DOWNSTREAM IMPACT PROJECT: IDENTIFYING DRIVERS OF TAS WORKLOAD

EXECUTIVE SUMMARY

Since the inception of the Taxpayer Advocate Service (TAS) in March 2000, the volume of TAS case receipts has varied greatly from year to year. Through fiscal year (FY) 2004 receipts were declining, but case receipts have precipitously increased in the last two fiscal years - TAS case receipts increased from about 169,000 in FY 2004 to over 242,000 in FY 2006. This volatility in receipts has made it difficult for TAS to effectively plan for future workload and to assure that sufficient resources are available. At the request of the National Taxpayer Advocate, TAS Research conducted a study to develop an approach that will enable TAS to make more accurate projections of our workload in the future. This approach will also highlight trends in case receipts and help identify emerging potentially problematic areas.

In the study, TAS Research set out to identify the "drivers" of the TAS workload (*i.e.*, the TAS cases) and to devise a means of projecting future changes in case receipt volumes. We defined drivers as any activities that influenced the volume of cases that TAS received. We decided to develop a series of econometric models based on these drivers to make our projections. We used linear regression to develop each of the models — a common tool used to make a variety of projections.

Based on the TAS fiscal year (FY) 2004 inventory, we determined that ten areas accounted for about two-thirds of all TAS case receipts. We decided to build a separate model for each of these ten categories of taxpayer issues. Each model has a primary "workload driver." Each workload driver is the activity that is principally responsible for generating TAS workload for the category of taxpayer issues being modeled. Generally, the drivers are operating division (OD) activities, such as the processing of amended returns, the initiation of an audit, or the issuance of a levy.

In addition, we found that we needed to add another driver to a number of our models. This second driver we call the "BOD referral rate." The BOD referral rate accounts for the likelihood that the operating division will refer cases related to a primary workload driver, such as amended returns or levy issuance, to TAS. For example, for our model of TAS amended return cases we used the ratio of TAS amended return case receipts to total Forms 1040X (Amended U.S. Individual Income Tax Return) filed in the same year as our BOD referral rate.

We also designed two other models to address the remainder of the TAS issues not already addressed by the ten individual models. Since TAS categorizes its workload as either customer service or compliance issues, we developed one model for the remainder of the TAS customer service inventory receipts and another model for the remainder of the compliance inventory receipts. We use the results from all twelve models to project total TAS inventory receipts.

Since the models' inventory projections rely on the input of the corresponding workload drivers, these driver values must be determined. In most instances, the workload drivers must be estimated from existing IRS projections or determined from historical trends.

We decided to evaluate the models by comparing each model's results with the actual FY 2006 TAS case receipts for the segment of the workload described by the model. We evaluated the models against actual receipts in two ways:

- We used our estimates for the workload drivers to produce a projection that we compare to actual receipts. This analysis enables us to evaluate the accuracy of our projections.
- We also did a projection using actual values for the drivers to see how well the model performs with correct (as opposed to estimated) values for the drivers. This analysis enables us to assess how well the models reflect the relationship between the drivers and TAS receipts.

When considering all twelve models together, the combined initial projection was within ten percent of the actual FY 2006 TAS workload receipts. When supplying the actual workload driver values, instead of their estimated values, the combined projection from all twelve models was within three percent of the final FY 2006 total TAS inventory receipts.

Initial Projection	Projection with Actual Drivers	Actual Receipts
220,256	235,257	242,173

The discussion of each individual model contained in this report includes an analysis of the effectiveness of the model. More detailed findings and a discussion of future efforts to improve the models are contained in the final sections of the report.

TAS Research believes that the most important area for future research will be to rework the models using additional data points. While this may not be possible for all models, in many instances, we expect to be able to obtain workload driver information on a monthly or quarterly basis. Doing so will allow us to break out the TAS case receipts in the same manner and thus increase the number of data points available to develop and test the models. These additional data points should result in better models, expressed with smaller confidence intervals, which in turn will enable TAS to better predict and prepare for fluctuations in its workload.

INTRODUCTION

At the request of the National Taxpayer Advocate, TAS Research has undertaken a study to identify the relationships between operating division activities and the TAS workload of taxpayer cases (*i.e.*, taxpayer problems that TAS is helping to resolve), and to develop an approach based on those relationships that will enable TAS to make accurate projections of our future workload. Since TAS is "downstream" from the operating divisions in the sense that most of our cases begin as issues worked in the operating divisions and subsequently come to TAS, we have titled the study the "Downstream Impact Study."

In July of 2005, TAS Research completed a profile of the workload within TAS. This effort was Phase I of the study. In the profile report TAS Research analyzed the types of cases that make up the TAS workload. We also analyzed the volume of cases that were closed each year and how those volumes fluctuated from fiscal year (FY) 2002 through FY 2004. With a better understanding of the volume and types of cases worked by TAS, TAS Research began Phase II of the study.

In Phase II, TAS Research set out to identify the "drivers" of the TAS workload (*i.e.*, the TAS cases) and to devise a means of projecting future changes in case volumes. TAS Research defined drivers as any activities that influenced the volume of cases that TAS received in its inventory. We decided to develop a series of econometric models based on these drivers to make our projections.

The body of the report contains a separate, but similar, section for each of the twelve models used to describe TAS inventory receipts. Each model describes a specific segment of TAS inventory. The TAS inventory segments are defined and relevant background information is provided. TAS Research briefly discusses how each model was developed, and the equation for each model is displayed. We include a brief summary of how we used the models to project the TAS inventory. Lastly, the models are evaluated by examining each model's results with the actual TAS case receipts for the segment of the workload described by the model. We evaluate the models against actual receipts in two ways:

- We use our estimates for the workload drivers to produce a projection that we compare to actual receipts. This analysis enables us to evaluate the accuracy of our projections.
- We also do a projection using actual values for the drivers to see how well the model performs with correct (as opposed to estimated) values for the drivers. This analysis enables us to assess how well the models reflect the relationship between the drivers and TAS receipts.

In this report, TAS Research shares the study findings, which collectively define a methodology that will enable TAS to make more accurate projections of future TAS workload. The need for an improved methodology has become especially apparent in recent years, given the volatility of TAS case receipts from year to year and the dramatic increase in case receipts in the last two years.[1]

[1] TAS case receipts increased from about 169,000 in FY 2004 to over 242,000 in FY 2006.

METHODOLOGY

TAS Research decided that the best way to identify the drivers of TAS workload, and to make projections for TAS workload was to develop a series of econometric models. We began by looking at case receipts broken out by Primary Core Issue (PCI) code. Each PCI is a category denoting cases of a particular kind (*e.g.*, EITC audits, amended returns, etc.) or with a particular issue that caused them to come to TAS for resolution (*e.g.*, levies, frozen refunds, etc).[2] We then grouped similar PCI codes together into broader categories of closely related cases. After ordering the categories by volume, we noticed a natural break in the data.

In particular, the cases associated with PCI codes within the 'Top 10' volume leader categories represented nearly two-thirds of all cases closed by TAS in FY 2004.[3] TAS Research decided to concentrate our efforts on studying the drivers associated with the PCI codes within this 'Top 10' list. We did this for a couple of reasons. One, the sheer number of PCI codes deterred us from developing methodologies for projecting workload across each PCI code. Two, the results from the Profiling Report showed nearly two out of every three cases in TAS workload were associated with PCI codes in the 'Top 10.'

Since most of the workload within TAS was concentrated in 10 categories of closely related PCI codes, TAS Research decided to direct our resources to identifying the underlying drivers for these cases. With the 'Top 10' list of case categories, we next focused on developing theoretical models that could explain the relationship between the cases and their drivers.

The theoretical models included the number of TAS cases for a given category as the dependent variable. For our independent variable(s), we looked for a measure of an underlying activity that "drove" the case(s) to TAS. For example, one theoretical model shows that the number of cases that TAS works as a result of Criminal Investigation activity is driven by the number of refunds that CI freezes because of suspected fraud:

(TAS cases involving CI) is a function of (the number of CI freezes)

TAS Research developed theoretical models like this one for each of the PCI codes in our 'Top 10' list. This task required us to draw upon our institutional knowledge of the operating division activities. In addition, we had to consider changes like the increased use of electronic filing, as this was also influencing TAS caseload. We also eventually learned that we had to consider the 'referral rate' for cases being sent to TAS. We will explain the referral rate in more detail later in this report. With the theoretical models developed, TAS Research then acquired the data that would be needed to perform the regression analysis.

At this point, TAS Research had to make two judgment calls. One, we had to determine the best independent variables to be used within each model. Two, we had to decide how to proj-

[2] Prior to April 1, 2003, TAS referred to PCI codes as Major Issue (MI) codes. During the conversion, it was often the case that a MI code was broken out into several PCI codes. Hence the reader will often see several PCI codes at once, and these various codes at one time were consolidated under an MI code.

[3] *See* the TAS Research Profiling Report from Phase I.

ect each independent variable for the following year. We used official IRS projections if they were available (*e.g.*, number of returns filed). In some instances, we were able to use the prior year actual value due to the lag between the operating division work and the case reaching TAS. For all other projections of independent variables, we regressed the independent variable on a time series, using either a linear or quadratic model. The choice of the time series model was based upon the fit of the data and past experience with TAS inventory. Finally, in some instances the projection was made by averaging the two projections generated by the linear and quadratic time series models.

As mentioned previously, we quickly learned that we needed to add yet another variable to many of our models. This variable accounted for the likelihood that the operating division would refer the case to TAS. We referred to the likelihood of a case being referred to TAS as the "BOD referral rate." We calculated the BOD referral rate in two steps. First, we took the number of TAS cases in the given category that were attributable to referrals from the operating divisions. Then we divided this number of TAS case receipts by the "driver workload" volume for that particular model.[4] For example, for our model of TAS amended return cases we used total Forms 1040X (Amended U.S. Individual Income Tax Return) filed in the same year as our "driver workload."[5]

For each model, we comment on the proportion of variation *"explained"* by the model. The adjusted R Square value is reported as the measure of the variation explained by the model. Essentially, the R Square value shows the percent of variation in the dependent variable (*i.e.*, the TAS case receipts variable we are trying to predict) that is predicted by the model. The closer actual values for the dependent variable are to model predictions, the higher the R Square value will be. The R Square value is conservatively "adjusted" to account for the number of observations (data points) and the number of independent variables (workload drivers).

The "t" statistic value for each workload driver and its significance value are also footnoted for each of the models. The significance value for the "t" statistic is a measure of the probability that variability in the independent variable (*i.e.*, workload driver) being tested is actually correlated with variability in the dependent variable being predicted. In basic layman's terms, the probability value for a workload driver is the probability that the driver truly impacts the workload.

[4] For Fiscal Years 2001 through 2003, the percent of cases attributable to operating division referrals was obtained by examining the "How Received" field of the Taxpayer Advocate Management Information System (TAMIS) database for cases closed between Fiscal Years 2002 and 2004. This represented a significant sample size of all receipts during FY 2001 through 2003 (population data could not be obtained because TAMIS receipts data for FY 2001 through FY 2003 have been archived). The FY 2004 and FY 2005 percents are from all TAS receipts for these fiscal years.

[5] Cases also come to TAS through the National Taxpayer Advocate toll-free line, and to a lesser extent through "walk-ins" at TAS offices and via correspondence. We plan to explore using toll-free referrals as a possible driver in future models.

LIMITATIONS

As we generated projections from our models, TAS Research was confronted with a limited amount of data. In general, we were only able to secure case counts for PCI codes back to FY 2001 and through FY 2005. These constraints prevented us from using too many regressors, as the degrees of freedom constraints were onerous. We remind the reader that all regression results shown in the upcoming pages were rounded.[6] This was done to improve the readability of the text. What follows is a summary of efforts to date to identify the drivers of TAS workload, and to quantify the relationship between TAS workload and these drivers. TAS Research expects that input from within and outside of TAS will lead to refinements and other improvements to these models as time progresses.

This report only contains the point estimates for the workload drivers and not their confidence intervals. The ready availability of data limited the models to usually five, and, at most, six data points. As a result, the confidence intervals for the workload drivers are generally large and their display would not contribute to a discussion of the models.

AMENDED RETURNS

Definition

Amended returns are coded by TAS as Primary Issue Code 330. This group of casework includes taxpayer problems with the initial processing of amended returns (*e.g.*, Form 1040X, Amended U.S. Individual Income Tax Return). While this body of casework may include other claim types such as Form 843 (Claim for Refund and Abatement) or Form 941C-Correction of Information, the vast majority of the amended return casework is attributable to the processing of Form 1040X.

Background

Prior to April 2003, injured spouse claims (Form 8379) were grouped with other amended returns. However, the injured spouse cases were subsequently separated from other amended return issues. FY 2004 data regarding the known proportion of amended return and injured spouse cases was utilized to estimate the TAS amended return inventory for FY 2001 through 2003. Accordingly, this model focuses on amended returns (PCI 330) and excludes injured spouse cases.

As mentioned, amended returns attributable to Forms 1040X comprise most of this TAS casework category. In fact for FY 2004, TAS Research found that over 90 percent of the closed amended return cases were associated with a Form 1040X, while less than 2 percent of these cases were associated with a Form 1120X (Amended U.S. Corporation Income Tax Return). The remainder of this inventory was attributable to other less common claim types.

[6] Workload driver coefficients are rounded differently to ensure that sufficient digits are displayed for the reader to understand the value.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory for amended returns. Since TAS's inventory for this issue is overwhelmingly attributable to amendments of Form 1040 (U.S. Individual Income Tax Return) we chose to only consider workload drivers associated with Forms 1040.[7] TAS Research believed that the volume of Forms 1040X filed should be a primary workload driver for this model. Analysis also revealed that the BOD referral rate (the likelihood that an operating division will refer the case to TAS) was another important factor in the number of amended return cases coming to TAS for assistance. The following table depicts the TAS inventory volume from FY 2001 through FY 2005, the volume of amended returns for this same period, and the respective BOD referral rates.

FIGURE 1: TAS RECEIPTS OF AMENDED RETURN CASES

Fiscal Year	Receipts for Amended Returns Only (PCI 330)	Forms 1040X	BOD Referral Rate (PCI 330)
2001	17,884	3,399,000	.002999
2002	19,767	3,552,490	.003116
2003	14,316	3,568,280	.002046
2004	11,025	3,271,290	.001786
2005	12,236	3,181,743	.002307

Resulting Model

The linear regression analysis shows that the TAS amended return receipts may be estimated by the following formula:

.008 * (volume of Forms 1040X filed) + 4,963,784 * (BOD referral rate) – 25,960

In other words, the expected TAS amended return workload is determined by multiplying the volume of filed Forms 1040X and the BOD referral rate by the indicated factors and subtracting a constant of 25,960. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis confirmed that both the Form 1040X volume and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 99 percent of the variation in TAS amended return inventory.[8]

Projection

TAS used the aforementioned model to project its FY 2006 amended return receipts. The first step was to determine the FY 2006 Form 1040X volume and the FY 2006 BOD referral

[7] Workload drivers are taxpayer or IRS actions which likely contribute to (drive) the volume of casework received by TAS. These drivers become independent variables in the regression analysis.

[8] The adjusted R square for the linear model was .99. The t-test for the independent variables showed a value of 7.7 for the amended return volume which is significant at the 98 percent level and a value of 15.5 for the BOD referral rate which is significant at the 98 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

rate. Since neither of these values was known quantities at the time of model development, both items had to be estimated. The FY 2006 Form 1040X volume was obtained from the Projection and Forecasting's Document 6292 (Spring). The FY 2006 BOD referral rate was estimated from a time series analysis of the prior years' referral rates. Both linear and quadratic time series models were tested. The linear model projected an FY 2006 BOD referral rate of .00164 and the quadratic model projected a rate of .00245. The final FY 2006 projection of TAS amended return inventory volume is 9,649 which is the midpoint of the model projections resulting from the two different estimates for the FY 2006 BOD referral rate.[9]

Model Evaluation

Despite the fact that this model shows good ability to explain the variation in TAS amended return inventory, a proper evaluation of the model must compare the projected amended return case receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual amended return receipts for FY 2006. Secondly, the projection will be recomputed by using the actual 2006 IRS Form 1040X volume and the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS amended return inventory, the actual FY 2006 TAS amended return inventory, the expected 2006 Form 1040X volume, the actual 2006 Form 1040X volume, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 2: AMENDED RETURNS MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Amended Return Receipts	9,649	17,140	18,467
FY 2006 Form 1040X Volume	3,256,600	3,359,627	10,525
FY 2006 BOD Referral Rate	.00164	.0032	18,088

[9] The R square for the time series estimates is moderate at .54 for the linear model and .67 for the quadratic model.

When considering the actual values for both the Form 1040X volume and BOD referral rate, the resulting FY 2006 model projection for amended returns is 18,467 compared to the actual FY 2006 TAS amended return receipts of 17,140. When using the actual workload drivers, the model's projection exceeds the actual FY 2006 TAS amended return issue case receipts. Nevertheless, the use of the actual workload drivers greatly improves the projection. TAS Research's inability to project an accurate FY 2006 BOD referral rate contributed most significantly to the model's initial low projection.

REVENUE PROTECTION STRATEGY EXAMINATIONS

Definition

Revenue Protection Strategy (RPS) examination cases are coded by TAS as Primary Issue Code 630. This group of casework encompasses any return selected for examination as a result of RPS. Generally, this category of cases consists of EITC examinations but excludes cases associated with EITC audit reconsideration and EITC recertification issues.

In order to determine counts from FY 2001, TAS had to break out those cases not attributed to RPS using the known split that existed among cases in FY 2004.

Background

Prior to April 2003, EITC audit reconsideration and EITC recertification issues were grouped with EITC RPS examinations. However, EITC audit reconsideration and EITC recertification cases were subsequently separated into distinct TAS case categories. The FY 2004 data regarding the known proportions of RPS, EITC audit reconsideration, and EITC recertification cases were used to estimate the TAS RPS case volumes for FY 2001 through FY 2003. Accordingly, this model is concerned only with RPS examination cases.

The volume of TAS receipts associated with RPS has been declining from FY 2001 through FY 2005. The most likely workload driver associated with this TAS inventory component is some aspect of the Examination RPS inventory. In contrast to the steadily declining TAS RPS case inventory, the number of returns selected by the RPS strategy has fluctuated throughout this period. We explored several related RPS workload drivers including agreed RPS closed cases, unagreed RPS closed cases, and total RPS closed case.

TAS Research also compared these possible drivers with the number of cases referred to TAS from the operating divisions to determine a BOD referral rate. The best model was determined to be one which relied on the BOD referral rate based on the number of unagreed RPS cases for the Fiscal Year. The BOD referral rate was computed as the ratio of BOD RPS cases referred to the total number of RPS cases closed by Examination as unagreed.

Model Development

TAS Research used a linear regression model for this issue. As previously mentioned, since this TAS inventory component is comprised solely of RPS cases, the use of RPS cases in the model is a logical beginning. We refined this approach to only include RPS cases closed as unagreed by Examination, since it is unlikely that a taxpayer would seek TAS assistance where no disagreement with the Examination results occurred. Finally, the discrepancy between the fluctuating overall Examination RPS volumes and the steadily declining TAS inventory again suggested the importance of the BOD referral rate to the model. Specifically, TAS Research regressed the number of RPS cases received on the ratio of BOD referred RPS cases to the unagreed closed RPS cases. The following table depicts the TAS inventory volumes from FY 2001 through FY 2005, and the BOD referral rates for the same periods:

FIGURE 3: TAS RECEIPTS OF RPS CASES

Fiscal Year	Receipts for RPS (PCI 630)	BOD Referral Rate
2001	26,338	.08
2002	20,428	.05
2003	19,453	.04
2004	10,003	.02
2005	6,880	.01

Resulting Model

The linear regression analysis shows that the TAS RPS return receipts may be estimated by the following formula:

296,858 * (BOD referral rate) + 5,396

In other words, the expected TAS RPS workload is determined by multiplying the volume of filed returns by the indicated factor and adding a constant of 5,396. The multiplying factor and the constant are determined by the regression analysis. The model analysis confirmed that the BOD referral rate is a significant workload driver for this TAS inventory component. The model explains 93 percent of the variation in the TAS RPS inventory.[10]

Projection

TAS Research used the previously described model to project FY 2006 RPS TAS case receipts. The first step was to determine the FY 2006 BOD referral rate for RPS cases. Since this value was not known when the model was developed, we estimated the value by conducting a time series analysis on the prior year referral rates. A graphical depiction of the prior referral rates showed that the BOD referral rate has been behaving in a quadratic fashion. Accordingly,

[10] The adjusted R square for the model was .93. The t-test for the independent variable (BOD referral rate) showed a value of 7.4 which is significant at the 99 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload driver.

a quadratic time series model projected an FY 2006 BOD referral rate of .006.[11] Using this value in the RPS receipts model provides a projection of 7,177 TAS RPS receipts for FY 2006.

Model Evaluation

Despite the fact that this model shows good ability to explain the variation in the TAS RPS receipts, a comparison of the model's projection of the FY 2006 TAS RPS receipts to the actual FY 2006 RPS receipts is necessary. The comparison will be explored by two methods. First, the original model projection will be compared to the actual FY 2006 TAS RPS receipts. Secondly, the projection will be recomputed by substituting the actual BOD referral rate for the time series estimate. This will allow us to determine if the discrepancy between the projected and actual receipts is more attributable to the underlying model or the underlying assumptions necessary for using the model to make the projection.

The following table shows the model's projection the TAS RPS inventory, the actual FY 2006 TAS RPS inventory, the estimated BOD referral rate, the actual FY 2006 RPS BOD referral rate, and the model's projection based on the actual BOD referral rate:

FIGURE 4: RPS MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS RPS Receipts	7,177	5,704	7,533
FY 2006 BOD Referral Rate	.006	.0072	7,533

The actual FY 2006 BOD referral rate for FY 2006 TAS RPS receipts was .0072 which is higher than predicted.[12] The resulting FY 2006 model projection for RPS returns is 7,533 compared to the actual FY 2006 TAS RPS return receipts of 5,704. The relatively small number of data points undoubtedly contributes to the model's overestimating the number of FY 2006 TAS RPS receipts. The few data points prevent the model from being able to adapt to alternating steep and shallow inventory decreases.

RETURN AND DOCUMENT PROCESSING

Definition

Return processing issues and unpostable or rejected document issues are coded by TAS as Primary Issue Codes 310 and 315, respectively. These issues include problems with processing

[11] The R Square value for the regression formula was .96.

[12] This is an estimated rate based on doubling the unagreed RPS closures through the second quarter of FY 2006 – from the Automated Information Management System (AIMS) Closed Case Database.

an original paper or electronic return and problems with transactions to return modules being rejected or unposting at the IRS tax account Master File.

Background

Prior to April 2003, these two issues were grouped together into one TAS inventory code. However, these issues were subsequently separated from each other. These two types of inventory often represent similar issues and will therefore be considered together for this analysis. The TAS receipts for these cases fell dramatically from FY 2001 through FY 2004, but showed a 14 percent increase from FY 2004 to FY 2005. As a general rule, TAS inventory increased across all PCI codes from FY 2004 to FY 2005.

As with much of TAS inventory, the majority of these case receipts are related to the processing of Form 1040 returns. For FY 2004, TAS Research found that almost 91 percent of the closed return and document processing cases were associated with a Form 1040. The next most common types of forms affected by the aforementioned processing problems were Forms 940 (Employer's Annual Federal Unemployment Tax Return) and 941 (Employer's Quarterly Federal Tax Return) with a combined percentage of only 5.7 percent.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory for the return and document processing issues. Since TAS's inventory for this issue is overwhelmingly attributable to Form 1040, we chose to only consider workload drivers associated with Forms 1040.[13] Because of the considerable verification checks for electronically filed returns, paper returns are more likely to result in processing errors. Accordingly, we chose the paper return volume as the primary independent variable and again used the BOD referral rate to account for the likelihood of a case being referred to TAS from the operating division. It is interesting to note that returns filed electronically surpassed those filed on paper for the first time in FY 2005. The following table depicts the TAS return and document processing inventory volumes from FY 2001 through FY 2005, the volume of paper returns for this same period, and the respective BOD referral rates:

[13] Workload drivers are taxpayer or IRS actions which likely contribute to (drive) the volume of casework received by TAS. These drivers become independent variables in the regression analysis.

FIGURE 5: TAS RECEIPTS OF RETURN PROCESSING CASES

Fiscal Year	Receipts for PCI 310 and 315	Paper Return Filings[14]	BOD Referral Rate
2001	25,970	89,238,124	.00015
2002	19,354	83,505,077	.00011
2003	11,241	77,265,266	.00007
2004	9,489	69,148,584	.00008
2005	10,815	63,811,993	.00011

Resulting Model

The linear regression analysis shows that the TAS return and document processing receipts may be estimated by the following formula:

> .000401 * (volume of filed paper Forms 1040) + 119,386,811* (BOD referral rate) – 27,517.

In other words, the expected TAS amended return workload is determined by multiplying the volume of filed paper Forms 1040 and the BOD referral rate by the indicated factors and subtracting a constant of 25,717. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis determined that both the Form 1040 paper return volume and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 99 percent of the variation in the TAS return and document processing inventory.[15]

Projection

TAS used the aforementioned model to project its FY 2006 return and document processing receipts. The first step was to determine the FY 2006 paper Form 1040 volume and the FY 2006 BOD referral rate. Since neither of these values was known quantities at the time of model development, both items had to be estimated. The FY 2006 paper Form 1040 volume was obtained from the Projection and Forecasting's Document 6292 (Spring). A linear time series for the referral rate produces a very poor model because of the inflection of the rate between FY 2003 and FY 2004. Although a quadratic model fits the data nicely, it is extremely doubtful that the referral rate would reach the rate projected in FY 2006, given that the rate is over three times the highest previous rate. Moreover, the FY 2005 rate is the second highest rate observed over the past five fiscal years. Therefore, the FY 2006 BOD referral rate was set at the FY 2005 level for the projection. The final FY 2006 projection of TAS return and document processing inventory volume is 10,014.

[14] Note: The paper Form 1040 counts were extracted from the actual form filings as recorded by the IRS Projections and Forecasting Group.

[15] The adjusted R square value for this model is .99. The t-tests for the independent variables showed a value of 11.5 for Paper Forms 1040 and 10.7 for the BOD referral rate. Both values are significant at the 99 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

Model Evaluation

Despite the fact that this model shows good ability to explain the variation in TAS return and document processing inventory, a proper evaluation of the model must compare the projected return and document processing receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual return and document processing receipts for FY 2006. Secondly, the projection will be recomputed by using the actual 2006 IRS paper Form 1040 volume and the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS return and document processing inventory, the actual FY 2006 TAS return and document processing inventory, the expected 2006 paper Form 1040 volume, the actual 2006 paper Form 1040 volume, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 6: RETURN PROCESSING MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Return and Document Processing Receipts	10,014	12,882	11,860
FY 2006 Paper Form 1040 Volume	60,897,900	58,354,301	8,995
FY 2006 BOD Referral Rate	.000110	.000134	12,879

When considering the actual values for both the paper Form 1040 volume and BOD referral rate, the resulting FY 2006 model projection for return and document processing is 11,860 compared to the actual FY 2006 TAS return and document processing receipts of 12,882. The actual volume of paper returns was about 2.5 million less than IRS projections, while the BOD referral rate continued its increase which began in FY 2003. The inability to correctly predict the BOD referral rate contributed most of the variation between the model's prediction and the actual number of observed TAS FY 2006 return and document processing receipts.

LEVIES

Definition

Levies are coded by TAS as Primary Issue Codes 710, 711, 712, 713, 714, and 715. TAS levy receipts encompass those cases where a taxpayer has sought TAS assistance because the IRS has attached the property belonging to a taxpayer to satisfy a delinquent tax liability. Codes 711 through 715 are only used for Federal Payment Levy Program (FPLP) levies and will be discussed later in a separate model. Primary Issue Code 710 is used for all other TAS cases received as a result of IRS levy actions.

Background

Prior to April 2003, all TAS levy receipts were grouped into a single inventory category. However, the FPLP cases were subsequently separated from other general levy cases into separate categories based on which Federal payment program (*i.e.*, Social Security, Federal retiree benefits, etc.) was levied. The receipts for all TAS levy issue cases have more than doubled over the FY 2001-2005 period. The overall growth in receipts is likely due to the increase in the number of levies issued during this time period. Overall, the number of levies issued by the IRS has increased by over 1,100 percent from FY 2000 to FY 2005.

One would clearly expect the number of IRS levies issued to be a major contributor to the number of levy cases received by TAS. We also explored the use of the ratio of IRS levies issued to the ACS inventory level at the close of each respective fiscal year. Both workload drivers produced models which provided a good explanation of the variation in TAS general levy case receipts. However, the use of the actual levy volumes is a more straight forward approach and also appears to result in better projections if the IRS volume of levies issued continues to rise precipitously (because the relatively constant level of ACS inventory tends to mute the effect of increased levy issuances).

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory attributable to IRS general levies. As previously discussed, TAS utilized levy issuances as the workload driver. The BOD referral rate was also considered, but not found to be an important component of this model. The following table depicts the TAS inventory volume from FY 2000 through FY 2005 and the volume of IRS levies issued for this same period:

FIGURE 7: TAS RECEIPTS OF LEVY CASES

Fiscal Year	Receipts for PCI 710	Levies Issued[16]
2000	2,337	220,000
2001	3,857	674,080
2002	7,886	1,283,742
2003	8,571	1,680,844
2004	8,599	2,029,613
2005	9,455	2,743,577

Resulting Model

The linear regression analysis shows that the TAS general levy receipts may be estimated by the following formula:

.003 * (FY volume of IRS levies) + 2,515

In other words, the expected TAS general levy workload is determined by multiplying the IRS FY levy volume by the indicated factor and adding a constant of 2,515. Both the multiplying factor and the constant are determined from the regression analysis. The model analysis confirmed that the volume of levies issued is a significant workload driver for this TAS inventory component. The model explains 82 percent of the variation in the TAS general levy inventory.[17]

Projection

TAS used the aforementioned model to project its FY 2006 general levy receipts. The first step was to determine the FY 2006 levy volume. Since this value was not known at the time of model development, it had to be estimated. The FY 2006 volume of levies issued was estimated from a time series analysis of the prior years' rates. This linear time series model projected an FY 2006 IRS levy volume of 3,146,799.[18] The final FY 2006 projection of TAS general levy inventory volume is 11,854.

Model Evaluation

Despite the fact that this model shows good ability to explain the variation in TAS general levy inventory, a proper evaluation of the model must compare the projected general levy receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual general levy receipts for FY 2006. Secondly, the projection will be recomputed by using the actual 2006 volume of levies issued.

[16] The counts of "number of notices of levy served upon third parties" came from the IRS Data Book, Table 16.

[17] The adjusted R square for the linear model was .82. The t-test was 4.9 for the volume of levies issued which is significant at the 99 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload driver.

[18] The R square for this linear time series is .99.

As a part of this second analysis, we will also examine the projected and actual workload driver to better determine the amount of inaccuracy introduced by the estimation of the workload driver.

The following table depicts the model's projection for the TAS general levy inventory, the actual FY 2006 TAS general levy inventory, and the revised model projection based on the actual value of the FY 2006 workload driver.

FIGURE 8: LEVY MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS General Levy Receipts	11,854	14,653	13,620
FY 2006 IRS Levies Issued	3,146,892	3,742,276	13,620

The time series analysis on the volume of IRS levies issued significantly underestimated the FY 2006 IRS levies issued volume. However, when correcting for this factor, the model performs better, only underestimating the actual FY 2006 TAS general levy receipts by about 1,000 cases.

FPLP Levies

The TAS volume of FPLP levies will be considered as a special case of the TAS levy receipts.

Background

The volume of TAS case receipts from FPLP levy issuance has been increasing since FY 2000, with a precipitous increase occurring from FY 2004 to FY 2005. The FY 2005 TAS FPLP levy receipts were nearly five times the FY 2004 volume. This increase corresponded with the IRS decision to remove a filter which prevented taxpayers with lower total positive income (TPI) values from receiving an FPLP levy. The vast majority of TAS FPLP cases result from FPLP levies on Individual Income Tax liabilities. In fact, for FY 2004, TAS Research found that over 90 percent of TAS's inventory for this issue was attributable to Form 1040 liabilities. One would clearly expect the number of IRS FPLP levies issued to be a major contributor to the number of these cases received by TAS. Moreover, since most of this inventory is comprised of cases of levies against individuals, TAS Research used the volume of Individual Master File FPLP levies as the primary workload driver for this inventory. Other workload drivers considered included the total FY volume of all levies issued and the enforcement activity indicator.[19]

[19] The enforcement activity indictor is a created ratio of the levy volume divided by the ending FY collection inventory. It represents the IRS level of enforcement activity.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory attributable to IRS FPLP levies. As previously discussed, TAS utilized FPLP levy issuances as the workload driver. The BOD referral rate was also considered, but not found to be an important component of this model. We used a dummy variable to represent the phase-out of the TPI filter. This variable appears in the table below as the "TPI Indicator." The variable impacts the regression equation when it has a value other than 0 (*i.e.*, in FY 2005 in the table below) and does not affect the calculation in the other years. The following table depicts the TAS inventory volume from FY 2001 through FY 2005 and the volume of IRS FPLP levies issued for this same period:

FIGURE 9: TAS RECEIPTS OF FPLP LEVY CASES

Fiscal Year	Receipts for FPLP Levies	Individual Master File (IMF) FPLP Levies Issued[20]	TPI Indicator
2001	202	129,691	0
2002	413	384,088	0
2003	449	673,396	0
2004	420	608,989	0
2005	1,603	816,155	1

Resulting Model

The linear regression analysis shows that the TAS FPLP levy receipts may be estimated by the following formula:

.00042 * (FY volume of IRS FPLP levies) + 1,078 * (TPI phase-out indicator) + 182.

In other words, the expected TAS FPLP levy workload is determined by multiplying the IRS FY IMF FPLP levy volume and the TPI phase-out indicator by the indicated factors and adding a constant of 182. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis confirmed that the volume of IMF FPLP levies issued is a significant workload driver for this TAS inventory component and that the phase-out of the TPI filter had a strong positive impact on the volume of TAS FPLP receipts. The model explains 99 percent of the variation in the TAS general levy inventory.[21]

Projection

TAS used the aforementioned model to project its FY 2006 FPLP levy receipts. The first step was to determine the FY 2006 volume of IMF FPLP levies issued. Since this value was not

[20] The counts of "number of notices of levy served upon third parties" come from the Collection Report for Federal Levy Payment Program at http://colreports.hq.irs.gov/smallrep/.

[21] The adjusted R square for the linear model was .99. The t-tests for the independent variables showed a value of 3.1 for the FPLP IMF volume of levies issued and 13.3 for the TPI phase-out indicator, which are significant at the 91 percent and 99 percent level, respectively. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload driver.

known at the time of model development, it had to be estimated. The FY 2006 volume of IMF FPLP levies issued was estimated from a time series analysis of the prior years' rates. This linear time series model projected an FY 2006 IRS IMF FPLP levy volume of 1,001,813.[22] The next step was to determine the appropriate treatment of the dummy variable used to represent the phase-out of the TPI filter. Since FY 2006 represented the complete phase-out of the TPI filter at the lowest income levels, and since these low income taxpayers are the most likely to experience hardship because of the FPLP levy, the FY 2006 dummy variable value was set at two (double the FY 2005 value). The final FY 2006 projection of TAS general levy inventory volume is 2,759.

Model Evaluation

Despite the fact that this model shows good ability to explain the variation in TAS general levy inventory, a proper evaluation of the model must compare the projected FPLP levy receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual IMF FPLP levy receipts for FY 2006. Secondly, the projection will be recomputed using the actual FY 2006 FPLP levy volume. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS IMF FPLP levy inventory, the actual FY 2006 TAS FPLP levy inventory, the total positive income indicator value, and the revised model projection based on the actual value of the FY 2006 workload driver.

FIGURE 10: FPLP LEVY MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS FPLP Levy Receipts	2,759	4,147	2,727[23]
FY 2006 IRS FPLP Levies Issued	1,001,813	926,504	2,727
Removal of TPI Indicator	2	Unknown	N/A

The projected number of FY 2006 FPLP levy cases received into TAS inventory is significantly smaller than the actual FY 2006 TAS case receipts for this type of case. However, virtually none of the discrepancy is attributable to the projection of the FY 2006 FPLP levies. Rather, the model itself under-predicted the inventory. It is likely that even doubled, the variable used to indicate the phase-out of the TPI filter is unable to compensate for the significant affect this policy change has had on this component of the TAS inventory.

[22] The R Square value was .88.

[23] Since we have no method for determining the actual FY 2006 value of the TPI dummy variable, we are considering the projected value to be the actual value.

AUDIT RECONSIDERATIONS

Definition

Regular audit reconsiderations are coded by TAS as Primary Issue Code 620. This code applies to any request for reopening an examination case after tax has been assessed but not paid. Reconsideration of substitutes for returns, automated substitutes for returns, and EITC audits are categorized separately and are not included in the inventory code.

Background

The receipts associated with PCI code 620 have declined each year from FY 2000-2004, but they increased in FY 2005. Taxpayers who fail to resolve their issue through this normal channel can turn to TAS for assistance if the initial audit reconsideration is not satisfactory.

Nearly 99 percent of TAS general audit reconsideration cases are from Individual Income Tax returns (Form 1040 series). Accordingly, the expected workload drivers are those related to Form 1040 audits and reconsiderations. TAS Research considered several different variables as workload drivers including the IRS audit reconsideration volumes, closed audit volumes, closed unagreed audit volumes, and BOD referral rates. We also examined the one year lag of closed audits and unagreed audits as a previous study on audit reconsiderations showed that taxpayers often wait a number of months after the audit closing before pursuing reconsideration (*e.g.*, the FY 1999 audit closures would be related to the number of TAS receipts in FY 2000 for this issue code).

Model Development

TAS Research used linear regression to produce a model for predicting TAS audit reconsideration inventory. The model used the volume of the prior year unagreed Form 1040 series audits and the BOD referral rate. The BOD referral rate for this inventory segment is the ratio of cases referred from the BODs to the unagreed Form 1040 audits from the prior fiscal year.[24] The following table depicts the TAS inventory volume from FY 2001 through FY 2005, the one year lag of the volume of closed Form 1040 unagreed audits and the respective BOD referral rates:

[24] Unagreed audits are defined here as any audit where the taxpayer did not agree to the audit and includes cases where the taxpayer did not respond to the audit or where the audit notice was undeliverable.

FIGURE 11: TAS RECEIPTS OF AUDIT RECONSIDERATION CASES

Fiscal Year	Receipts for PCI 620	One Year Lag of Unagreed Closed Form 1040 Audits	BOD Referral Rate
2001	9,088	255,551	.01600
2002	7,347	328,568	.00894
2003	7,209	325,611	.00775
2004	6,551	369,135	.00639
2005	7,809	484,326	.00629

Resulting Model

The linear regression analysis for the model shows that the TAS audit reconsideration receipts may be estimated by the following formula:

> .008 * (volume of prior year unagreed Form 1040 audits) + 333,908 * (BOD referral rate) + 1,693.

In other words, the expected TAS general audit reconsideration workload is determined by multiplying the unagreed Form 1040 audit volume and the BOD referral rate by the indicated factors and adding a constant of 1,693. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis confirmed that the one year lag of unagreed audit volume and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 91 percent of the variation in TAS general audit reconsideration inventory.[25]

Projection

TAS used the model to project its FY 2006 general audit reconsideration receipts. The first step was to determine the prior fiscal year volume of unagreed Form 1040 audits and the BOD referral rate. The audit data was obtained from the AIMS Closed Case Database. The FY 2006 BOD referral rate was obtained from a linear time series estimate of the prior years' BOD referral rates. Both a linear and quadratic approach were explored. The quadratic model showed the best explanatory power, explaining about 96 percent of the variability, while the linear model explained about 75 percent of this variability.[26] However, a comparison of the projected BOD referral rates to the historic rates suggested that neither rate was likely for FY 2006. The quadratic projection at .0099 would have placed the rate at its second highest level in six years, while the linear projection at .0025 would have created an unexpected and unlikely steep decline. Ultimately, we chose to average the two rates to create an FY 2006

[25] The adjusted R square value for this projection model is .87. The t-tests for the independent variables showed a value of 5.30 for the ratio of the one year lag of unagreed Form 1040 audits to total audits and 3.7 for the BOD referral rate, which are significant at the 96 percent and 91 percent level respectively. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

[26] The R square for the quadratic time series projection is.88, while the R Square for the linear time series projection is .74.

projected BOD referral rate of .006. With this estimated BOD referral rate, the model produced a FY 2006 projection of general audit reconsideration cases of 8,910.

Model Evaluation

The model shows good ability to explain the variation in TAS general audit reconsideration inventory, but uses a factor (the BOD referral rate) which is difficult to predict for FY 2006. A proper evaluation of the model must compare the general audit reconsideration inventory projection to the actual number received. This comparison will be examined in two ways. First, the model's projection will be compared to the actual general audit reconsideration inventory receipts for FY 2006. Secondly, the projection will be recomputed by using the actual FY 2006 BOD referral rate.

The following table depicts the model's projection for the TAS general audit reconsideration inventory, the actual FY 2006 TAS general audit reconsideration inventory, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 12: AUDIT RECONSIDERATION MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS general audit reconsideration inventory Receipts	8,910	10,045	9,009
FY 2005 unagreed Form 1040 audit volume	N/A	630,741	8,910
FY 2006 BOD Referral Rate (first model only)	.006	.0065	9,009

When considering the actual values for the ratio of FY 2005 Form 1040 audit cases closed unagreed to total closed audits and the projected BOD referral rate, the resulting FY 2006 model projection for audit reconsideration cases is 8,910 compared to the actual FY 2006 TAS audit reconsideration case receipts of 10,045. The projection increases slightly when applying the actual FY 2006 BOD referral rate to the model, although the average of the linear and quadratic time series projections for the BOD referral rate proved quite accurate. Even when correcting for the actual BOD referral rate, the model still under-projected the FY 2006 TAS general audit consideration receipts.

OPEN AND CLOSED AUTOMATED UNDERREPORTER ISSUES

Definition

Automated Underreporter (AUR) cases are coded by TAS as Primary Issue Codes 660 (open) and 670 (closed). AUR cases are those proposed (for open cases) and actual (for closed cases) assessments resulting from IRS computer matching of payer documents to income reported on the tax return.

Background

Prior to April 2003, both open and closed AUR cases were grouped into a single TAS inventory code. However, the open and closed cases were subsequently split into separate inventory categories. Since good data sources for AUR open cases at specific points in time are not readily available, we have chosen to develop a combined model for both open and closed AUR cases.

The IRS AUR activity is the most likely workload driver for these TAS receipts. We were not able to find good data on the time lapse between the opening and closing of an IRS AUR case and when a taxpayer would come to TAS for assistance. However, taxpayers are often not contacted by the IRS about AUR issues until after the filing season. Therefore, it is likely that TAS FY AUR receipts operate on a one year lag from the initial AUR activity.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory from AUR activity. As already mentioned, IRS AUR activity, lagged by one year, is the most likely workload driver for this TAS inventory component. Analysis also revealed that the BOD referral rate (the likelihood that an operating division will refer the case to TAS) was another important factor in the number of AUR cases coming to TAS for assistance. The following table depicts the TAS AUR inventory volume from FY 2001 through FY 2005, the one year lag of the volume of IRS AUR cases, and the respective BOD referral rates:

FIGURE 13: TAS RECEIPTS OF AUR CASES

Fiscal Year	Receipts for AUR Issues	One Year Lag of IRS AUR Cases	BOD Referral Rate
2001	7,931	1,353,545	.002694
2002	7,312	1,161,901	.002440
2003	7,655	1,491,139	.001902
2004	6,902	1,561,068	.001503
2005	9,068	1,948,363	.001862

Resulting Model

The linear regression analysis shows that the TAS AUR case receipts may be estimated by the following formula:

.003 * (one year lag of IRS AUR cases) + 1,463,501* (BOD referral rate) – 405

In other words, the expected TAS AUR workload is determined by multiplying the volume of IRS AUR cases, lagged by one year, and the BOD referral rate by the indicated factors and subtracting a constant of 405. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis confirmed that both the one year lag of IRS AUR case volume and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 87 percent of the variation in TAS AUR return inventory.[27]

Projection

TAS used the aforementioned model to project its FY 2006 AUR receipts. The first step was to determine the FY 2005 IRS AUR Case volume and the FY 2006 BOD referral rate. The IRS FY 2005 AUR case volume is available from the FY 2005 IRS Data Book. The FY 2006 BOD referral rate for this inventory was not known at the time of model development and was estimated. The FY 2006 BOD referral rate was estimated from a time series analysis of the prior years' referral rates. A linear time series model was employed. The linear model projected an FY 2006 BOD referral rate of .0013.[28] The final FY 2006 projection of TAS AUR return inventory volume is 9,172.

Model Evaluation

Despite the fact that this model shows reasonable ability to explain the variation in TAS AUR return inventory, a proper evaluation of the model must compare the projected AUR return receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual AUR receipts for FY 2006. Secondly, the projection will be recomputed by using the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by the time series estimate of the driver.

The following table depicts the model's projection for the TAS AUR inventory, the actual FY 2006 TAS AUR inventory, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 BOD referral rate.

[27] The adjusted R square value for this model is .87. The t-tests for the independent variables were 5.3 for the one year lag of IRS underreporter contacts and 3.7 for the BOD referral rate. These are significant at the 96 percent and 93 percent level, respectively. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

[28] The R Square value for this linear model is .88.

FIGURE 14: AUR MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS AUR Receipts	9,172	11,929	9,904
FY 2005 AUR Cases	N/A	2,246,751	9,172
FY 2006 BOD Referral Rate	.0013	.0018	9,904

Since this model operates on a lag of the primary workload driver (volume of IRS AUR cases), the input value for FY 2006 was available at the time of model development. When considering the actual value for the BOD referral rate, the resulting FY 2006 model projection for TAS AUR receipts is 9,904 compared to the actual FY 2006 TAS AUR receipts of 11,929. The use of the actual BOD referral rate greatly improves the model's FY 2006 prediction; however, the model still under-projects the FY 2006 TAS AUR case receipts.

CRIMINAL INVESTIGATION

Definition

General Criminal Investigation (CI) case receipts are coded by TAS as Primary Issue Code 950, while Return Preparer Program CI cases are coded by TAS as Primary Issue Code 951. The vast majority of the CI cases in TAS are related to the freezing of taxpayer refunds by CI because return characteristics suggest that the returns may be fraudulent or because the taxpayer previously submitted a return identified as fraudulent by CI. In the instance of the Return Preparer Program returns, CI will freeze all returns of a preparer suspected of fraud regardless of the characteristics of specific individual returns. Whether refunds are frozen because of individual characteristics or because of suspected preparer fraud, taxpayers may be seriously inconvenienced or harmed by these actions.[29]

Background

The receipts associated with these CI cases depict an upward trend. The growth in TAS cases in these codes has made them one of the largest sources of TAS workload over the past few years and the largest single source of inventory in FY 2005. TAS has worked with CI to address concerns with this growth, and CI has significantly changed its procedures to reduce the number of refunds frozen. These changes include new procedures for the length of time that a refund may be frozen without CI action and also includes sending notices to taxpayers that alert them to their right to contact TAS. CI is also working to "clean out" its old inventory which may generate more cases. The immediate impact of these various changes is unknown, and this uncertainty was especially problematic to the development of a model which accurately projects the FY 2006 CI receipts in TAS.

[29] For an in-depth discussion of the CI refund freeze process, see National Taxpayer Advocate 2005 Annual Report to Congress 25-54, Criminal Investigation Refund Freezes, and National Taxpayer Advocate 2005 Annual Report to Congress Vol. 2, Criminal Investigation Refund Freeze Study.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory for CI cases. Since TAS'S inventory for this issue is overwhelmingly attributable to frozen Form 1040 refunds, we chose to only consider a workload driver associated with this activity.[30] We used the total number of frozen refunds that CI "verified" as fraudulent, since a broader measure of all frozen returns, including those on which fraud was not subsequently verified, was not available. TAS Research believed that the volume of returns frozen by CI should be the primary workload driver for this model. Since other operating divisions do not have the authority to release the returns frozen by CI, the BOD referral rate was not considered for this model. The following table depicts the TAS inventory volume from FY 2001 through FY 2005 and the volume of CI frozen refund returns for this same period:

FIGURE 15: TAS RECEIPTS OF CI CASES

Fiscal Year	Receipts of CI Cases	CI Frozen Refunds "Verified" Fraudulent
2000	2,940	29,432
2001	3,785	28,953
2002	5,590	41,358
2003	15,288	72,647
2004	16,139	87,475
2005	28,790	120,000

Resulting Model

The linear regression analysis shows that the TAS CI case receipts may be estimated by the following formula:

.27 * (volume of CI returns frozen) – 5,051.

In other words, the expected TAS CI workload is determined by multiplying the yearly volume of returns frozen by the indicated factor and subtracting a constant of 5,051. Both the multiplying factor and the constant are determined from the regression analysis. The model analysis confirmed that the annual volume of CI returns frozen is a significant workload driver for this TAS inventory component. The model explains 98 percent of the variation in TAS CI inventory.[31]

[30] Workload drivers are taxpayer or IRS actions which likely contribute to (drive) the volume of casework received by TAS. These drivers become independent variables in the regression analysis.

[31] The adjusted R square value for this model is .98. The t-test for the independent variable, volume of CI frozen refunds, showed a value of 14.2 which is significant at the 99 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

Projection

TAS used the aforementioned model to project its FY 2006 CI case receipts. The first step was to determine the FY 2006 volume of returns frozen by CI. Since this value was not a known quantity at the time of model development, it had to be estimated. The FY 2006 volume of returns frozen was estimated by linear time series conducted on the volumes of returns frozen by CI for the prior years. This model projected 129,280 as the FY 2006 volume of returns frozen by CI.[32] Applying this data to the model yielded an FY 2006 projection of 29,948 TAS CI receipts.

Model Evaluation

Despite the fact that this model shows good ability to explain the variation in TAS CI inventory, a proper evaluation of the model must compare the projected CI case receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual TAS CI receipts for FY 2006. Secondly, the projection will be recomputed by using the actual 2006 volume of returns frozen by CI.

The following table depicts the model's projection for the TAS CI inventory, the actual FY 2006 TAS CI inventory, the expected 2006 volume of returns frozen by CI, the actual 2006 volume of returns frozen by CI , and the revised model projection based on the actual volume of the FY 2006 returns frozen by CI.

FIGURE 16: CI MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS CI Receipts	29,948	21,395	21,209
FY 2006 CI Frozen Refunds	129,280	97,000[33]	21,209

When considering the actual value or the volume of refunds frozen by CI, the resulting FY 2006 model projection for CI cases is 21,209 compared to the actual FY 2006 TAS CI case receipts of 21,395. Supplying the model with the correct number of CI frozen returns greatly improved the model's FY 2006 prediction. The significant changes made to the CI refund freeze procedures greatly inhibited an accurate projection of the FY 2006 volume of refunds frozen by CI.

[32] The R Square value for the linear time series is .93.

[33] Based on recent data supplied by CI on the number of returns referred to Examination or Accounts Management, and the number still awaiting a CI decision.

REFUND ISSUES

Definition

Refund Issues are included in TAS Primary Issue Codes 0, 20, 40, 80, 90 and 180. This category includes expedited refund requests, returned or stopped refunds, direct deposit issues and refund statutes as well as other miscellaneous refund issues. Most expedited refunds on Forms 911 (Application for Taxpayer Assistance Order) fit under this code.

Background

Prior to April 2003, these refund issues were grouped together into a single TAS inventory code. However, subsequent to this time, these issues were separated from each other to provide more detailed tracking information. For purposes of our model development, we will continue to consider all of these refund issues together as we believe that each individual inventory code is affected by the same workload drivers.

For FY 2004, TAS Research found that about 97 percent of the closed refund cases were associated with Individual Income Tax returns (Form 1040 series). No other tax type accounted for even two percent of the TAS closures. Accordingly, only workload drivers associated with Individual Income Tax returns were considered for this model.

The number of TAS cases in this category has steadily declined over the last 5 fiscal years. The rate of the decline from FY 2004 to FY 2005 was 11 percent. TAS Research believes the growth in electronically filed (ELF) returns is largely responsible for the decline in TAS cases for this series. We believe taxpayers are much less likely to need assistance with an expedited refund when they electronically file their returns, as taxpayers get their refunds much quicker when they electronically file their tax returns. In addition, taxpayers are now able to use the telephone or internet to check on the status of their refunds.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory originating from refund issues. TAS Research believed that the ratio of paper Form 1040 series returns to the electronically filed Form 1040 series of returns should be a primary workload driver for this model. Analysis also revealed that the BOD referral rate (the likelihood that an operating division will refer the case to TAS) was another important factor in the number of refund cases coming to TAS for assistance. Since we believed that paper returns are the most likely to generate TAS refund cases, we computed the BOD referral rate as the ratio of BOD referrals for this inventory category to the volume of paper returns filed for the corresponding year. The following table depicts the TAS refund inventory volume from FY 2001 through FY 2005, the ratio of paper returns to ELF returns for this same period, and the respective BOD referral rates:

FIGURE 17: TAS RECEIPTS OF REFUND CASES

Fiscal Year	Expedite refund request or request for refund status (PCI 20)	Paper 1040/ELF 1040	BOD Referral Rate
2001	29,584	2.22	.0001487
2002	20,124	1.78	.0000976
2003	16,730	1.46	.0000880
2004	15,536	1.13	.0000966
2005	13,882	.94	.0001090

Resulting Model

The linear regression analysis shows that the TAS refund issue receipts may be estimated by the following formula:

> 8,614 * (2006 ratio of paper to electronic Form 1040 series returns filed) + 101,588,486 * (BOD referral rate) – 4,772.

In other words, the expected TAS refund issue workload is determined by multiplying the ratio of 2006 paper to electronic Form 1040 series returns filed and the BOD referral rate by the indicated factors and subtracting a constant of 4,772. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis confirmed that both the paper to electronic return ratio and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 99 percent of the variation in TAS refund issue inventory.[34]

Projection

TAS used the aforementioned model to project its FY 2006 refund issue case receipts. The first step was to determine the FY 2006 Form 1040 series paper to electronic return ratio and the FY 2006 BOD referral rate. Since neither of these values was known at the time of model development, both items had to be estimated. The FY 2006 Form 1040 series paper to electronic return ratio was obtained from the Projection and Forecasting's Document 6292 (Fall 2005) return projection volumes (by type). The FY 2006 BOD referral rate was estimated from a time series analysis of the prior years' referral rates. A quadratic time series model was employed. The quadratic time series model projected an FY 2006 BOD referral rate of .00016.[35] After applying the estimated FY 2006 paper to electronic return ratio and the estimated FY 2006 refund issue BOD referral rate, the final FY 2006 projection of TAS refund issue inventory volume is 18,225.

[34] The adjusted R square value for this model is .99. The t-test was 9.8 for the ratio paper/electronically filed returns and 5.4 for the BOD referral rate, which are both significant at the 98 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

[35] The R Square value for the quadratic time series was .94.

Model Evaluation

Despite the fact that this model shows exceptional ability to explain the variation in TAS refund issue inventory, a proper evaluation of the model must compare the projected refund issue receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual refund issue receipts for FY 2006. Secondly, the projection will be recomputed by using the actual 2006 IRS Form 1040 paper to electronic return ratio and the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS refund issue inventory, the actual FY 2006 TAS refund issue inventory, the expected FY 2006 Form 1040 series paper to electronic return ratio, the actual FY 2006 Form 1040 series paper to electronic return ratio, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 18: REFUND MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Refund Issue Receipts	18,225	16,286	17,342
FY 2006 Form 1040 Series Paper to Electronic Return Ratio	.83	.81	18,053
FY 2006 BOD Referral Rate	.00016	.000149	17,514

When considering the actual values for both the Form 1040 series paper to electronic return ratio and BOD referral rate, the resulting FY 2006 model projection for refund issues is 17,342 compared to the actual FY 2006 TAS refund issue receipts of 16,286. Both the estimates for the Form 1040 series paper to electronic return ratio and the BOD referral rate were close to the actual FY 2006 values, although somewhat higher. Overall, the model appears to be effective for predicting this portion of the TAS inventory.

PENALTY ADJUSTMENTS AND ABATEMENTS

Definition

Penalty abatement and adjustment cases are coded by TAS as Primary Issue Codes 500, 520, 530, 540, 560, and 590. This group of casework includes taxpayer problems with late filing and late payment penalties, civil penalties (other than the penalty imposed by IRC Section 6672), IRA penalties, and other miscellaneous penalty issues.

Background

Prior to April 2003, these penalty issues were grouped together into one single TAS inventory code. However, subsequent to this time, these issues were separated from each other to provide more detailed tracking information. For purposes of our model development, we will continue to consider all of these penalty issues together as we believe that each individual inventory code is affected by the same workload drivers.

The number of TAS receipts associated with these PCI codes has declined every year since FY 2002, with the exception of FY 2005. The number of cases received increased in FY 2005 to a level higher than the FY 2003 inventory level. Penalties attributable to Individual Income Tax returns comprise the majority of this TAS casework category. For this reason, we believe a count of balance due returns for all Forms 1040 is a reasonable variable to use as the primary workload driver. The balance due counts came from IRS Individual Tax Return Filing data. We believe this group is the most likely to incur the penalties associated with this series. However, one should note that this series includes other penalties not associated with balance due returns. Future enhancements of this model might include data for penalties not related to Individual Income Tax returns.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory for penalty issues. As previously mentioned, TAS Research believed that the volume of Form 1040 series balance due returns should be a primary workload driver for this model. Analysis also revealed that the BOD referral rate (the likelihood that an operating division will refer the case to TAS) was another important factor in the number of penalty cases coming to TAS for assistance. The following table depicts the TAS inventory volume from FY 2001 through FY 2005, the volume of Form 1040 series balance due returns for this same period, and the respective BOD referral rates:

FIGURE 19: TAS RECEIPTS OF PENALTY CASES

Fiscal Year	Receipts for Penalty Issues	Balance Due Returns	BOD Referral Rate
2001	14,790	30,810,178	.000205
2002	11,295	24,343,144	.000175
2003	7,882	22,779,971	.000118
2004	6,869	20,720,084	.000119
2005	8,096	22,982,544	.000125

Resulting Model

The linear regression analysis shows that the TAS penalty receipts may be estimated by the following formula:

> .00030987 * (Form 1040 series balance due returns) + 54,188,993 * (BOD referral rate) – 5,835

In other words, the expected TAS penalty workload is determined by multiplying the volume of Form 1040 series balance due returns and the BOD referral rate by the indicated factors and subtracting a constant of 5,835. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis determined that both the Form 1040 series balance due volume and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 99 percent of the variation in TAS penalty inventory.[36]

Projection

TAS used the aforementioned model to project its FY 2006 penalty issue receipts. The first step was to determine the FY 2006 balance due volume of Individual Income Tax returns and the FY 2006 BOD referral rate. Since neither of these values was known quantities at the time of model development, both items had to be estimated. The FY 2006 Individual Income Tax balance due return volume was obtained from the Projection and Forecasting's Document 6187 (Fall 2005). This was done by subtracting the refund returns from the total return count and then subtracting an additional volume for the number of even returns.[37] The FY 2006 BOD referral rate was estimated from a time series analysis of the prior years' referral rates. A quadratic time series model was employed. The quadratic linear model projected an FY 2006 BOD referral rate of .00015.[38] The final FY 2006 projection of TAS penalty issue inventory volume is 10,310.

[36] The adjusted R square value for this model is .99. The t-tests were 3.7 for the volume of balance due returns and 6.6 for the BOD referral rate. These are significant at the 93 percent level and the 97 percent level, respectively. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

[37] The Tax Year 2004 volume of even returns was used as an estimate for the number of FY 2006 even returns (no balance due or refund). Unfortunately, the IRS does not routinely make projections for the volume of even returns.

[38] The R square for the quadratic time series estimate is .94.

Model Evaluation

Despite the fact that this model shows exceptional ability to explain the variation in the TAS penalty issue inventory, a proper evaluation of the model must compare the projected penalty issue receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual penalty receipts for FY 2006. Secondly, the projection will be recomputed by using the actual volume of FY 2006 individual income tax balance due returns and the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS penalty issue inventory, the actual FY 2006 TAS penalty issue inventory, the expected FY 2006 Individual Income Tax balance due return volume, the actual FY 2006 Individual Income Tax balance due return volume, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 20: PENALTY MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Penalty Issue Receipts	10,310	10,165	11,122
FY 2006 Form 1040 Balance Due Return Volume	23,771,226	22,452,771	9,901
FY 2006 BOD Referral Rate	.00015	.00018	11,530

When considering the actual values for Individual Income Tax balance due return volume and BOD referral rate, the resulting FY 2006 model projection for the TAS penalty issue inventory is 11,122 compared to the actual FY 2006 TAS penalty receipts of 10,165. Overall, the model provided a close projection to the actual FY 2006 TAS penalty issue receipts. The estimate of the FY 2006 balance due return count was about two million returns low. This may be attributable to the method necessary to estimate balance due returns from the available data. The estimated FY 2006 BOD referral rate slightly low, but a close approximation of the actual value.

PAYMENTS AND CREDITS

Definition

Problems with payments and credits are coded by TAS as Primary Issue Codes 200, 210, 250 and 290. This group of issue codes includes problems with credits transferred to excess collections, but excludes problems with electronic payments, federal tax deposits and estimated tax payments.

Background

Prior to April 2003, these payment issues were grouped together into one single TAS inventory code. However, subsequent to this time, these issues were separated from each other to provide more detailed tracking information. For purposes of our model development, we will continue to consider all of these payment issues together as we believe that each individual inventory code is affected by the same workload drivers.

The number of TAS receipts associated with these PCI codes has declined every year since FY 2001, with the exception of FY 2005. In fact, the FY 2004 case volume for these payment issue codes was less than half of the FY 2001 case volume. Payments related to Individual Income Tax returns are responsible for over 70 percent of the TAS payment and credit cases. Employment tax returns were the next most common return types experiencing payment or credit problems.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory resulting from payment and credit problems. Since TAS'S inventory for these issues is mostly attributable to payment and credit problems with Individual Income Tax returns, we chose to only consider workload drivers associated with the Form 1040 series of returns.[39] For this reason, we believe a count of balance due returns for all Forms 1040 is a reasonable variable to use as the primary workload driver. Analysis also revealed that the BOD referral rate (the likelihood that an operating division will refer the case to TAS) was another important factor in the number of payment and credit cases coming to TAS for assistance. The following table depicts the TAS inventory volume from FY 2001 through FY 2005, the volume of balance due returns for this same period, and the respective BOD referral rates:

[39] Workload drivers are taxpayer or IRS actions which likely contribute to (drive) the volume of casework received by TAS. These drivers become independent variables in the regression analysis.

FIGURE 21: TAS RECEIPTS OF PAYMENT CASES

Fiscal Year	Receipts for PCI 200, 210, 250 and 290)	Balance Due Returns	BOD Referral Rate
2001	10,764	30,810,178	.000177
2002	8,684	24,343,144	.000171
2003	5,938	22,779,971	.000111
2004	5,095	20,720,084	.000107
2005	5,472	22,982,544	.000106

Resulting Model

The linear regression analysis shows that the TAS payment and credit case receipts may be estimated by the following formula:

> .00027 * (volume of Forms 1040 series balance due returns) + 41,764,316 * (BOD referral rate) – 5,023

In other words, the expected TAS payment and credit workload is determined by multiplying the volume of Form 1040 series balance due returns and the BOD referral rate by the indicated factors and subtracting a constant of 5,023. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis determined that both the Form 1040 series balance due return volume and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 99 percent of the variation in TAS payment and credit inventory.[40]

Projection

TAS used the aforementioned model to project its FY 2006 payment and credit case receipts. The first step was to determine the FY 2006 balance due volume of individual income tax returns and the FY 2006 BOD referral rate. Since neither of these values was known quantities at the time of model development, both items had to be estimated. The FY 2006 Individual Income Tax balance due return volume was obtained from the Projection and Forecasting's Document 6187 (Fall 2005). This was done by subtracting the refund returns from the total return count and then subtracting an additional volume for the number of even returns.[41] The FY 2006 BOD referral rate was estimated from a time series analysis of the prior years' referral rates. A quadratic time series model was explored. The quadratic model projected an FY 2006 BOD referral rate of .00011.[42] Given the recent sharp rise in BOD referral rate, we expect that the quadratic model will underestimate the FY 2006 BOD referral

[40] The adjusted R square value for this model is .99. The t-tests were 7.8 for the volume of balance due returns and 11.4 for the BOD referral rate. These are significant at the 98 percent and 99 percent level, respectively. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

[41] The Tax Year 2004 volume of even returns was used as an estimate for the number of FY 2006 even returns. Unfortunately, the IRS does not routinely make projections for the volume of even returns.

[42] The R Square for the quadratic time series estimate was .87.

rate, but no other model appears to better project the FY 2006 rate. Based on the estimated FY 2006 balance due Individual Income Tax return volume and the estimated BOD referral rate, the final FY 2006 projection of TAS payment and credit issue inventory volume is 6,018.

Model Evaluation

Despite the fact that this model shows exceptional ability to explain the variation in TAS payment and credit issue inventory, a proper evaluation of the model must compare the projected payment and credit case receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual payment and credit case receipts for FY 2006. Secondly, the projection will be recomputed by using the actual FY 2006 volume of balance due Individual Income Tax returns and the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS payment and credit case inventory, the actual FY 2006 TAS payment and credit case inventory, the expected FY 2006 volume of balance due Individual Income Tax returns, the actual FY 2006 volume of balance due Individual Income Tax returns, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 22: PAYMENT MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Payment and Credit Receipts	6,018	6,356	6,617
FY 2006 Form 1040 Balance Due Return Volume	23,771,226	22,452,771	5,661
FY 2006 BOD Referral Rate	.00011	.00013	6,975

When considering the actual values for both the FY 2006 volume of balance due Individual Income Tax returns and BOD referral rate, the resulting FY 2006 model projection for payment and credit cases is 6,617 compared to the actual FY 2006 TAS payment and credit receipts of 6,356. Overall, the model's prediction of the FY 2006 TAS payment and credit case receipts closely approximates the actual receipts when the actual values for the workload drivers are know. The estimates for both drivers were close to their actual values, resulting in an initial projection that only slightly underestimated the actual FY 2006 TAS payment and credit case receipts.

REMAINING INVENTORY

Overall, TAS inventory is divided into two primary categories, customer service issues and compliance issues. Customer service issues involve items such as problems with return and document processing, refunds, identify theft, etc. Compliance issues include problems that taxpayers may encounter when interfacing with the IRS regarding collection of delinquent liabilities and audits of filed returns. The ten previous models account for the top 55 percent of all TAS inventory. For its initial endeavor in projection of TAS inventory receipts, TAS Research decided to divide those inventory issue codes not already included in the ten previous models into the two primary case categories and to project the combined inventory for the codes remaining in each category. We will first discuss the model for the remaining customer service issues and then the model for the remaining compliance issues.

OTHER CUSTOMER SERVICE CASES

Definition

TAS Research removed the case receipts included in the models for the customer service primary issue codes discussed previously to create a category of "other" customer service case receipts. Specifically, the following previously discussed case categories were removed: amended return, document processing, and refund issues. The remaining TAS customer service primary issue code case receipts were combined for the purpose of creating an additional model for projecting these "other" case receipts. Some of the inventory types contained in this Customer Service "other" category include account inquiry, form acquisition, statute expiration, and entity cases.

Background

TAS case receipts in this broad category declined significantly from FY 2001 through FY 2003, but have been increasing since that time. While the increase from FY 2003 to FY 2004 was trivial, the increase in receipts from FY 2004 to FY 2005 was almost 25 percent. The "other" TAS customer service receipts are most commonly attributable to taxpayer problems with Individual Income Tax returns. In fact, for FY 2004 TAS Research found that nearly three quarters of these "other" customer service cases were associated with Individual Income Tax returns, which is significantly larger than any other form type. These customer service primary issue codes encompass a variety of different issues. However, the limited data available for modeling prevents the use of a variety of different workload drivers. Since the majority of TAS receipts in this category are associated with Individual Income Tax returns, we concentrated on workload drivers related to the Form 1040 series of tax returns. Because data shows that paper returns are more likely than electronic returns to experience processing problems and to experience delayed refunds, we chose to again utilize the ratio of paper to electronic returns.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory for the customer service receipts not previously included in other inventory models. As previously mentioned, we chose to utilize the paper to electronic return ratio for Forms 1040 as the primary workload driver for this inventory segment. Analysis also revealed that the BOD referral rate (the likelihood that an operating division will refer the case to TAS) was another important factor in the number of other customer service cases coming to TAS for assistance. The following table depicts the TAS inventory volume for the remaining customer service issue codes from FY 2001 through FY 2005, the Form 1040 series paper to electronic return ratio, and the respective BOD referral rates:

FIGURE 23: TAS RECEIPTS OF "OTHER" CUSTOMER SERVICE CASES

Fiscal Year	Customer Service ('Top 10' Cases Removed)	Paper/ELF Ratio	BOD Referral Rate
2001	48,401	2.22	.000241
2002	35,566	1.78	.000182
2003	25,922	1.46	.000133
2004	25,831	1.13	.000169
2005	31,059	.94	.000222

Resulting Model

The linear regression analysis shows that the TAS other customer service receipts may be estimated by the following formula:

> 10,545 * (Form 1040 series Paper to Electronic return ratio) + 116,628,797 * (BOD referral rate) – 5,597.

In other words, the expected TAS "other" customer service workload is determined by multiplying the Form 1040 series paper to electronic return ratio and the BOD referral rate by the indicated factors and subtracting a constant of 5,597. Both the multiplying factors and the constant are determined from the regression analysis. The model analysis confirmed that both the Form 1040 paper to electronic return ratio and the BOD referral rate are significant workload drivers for this TAS inventory component. The model explains 99 percent of the variation in the remaining TAS customer service inventory.[43]

Projection

TAS used the aforementioned model to project its FY 2006 other customer service receipts. The first step was to determine the FY 2006 Individual Income Tax return paper to electronic ratio and the FY 2006 BOD referral rate. Since neither of these values was known at the time

[43] The R square was good at .99. The t test for the independent variables showed a value of 27.1 for the Paper/ELF and 28.7 for the BOD referral rate. Both of these values were significant at the 99 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

of model development, both items had to be estimated. The FY 2006 Form 1040 series paper to electronic return ratio was obtained from the Projection and Forecasting's Document 6292 (Spring) return projection volumes (by type). The FY 2006 BOD referral rate was initially estimated from a time series analysis of the prior years' referral rates. A quadratic time series model was clearly the most effective, explaining 96 percent of the variation in the referral rates.[44] However, the quadratic model projected a FY 2006 BOD referral rate which is more than twice as high as any historical rate. Therefore, we chose to use the FY 2005 BOD referral rate as the estimated FY 2006 rate, even though this will likely underestimate the actual FY 2006 BOD referral rate. After applying the estimated FY 2006 paper to electronic returns ratio and the estimated FY 2006 BOD referral rate, the final FY 2006 projection of TAS other customer service issues inventory volume is 30,144.

Model Evaluation

Despite the fact that this model shows exceptional ability to explain the variation in the TAS "other" customer service inventory, a proper evaluation of the model must compare the projected other customer service receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual "other" customer service receipts for FY 2006. Secondly, the projection will be recomputed by using the actual 2006 IRS Form 1040 series paper to electronic return ratio and the actual FY 2006 BOD referral rate. As a part of this second analysis, we will also examine the projected and actual workload drivers separately to better determine the amount of inaccuracy introduced by each.

The following table depicts the model's projection for the TAS "other" customer service inventory, the actual FY 2006 TAS "other" customer service inventory, the expected 2006 Form 1040 series paper to electronic return ratio, the actual 2006 Form 1040 series paper to electronic return ratio, the expected FY 2006 BOD referral rate, the actual FY 2006 BOD referral rate, and the revised model projection based on the actual value of the FY 2006 workload drivers.

FIGURE 24: "OTHER" CUSTOMER SERVICE MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Other Customer Service Receipts	30,144	40,345	37,736
FY 2006 Form 1040 Series Paper to Electronic Return Ratio	.83	.81	29,934
FY 2006 BOD Referral Rate	.000228	.000298	37,947

When considering the actual values for both the Form 1040 series paper to electronic return ratio and BOD referral rate, the resulting FY 2006 model projection for the TAS "other" customer service receipts is 37,736 compared to the actual FY 2006 TAS other customer service

[44] The R Square value for the quadratic time series was .98.

receipts of 40,345. Accordingly, the model performs adequately when the actual values of the workload drivers are known. The projection for the Form 1040 series paper to electronic return ratio is close to the actual value. However, as indicated by the previous table, most of the inaccuracy in the original projection is introduced by the less than optimal estimate of the BOD referral rate.

OTHER COMPLIANCE CASES

Definition

TAS Research removed the case receipts included in the models for compliance primary issue codes discussed previously to create a category of "other" compliance case receipts. Specifically, the following previously discussed case categories were removed: return protection strategy, levies, general audit reconsiderations, automated underreporter, criminal investigation, penalties and payment or credit cases. The remaining TAS compliance primary issue code case receipts were combined for the purpose of creating an additional model for projecting these "other" enforcement related case receipts. Some of the inventory types contained in this compliance "other" category include liens, seizures, other audit issues, trust fund recovery penalties, and appeals cases.

Background

TAS case receipts in this broad category declined significantly from FY 2001 through FY 2004, but increased during FY 2005. The increase in receipts from FY 2004 to FY 2005 was almost 13 percent. The "other" TAS compliance receipts are most commonly attributable to taxpayer problems with Individual Income Tax returns. In fact, for FY 2004 TAS Research found that nearly 80 percent of these "other" compliance cases were associated with Individual Income Tax returns, which is significantly larger than any other form type. Because most of these cases are either related to collection or audit cases, we believe that the volumes of balance due returns and audit assessments are likely the most significant factors driving this workload.

Model Development

TAS Research used linear regression to produce a model for predicting TAS inventory for the compliance receipts not previously included in other inventory models. After reviewing a variety of potential workload drivers, we chose to use balance due with remittance returns, levy issuances, and IRS audit volumes in this model. Balance due with remittance returns are likely associated with penalty and interest cases, and possibly collection cases, if the remittance is not for the full amount due. Although levy cases are not included in this "other" compliance group of inventory, we still believe that levies are an important workload driver, because of their correlation with other types of collection inventory such as installment agreements and currently not collectible cases and because of the Collection Due Process component of this inventory. Lastly, audit cases were included because of the number of these issues in TAS inventory not included in the previous models.

We used the combined sum of these three workload components to compute a BOD referral rate, which we used as our model driver. We computed the BOD referral rate by dividing the number of operating division "other" compliance case referrals to TAS by the combined sum of the yearly volume of balance due with remittance returns, levies issued and the one year lagged volume of closed audits. The following table depicts the TAS "other" compliance issues inventory volume and BOD referral rate from FY 2001 through FY 2005:

FIGURE 25: TAS RECEIPTS OF "OTHER" COMPLIANCE CASES

Fiscal Year	Compliance Cases ('Top 10' Cases Removed)	BOD Referral Rate
2001	74,201	.001149
2002	63,121	.000994
2003	54,315	.000841
2004	47,368	.000835
2005	53,470	.000909

Resulting Model

The linear regression analysis shows that the TAS compliance receipts may be estimated by the following formula:

77,225,796 * (BOD referral rate) - 14,492

In other words, the expected TAS "other" compliance workload is determined by multiplying the BOD referral rate by the indicated factor and subtracting a constant of 14,492. Both the multiplying factor and the constant are determined from the regression analysis. The model analysis confirmed that the BOD referral rate is a significant workload driver for this TAS inventory component. The model explains 92 percent of the variation in the "other" TAS compliance inventory.[45]

Projection

TAS used the aforementioned model to project its FY 2006 other compliance receipts. The first step was to determine the FY 2006 BOD referral rate. This rate was estimated by a quadratic time series analysis. This quadratic time series model produced an estimate of .001055 for the FY 2006 BOD referral rate.[46] After applying the estimated FY 2006 BOD referral rate, the projected TAS "other" compliance inventory volume is 66,981.

Model Evaluation

Despite the fact that this model shows reasonable ability to explain the variation in the TAS "other" compliance inventory, a proper evaluation of the model must compare the projected

[45] The adjusted R square was a reasonable .92. The t test for the BOD referral rate showed a value of 6.8 and this was significant at the 99 percent level. Please see Page 22 for a detailed discussion of the meaning of the R Square value and the interpretation of the significance testing for the workload drivers.

[46] The R Square value for this quadratic time series estimate is .98.

compliance receipts to the actual number received. This comparison will be examined in two ways. First, the original model projection will be compared to the actual "other" compliance receipts for FY 2006. Secondly, the projection will be recomputed by using the actual FY 2006 BOD referral rate.[47]

The following table depicts the model's projection for the TAS "other" compliance inventory, the actual FY 2006 TAS "other" compliance inventory, the expected and actual combined volumes for the FY 2006 Form 1040 series balance due returns and the FY 2005 Form 1040 series audited returns, and the revised model projection based on the actual value of the FY 2006 workload driver.

FIGURE 26: "OTHER" COMPLIANCE MODEL EVALUATION

	Projected	Actual	Model with Actual Workload Driver(s)
FY 2006 TAS Other Compliance Receipts	66,981	71,166	68,111
FY 2006 BOD Referral Rate	.00105	.00107	68,111

When considering the actual values for FY 2006 Form 1040 series balance due returns and the FY 2005 Form 1040 audit volume, the resulting FY 2006 model projection for the TAS "other" compliance receipts is 68,111 compared to the actual FY 2006 TAS other compliance receipts of 71,166. Accordingly, the model performs adequately when the actual values of the workload drivers are known. The projected BOD referral rate was close to, but slightly less than its actual FY 2006 value.

[47] The FY 2006 BOD referral rate will by computed by dividing the FY 2006 TAS other compliance receipts by the sum of the FY 2006 returns with remittance (estimated by the number of Tax Year 2005 balance due returns less the number of Tax Year 2004 balance due returns without remittance, the FY 2006 levy volume, and the FY 2005 closed Form 1040 series audit volume.

SUMMARY AND CONCLUSIONS

FIGURE 27: SUMMARY OF MODEL RESULTS

Issue(s)	Initial Projection	Projection with Actual Drivers	Actual Receipts
Amended Returns	9,649	18,467	17,140
RPS	7,177	7,533	5,704
Return and Document Proc.	10,014	11,860	12,882
General Levies	11,854	13,620	14,653
FPLP Levies	2,759	2,727	4,147
Audit Recon	8,910	9,009	10,005
AUR	9,172	9,904	11,929
CI	29,948	21,209	21,395
Refund	18,225	17,342	16,286
Penalty	10,310	11,122	10,165
Payments and Credits	6,018	6,617	6,356
Other non-Compliance	30,144	37,736	40,345
Other Compliance	66,076	68,111	71,166
Total	**220,256**	**235,257**	**242,173**

The development of projections for future TAS inventory is a two step process. First, the base models must be constructed from the prior year TAS inventory receipts and the prior year factors which drive the inventory. Secondly, estimates for the future values of these drivers must be constructed. Most of the time the future values for these drivers must be based on past historical trends, with little or no other data available to determine these values.

While the models performed well when the actual values for the actual factors driving the inventory were inserted, TAS success in projecting many of the driver values could clearly be improved. This fact is particularly true for the projections of the BOD referral rate. An analysis of the BOD referral rates shows that the TAS time series projections were often either too steep or too flat. Particularly, linear time series estimates often underestimated the referral rate, while the quadratic estimates overstated the rates. Moreover, even when the quadratic estimates were on target, the likelihood that the referral rate would continue to progress at the indicated exponential rate is highly unlikely.

Another significant limitation to the models is the lack of data available for model development. Many of the models are only based on five data points which represent the most recent fiscal years. The small number of data points results from difficulties in obtaining both TAS receipt volumes and BOD referral rates for older years.[48]

Some additional specific findings from the development of these TAS inventory models follow:

[48] TAS was created under the provisions of the Internal Revenue Service Restructuring and Reform Act of 1998 (RRA 98) and did not standup as a separate organization until March 2000. Data for casework performed under the Problem Resolution Program, the predecessor to TAS, was not available at the level of detailed required and would not be fully comparable.

- Some TAS case receipts operate on a lag to the time of the actual operating division action. This is particularly true for IRS audit actions which often require several months for completion.
- Models which do not rely on the use of a BOD referral rate showed greater accuracy in predicting TAS FY 2006 inventory than those models using the referral rates.
- Estimating the values of certain workload drivers from past values often introduces unwanted inaccuracy in the models' projections.
- Estimating the BOD referral rate proved exceptionally difficult. Moreover, we generally do not know the underlying causes for yearly fluctuations. For example, improvements in procedures and processes could lead to a decrease in the referral rate, while the introduction of a new program could lead to a temporary increase in TAS referrals while the operating division adjusts to new policies and procedures.

NEXT STEPS

The most important next step will be to rework the models using additional data points. While this may not be possible for all models, in many instances, we expect to be able to obtain workload driver information on a monthly or quarterly basis. Doing so will allow us to breakout the TAS case receipts in the same manner and thus increase the number of data points available to develop and test the models. For example, we can obtain levy issuances on a monthly basis for two to three years. Once we determine the appropriate lag of TAS levy receipts to levy issuances, we will be able to create a model with as many as 36 data points. These additional data points should result in better models, which can be expressed with smaller confidence intervals around their estimates of TAS workload volume. Increasing the number of data points will also allow us to make better time series estimates of future workload driver values, especially for the BOD referral rates.

Additional next steps include further exploration of potential workload drivers. Small Business Self-Employed (SBSE) Research suggested several different workload drivers in their brief review of our models. For example, we might use the percent of paper returns to total returns instead of the paper return to electronically filed return ratio. Another possible refinement is the use of proportional weights when two estimates for the same workload driver are used (based on over or under projection), instead of the simple averaging which has been occasionally used previously.

We also plan to explore the rate at which cases are received through the National Taxpayer Advocate Toll Free telephone line. As TAS continues to see a larger proportion of its receipts from this source, its impact may need to be considered in conjunction with the BOD referral rate. Lastly, we will also continue to examine the existing models by adding the FY 2006 data and making new projections for FY 2007.