and focus the discussion of the subject, and to create data series for use in modeling the impact of influencing factors. In this paper, a data series representing estimated direct enforcement revenue for the personal income tax program is used in selected examples of both short and long range econometric models. We do not expect to find a single comprehensive model of enforcement revenue because there is not a simple quantitative relationship between inputs and outputs in DOR enforcement work. No two questions can be answered with the same model, and even the same question asked at different points in time will require a fresh look at the modeling process.

Two points related to the examination of enforcement revenue should be noted. One is that DOR enforcement efforts have multiple goals. While much of the agency focuses on processing revenue, enforcement functions hold current revenue increases as an important outcome but not necessarily the primary goal. Fundamental questions of tax policy principles such as uniformity and equity affect enforcement strategy. In fact, in pursuing compliance and fairness, some of DOR's work results in negative net revenue. Additional costs to taxpayers due to increased compliance efforts must also be weighed.

Another point to consider is that there are many important components of strategy pursued by DOR in its compliance activities. One way to look at strategy is short term revenue increases versus long term revenue protection. Generally, changing the emphasis on one necessitates an opposite, though not necessarily equal, change in the other. Emphasis placed on one area typically comes at the expense of emphasis placed on another.

Areas for further related research include further utilization of data series generated through the specification process in modeling as well as the use of the specification tool in informing revenue forecasting and budgeting processes.

AN EXAMINATION OF REVENUE FROM DOR ENFORCEMENT EFFORTS

The costs of enforcement efforts at the Oregon Department of Revenue (DOR) are a significant portion of the Department's discretionary budget. Activities such as collections and audits are considered discretionary, as opposed to compulsory activities such as developing forms, implementing law changes into processing systems, opening mail, and making deposits.

Discretionary enforcement activities are believed to be directly value-added so that one dollar spent on these activities creates a direct revenue increase greater than one dollar. This relationship has led DOR to report in the past that when a budget decrease is mandated, for example through the Governor's allotment reduction authority, that there will be a resulting decline in revenue as the discretionary activities are curtailed. It has also led to the idea that if more revenue is desired, it may be "paid for" by increasing DOR staffing. This strategy of "dialing up" revenue through increased enforcement staffing is likely to work in some cases, especially in the near term and for small changes in enforcement staffing. Large changes in staffing and changes in staffing not accompanied by strategic changes in DOR business processes likely will not have proportionate effects.

While the average relationships between DOR staffing and revenue can be expressed in several ways – revenue collected per revenue agent per month being the primary example of a typical measure – a more holistic relationship between DOR staffing and revenue is not well known or documented. Estimates of the impact of staffing on revenue are typically made by assigning a fixed monthly revenue number to Revenue Agents or Auditors in a simple linear mathematical model which implies that revenue is increased by the same amount for each additional agent/auditor hired. Alternative methods of quantifying the impact of enforcement resources are difficult because internal tracking methods and systems have not been designed or organized with the intent of calculating marginal collections.¹

During DOR's budget hearings, the following budget note was added to explore this issue:

The Department of Revenue is directed to work with the Office of Economic Analysis and the Legislative Revenue Office to develop a methodology to determine what portions of the state's personal and corporate income tax receipts are attributable to the enforcement work (audit and collection efforts) performed at the Department of Revenue. The intent is to quantify the return on investments made in the agency's enforcement resources and to use that information to help inform decisions about potential future investments.

In addition, a baseline calculation for enforcement efforts can be used to delineate between enforcement revenues and revenues from voluntary collections within the context of the quarterly revenue forecast.

Prior to formally adopting a methodology, the Department will report on its proposed methodology to the House and Senate Revenue Committees (either interim or session). In addition, the Department will report to the Joint Committee on Ways and Means during the 2012 Legislative Session on the methodology and a plan for integrating it into budget development for the 2013-15 biennium.

To formally address this Budget Note, the purpose of this paper is to meet the following objectives:

1. Describe a framework to estimate Oregon's enforcement revenue from personal and corporate taxes that is directly due to DOR action, and examine that revenue from a variety of perspectives.
2. Provide some understanding of the various internal and external factors that influence "Enforcement Revenue" and how those factors have affected revenue in the recent past.
3. Create a methodological basis for estimating impacts of changes in DOR staffing or technology on enforcement revenue.

¹Marginal collections would be the total change in collections attributable to the addition (or subtraction) of one more revenue agent or auditor. This can be significantly different from average. For instance, if a new auditor receives all the "easy" cases then every existing auditor loses those cases. This means that the collections attributed to the new auditor would overstate the change caused by hiring the auditor due to the reduced collections of the existing auditors. The change is more dramatic if existing auditors have reduced their hours spent auditing in order to train the new auditor.

There are several themes in the paper that help to build perspective:

- Identifying the revenue that is directly due to DOR enforcement activities is a difficult and subjective task. This paper describes both a framework for identifying which tax receipts are most appropriately categorized as direct enforcement revenue and a specification of this revenue. The framework is a flexible foundation for readers to define alternate specifications of enforcement revenue.
- DOR enforcement efforts have multiple goals. While much of the agency focuses on processing revenue, enforcement functions hold current revenue as an important outcome but not necessarily the primary goal. Fundamental questions of tax policy principles such as uniformity and equity affect enforcement strategy. In fact, in pursuing compliance and fairness, some of DOR's work results in negative net revenue.² Additional costs to taxpayers due to increased compliance efforts must also be considered.³
- There are many important components of strategy pursued by DOR in its compliance activities. One way to look at strategy is short-term revenue increases versus long-term revenue protection. Generally, changing the emphasis on one necessitates an opposite (though not necessarily equal) change in the other. Any emphasis placed on one area comes at the expense of emphasis placed on another.
- There is not a simple quantitative relationship between inputs and outputs in DOR enforcement work. For a given level of resource input, a wide range of outputs is possible. In fact, many factors (e.g. state and national economic conditions) that have significant impacts on compliance are beyond the direct control of DOR.

A NOTE ON DETAILS AND SIMPLIFICATION

This paper necessarily presents many topics in the form of high level discussions. Descriptions of audit and collection processes, of the tax payment cycle, of factors that influence revenue and other topics do not attempt to represent all situations. With two million taxpayers in the programs described, there will be situations that do not fit the concise descriptions presented. The objective in most descriptions was to present enough detail to be materially correct, but without so much detail that the narrative becomes confusing.

In this paper, we are focusing on personal income tax enforcement revenue due to research team resource constraints which require staff to focus on the program which yields the most research benefit for the allocation of available resources. PIT enforcement revenue represents the majority of tax receipts due to enforcement efforts. There is some direct presentation of withholding⁴ and corporate taxes, but the discussion surrounding PIT can largely be generalized to include withholding and corporate taxes. While not always explicit, each of these taxes has been part of the analysis that underlies the presentation in this paper.

² For instance, negative net revenue can result when taxpayers have withholding payments that exceed their tax due, and DOR requests that they file a return. In these cases, even though the taxpayers had paid their tax, they were not in compliance until they filed a return reconciling the amount due and the amount paid. By requesting required returns be filed, DOR initiates a refund to taxpayers through enforcement actions.

³ Costs to taxpayers include draws on agency resources such as increased paperwork, additional time responding to audit issues and the hiring of tax professionals to respond to audits.

⁴ The withholding tax is typically treated as a component of the personal income tax. For instance, DOR's financial statements include withholding tax payments as personal income tax receipts. However, compliance characteristics and enforcement activities are different for the withholding tax. Because the tax is remitted by employers, on behalf of employees, withholding tax compliance is focused on employers rather than individuals.

SPECIFICATION OF DIRECT ENFORCEMENT REVENUE

The first step in an examination of enforcement revenue is to identify the receipts that occur because of DOR's enforcement activities. This is a complex task. Although financial transactions data is utilized to quantify enforcement revenue, the task of specifying the types of enforcement revenue cannot be carried out as a financial accounting exercise. We begin with a conceptual discussion to provide context for the presentation of a specification of enforcement revenue that directly results from DOR enforcement efforts.

Most of DOR's revenue is the result of voluntary payments and is not directly due to enforcement efforts, though the deterrent effect of enforcement efforts undoubtedly increases the voluntary payments received by DOR. There are studies that have attempted to quantify the increase in voluntary payments due to enforcement activities and other tax administration efforts such as education. Those studies often frame the indirect effects of enforcement as a multiple of the direct effects. For instance Durbin et al. (1990)⁵ estimates the indirect impact of audits is seven times as large as the direct impact, while Plumley (1996)⁶ estimates that the indirect effect is eleven times as large. These estimates may or may not be indicative of the results of state tax audits, but it is well accepted by researchers that, in general, tax audit indirect effects are significantly larger than the direct effects.

DOR enforcement activities can be grouped into three general categories; audit, filing enforcement and collection. Audits generally lead to adjustments to tax liabilities that have been previously reported. Filing enforcement involves identifying individuals or business that may have a filing requirement and attempting to get them to file, or in some cases filing on their behalf. In addition, collection involves assisting taxpayers in meeting their payment obligations, or taking assertive actions to secure payment such as garnishing wages.

An understanding of collections and audits furthers the task of identifying criteria for isolating the direct effects of enforcement. These enforcement activities lead to a number of characteristics associated with transactions and liabilities. It is those characteristics that are the basis for specifying which transactions are directly associated with DOR activity. For discussion purposes, we include a brief description of collections and audit processes for DOR's Personal Income Tax (PIT) program.⁷

PERSONAL INCOME TAX COLLECTIONS PROCESS

When a tax payment is known to be late either based on a return filed by the taxpayer (self-assessment), or an assessment made through filing enforcement efforts (failure-to-file assessment, also known as a FAST), it goes into a status that allows DOR's computer systems to automatically send collection letters to the taxpayer.

The first letter sent is a billing notice, with information about the amount owed. About thirty days later (once the debt is liquid and delinquent), the taxpayer receives a Notice and Demand for Payment (auto-demand) automatically generated by the system. The auto-demand is required by the Taxpayer Bill of Rights in ORS 305.895 and requires the Department to wait 30 days from the date of the Notice and Demand to take any collection action or issue a Dstraint Warrant. Finally, after those thirty days have expired, the taxpayer (debtor) receives a Dstraint Warrant authorized under ORS 314.430. The warrant process is also automated (auto-warrant). The entire legal process before DOR can take collection action is typically 60-75 days from the time the personal income tax return was due (April 15).

⁵ Dubin, J., M. Graetz and L. Wilde (1990) The Effect of Audit Rates on the Federal Individual Income Tax 1977-1986, National Tax Journal Vol. 43, pp. 395-409

⁶ Plumley A. (1996), The Determinants of Individual Income Tax Compliance. Internal Revenue Service Publication 1916 (Rev. 11-96) Washington, DC

⁷ The processes for Corporate Taxes and Withholding Taxes are similar enough to use the same analysis, but the processes are significantly different, especially in audit selection. The results of the processes also differ: for example, accounts receivable for corporate and withholding programs is relatively smaller than for PIT; a result of corporate and withholding taxpayers having a higher propensity to pay debt sooner after it is assessed. Most of the differences result from PIT taxpayers being individuals, while Corporate and Withholding taxpayers are businesses.

For the Personal Income Tax program, the Automated Collections Tracking (ACT) system assigns the debt to a collector to begin the collection process once the auto-warrant is issued which is generally the end of June each processing season. Other tax programs assign accounts to a collector after the auto-demand, because they are programs that typically file returns more frequently than once a year.

If a taxpayer calls to set up a payment plan prior to ACT assigning the case to a collector, or if a collector is working related debt, the case may be assigned prior to the auto-warrant, interrupting the automatic letter series. Interrupting This interruption forces manual processes such as Notices of Demand and Warrants later in the process.

For most programs, there is a 45-day waiting period prior to entering the normal collections process. This waiting period is necessary because the debt is not collectible until appeal rights are exhausted and the debt has become "liquid and delinquent." It is at that point that the debt is assigned to a collector.

Amnesty at the end of 2009 significantly complicated the collection process for amnesty cases. The statutory due date for amnesty payments was May 2011, but the language was ambiguous enough that DOR was reticent to actively collect those cases prior to the due date. The 2011 legislature passed an extension of time to pay, giving DOR subjective authority to extend the pay period, at least partly because the volume of amnesty applicants led to DOR requiring many months to contact some with a description of their payment obligations.

Once a debt is assigned to a revenue agent, the debt is in active collection status and the normal process of collection is to have one phone conversation with the taxpayer. Either the letter series causes the taxpayer to call DOR, or the agent will make one phone call (or provide reasons why taxpayer could not be reached) to request payment in full or offer a 12-month payment plan before looking for a garnishment source. There are multiple rules concerning garnishments including specifications about what can and cannot be garnished, and prioritization of multiple garnishments to be applied to a particular source. When a garnishment must be refunded, a new liability is created in DOR's accounting system.

PERSONAL INCOME TAX AUDIT SELECTION PROCESS

Once a tax return is received by DOR, it is available to audit or adjust for at least three years. As a return is processed and first entered into DOR databases, there are several types of adjustments that can be made. Many simple math errors are caught by parameters set in the processing program. For instance, if a taxpayer incorrectly added tax credits, the system will make adjustments and increase or decrease the tax due.

There are also many returns reviewed for potential adjustment through DOR's suspense process. The system has a built in list of parameters that require human review to validate the data entered by the taxpayer. For instance, tax credits with precertification may be reviewed to ensure that the credit claimed on the return matches the certified amount. More difficult suspense cases may be referred to tax auditors for resolution.

After a return is processed, it becomes available for audit. Because obvious errors are corrected during processing, the review of returns for audit purposes involves complex selection methods and expertise. Audit selection is used to identify returns at high risk of reflecting either intentional noncompliance or errors made in good faith.

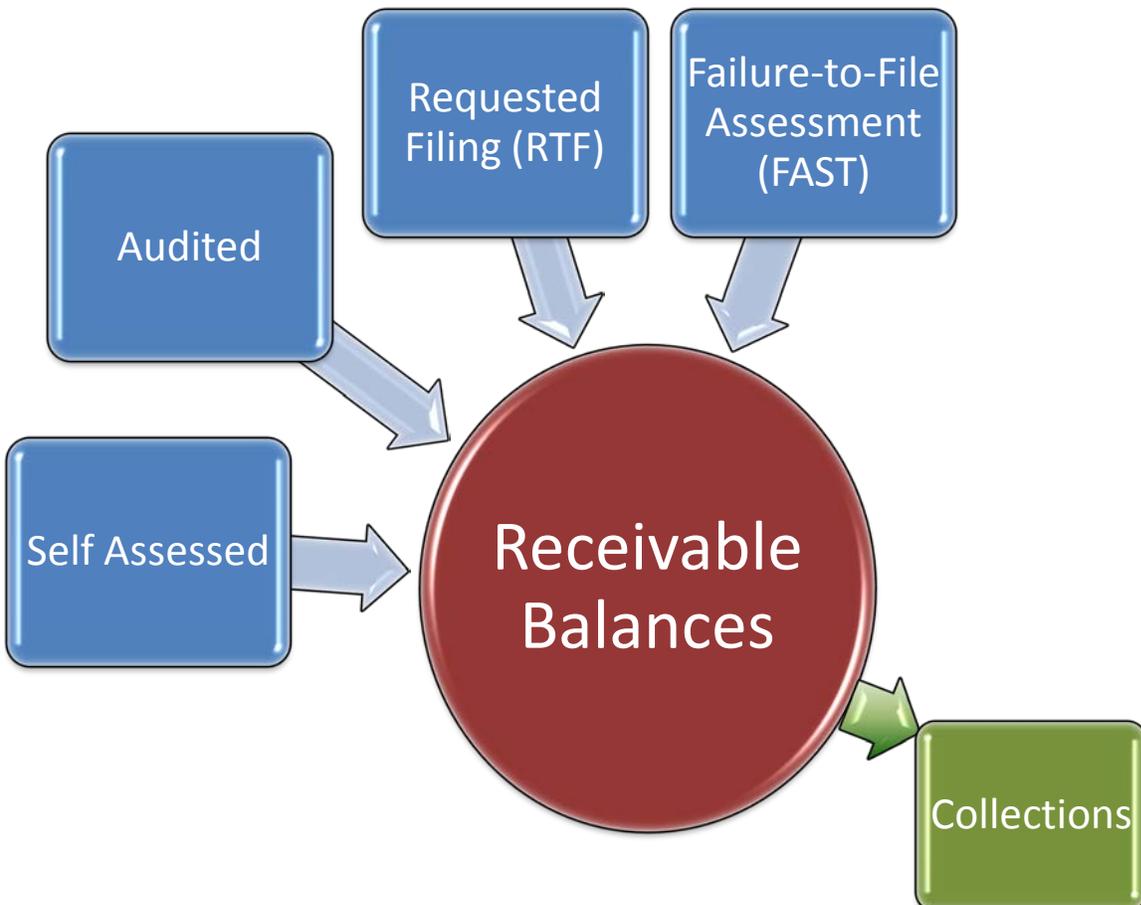
In early 2011, DOR changed the way audits were selected. The new process provides a way for DOR to strategically select audits, and improves the Department's ability to analyze the results of audit selection strategies.

DOR created a centralized workgroup that assesses ideas and criteria for audit selection. The criteria are applied to the pool of available returns, and a list of potential audit subjects is created. Several times throughout the year, the audit selection workgroup reviews the criteria used to select returns and the corresponding results of audits, allowing continuous improvement in audit selection as well as timely adjustments based on changes in agency strategy or objectives, or changes in taxpayer behavior based on taxpayers' most recent returns.

The workgroup focuses on identifying taxpayer behavior and identifying the risks of that behavior, then modeling the behavior and its impact on compliance. The team pulls tax returns based on the behavior model to provide a "target rich" selection of multiple types of issues and a wide variety of available audit work.

The data from the audit, appeal, and collection process is collected for each case and traced back to the case selection model that pulled the return allowing continuous analysis and improvement of audit selection. The data gathered can also be used to help improve other areas of the Department such as form instructions.

ENFORCEMENT REVENUE RELATIONSHIP TO ACCOUNTS RECEIVABLE AND COLLECTIONS



This diagram is useful for a bird's eye orientation. The four blue boxes represent the four liability characteristics in the specification used to identify the four liability source types. Once the liabilities are created, most flow into the red receivable balances circle. From these outstanding liabilities flows the collections revenue.

When we measure the size of accounts receivable, we are measuring the balance at a point in time. Additions to, and subtractions from, accounts receivable are measured in transactions over a time period. An important note to keep in mind is that the explanations and analyses that follow do not take into account the tax gap. The figures and analysis provided in the following sections refer only to known accounts receivable; unidentified tax liabilities are not included in this discussion.

The complexity of the actual process is not represented in this diagram, and the diagram is not a complete picture. Most revenue that comes through DOR bypasses accounts receivable entirely because the payment arrives prior to the tax being known and delinquent. In fact, most tax payments occur before the tax liability is known. For example, personal income tax withholding payments are received throughout a calendar year, but the reason for the withholding payments is best described by the tax return. That tax return is due up to nine months after the year has ended.

For collectors, the pool of accounts available to collect comes entirely from accounts receivable, which includes self-assessed, audit, and filing enforcement liabilities (Request-to-File & Failure-to-File Assessments). This relationship means that quantifying the effect of audits and collections can result in some double counting if the transactions are not reviewed at a very detailed level. In contrast, counting only collections from accounts receivable does not capture some enforcement revenue for which a balance never existed on the taxpayer account. For instance, some collections from audits are paid before the adjusted liability is known and these payments bypass accounts receivable (these are “paid in field”). In addition, some adjustments made during return processing increase tax liability and are paid by reducing the refund sent to the taxpayer.

It is worth noting that measurements of financial data are subject to interpretation and can be heavily influenced by non-substantive changes in business processes. For instance, if a credit is available up to \$1,000 per taxpayer, claims over \$1,000 can be rejected by the processing system, or by later audit adjustments. The difference can change the measured impact of each, while the result (though not the effort) would be substantially similar. Similarly, if the agency currently takes 60 days to assign an account to a revenue agent, but reduces the time to 30 days, the specified enforcement revenue goes up from both earlier active collections status as well as “passive” collections being attributed to active collections sooner.

Changes in the specification will be necessary in the future. Increased understanding of business processes, suggested changes by the legislature, or others, and routine process improvements can necessitate redesigning the specification of enforcement revenue. Redesigns may be necessary to maintain consistency after process changes, or may be advisable to improve the connection of the specified revenue to the effort of collections. As DOR moves to upgrade its computer systems and business processes, the specification of enforcement revenue obviously needs to be monitored and adjusted. This specification is not final and, because of continuous process improvements, will likely need regular updating.

SPECIFYING DIRECT ENFORCEMENT REVENUE

Conceptually, there is no precise rule as to which transactions are most appropriately classified as direct enforcement rather than non-enforcement revenue. Arguably, every dollar received by DOR is at least partially received because of enforcement efforts, and very few dollars are solely received because of enforcement efforts. Each payment received by DOR lies on a continuum. Most payments fall on one side of the continuum and are received despite a relatively low threat of enforcement. A significant number of payments fall on the other side of the continuum and would not be received without dogged enforcement efforts and strong enforcement tools. Therefore, identification of the receipts due to enforcement is estimation rather than measurement.

For most payments, it is impossible to know how much enforcement was necessary to receive that payment. However, it is not likely the production function for enforcement revenue is significantly different from other production functions. That is, the revenue produced by the first dollar spent on enforcement is significant, and at some point, due to diminishing returns, the revenue produced by additional dollars begins to decline. With this caveat, we present a framework for defining enforcement revenue based on characteristics of taxpayer liabilities and transactions.

The first classification of transactions is conducted based on the way that the tax liability was discovered. Next, refund offset and garnishment transactions are identified. The remaining transactions are grouped according to the status of collection and the application of a series of rules. This framework provides a definitive basis to analyze enforcement revenue yet is intended to be flexible. Categorizing each payment or refund allows different interpretation and is the

starting place for a discussion of how to identify enforcement revenue. For instance, it might be reasonable to include second and third returns after a taxpayer is identified as a nonfiler and DOR action results in their continued compliance. Currently, only the first return is counted in our specification.

This framework is based on DOR's current systems and business processes, and will evolve as processes or systems change.

LIABILITY CHARACTERISTICS

The first dimension used to characterize transactions is a representation of how the tax debt was discovered. To find the payments related to enforcement activity, it is helpful to begin with an understanding of whether enforcement activity was necessary to discover the tax debt, and if so which type of activity. Using DOR data, the best way to identify the level of enforcement associated with identifying the tax debt is to use the initial liability type the transaction is associated with. For personal income taxes, a liability is defined by the unique combination of taxpayer, tax year, and the source of the liability.⁸

The **liability type** falls into one of four categories:

- **Self-Assessed Liability:** The taxpayer filed a return reporting tax liability prior to any enforcement action by DOR. This category also includes amended returns if the original was self-assessed. This category includes the bulk of liabilities and payments.
- **Requested Filing (RTF):** The taxpayer did not file a return by the due date, but did file a return after DOR sent a letter requesting the taxpayer to file.
- **Failure to File Assessment (FAST):** The taxpayer did not file a return after DOR sent letters requesting or demanding that the taxpayer file, so DOR estimated the taxpayer's liability and filed a return on the taxpayer's behalf. Taxpayers may still file after a FAST, but for this framework the liability remains categorized as FAST.
- **Audited or Adjusted Return:** The taxpayer's liability from one of the previous categories was reviewed by DOR and adjusted. The adjustment can be made automatically by the tax processing system, as a result of a review if the processing system notes a discrepancy or high risk return, or as a result of an audit after a return is processed and accepted by the system.

A taxpayer's return and payments for a specific year may be represented in multiple categories. For instance, if a taxpayer sends an original return that is later audited, that taxpayer's payments will be represented in the self-assessed and audited categories.

TRANSACTION TYPES TO IDENTIFY GARNISHMENTS AND OFFSETS

The second dimension used to characterize transactions is the type of payment. The first designated payment type is *offset payments*, which are transactions that use a refund from one liability to pay a balance on another liability. For instance, if a taxpayer files a 2010 return and is due a refund for 2010, but has an outstanding balance for 2009, the refund will be used to offset the 2009 balance. The second designated payment type is *garnishment payments*, which occur primarily when DOR notifies the employer of a debtor to remit a portion of each of the debtors' paychecks to DOR to apply to the debt, or when DOR notifies a financial institution of a debt and a portion of a taxpayers account balances are remitted to DOR.

Garnishments and offsets are separated from other payments because they represent different levels of involvement by DOR staff in the collection of debt. Offsets are largely automated and would occur without direct involvement by DOR collection staff. The level of enforcement resources needed to receive offset payments is minimal for self-assessed

⁸ DOR defines each unique liability as: ID number, Tax Year, Reporting Period, Tax Program, and liability number. Each source of liability gets a sequential number.

liabilities, but is related to the discovery of the tax debt for other liabilities. The resources needed to obtain a garnishment payment are unrelated to the source of the liability, and involve finding the garnishment source (e.g. employer or bank account), and then establishing the garnishment. In estimating which payments occur because of DOR activity, this distinction seems important.⁹

If a payment was an offset or garnishment, then we want to count it as direct or indirect based on the type of liability the payment applies to, regardless of the liability's status in collections. For instance, if a liability is being actively collected by a revenue agent and a payment is made by offset, we still want to treat that payment like all other offsets, believing that the active collection is coincident to, but not the cause of the payment. Conversely, if a liability is not being actively collected and a garnishment payment comes in, the belief is that the garnishment was still caused by past active collection.

COLLECTION STATUSES (FOR PAYMENTS MADE BY TAXPAYER)

The third dimension used to characterize transactions is the status of the associated liability at the time a payment was made. If a payment was not automated (that is, not an offset or garnishment), an estimate of whether the payment was a result of DOR enforcement efforts can be informed by the collection status.

The **status of the liability** falls into one of four inclusive categories:

- **On Hold/Unassigned:** This is a very broad category, including multiple similar statuses. The most prominent is the period before a debt is assigned to an agent, which includes periods that liabilities are not in the collection tracking system. Once a liability is in the system, but prior to assignment, DOR has a series of notices that are automatically sent to the taxpayer to request or demand payment. In addition, a liability might be on hold for a number of reasons, including the taxpayer being in bankruptcy, the taxpayer appealing an audit deficiency, or the debt is otherwise deemed uncollectable. The unifying theme for this category is that the debt is not being actively worked by a revenue agent.
- **Collection Agency Program (CAP):** DOR has passed the debt along to a private collection agency to collect.
- **Active:** DOR collectors have the case assigned to them and are making attempts to contact the taxpayer, find a garnishment source, or otherwise resolve the debt. The most common activity recorded during active collection status is phone conversations with the taxpayer. For DOR revenue agents, phone conversations have the objective of obtaining payment in full or arranging a payment plan.
- **Pay Plan:** The taxpayer is making regular payments toward the tax debt.

RULES FOR DISTINGUISHING DIRECT ENFORCEMENT REVENUE

Along with the categorization of financial transactions based on liability characteristics, transactions types and collection statuses, a set of rules is needed to finalize the method of placing each transaction into the appropriate category.

- The overarching principal that we tried to apply in specifying whether a particular payment was directly related to DOR enforcement efforts was to consider the relationship of DOR activities to the preponderance of payments within a particular category. If the preponderance were directly the result of some enforcement action by an individual auditor or collector at DOR, then the transactions that fit the category characterization (including both payments and refunds) are considered direct enforcement revenue.
- Payments are considered a direct result of DOR enforcement activities if they are due to an audit or adjustment, because DOR would not have known about the liability without the audit.

⁹ Treasury Offsets (payments made to DOR from refunds due to taxpayers from the US Treasury) are categorized as garnishments because they bear more resemblance to a garnishment than to an internal offset in terms of the degree of DOR staff involvement. Kicker offsets are treated separately because the existence of the kicker is the sole reason for the existence of the ability to use those offsets, so they need to be “discounted” to make the payment history coherent.

- For returns/assessments due to filing enforcement, payments (or refunds) that occurred after the liability was in collections status are direct.
- For self-assessed liabilities, payments that occur after the liability is in collections are direct if the transaction is a garnishment, or the liability was in active collection or pay plan status.
- As a simple rule, this specification treats collections resulting from kicker offsets for enforced liabilities as being 50% direct, which approximates how much would have been collected in the absence of the kicker. This treatment is intended to restore the natural measure of collections that kicker offsets upset because they reduce the amount available to collect, but the DOR accounting system treats them as 100% collected.

The result of this specification is not a measure of enforcement revenue, it is one possible specification. The result is a proxy representing enforcement revenue related to human effort of DOR employees. Because it is only one possible specification, readers have an opportunity to judge transaction characteristics themselves and propose different characterizations.

For instance, if DOR identifies a tax nonfiler, arguably that nonfiler would have never filed a return except for the intervention from DOR. There is a case to be made that, each return filed by that nonfiler after DOR contact should be included in a specification of enforcement revenue. Under the specification presented here, only the first return of nonfilers is counted (though repeated failure-to-file assessments are counted). Other options may be to refine the treatment of payment plans, or develop an entirely new specification that includes technological intervention as well as human intervention.

To represent the culmination of the various steps in this method of specification, a matrix format is presented on the next page. Following the specification matrix are charts and graphs showing the application of the specification to different tax programs, accounting periods, and tax years.

SPECIFICATION OF PAYMENTS RESULTING FROM DOR ENFORCEMENT EFFORTS

For purposes of the analysis reported in this paper, each payment transaction was placed into one of the following categories.

If account is NOT in collections tracking system:
Category is [“Not in Collections”](#)

Otherwise:
IF Payment Type is Garnishment or Offset:
Category is [Payment Type](#).

Otherwise:
Left with payments in collection system
that are not garnishment or offset:
Category is [Collection Status](#)

| | SELF-ASSESSED | REQUESTED FILING <i>(Filed after Request to File)</i> | FAILURE TO FILE ASSESSMENT | AUDITED/ADJUSTED RETURN |
|----------------------------------------------------------|-----------------------|-----------------------------------------------------------------|-----------------------------------|--------------------------------|
| NOT IN COLLECTIONS | Indirect | Indirect | Indirect | Direct |
| • Withholding Payments [inc. Refundable Credits] | Presented for Context | Presented for Context | Presented for Context | Presented for Context |
| PAYMENT TYPE <i>(Considered Before Status)</i> | | | | |
| • Kicker Offset* | Indirect | Partial* | Partial* | Partial* |
| • Other Offset | Indirect | Direct | Direct | Direct |
| • Garnishment** | Direct | Direct | Direct | Direct |
| STATUS <i>(Considered After Pay Type)</i> | | | | |
| • On Hold | Indirect | Direct | Direct | Direct |
| • CAP | Indirect | Direct | Direct | Direct |
| • Active | Direct | Direct | Direct | Direct |
| • Pay Plan | Direct | Direct | Direct | Direct |

Direct enforcement revenue is the specified revenue that is intended to estimate and represent the revenue that occurs because of direct action by DOR auditors and collectors.

Indirect revenue includes payments made by taxpayers without direct auditor or collector action.

*Partial enforcement revenue is only used for kicker offsets. For PIT only: Estimated amount that would have been collected in absence of kicker as 50% (approximate average collection rate of audit setups).

**Garnishments include treasury offsets, which occur when Oregon receives money from a taxpayer’s federal refund from US Treasury. These are included in the garnishments payment type because the work involved is more similar to garnishment than it is to internal offsets.

FINANCIAL TRANSACTIONS AND THE ENFORCEMENT REVENUE SPECIFICATION

We now apply the specification to financial transactions data and look at the data in two ways. First, we look at data in terms of all financial transactions that occur in a fiscal year, regardless of the tax year the transaction is associated with. We present detailed figures for financial transactions that occurred in fiscal year 2010-11 as well as bar charts that illustrate a higher-level view of historical fiscal year transactions. Along with personal income tax payments, we present figures for withholding and corporate payments.

Next, we include all financial transactions for a specific tax year; 2007 is used since it is the most recent tax year which may be considered complete. Looking at all receipts for a given tax year is also a good way to consider profiles of taxpayers and how they are reflected in this matrix structure. In 2007, most taxpayers fall into four profiles, which are also presented in this section.

TRANSACTIONS BY FISCAL YEAR

PERSONAL INCOME TAX PAYMENTS DURING FY 2010-11

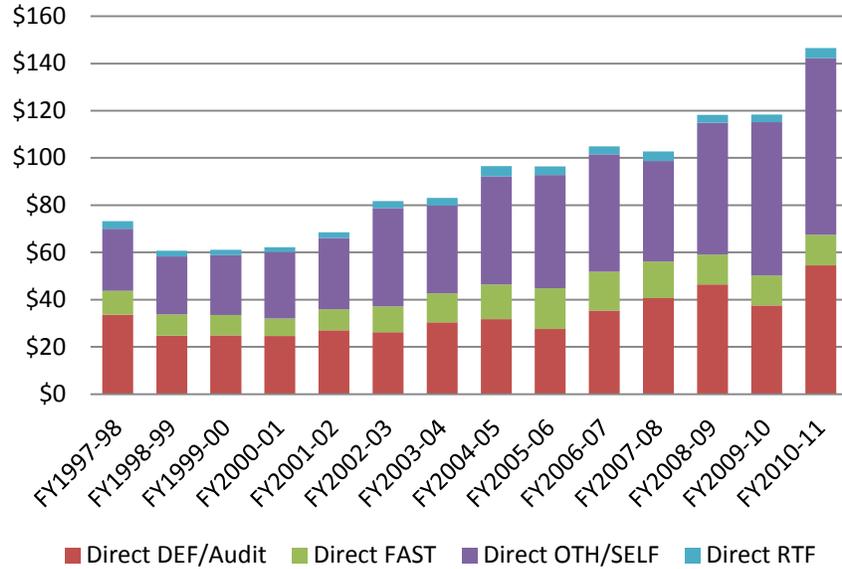
| | Self Assessed | RTF | FAST | Audited/ Adjusted Return | Total | Total Direct | Percent Direct |
|---------------------------|---------------|------------|------------|-----------------------------|---------------|--------------|-------------------|
| Not in Collections | 491,640,000 | (460,000) | 20,000 | 16,530,000 | 507,720,000 | 16,530,000 | 3.3% |
| Withholding | 4,619,250,000 | 14,810,000 | 6,620,000 | 1,600,000 | 4,642,270,000 | - | |
| Payment Type | | | | | | | |
| Kicker Offset | 740,000 | 40,000 | 330,000 | 580,000 | 1,690,000 | 480,000 | 28.1% |
| Other Offset | 18,640,000 | 890,000 | 1,930,000 | 6,790,000 | 28,250,000 | 9,610,000 | 34.0% |
| Garnishment | 19,720,000 | 1,080,000 | 9,750,000 | 5,420,000 | 35,960,000 | 35,960,000 | 100.0% |
| Status | | | | | | | |
| Unassigned/On Hold | 17,350,000 | 130,000 | (550,000) | 16,540,000 | 33,470,000 | 16,120,000 | 48.2% |
| CAP | 1,550,000 | 90,000 | 120,000 | 320,000 | 2,090,000 | 540,000 | 25.7% |
| Active | 24,820,000 | 1,120,000 | 660,000 | 4,690,000 | 31,280,000 | 31,280,000 | 100.0% |
| Pay Plan | 30,150,000 | 1,030,000 | 870,000 | 4,010,000 | 36,070,000 | 36,070,000 | 100.0% |
| Total | 5,223,850,000 | 18,730,000 | 19,740,000 | 56,480,000 | 5,318,800,000 | 146,580,000 | 2.8% |
| Total Direct | 74,680,000 | 4,360,000 | 12,940,000 | 54,590,000 | 146,580,000 | | |
| Percent Direct | 1.4% | 23.3% | 65.6% | 96.7% | 2.8% | | |

Direct collections are highest in the self-assessed category, followed by the category of audits and adjustments. The percentage of direct collections is highest in the category of audits and adjustments.

Enforcement revenue that is received through the personal income tax program is primarily due to self-assessed and audit liabilities. In fact, under the categorization used here, self-assessed is the primary component in most years (it was about \$75 million of \$147 million total in FY 2010-11).

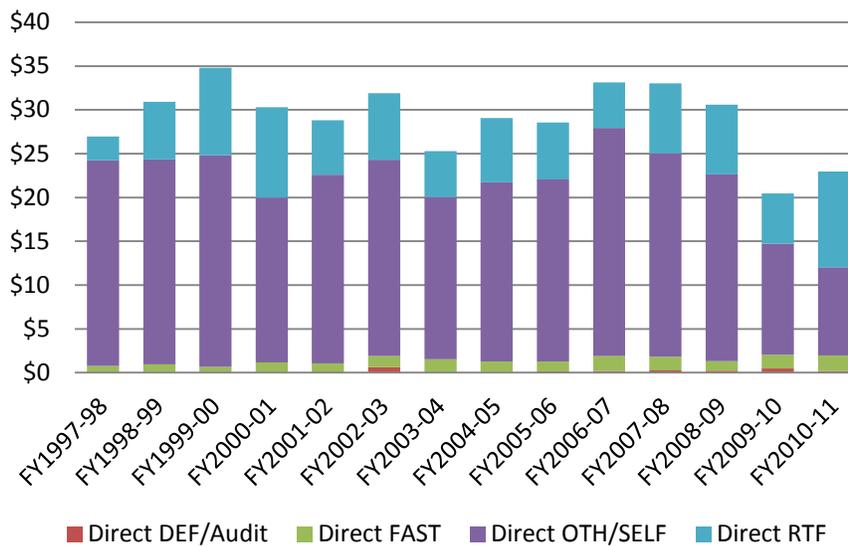
Fiscal years 2009-10 and 2010-11 were probably affected by a variety of factors, including one-time shifts in revenue timing and source due to the tax amnesty held in late 2009, which, at the time, anticipated payment plans going through 2011.

PIT Direct Revenue (in millions)



Based on the specification developed in this paper, direct revenue from the personal income tax (PIT) has been increasing for some time. The increase in 2011 was the largest in the last decade, and was driven by increases in audits and in self-assessed liabilities through garnishments and payment plans. The withholding tax is included with PIT in financial statements, but is a separate tax program. Direct enforcement revenue from the withholding program is more variable.

Withholding Direct Revenue (in millions)

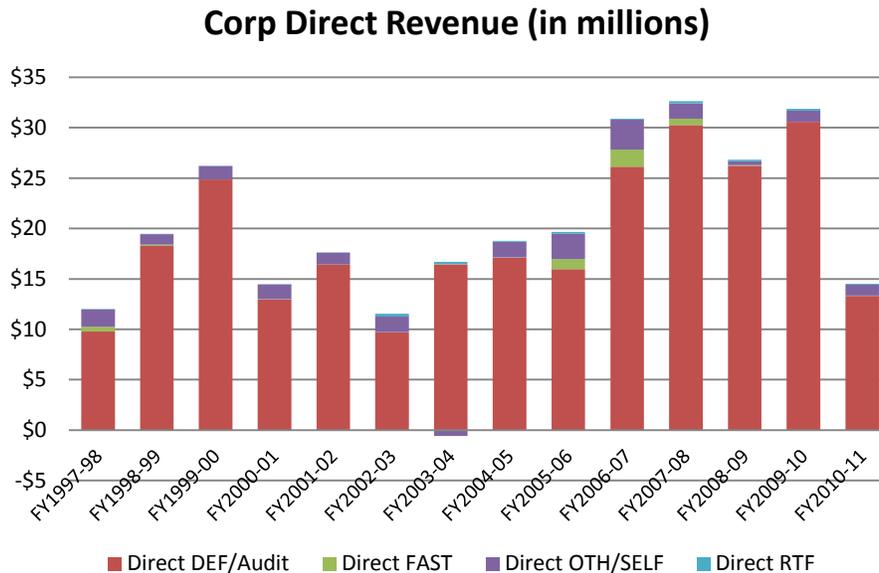


CORPORATE TAX PAYMENTS DURING FY 2010-11

| | Self Assessed | RTF | FAST | Audited/ Adjusted Return | Total | Total Direct | Percent Direct |
|---------------------------|---------------|----------|--------|-----------------------------|-------------|--------------|-------------------|
| Not in Collections | 457,870,000 | (20,000) | - | 2,180,000 | 460,030,000 | 2,180,000 | 0.5% |
| Payment Type | | | | | | | |
| Offset | 1,240,000 | 20,000 | - | 300,000 | 1,560,000 | 320,000 | 20.4% |
| Garnishment | 60,000 | 10,000 | - | 10,000 | 80,000 | 80,000 | 100.0% |
| Status | | | | | | | |
| Unassigned/On Hold | 3,090,000 | - | 10,000 | 8,920,000 | 12,030,000 | 8,940,000 | 74.3% |
| CAP | 30,000 | - | - | - | 30,000 | - | 1.2% |
| Active | 860,000 | 10,000 | 20,000 | 1,880,000 | 2,780,000 | 2,780,000 | 100.0% |
| Pay Plan | 140,000 | 50,000 | 10,000 | 10,000 | 210,000 | 210,000 | 100.0% |
| Total | 463,300,000 | 70,000 | 50,000 | 13,300,000 | 476,720,000 | 14,500,000 | 3.0% |
| Total Direct | 1,070,000 | 90,000 | 50,000 | 13,300,000 | 14,500,000 | | |
| Percent Direct | 0.2% | 133.1% | 100.0% | 100.0% | 3.0% | | |

In contrast to personal income tax and withholding receipts, enforcement revenue from corporate tax liabilities is primarily due to audits. Over \$13 million of the \$14.5 million in direct enforcement revenue from corporate tax payments in FY 2011 came from audited or adjusted corporate returns.

DIRECT ENFORCEMENT REVENUE OVER TIME: CORPORATE TAX PAYMENTS



This historical data illustrates the volatility of direct enforcement revenue from corporate tax payments; the number and size of audits drives much of this volatility. In addition, one-time events such as the tax amnesty program in 2009 can have significant impacts.

TRANSACTIONS AND TAXPAYER PROFILES FOR TAX YEAR 2007

We now switch our perspective to look at all tax payments received for a given tax year. We selected tax year 2007 since it is the most recent year which may be considered complete in terms of tax payments received.

SUMMARY OF PERSONAL INCOME TAX LIABILITIES TY 2007

| | Self Assessed | RTF | FAST | Audited/ Adjusted Return | Total | Total Direct | Percent Direct |
|---------------------------|---------------|------------|-----------|-----------------------------|---------------|--------------|-------------------|
| Not in Collections | 1,189,240,000 | 460,000 | 120,000 | 15,370,000 | 1,205,190,000 | 15,370,000 | 1.3% |
| Withholding | 4,436,730,000 | 8,450,000 | 2,890,000 | 1,380,000 | 4,449,470,000 | - | |
| Payment Type | | | | | | | |
| Kicker Offset | 1,280,000 | 30,000 | 40,000 | 40,000 | 1,400,000 | 60,000 | 4.1% |
| Other Offset | 19,680,000 | 270,000 | 520,000 | 3,860,000 | 24,330,000 | 4,650,000 | 19.1% |
| Garnishment | 14,180,000 | 220,000 | 1,800,000 | 2,610,000 | 18,800,000 | 4,620,000 | 24.6% |
| Status | | | | | | | |
| Unassigned/On Hold | 36,990,000 | 90,000 | (140,000) | 12,510,000 | 49,450,000 | 12,460,000 | 25.2% |
| CAP | 630,000 | 10,000 | (10,000) | 80,000 | 710,000 | 80,000 | 10.9% |
| Active | 23,280,000 | 350,000 | (40,000) | 2,740,000 | 26,330,000 | 26,330,000 | 100.0% |
| Pay Plan | 18,750,000 | 290,000 | 200,000 | 2,200,000 | 21,440,000 | 21,440,000 | 100.0% |
| Total | 5,784,500,000 | 10,200,000 | 5,380,000 | 41,570,000 | 5,841,650,000 | 99,180,000 | 1.7% |
| Total Direct | 56,210,000 | 1,240,000 | 2,340,000 | 39,380,000 | 99,180,000 | | |
| Percent Direct | 1.0% | 12.2% | 43.6% | 94.7% | 1.7% | | |

While it is useful to examine how tax payments are distributed at an aggregate level, we are also interested in how the individual taxpayer shows up in our specification. Rather than taking an anecdotal approach or attempting to describe each cell in the matrix, we characterized taxpayers and found that four profiles account for most taxpayers. The next four pages illustrate these four profiles in the matrix format.

The profiles provide a breakdown of the 1,931,194 taxpayers with at least one liability in Tax Year 2007. Note that we only display taxpayers (and dollars) that we know about, and this specification does not include non-filers or incorrect tax unless it is in the DOR accounting system. While these four profiles include most taxpayers for tax year 2007, many taxpayers have multiple liabilities, and some have multiple types of liabilities:

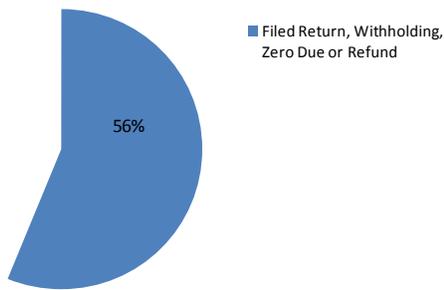
| | |
|----------------------------------------------------------------|-------------------|
| Taxpayers with one or more Self-Assessed liabilities only | 1,850,941 (95.8%) |
| Taxpayers with one or more Self-Assessed and one or more Audit | 70,325 (3.6%) |
| Taxpayers with one or more FAST liabilities only | 6,657 (0.3%) |
| Taxpayers with one or more Requested Filing liabilities only | 2,530 (0.1%) |

PROFILE 1: TY07 PIT TAXPAYERS WITH WITHHOLDING, RETURN AND ZERO DUE OR REFUND

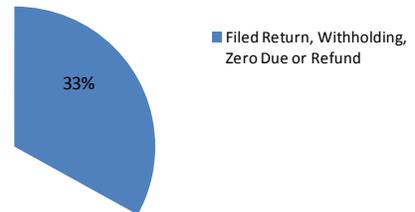
| | SELF-ASSESSSED | REQUESTED FILING <i>(Filed after Request to File)</i> | FAILURE TO FILE ASSESSMENT | AUDITED/ADJUSTED RETURN |
|--------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------|----------------------------|-------------------------|
| NOT IN COLLECTIONS | -573,260,000 | | | |
| <ul style="list-style-type: none"> Withholding Payments [inc. Refundable Credits] | 2,503,400,000 [35,370,000] | | | |
| PAYMENT TYPE <i>(Considered Before Status)</i> | | | | |
| <ul style="list-style-type: none"> Kicker Offset | | | | |
| <ul style="list-style-type: none"> Other Offset | | | | |
| <ul style="list-style-type: none"> Garnishment | | | | |
| STATUS <i>(Considered After Pay Type)</i> | | | | |
| <ul style="list-style-type: none"> On Hold | | | | |
| <ul style="list-style-type: none"> CAP | | | | |
| <ul style="list-style-type: none"> Active | | | | |
| <ul style="list-style-type: none"> Pay Plan | | | | |

This matrix displays the categories that transactions occur in for the simplest profile of a taxpayer. In this case, there are no payments other than withholding (or refundable credits), and the taxpayer’s tax situation results in no tax due or a refund. For tax year 2007, there were 1,085,594 taxpayers in this category, 56% of the total number of taxpayers.

Percentage of Taxpayers TY 07



Percentage of Total Payments TY 07

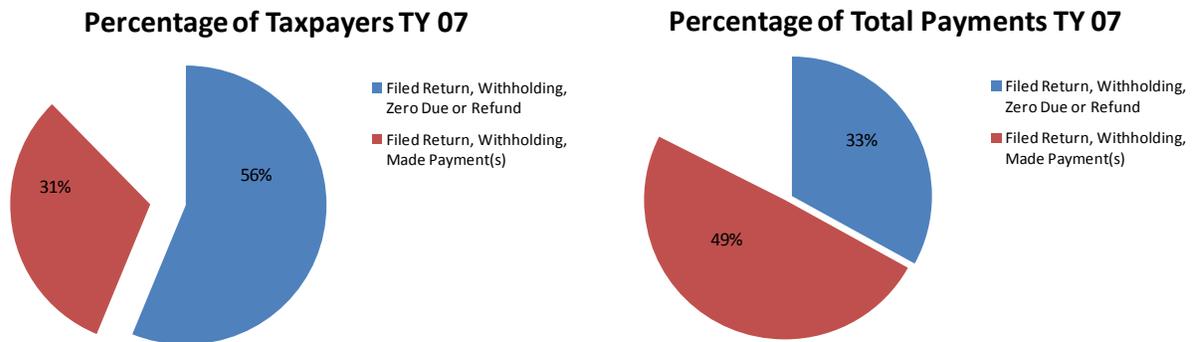


PROFILE 2: TY07 PIT TAXPAYERS, ALL OTHER SELF-ASSESSED WITH NO LATE PAYMENTS OR AUDITS

| | SELF-ASSESSED | REQUESTED FILING (Filed after Request to File) | FAILURE TO FILE ASSESSMENT | AUDITED/ADJUSTED RETURN |
|--------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------|----------------------------|-------------------------|
| NOT IN COLLECTIONS | 1,441,380,000 | | | |
| <ul style="list-style-type: none"> Withholding Payments [inc. Refundable Credits] | 1,444,500,000 [4,340,000] | | | |
| PAYMENT TYPE (Considered Before Status) | | | | |
| <ul style="list-style-type: none"> Kicker Offset | | | | |
| <ul style="list-style-type: none"> Other Offset | | | | |
| <ul style="list-style-type: none"> Garnishment | | | | |
| STATUS (Considered After Pay Type) | | | | |
| <ul style="list-style-type: none"> On Hold | | | | |
| <ul style="list-style-type: none"> CAP | | | | |
| <ul style="list-style-type: none"> Active | | | | |
| <ul style="list-style-type: none"> Pay Plan | | | | |

The next largest category of taxpayers is those that file a return on time, but have made estimated payments applied a refund from a prior year, or have submitted a payment when filing their return. For tax year 2007, there were 607,973 taxpayers in this category, 31% of the total number of taxpayers.

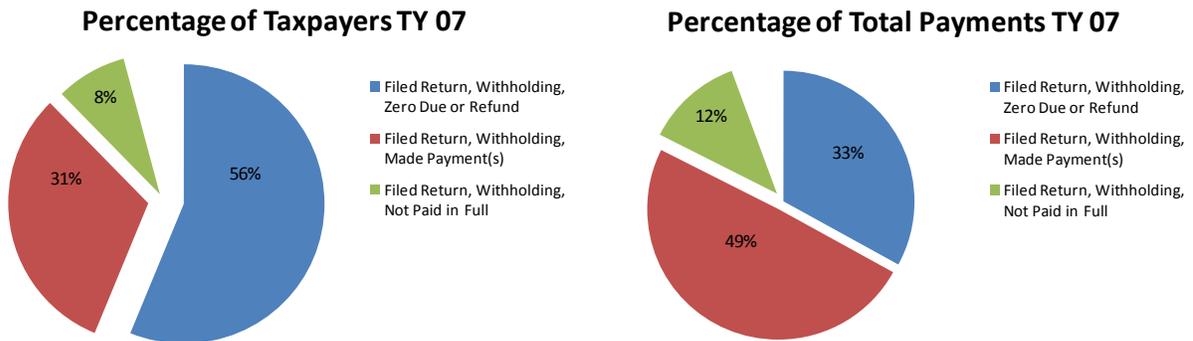
Note that together with the prior category that included taxpayers with no payments other than withholding, 87% of taxpayers have all their transactions characterized in two categories in the classification scheme.



PROFILE 3: TY07 PERSONAL INCOME TAXPAYERS WHO VOLUNTARILY FILED, AND HAD SOME LATE PAYMENTS BUT NO AUDITS.

| | SELF-ASSESSSED | REQUESTED FILING <i>(Filed after Request to File)</i> | FAILURE TO FILE ASSESSMENT | AUDITED/ADJUSTED RETURN |
|--------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------|----------------------------|-------------------------|
| NOT IN COLLECTIONS | 289,960,000 | | | |
| <ul style="list-style-type: none"> Withholding Payments [inc. Refundable Credits] | 299,020,000 [1,840,000] | | | |
| PAYMENT TYPE <i>(Considered Before Status)</i> | | | | |
| <ul style="list-style-type: none"> Kicker Offset | 1,190,000 | | | |
| <ul style="list-style-type: none"> Other Offset | 18,600,000 | | | |
| <ul style="list-style-type: none"> Garnishment | 13,120,000 | | | |
| STATUS <i>(Considered After Pay Type)</i> | | | | |
| <ul style="list-style-type: none"> On Hold | 35,200,000 | | | |
| <ul style="list-style-type: none"> CAP | 600,000 | | | |
| <ul style="list-style-type: none"> Active | 22,020,000 | | | |
| <ul style="list-style-type: none"> Pay Plan | 17,860,000 | | | |

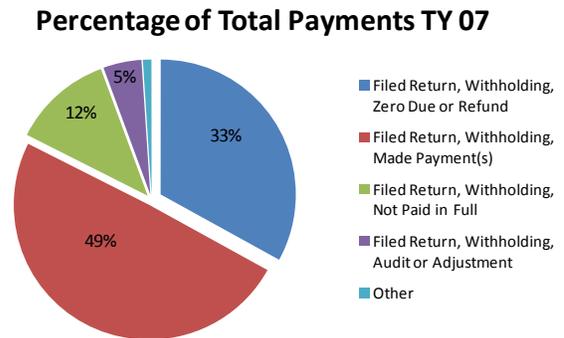
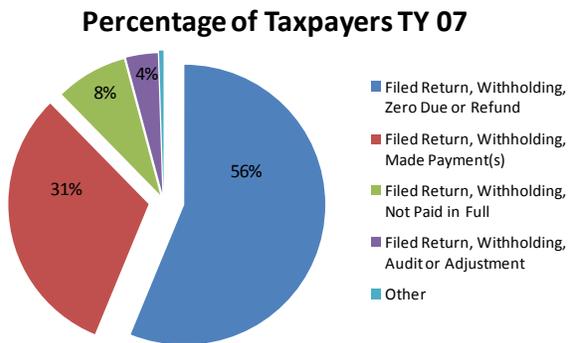
Rounding out the group of taxpayers for whom tax liability is entirely self-reported are those taxpayers that self report their liability but do not pay it in full prior to the due date. For tax year 2007, there were 157,374 taxpayers in this category, 8% of the total number of taxpayers.



PROFILE 4: TY07 PERSONAL INCOME TAXPAYERS WHO VOLUNTARILY FILED, BUT RETURN WAS ADJUSTED IN PROCESSING OR AUDITED

| | SELF-ASSESSSED | REQUESTED FILING <i>(Filed after Request to File)</i> | FAILURE TO FILE ASSESSMENT | AUDITED/ADJUSTED RETURN |
|--------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------|----------------------------|-------------------------|
| NOT IN COLLECTIONS | 31,450,000 | | | 15,090,000 |
| <ul style="list-style-type: none"> Withholding Payments [inc. Refundable Credits] | 189,510,000 [2,160,000] | | | 1,340,000 [790,000] |
| PAYMENT TYPE <i>(Considered Before Status)</i> | | | | |
| <ul style="list-style-type: none"> Kicker Offset | 90,000 | | | 40,000 |
| <ul style="list-style-type: none"> Other Offset | 1,080,000 | | | 3,820,000 |
| <ul style="list-style-type: none"> Garnishment | 1,060,000 | | | 2,560,000 |
| STATUS <i>(Considered After Pay Type)</i> | | | | |
| <ul style="list-style-type: none"> On Hold | 1,790,000 | | | 12,490,000 |
| <ul style="list-style-type: none"> CAP | 40,000 | | | 80,000 |
| <ul style="list-style-type: none"> Active | 1,270,000 | | | 2,710,000 |
| <ul style="list-style-type: none"> Pay Plan | 890,000 | | | 2,180,000 |

After taxpayers file their return, DOR will sometimes adjust the return during processing, or audit the return after processing. This group includes taxpayers that self reported a tax liability that DOR later “corrected.” For tax year 2007, there were 70,325 taxpayers in this category, 4% of the total number of taxpayers.



FACTORS THAT INFLUENCE ENFORCEMENT REVENUE

With the specification, we are able to categorize tax payments into direct and indirect enforcement revenue and create historical data series for three programs: personal income tax, withholding tax, and corporate income and excise tax.¹⁰ These data series may be used in models to estimate the influence of various factors in the past and to create predictive models of future enforcement revenue. Before beginning the task of exploratory modeling, we take a conceptual look at factors that influence enforcement revenue: taxpayer characteristics and economic conditions, tax structure and complexity, enforcement objectives, and enforcement staffing.

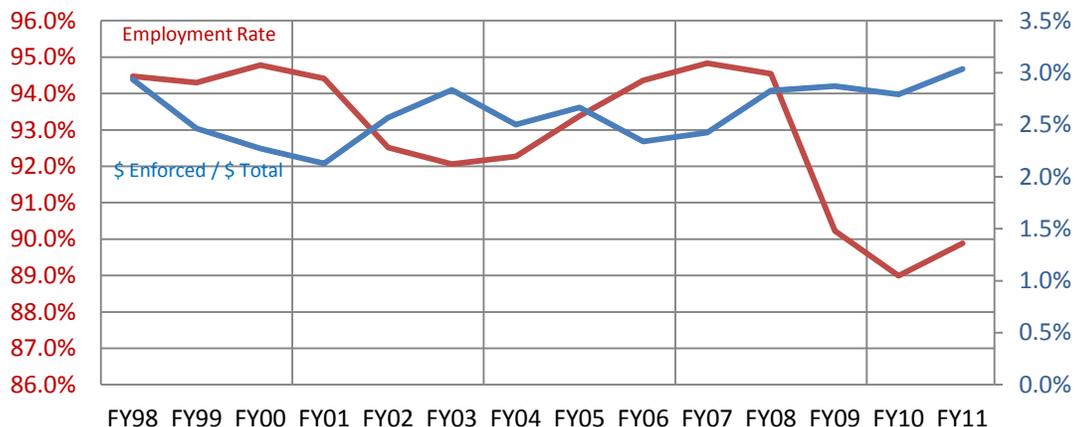
TAXPAYER CHARACTERISTICS AND ECONOMIC CONDITIONS

Each year, the population of Oregon taxpayers changes. These changes have significant impacts on Oregon tax revenue generally, but also affect the revenue associated with DOR enforcement activities. Changes include both the number and types of taxpayers, along with the circumstances faced by each taxpayer. Specific circumstances include such factors as taxpayer sophistication, attitudes about paying taxes, and the effect of withholding on a taxpayer's amount due in April.

Each taxpayer is unique, but broad changes in economic conditions can affect many taxpayers simultaneously. The relationship between economic conditions and enforcement revenue is complex, but some broad trends emerge in reviewing the data.

An example of a broad economic trend that seems to affect enforcement revenue is the overall level of employment. This chart displays two trends. The first is the percent of Oregon's labor force that is employed (annual average). This is the complement to the unemployment rate; for example, if the unemployment rate is 10% then the "employment rate" is 90%. This series moves higher when economic conditions improve and moves lower when they deteriorate (note the significant decline since 2008). The second trend is the percent of total Personal Income Tax (PIT) collections that are included in the specification of direct enforcement revenue (annual total).

**"Employment Rate" vs.
PIT Enforcement Revenue / Total PIT Revenue**



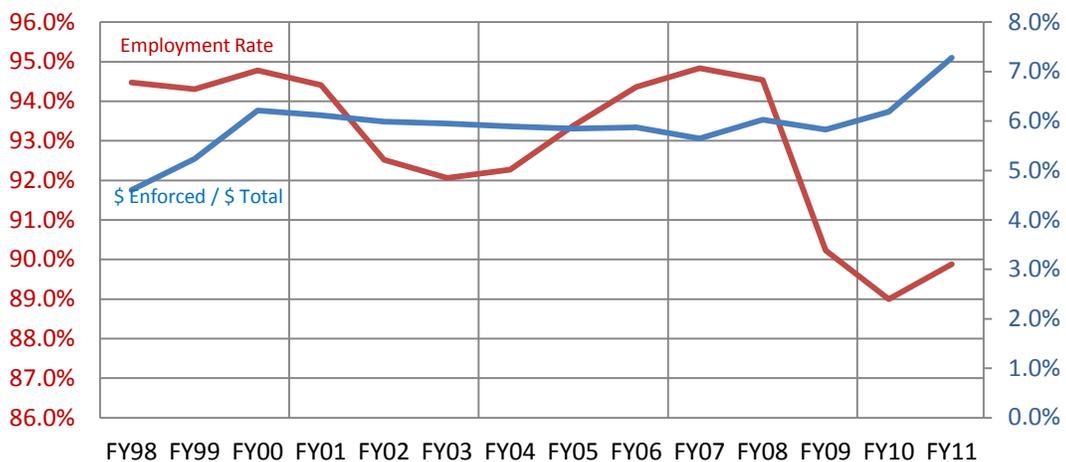
¹⁰ Although we have data series of specified enforcement revenue for the three programs, in this paper we are focusing on personal income tax enforcement revenue due to research team resource constraints which requires staff to focus on the program which yields the most research benefit for the allocation of available resources. PIT enforcement revenue represents the majority of tax receipts due to enforcement efforts.

The most obvious trend when looking at these lines together is that as a percentage of total collections, enforcement revenue is counter-cyclical. That is, when economic conditions improve, direct enforcement revenue deteriorates (and vice versa). While not presented here, self-assessed enforcement revenue and audit revenue also have roughly the same counter-cyclical pattern as overall enforcement revenue. This counter-cyclical revenue is partly due to taxpayers' ability to pay when they file their return. For instance, during bad economic times taxpayers are less able to pay immediately, but pay a few months late or begin paying through a payment plan leading the enforcement revenue to increase.

The relationship is more complex for liabilities originating with audit and filing enforcement because revenue may arrive months or years after enforcement action is taken. For example, a significant amount of revenue from failure to file assessments arrives more than 24 months after DOR has assessed the tax liability.

Creating a similar graph for enforcement revenue from corporate taxes doesn't lead to strong conclusions. In fact, this graph illustrates surprising consistency in corporation enforcement revenue as a percent of total corporation tax revenue. Typically, the revenue from corporations is very volatile, so it would be difficult to know if this relationship will continue to be stable in the future.

"Employment Rate" vs. Corp Enforcement Revenue / Total Corp Tax Revenue



Another strong influence on enforcement revenue is tax withholding paid on wages. Withholding is the primary source of revenue from personal income taxes, and each year DOR faces a choice about whether to change withholding tables to more accurately reflect the tax due from taxpayers' wages. Aside from DOR's implementation of withholding tables, taxpayers have a choice about the parameters used for withholding in their specific situation. While Oregon law requires the Department to design the withholding tables to be the best estimate of taxes on the taxpayer's wages, there is no requirement that taxpayers implement the tables or formulas in the way DOR anticipates when developing the tables. For instance, a single taxpayer with no dependants might fill out their withholding form to withhold as if s/he has many exemptions. In fact, the federal form used for Oregon withholding takes tax reductions specific to federal taxes into account and leads many taxpayers to claim more exemptions than are anticipated by DOR when DOR develops Oregon withholding tables. If taxpayers are under-withheld when they file their taxes, they may have a harder time making their tax payments, affecting enforcement revenue received by DOR. Changes to the withholding tables can also have an impact on enforcement revenue by causing individuals that in previous years received refunds, to need to make a payment when filing a return (or vice versa). Similarly, in bad economic times taxpayers may deliberately change their withholding and need to make a payment when filing their return. Tax due at return filing could cause some taxpayers to become delinquent and their payments to be counted as enforcement revenue.

Corporate taxpayers make payments largely based on their actual or anticipated profits, which can swing wildly. At the same time, these taxpayers are also generally responsible for remitting the tax withheld from their employees' paychecks. When financial conditions deteriorate for corporations, they may be unable to make their required payments, leading to a tax debt when they file their return. If their financial situation does not improve, they may have difficulty paying that tax debt. The financial situation of one relatively larger business, or the overall economic environment, can drive changes in the enforcement revenue received by DOR.

EDUCATION AND ATTITUDES OF TAXPAYERS

In addition to the financial situation of taxpayers, beliefs and attitudes about government services and taxation can affect enforcement revenue by influencing taxpayer willingness to voluntarily report income or to pay their tax liability without DOR intervention.

Taxpayer education can influence the level of compliance as well. Many people complain about the complexity of the tax code and how difficult it is to follow. However, tax auditors also see very rudimentary errors in accounting and record keeping that lead to situations where taxpayers may be entitled to a certain deduction or credit, but they can't meet the substantiation requirements causing the auditor to disallow the deduction or credit. Complexity of the tax code can change enforcement revenue, but the general knowledge of taxpayers and their ability to maintain accurate records also play a role.

TAX STRUCTURE AND COMPLEXITY

The underlying design of taxes influences the ability of taxpayers to comply with tax laws, as well as their ability to hide noncompliance. Simpler taxes are easier to collect, and taxes based on easily verifiable data are simpler to validate.

Complexity makes it difficult for taxpayers to report correctly, and makes it difficult for DOR to verify that taxpayers reported correctly. Complexity can be driven by the volume of information (e.g. nearly every line on the tax return is an opportunity for errors, omissions, or exaggerations) and it can be driven by the reporting rules themselves (e.g. temporary provisions are inherently more complex than permanent provisions). Complexity can increase or decrease enforcement revenue, but overall likely increases it by increasing opportunity for errors, which are reflected in enforcement revenue when the errors are corrected and subsequent payments are made.

For example, refundable credits have added complexity¹¹ and cost to tax administration. Presumably, the objective of Oregon's largest refundable credits (the Working Family Credit and Earned Income Credit) is to provide a "negative tax" payment to specific taxpayers with as little delay as possible after the taxpayer claims the credit. However, in order to ensure the accuracy of claims for the credit, DOR must delay payment until reasonably sure that the refundable credit is appropriately claimed. There are two competing objectives to be settled in this case between facilitating legitimate participation in an important program, and ensuring that only those entitled receive the benefits.

There are also unique aspects of Oregon laws that can have significant impacts on enforcement revenue. Oregon's kicker law provides a source of tax refunds that can be used to offset taxpayers' other liabilities. Because of this, enforcement revenue increases every time there is a kicker. Oregon also recently had a tax amnesty that affected enforcement revenue, largely by shifting receipts to an earlier time period.

¹¹ "Traditionally, social benefit programs such as food stamps...have screened out ineligible claimants on the front end at a high administrative cost with relatively low participation rates... On the other hand, refundable tax credits have low administrative cost and relatively high participation rates but a higher risk of payments to ineligible claimants... Using tax returns as the 'application' for EITC benefits rather than a traditional screening process results in low cost with high participation as well as the risk of improper payment." (*National Taxpayer Advocate, May 2011 written testimony before Congressional Ways and Means Committee*)

ENFORCEMENT OBJECTIVES AND ACTIONS

The Department of Revenue pursues enforcement strategies for a variety of reasons, only one of which is to increase current revenue. In order to maintain a healthy revenue system at reasonable cost, DOR enforcement strategies must also pursue objectives of efficiency, equity, and compliance. Each of these objectives must be balanced to ensure long-term health as well as short-term success.

In times of declining state revenue, DOR's emphasis on number of positions in budgeting is often replaced with promises to maintain or increase collections with fixed resources. This can lead to confusion among policy makers and the public. When DOR "speeds up" revenue, it is an explicit shift in resource use that results from an implicit shift in objectives.

For instance, "speed up" of collections through moving revenue agents that normally work on more difficult cases onto easier cases is done at the expense of other enforcement. This usually means that long-term compliance activities are reduced in order to increase short-term collections and compliance. Similarly, "quick hit" audits that achieve larger adjustments for a given amount of audit hours are intended to quickly lead to billings and collections, but are pursued at the expense of the audits that would have occurred otherwise.

It is easiest to pursue audits of wage earners over more complicated audits of taxpayers with farm, business or rental income. Even though overall compliance is higher for wages, it is easier to identify wage noncompliance resulting in an increased focus on wage noncompliance during periods of enhanced short-term revenue. Conversely, returns with increased complexity contain more opportunities for errors, but identifying those errors requires significantly more time and effort. However, to pursue a sense of "fairness" DOR chooses to pursue more complicated audits focusing on more complicated returns.¹² Short-term revenue can be increased by reducing the emphasis on fairness in tax enforcement. However, long-term revenue is dependent on voluntary compliance, which is lowest for complex returns.

Most tax liability is voluntarily reported, and most tax payments are voluntarily submitted. In fact, in the classification used for this exercise, about 97 percent of Oregon income tax revenue is not classified as the direct result of DOR enforcement efforts.¹³ Protection of the great majority of revenue that is voluntary is critical to the long-term health of Oregon's income tax revenue system and is the primary purpose behind most of the income tax centered activities of DOR.

In addition to strategic choices, the business processes and administrative actions of DOR can have a significant impact on enforcement revenue. Administrative actions could include choices such as how often to send taxpayers statements of their delinquent taxes due, how soon delinquent accounts are assigned to agents, and the level of certainty needed before assessing tax due when taxpayers have not filed a return. Business processes include collection timelines, form design, identification of potential nonfilers, and identification of potential audit issues. DOR has been engaged in many process improvement activities. After process improvement for PIT audit selection, DOR is capturing data regarding which characteristics of tax returns and taxpayers led to selection of returns for audits, and which lines on the tax returns were adjusted. Capturing this information will allow audit-selection process to continue improving through use of this enhanced data collection. Like strategic choices, process improvements improve the relationship of enforcement resources and enforcement outcomes but the underlying change is typically qualitative.

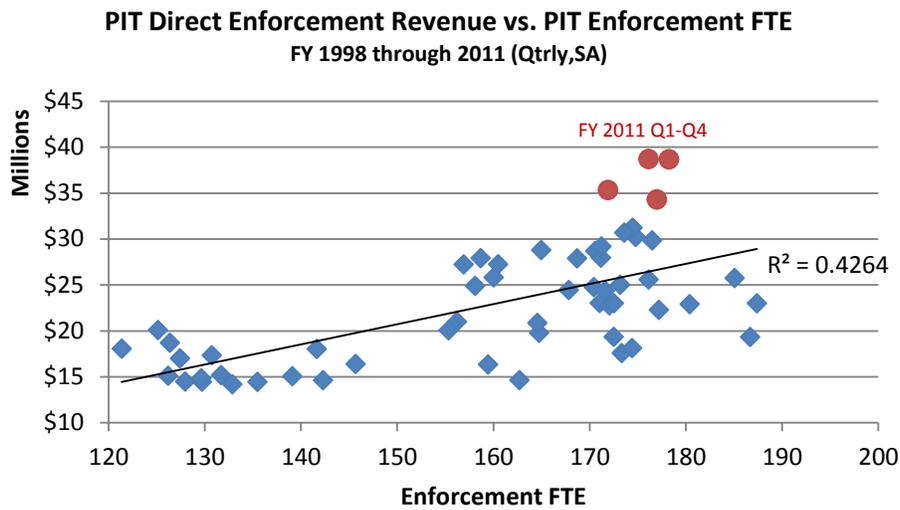
¹² Oregon law contains preference for equitably enforcing tax law. See, e.g., ORS 305.170 (3) requiring DOR to recommend to the legislature, "methods by which a more just and equitable system of taxation may be developed."

¹³ The referenced 97 percent of revenue received obviously excludes taxes that are part of the "tax gap" and are never received. In a separate report, DOR has estimated the net tax gap (tax owed but not paid) as 18.5% of tax due for tax year 2006.

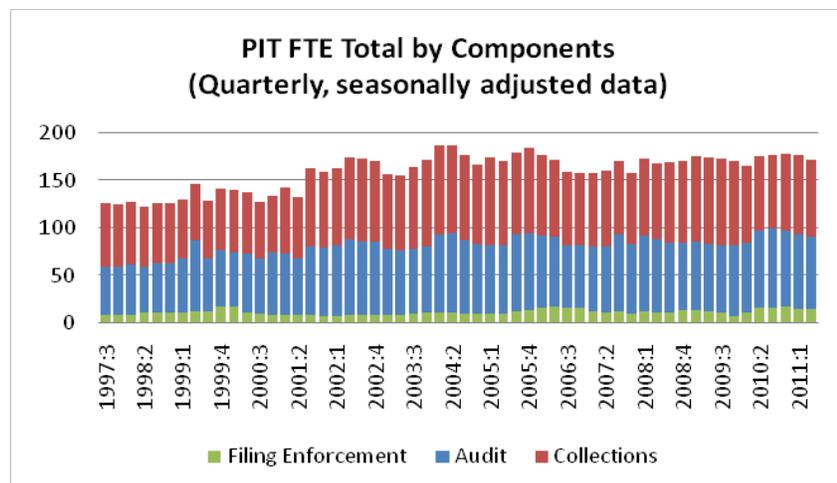
ENFORCEMENT STAFFING

The level of enforcement staffing was determined using employee timesheet information and the program cost account (PCA) to which the employee was assigned. Employees working less than full time were counted as a percentage of a full time equivalent (FTE) in proportion to the number of hours the employee worked. For example, an employee working thirty hours per week would be counted as .75 of an FTE. A more detailed analysis of the timesheet data, such as program or function code proved to be unreliable.

One obvious factor that influences enforcement revenue is the staff devoted to enforcement functions. However the relationship between staffing and enforcement revenue is hard to detect quantitatively. Because black-and-white rules for specifying whether any one payment is due to enforcement activity represent a proxy for enforcement revenue rather than a measurement, many payments in many shades of gray are partially miss-specified. That is, any specification of enforcement revenue will call some voluntary payments enforced, and some enforced payments voluntary. Thus, it is somewhat difficult to disentangle the impact of measurable inputs on the specified output. This can be illustrated by a graph showing total specified direct enforcement revenue (quarterly totals) plotted against the full-time-equivalent employees (average FTE over the quarter) assigned to units directly involved in enforcement activities.



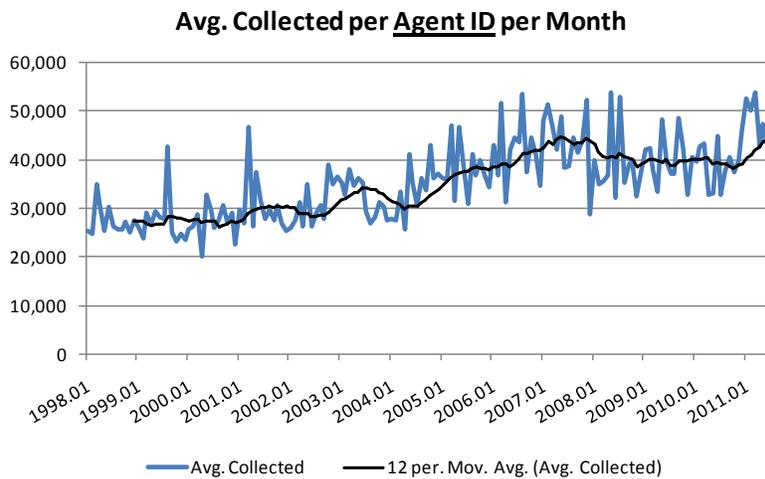
While there appears to be a strong positive relationship between the number of employees in enforcement units, there is significant variation in the level of collections for a given level of staffing. For reference, the FTE measure over time is presented.



ENFORCEMENT STAFFING AND ANALYSIS USING ACT AGENT ID NUMBER

A second way to analyze enforcement revenue is to use the agent ID number assigned to a liability in DOR's Automated Collection Tracking (ACT) database. This approach does not distinguish between the quantity of hours worked by employees, meaning an individual that spends five hours per week working collections would be counted the same as an individual devoting all forty hours to collection efforts. Agent ID also does not necessarily correspond to an actual agent, proven by the number of agent IDs consistently not matching the number of agents (using the FTE approach previously described). All caveats aside, there is still considerable information that can be gleaned by utilizing this approach.

The following chart illustrates the average enforcement revenue collected per agent ID. Keep in mind that this chart only displays collections that took place when an agent ID was assigned to the liability. While a payment made after a FAST assessment would be considered enforcement revenue regardless of agent assignment, that payment would only show up in the chart below if an agent ID was assigned to the liability at time of payment.

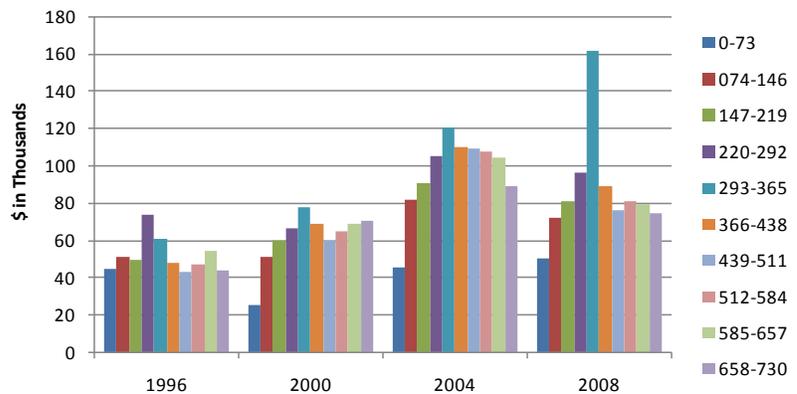


When hiring new collection agents, it would be expected that initially the new agents would, all things being equal, collect less revenue than existing agents due to differences in experience level. New agents need time to learn DOR's systems and various enforcement techniques. The following chart attempts to illustrate this change in collections productivity of new agents over time.

The chart displays the average enforcement revenue collected per new agent ID broken down into

seventy-three day increments (roughly one fifth of a year) for four different years. For example, on average, agents hired during the 2008 calendar year collected about \$50,000 during their first seventy-three days as compared to about \$96,000 during days 220-292 (illustrated by the first and fourth bars in the 2008 pack). Notice that, generally, average

Avg. Direct Enforcement Collections by Year Agent ID Began and Days Since Agent ID Start Date



agent ID collections increase for the initial 365 days prior to leveling off. This follows the general line of reasoning that newly hired employees will not initially be as efficient as current more experienced employees. Unsurprisingly, years can vary in part due to changes in the value of money (i.e. a dollar collected in 2008 is worth less than a dollar collected in 1996) and general economic circumstances. This type of analysis offers an example of the collections time lag associated with hiring new agents.

This average collections analysis example is just one of the many possible uses of the agent ID tracking file that could be valuable in the examination of enforcement revenue. Many areas for further study are available. Matching the agent ID tracking file with employee records could offer a wealth of information depending upon how well the files and systems match up. By matching the agent ID file with employee records, analysis could be done taking into account an agent's time allocation. This would avoid identically counting two agents that spend considerably different amounts of time performing direct collections activities. This linking of databases could also offer analysis to be done regarding agent experience level, possibly leading to the creation of experience elasticities. This type of analysis could also allow for a more accurate portrait of marginal change in collections to be developed by examining the collections results of new hires and following the assignment of collections accounts between agents. For example, a newly hired agent may receive collections accounts from other agents, thus lowering the collections of existing collectors because those collectable accounts are now being worked by the newly hired agent. Needless to say, there is much potential for further analysis of the agent ID file.

MODELING IMPACTS OF INFLUENCING FACTORS ON DIRECT ENFORCEMENT REVENUE

Having defined a specification process to categorize tax receipts related to enforcement revenue, and with a general understanding of factors which influence this revenue, we explore the potential of quantitative modeling. Challenging this work is the actuality that factors affecting compliance revenue are complex, interrelated, and often not quantifiable.

Influencing factors that are relatively easy to quantify include such measures as the number of taxpayers filing returns, the number of employees at DOR, and economic indicators such as the unemployment rate or gross state product. Factors that are less straightforward but still reasonable to quantify include events such as “kicker” refunds or federal stimulus payments. The timing of computer system and process changes may also be incorporated into a quantitative model, though the qualitative information related to these changes often lacks precision, making the conversion to a reliable quantitative measure difficult.

Some influencing factors are not realistically quantifiable at all. For instance, we do not have data on factors such as taxpayer sophistication and attitudes, nor of changes in the circumstances of individual taxpayers. Additionally, there are relationships between the factors that we can quantify and those that we can't, and the impact of these interrelationships is unknown.

Acknowledging these measurement challenges, we explore the possibility of developing models to estimate the impact of influencing factors on past enforcement revenue, information that may then be utilized to create predictive models of future enforcement revenue.

SUMMARY OF WHAT WE LEARNED THROUGH EXPLORATORY MODELING

The principal finding of our exploratory modeling was that no single unified equation is capable of capturing changes to the general economy, DOR resource and/or strategic changes, and all other impacts in a way that allows for predicting enforcement revenues going forward. This is not to say that predictions cannot be made or information gleaned from quantitative modeling. However, rather than attempting to rely on a single unified model, a more pragmatic approach tailored to the specific question being asked is required. A quantitative model needs to be developed for the situation at hand and supplemented with qualitative analysis. This multi-faceted approach is highlighted in the modeling appendix of this paper where examples of models are presented all of which could be applicable depending upon the question being posed, be it a long-term general economic model, or a more short-term model based upon DOR resource changes. In addition to the finding regarding a lack of a unified model, several general observations were found and are detailed below.

Throughout the past 10-15 years¹⁴, the largest driver of change in the collection of enforcement revenues has been broad economic factors, with DOR influenced changes appearing more on the periphery and difficult to estimate. This stems from the fact that the major contributor to the accounts receivable over the modeling timeframe was from liabilities unrelated to direct DOR enforcement activities.¹⁵ Another equally important contributing factor is the balance of DOR resources to the overall economy. If DOR resources are expanding at a trend similar to the overall expansion of Oregon's economy, then identifying DOR's contribution to enforcement collections becomes more difficult. Are audits growing due to changes in DOR resources or just changes to the overall economy? Is the average rate of collection per revenue agent changing due to DOR resource or strategy changes, or because the economic circumstances of taxpayers have changed? To answer these questions, a short term, more situation specific modeling approach is required.

¹⁴ The quarterly time series used in modeling exploration began with the third quarter of 1997 and ends with the second quarter of 2011. Due to DOR system changes, data prior to 1997 is unavailable.

¹⁵ The vast majority of these are self assessed liabilities, that is, liabilities that arise from returns filed by taxpayers.

The modeling work conducted during the course of this project only scratches the surface of the work that can be done. Many avenues of modeling exploration still exist and the supporting analysis and data creation work done and presented in this paper will have to be supported and adapted continuously in order to remain current with the internal and external changes to the tax enforcement environment.

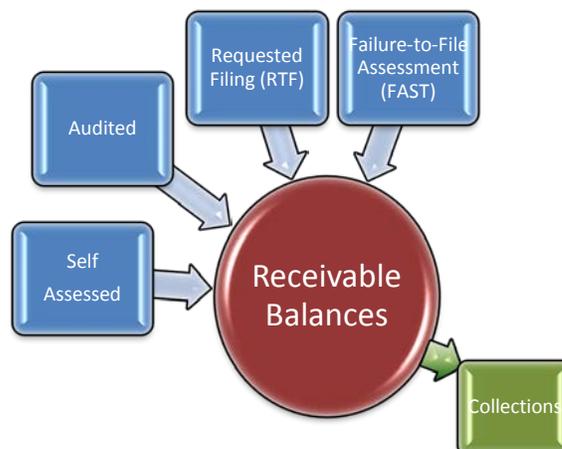
FUTURE WORK TO REFINE SPECIFICATION AND MODELS

Exploration of separating types of pay plans. There are several ways that a taxpayer can set up a payment plan for tax debt. Taxpayers have been able to proactively call DOR’s Tax Services Unit to set up a pay plan, or they could set up a pay plan after being contacted through the collection process. New in 2011 was the ability for a taxpayer to set up a pay plan without calling DOR. The likely result of modifying the specification to treat these pay plans differently is to reduce the revenue specified as enforcement revenue.

Extend exploratory modeling efforts to withholding and corporate tax programs. Most of the exploratory modeling done was focused on the personal income tax program (PIT). This was in part due to research team resource constraints but also because PIT enforcement collections represent the majority of all enforcement collections received. Lessons learned from PIT modeling can also be relevant to the withholding and corporate tax programs as well.

Develop models for individual liability types. Rather than modeling on aggregate direct enforcement, it would be instructive to model each of the four liability types (self-assessed, requested filing, failure to file assessment and audited/adjusted returns) individually or in specific combinations. In particular, it may be fruitful to subset the enforcement revenue data into two groups: enforced liabilities, which is filing enforcement and audit liability types, versus self-assessed liabilities.

Explore accounts receivable modeling as basis for collection modeling. Economic factors impact enforcement revenue in a variety of ways. Recall the figure from an earlier section which illustrates the relationship between enforcement revenue inputs and outputs. The economy can impact each of the blue boxes and the green box differently. The modeling in this paper examines the impact of economic factors on collections (green); a promising future path of exploration is to examine the impact of factors on the liability sources (blue) that feed the stock of accounts receivable (red). DOR has limited ability to impact self assessed accounts receivable as compared to the considerable ability of the Department to influence the size of the other three liability type streams.



CONCLUDING REMARKS

The 2011 Ways and Means Committee Budget Note directed the Oregon Department of Revenue (DOR) to work with the Office of Economic Analysis and Legislative Revenue Office to develop a methodology to determine what portions of the state's personal and corporate income tax receipts are attributable to the enforcement work performed at the Department of Revenue. This research paper was written to document the work necessary to respond to the Budget Note.

The proposed methodology of categorizing tax receipts as either direct or indirect receipts is the primary deliverable of this paper. We believe this proposed methodology more accurately presents the level of revenue directly related to the Department's enforcement efforts than methods used to date. This specification is not only new to DOR, but after a review of relevant literature, appears to be a new addition to the revenue field. This specification is important as it can be used to identify and examine components of enforcement revenue, to stimulate and focus the discussion of the subject, and to create data series for use in modeling the impact of influencing factors. While the proposed specification offers many improvements from past estimation techniques, due to the nature of the estimation process and the high-level assumptions that are required, significant gray areas still exist.

The next step in the process is to begin moving forward with the proposed methodology and subsequently created baseline in examining agency operations and results, as well as projecting changes to enforcement revenues based on external and internal factors. The intent of the budget note was to quantify the return on investments made in the agency's enforcement resources and we believe this specification methodology will significantly aid in that work.

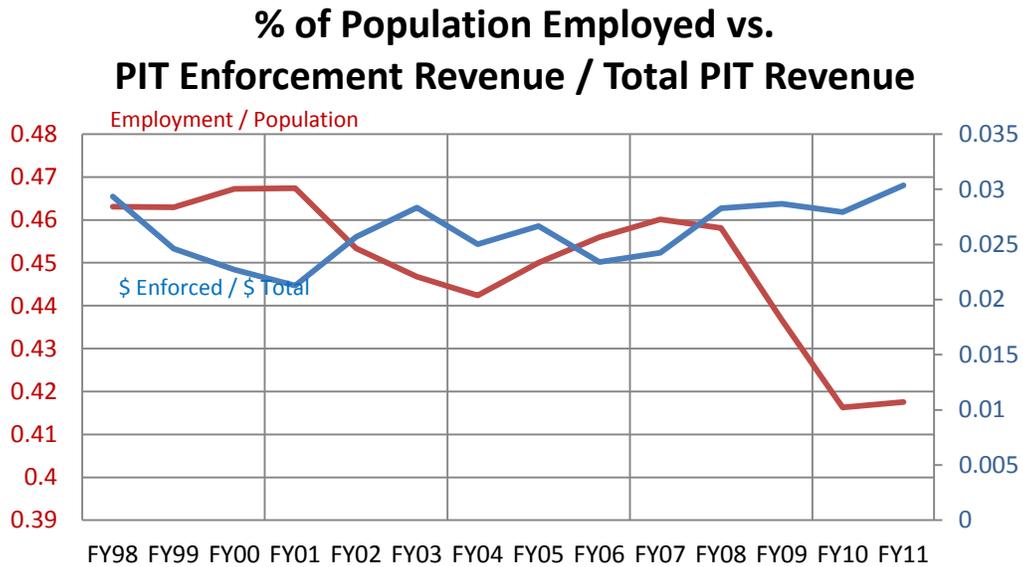
One point to keep in mind moving forward is that this specification methodology is only an initial step in the process, one that will require continuous revisions and updates to account for changes in the enforcement environment. Many areas for further exploration still exist, and areas discussed in this paper will be further refined.

APPENDIX: SELECTED ECONOMETRIC MODELS OF DIRECT ENFORCEMENT REVENUE FROM THE PERSONAL INCOME TAX

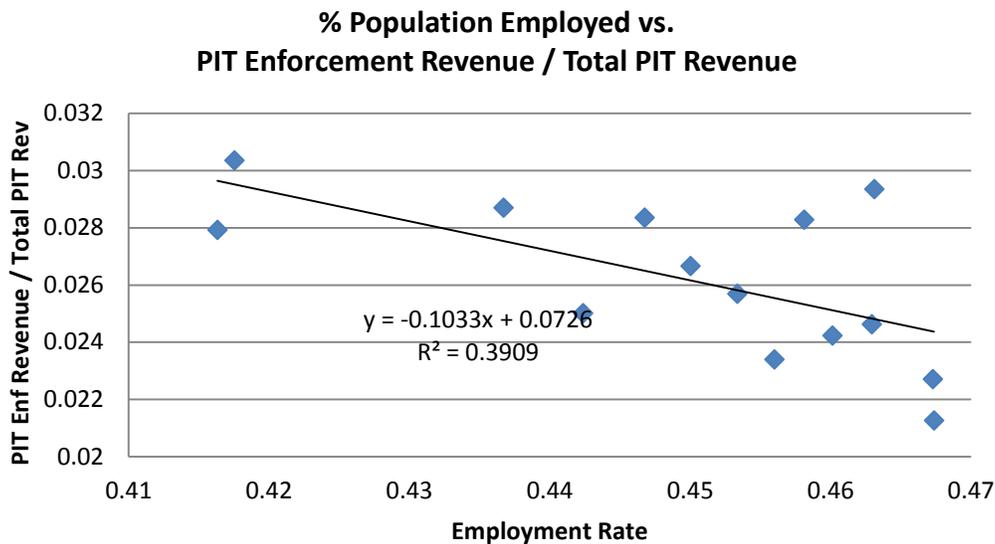
Utilizing the historical data series of direct enforcement revenue from the personal income tax program, we developed short and long range econometric models. The models presented below illustrate just a few of the numerous ways to predict enforcement revenue and are meant to guide the initial discussion of how enforcement revenues may be predicted.

A GENERAL MODEL OF THE PERCENT OF TOTAL PIT REVENUE THAT IS ENFORCEMENT REVENUE

For long-range forecasting of enforcement revenue, the historical pattern of revenue can be compared to the corresponding pattern of macroeconomic variables. Similar to a graph that has already been presented; the starting place for one rudimentary approach would be to compare employment levels to the level of enforcement revenue. To use information that is commonly included in forecasts as a starting place, a modification was made to the previous relationship and this relationship shows the non-farm employment as a percent of total population.



Looking at each year on the graph in a scatterplot helps to see how the direct enforcement revenue is related to employment in a more abstract way. This allows a simple linear regression to be used to describe the relationship.



While the relationship is relatively weak, the percent of total PIT revenue from direct enforcement is consistently between two and three percent of total PIT revenue. The average of the observed range of employment rates is 45.0%, while the average of the observed ratio of enforcement to total collections is 2.6%. So using this relationship one would expect that for employment rates below 45.0% the ratio of enforcement to total collections would exceed 2.6%.

In fact, the regression allows simple mathematical predictions that look very precise:

| | Fiscal Year 2014 | Fiscal Year 2015 |
|----------------------------------------------------|---------------------|---------------------|
| Employment (4qtr avg, 000s) | 1,707.4 | 1,750.0 |
| Population (000s) | 3,988.6 | 4,036.2 |
| Employment/Population | 0.428 | 0.434 |
| <i>Predicted % Direct</i> | <i>2.84%</i> | <i>2.78%</i> |
| Total PIT Revenue(\$million) | 6,591.0 | 7,098.5 |
| <u><i>Predicted Direct Revenue (\$million)</i></u> | <u><i>187.1</i></u> | <u><i>197.4</i></u> |

Calculations are based on “model” and information from Oregon Office of Economic Analysis December 2011 Forecast.

However precise these estimates appear, they are best thought of as ballpark estimates. These estimates were made without considering changes in DOR personnel, practices, or strategy. Based on the chart above, variations of 15 to 25 percent are in the range of possibility as highlighted by history.

Estimates developed in a similar manner may be appropriate to examine at the same time as the state’s quarterly general fund forecast.

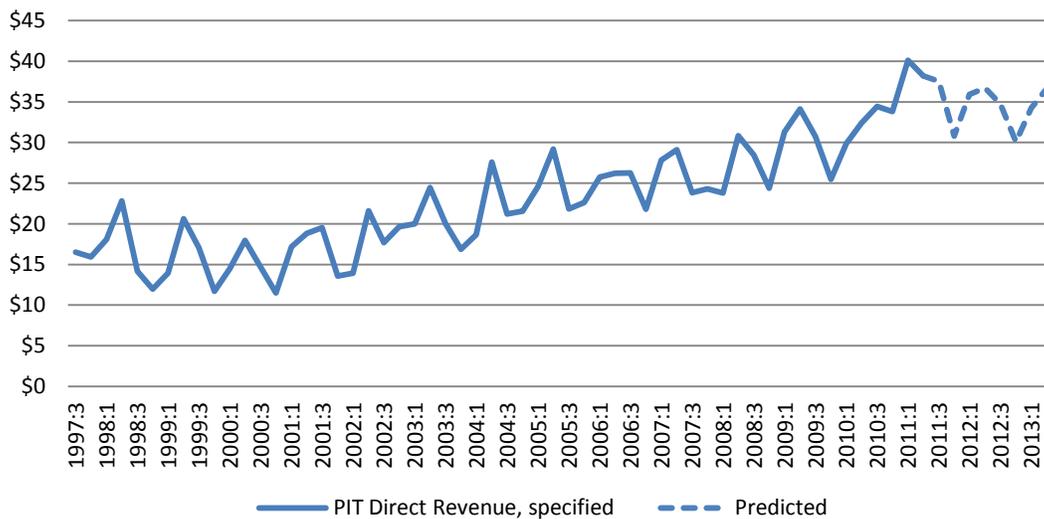
A SHORT-RANGE MODEL OF THE MARGINAL IMPACT OF ENFORCEMENT STAFFING ON DIRECT ENFORCEMENT PERSONAL INCOME TAX REVENUE

Initial exploratory modeling indicates that FTE is a minor driver of the long-range trend of direct enforcement revenue compared to the more influential factors of economic conditions and outstanding accounts receivable.¹⁶ However, because of strong interest in quantifying the impact of staffing levels on enforcement revenue, we present a short range model which focuses specifically on this relationship.

One way to tease out the marginal impact of adding FTE is to construct a simple time series model of direct revenue with FTE as the sole explanatory variable outside of the time series variables.¹⁷ In this model, the total dollars received as direct revenue for a given quarter is a function of the total dollars received as direct revenue from two quarters previous and the level of FTE in one quarter previous, controlling for the seasonal characteristics of the quarter in which we are measuring the direct revenue and also controlling for an unusual spike in enforcement revenue in late 2010 and early 2011.¹⁸

This model, which utilizes a variable representing a two-month lag of direct revenue, is statistically stronger than if the model utilized a lagged variable representing the direct revenue from the adjacent previous quarter. One explanation may be due to the timing of the new hire; since the FTE could be added at any point during the three months of the quarter, that initial quarter is not a good starting point for measuring the quarterly marginal impact. The first quarter *after* the FTE is added is most appropriate to determine the effect of having the additional FTE. Because of this, the estimated marginal impacts begin in the quarter after the first full quarter in which the FTE is added. To illustrate: If the FTE is hired at any time in the first quarter of the fiscal year, the impact of the FTE is estimated in the second quarter, and this estimate is used to predict the marginal impact of the impact on direct revenue beginning in the third quarter.

Quarterly PIT Direct Enforcement Revenue
(in millions)



¹⁶ There are also circular relationships between enforcement staffing, accounts receivables and the economy.

¹⁷ We utilize a standard, linear ordinary least squares model. The historical data for direct enforcement revenue is constructed according to the specification of enforcement revenue presented in this paper. FTE data is constructed from employee timesheet data.

¹⁸ Recall from the scatter plot presented on page 26 that the data points for the most recent four quarters show up as visual outliers.

The solid blue line illustrates the PIT direct enforcement revenue based on the enforcement revenue specification presented in this paper. The data is quarterly and non-seasonally adjusted - a clear quarterly cyclical pattern is evident. The dashed blue line represents the predicted quarterly revenue based on the time series model. For the predicted period, we assume a three percent annual growth rate in FTE, consistent with historical data. In order to identify the marginal impact of changes in the level of FTE, we look at the coefficient for the FTE variable in the econometric model which predicted the direct enforcement revenue stream in the graph above.

The model estimates that the quarterly impact of adding an FTE is \$78,500, which would annualize to \$276,700 for the first year.¹⁹ Because of the way the model is constructed, there is a one quarter delay of the effect on direct revenue, so the impact of hiring on revenue is predicted starting with the quarter following the first full quarter after the FTE is added.

This figure is notably lower than those presented in other reports. One explanation is that other presentations tend to focus on collections per revenue agent, whereas the FTE presented here represents a composite of revenue agents, auditors and other staff. Secondly, the revenue used in our modeling is based upon our specification of direct enforcement revenue, whereas other metrics obtain collections figures utilizing a different method. A third difference between our figure and those in other reports is that metrics are typically based on an average rate of collections per employee rather than a marginal rate. When an average calculation is made, factors other than the increase of the number of employees are incorporated in the resulting figure, whereas with a marginal calculation, the idea is to isolate the revenue due solely to the increased number of employees.

Expanding on the last point, we provide a simplified example of how an average rate of collections isn't designed to isolate the impact of changes in enforcement staffing using an example of collections per revenue agent. In the first quarter of the fiscal year, an agency collects \$1M in total direct enforcement revenue and employs 100 full time revenue agents. The average collection rate per revenue agent is \$10,000. In the last quarter of the fiscal year, the agency has increased the revenue agent staff to 120, and the total direct enforcement revenue is \$1.5M, increasing the average collections per revenue agent to \$12,500. In this example, the increase in revenue from \$1M to \$1.5M may have been partially due to the increase in collection staff, but may have been due to system changes, economic conditions or other factors. In fact, there is nothing to guarantee that the increase in the number of employees played a part in increasing the revenue; it is plausible that the impact of the employees actually decreased revenue, but other factors outweighed that resulting in a positive net effect.

There are different ways to make a calculation of an average figure, and this is a simple example, but it does illustrate how a calculated average figure is a different representation than an estimated marginal figure. In the model we present to estimate a marginal effect, our aim is to identify what increase in enforcement revenue would occur in the short term solely due to the increase in FTE.

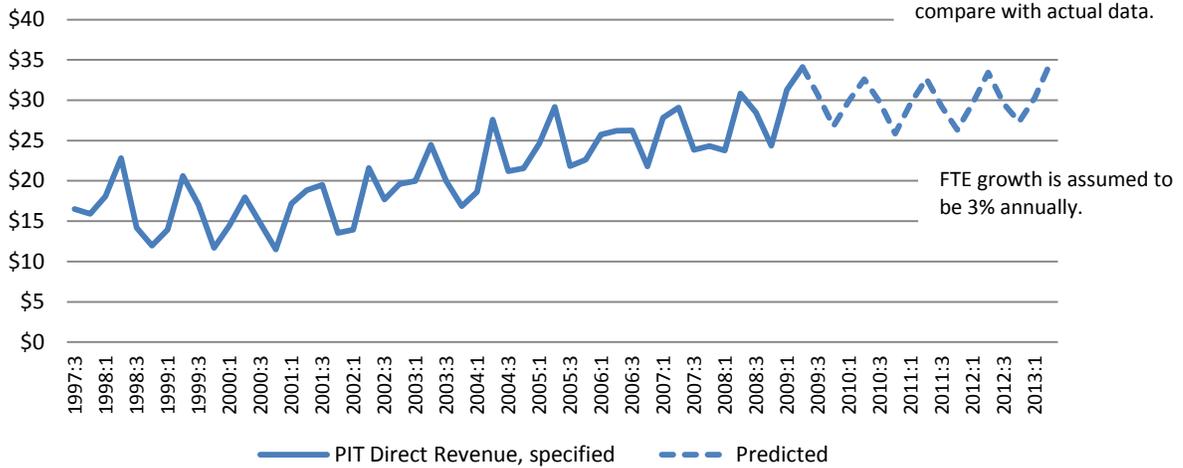
Testing the model on historical data. The next step is to generate a forecast using the same econometric model, but based on data before the level shift. Relying on visual examination, we'll consider that the shift up in the overall level of revenue begins in the third quarter of 2010. We back up four quarters from this point and forecast forward. Since we are forecasting for a period in which we have actual data, we call this an in-sample forecast.

The next figure illustrates the forecasted revenue based on data through the second quarter of 2009, with a forecast period of third quarter 2009 through second quarter of 2013; the in-sample period is through second quarter of 2011.

¹⁹ Note that the annualized marginal impact of adding an FTE is not the multiplication of the first quarter impact times four quarters. The hiring of an FTE is a discrete event, and the \$78,500 impact reflects the marginal increase in quarterly revenue resulting from the additional FTE for the first quarter. Over time, the estimated quarterly marginal impact declines. This is because there is less certainty in future quarters how much of the increase in revenue would continue to be due solely to the increased FTE versus from the interaction of other factors.

Quarterly PIT Direct Enforcement Revenue Insample Forecast (in millions)

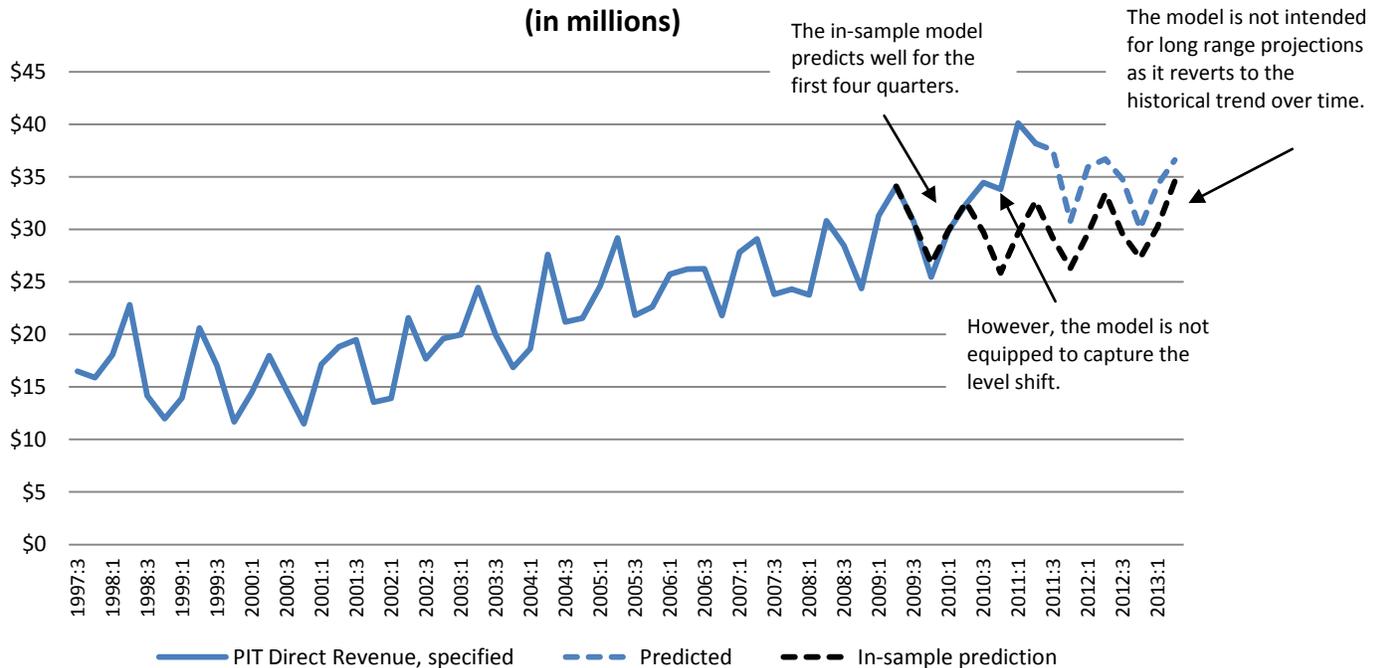
The in-sample forecast period is from third quarter of 2009 through second quarter of 2011; these are quarters that we are predicting and will compare with actual data.



This model would predict growth in revenue to continue a historical pattern as if the ending data point (second quarter of 2009) was an unusual high level. There is nothing in the earlier data to suggest the sustained shift up in revenue in late 2010 and early 2011 which is evident in the actual data from more recent quarters.

Overlaying the in-sample prediction on the first graph, we see that the model does predict well in the short term. But, beyond four quarters, the model is not a good predictor for two reasons. First, the level shift is not predicted; the factors that drive this shift up are exogenous to the model (outside the scope of the model). Second, the model reverts to the mean by the second year of the forecast; this illustrates why this is not a long range model.

Quarterly PIT Direct Enforcement Revenue (in millions)



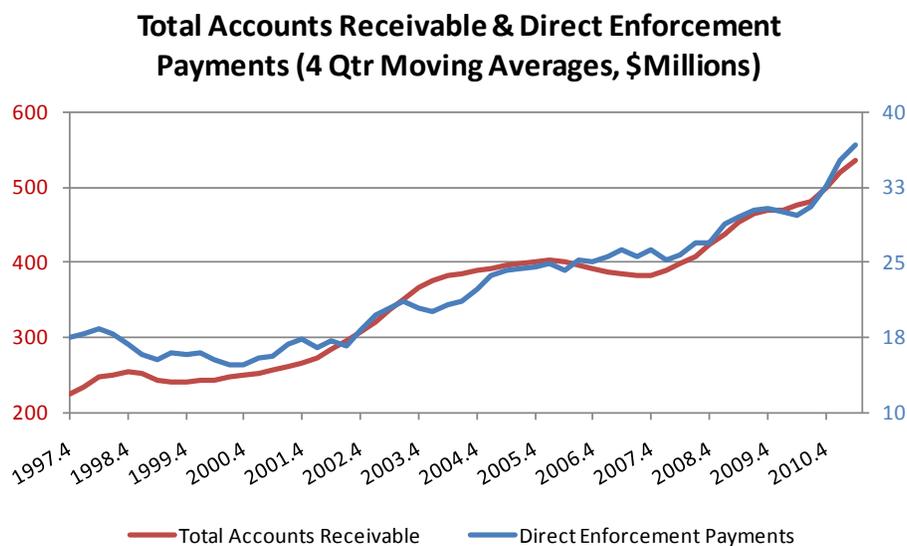
This exercise illustrates how the patterns and trends in the data are dynamic and cannot be explained by a fixed model. The model that makes sense today doesn't necessarily make sense at other points in time. For any model, review and modification is ongoing since the relationships between inputs and outputs may change, as may the availability and understanding of the data.

This model and the specification of direct enforcement revenue are based on DOR's current systems. A new system will likely provide a better basis for this type of analysis, at least forward-looking, but may have limitations that inhibit comparisons to historical data.

We presented this model to address the interest for having a quantitative measure of the impact of FTE on enforcement revenue. It is also possible to create a similar model to estimate the impact of other factors of interest, for example system changes. Note that this would be estimation only, not measurement, so it would not be appropriate for all uses; for example, it is not an appropriate method to provide a basis for compensating a vendor in a performance-based contract.

MODELING OF THE MARGINAL IMPACT OF ACCOUNTS RECEIVABLE ON DIRECT ENFORCEMENT PERSONAL INCOME TAX REVENUE

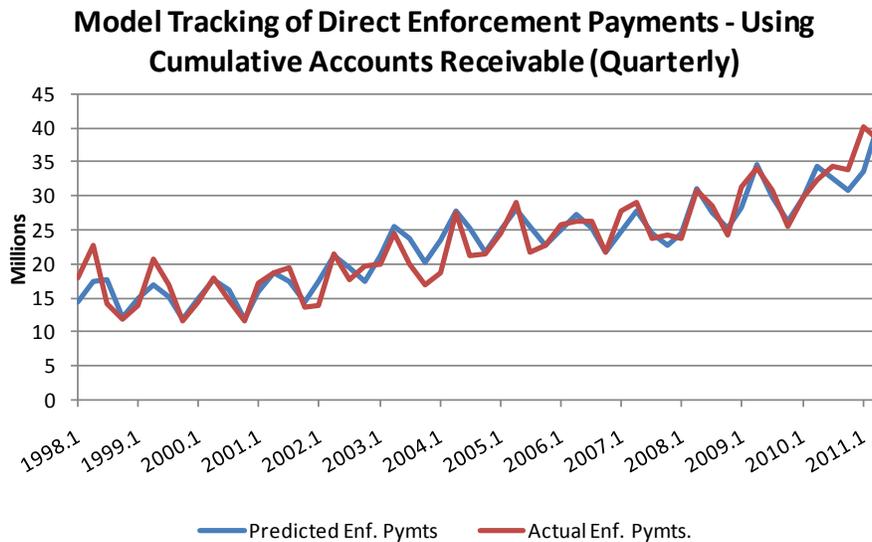
Using both new and established accounts receivable in a model to explain changes in direct enforcement revenue originates from the idea that direct enforcement revenue is driven in large part by the availability of revenue to be collected. If all taxpayers paid the correct and total amount of tax they owed on time, there would be no direct enforcement revenue available to be collected. Likewise, as the accounts receivable grows (be it from taxpayer self assessments, DOR activity such as audits or filing enforcement, or other reasons) it would be expected that enforcement collections would also grow. The exhibit below displays the four quarter moving averages for accounts receivable and enforcement payments received from the fourth quarter of 1997 through the second quarter of 2011. The exhibit appears to display a positive relationship between accounts receivable and enforcement payments and this relationship is what the following model was based upon.



The original least squares (OLS) modeling was performed using a quarterly time series with the quarterly sum of new accounts receivable liabilities and the one quarter lag of the average of outstanding liabilities for a three month period as

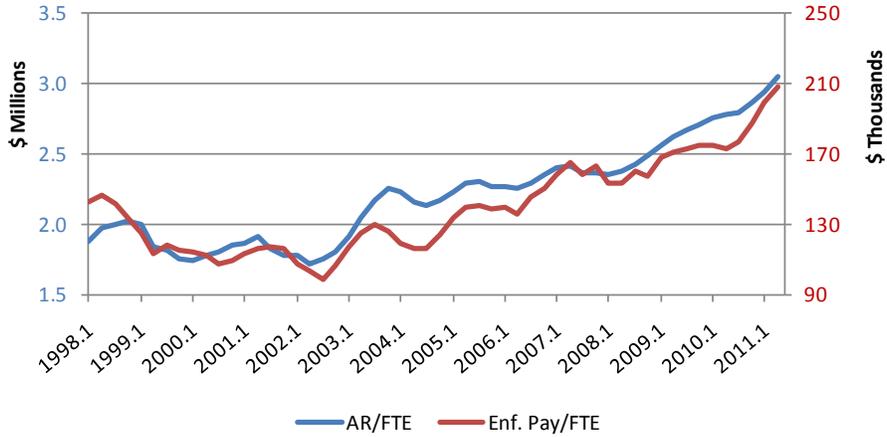
the two predictor variables along with a seasonable dummy variable. The reasoning behind utilizing new liabilities as a predictor variable was that liabilities are at their most collectable early on in the collection process, as liabilities become older, their collectability decreases. Using new liabilities as a predictor variable helps to account for some of the seasonality in new liabilities (new liabilities spike during the second quarter when returns are processed) as well as accounting for changes in new liabilities resulting from a variety of reasons such as DOR activity, or other economic or social issues.

The exhibit below illustrates the tracking of the predicted OLS enforcement payments variable with actual enforcement payments. Outside the late nineties and the past few quarters, the model tracks fairly well. With all the changes to the enforcement environment caused by amnesty, DOR actions (e.g. speed ups, blitzes, withholding table changes, etc.) as well as the general economic climate, it is not too surprising that the model performs less well in the most recent quarters. The OLS equation accounts for nearly ninety percent of the variation in actual enforcement payments. The model estimates that the quarterly impact of adding one dollar in new liabilities is 6.6 cents whereas the quarterly impact of adding to cumulative accounts receivable is 6.1 cents.



One of the disadvantages to this approach is the absence of a variable that accounts for DOR FTE. The parameters of this model do not allow for predictions to be made regarding changes to DOR enforcement staffing levels. In the past, the relationship between accounts receivable and DOR staffing levels remained relatively consistent, but if DOR was to make a sizable shift either upwards or downwards in staffing levels, then this model could become unsuitable for prediction purposes. The exhibit below details the relationship between accounts receivable per FTE and enforcement payments per FTE.

Quarterly Accounts Receivable Moving Average Per FTE & Quarterly Direct Enforcement Payments Moving Average Per all Enforcement FTE



A second disadvantage to this modeling approach is the reliance upon cumulative accounts receivable as a predictor variable. Accounts receivable is a calculation that is in part determined by the amount of direct enforcement payments received, creating an odd circular calculation.

MODELING DIRECT ENFORCEMENT PAYMENTS USING NEW LIABILITIES AND ECONOMIC VARIABLES

In an attempt to avoid the circular calculation described in the previous model, the following OLS model was formulated using a quarterly time series containing the following predictor variables: new accounts receivable, gross state product (lagged one quarter), unemployment rate (lagged three quarters), and a seasonal dummy variable. Because new accounts receivable is not dependent upon enforcement payments, the circular calculation issue plaguing the previous model is avoided. Just over ninety percent of the variation in enforcement payments can be attributed to the model.

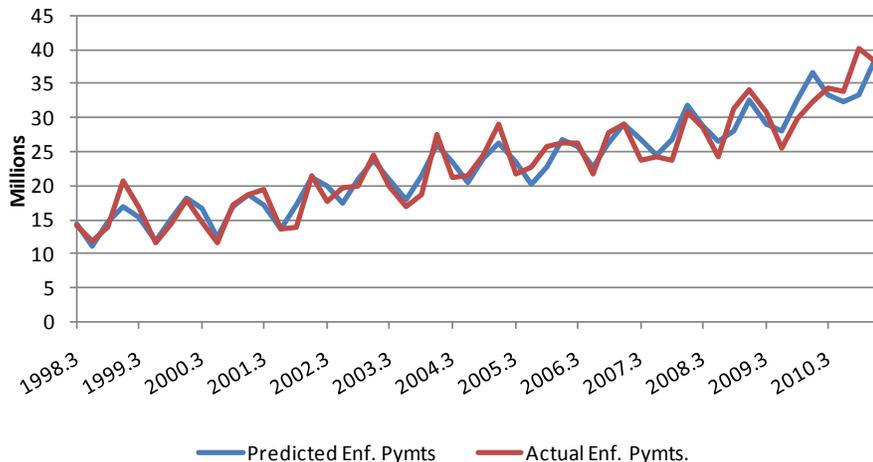
The exhibit below illustrates the tracking of the predicted OLS enforcement payments variable with actual enforcement payments. The model estimates that the quarterly impact of adding one dollar in new liabilities would be a 5.5 cent increase in

enforcement payments.

The model fits fairly well throughout the sample time series with the greatest amount of residual variation again occurring during the late nineties and most recent few quarters.

As in the previous model, the absence of a DOR FTE or other DOR enforcement effort predictor variable leaves this model

Model Tracking of Direct Enforcement Payments - No Cumulative Accounts Receivable (Quarterly)



unable to reflect the impact of DOR changes on enforcement payments. The fact that residual variation increased in the most recent quarters, a time period when the general enforcement environment has shifted from the past due to a number of circumstances (e.g. amnesty, speed ups, blitzes), illustrates the possible shortcomings of relying upon this specific model. This model is also reliant upon first predicting new liabilities as well.

APPLICATION OF MODELING RESULTS

How can these models be utilized? As an example, if the interest is in estimating the return on investment (ROI) in enforcement staffing, the short range model to quantify the marginal impact of increasing FTE is a good starting point. However, we strongly caution against using the reported figure as a rule of thumb. Rather, the model may be considered a framework to begin the process of addressing a specific question.

Along with the estimation of a marginal impact of FTE or system changes, we could utilize the enforcement specification and the insight gained from the project to quantify an appropriate average rate of collection. To prepare an estimate of the return on investment in enforcement resources, these marginal and average figures would be weighed with qualitative information. Implicit in this methodology is the need for staff expertise, as the appropriate application of qualitative data and contextual information is extremely important.