AN ABSTRACT OF THE ESSAY OF

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Tax credit auctions are a new way to fund government programs, dating back to just 2011. In place of funding new programs with direct appropriations from the general fund, tax credit auctions are a means to fund programs by monetizing tax credits. We performed a case study of all of the tax credit auctions that were run in the United States by the end of 2014. We were particularly interested in the motivation behind the choice of this funding mechanism, the efficiency and equity of each of the programs, and what attributes are associated with higher participation rates and a higher price for the tax credits. We found that the incrementalist theory of policy adoption is informative in understanding the invention of this policy mechanism. Marketing and auction design were found to be two factors associated with auction efficiency. The very use of tax credits and interactions between the state and federal tax codes were found to have implications for auction equity because they result in an upside-down subsidy.

# State Tax Credit Auctions

by
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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Elise Korejwa, Author

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# 1 Introduction

Tax credit auctions are a new way to fund government programs, dating back to just 2011. In place of funding new programs with direct appropriations from the general fund, tax credit auctions are a means to fund programs by monetizing tax credits. Tax credits are made available by the associated government to businesses or individuals with a tax liability in that jurisdiction. Those who know about the program can then bid on the tax credits via an auction system. The pool of money that is generated through the auction is then directed towards a specific government program. To date, Oregon and Maryland are the only jurisdictions in the United States to make use of the tax credit auction.

We performed a case study of all of the tax credit auctions that were run in the United States by the end of 2014. We were particularly interested in the motivation behind the choice of this funding mechanism, the efficiency and equity of each of the programs, and what attributes are associated with higher participation rates and a higher price for the tax credits. Since this mechanism is so new and has limited visibility, it has not yet been subject to a systematic evaluation. However, related research and theories in the economics, political science, and law literature are informative, such as the controversial concept of tax expenditures. The aim of this research is to introduce this novel funding mechanism to the research community and to draw attention to some of its more salient attributes.

# 2 Overview of the Auction Programs

## 2.1 Oregon

As of 2014, Oregon has conducted tax credit auctions to allocate revenue for three different funds: The Renewable Energy Development Grant Fund, the Oregon Production Investment Fund, and the Alternative Fuel Vehicle Revolving Fund. All of the tax credit auctions in Oregon are conducted by the Oregon Department of Revenue (ODoR). In exchange for this service, the department receives 0.25% of the auction proceeds. After the auction, the money is distributed into the associated fund. The Renewable Energy Development Grant Auction and the Alternative Fuel Vehicle Revolving Fund are administered by the Oregon Department of Energy (ODoE). The Oregon Production Investment Fund is administered by the Governor's Office of Film & Television, though the actual funds are managed by Business Oregon.

### 2.1.1 Renewable Energy Development Grant Auction

Oregon's Renewable Energy Development Grant Auction, which started in October, 2011, was, as far as we can tell, the very first state tax credit auction. It was established by House Bill 3672 (2011) and amended by House Bill 4079 (2012) as part of the Oregon Department of Energy's Energy Incentives Program (EIP). The EIP replaced the controversial Business Energy Tax Credit program known as BETC. The BETC provided tax credits for qualifying renewable energy projects for up to 50% of the project's costs. One of the problems with tax credits, however, is that not all businesses have enough tax liability to take full advantage of the incentive. To address this problem, the BETC provided a "pass-

through" option whereby a project owner could transfer the tax credit eligibility to a third party in exchange for a cash payment. The tax credits were purchased at a fixed "pass-through rate," set by the ODOE, which took into consideration the value of money over time and other factors. Project owners were responsible for securing their own "pass-through partner" to transfer the tax credit to. The program came under fire from the media and others due to ballooning costs, problems with the projects they funded, and loopholes that allowed developers to qualify for multiple credits (Sickinger 2014). It was also criticized for reducing the tax paid by corporations, such as Walmart, with only weak ties to Oregon in their role as pass-through partners (Cheeseman 2010).

The Renewable Energy Development Grant Auction provided a new means with which to transform tax credits into cash payments. Instead of making project owners pick "pass-through partners," who buy the credits at a fixed rate, the tax credits are auctioned off to the public by the ODoR. Each year from 2011 to 2014, $1.5 million in tax credits was made available for auction. The revenue from these auctions is then used to fund cash grants. A renewable energy system installed by an Oregon business can now qualify for a grant of up to $250,000, not to exceed 35 percent of eligible project cost. Projects are selected by the ODoE through a competitive process.

### 2.1.2 Oregon Production Investment Fund Tax Credit Auction

The Oregon Governor's Office of Film & Television was created to promote the development of the film, video, and multimedia industry in Oregon. The Investment Fund was established under ORS 284.367. Originally, people and organizations with a tax

liability in Oregon could "make a donation" to the Fund and then receive a tax credit worth $1 for every $0.90 donated. In order to increase the amount of money going into the Fund per tax credit issued, the office elected to switch to an auction system. This was made official under House Bill 2571 (2011), the same law that established the Renewable Energy Development Grant Auction. With this system, the minimum bid is $0.95 cents for each dollar of tax credit, though the average bid can be much higher.

Every year the legislature allocates a fixed amount of tax credits for this program. In 2012 and 2013, that amount was $6 million. In 2014, the amount was raised to $10 million. The funds generated through this program are used for the film and television production rebates. In order for a filmmaker to qualify for a grant, they must meet a set of criteria including spending $1 million in Oregon, or just $75,000 if they are a local filmmaker, and submitting a detailed report of Oregon expenses.

### 2.1.3 Alternative Fuel Vehicle Revolving Fund

This fund provides loans to Oregon's public bodies and federally recognized tribes to assist in the purchase of new alternative fuel vehicles or to convert existing vehicles that use gasoline or diesel to alternative fuels. The fund was established by Senate Bill 583 (2013) and House Bill 4107 (2014). It was capitalized through auctions of $3 million of an allowable $20 million in tax credits for transportation projects, which started in November of 2013. The fund and the related loans are administered by the ODOE, which has flexibility in setting loan terms and rates. According to the administrative rules, loan terms should ensure that the objectives of the program are met and that there are adequate funds

to meet future needs. There are some limits, however. The interest rate may not exceed the market rate and the loan term may not exceed six years (ORS 469.996, 2013, Vol. 11).

> "The Alternative Fuel Vehicle Revolving Fund is established in the State Treasury, separate and distinct from the General Fund. Interest earned by the Alternative Fuel Vehicle Revolving Fund shall be credited to the fund. The moneys in the Alternative Fuel Vehicle Revolving Fund are continuously appropriated to the State Department of Energy to be used for the purposes described in ORS 469.962 (Alternative Fuel Vehicle Revolving Fund)." (ORS 469.961, 2013, Vol. 11).

### 2.1.4 Auction Rules

All of the auctions conducted in Oregon by the ODoR have the same auction rules, with the exception that in 2011 the tax credits were sold in increments of $1000 and since 2012 they have been sold in $500 increments. Businesses and individuals with an Oregon income tax liability may bid on the certificates. Oregon uses a simultaneous sealed-bid auction, otherwise known as a blind auction. It is also a multiunit auction because all of the available tax credits are auctioned at the same time instead of individually. It can further be classified as a first-price, discriminatory price, or pay-as-bid auction since multiple identical units are sold for the amount bid. In this type of auction, the bids are rank ordered and the winning bids are the top bids that exhaust the supply of credits. Each person with a winning bid then pays the amount that they bid for the tax credit.

Bids are submitted via an online form during a pre-specified window of time. Once a bid is submitted, it cannot be changed. The ODoR then selects the top bids for the number of tax credits that are available. If there are fewer bids than tax credits available, all qualifying bids are winners, and the remaining credits are re-auctioned at a later date. The minimum bid is 95% of the value of the credits. For a $500 tax credit, this is equal to a $475 bid. If

there is a tie, the earliest bid wins. People may submit multiple bids for the same auction and certificates are issued for all winning bids.

The tax credit can be claimed on the current year's tax return. Any amount that cannot be used that year can be carried forward for up to three years. The tax credits cannot be transferred to anyone else. In a sense, the auctions are not independent of each other, because people who lose one auction are encouraged to participate in future auctions. Also, bidders can obtain information on the winning bids of previous auctions.

## 2.2 InvestMaryland

Maryland's tax credit auction was developed without knowledge of the Oregon tax credit auctions, and thus represents an independent case of policy invention. The InvestMaryland tax credit auction was created as a means to monetize tax credits to fund seed/angel stage business investment. This occurred as part of a larger innovation-based economic development plan to translate research and development in the state into new business formation. The money generated was used to fund a portion of a business plan competition, to replenish the Maryland Venture Fund, and provide funds for the Maryland Small Business Development Financing Authority, which supports economically and socially disadvantaged entrepreneurs. The tax credit auction was created as alternative to the Certified Capital Company (CAPCO) model of tax credit monetization, whereby tax credits are given in return for insurance companies' investments with venture capitalists. This model was viewed as having several problems, including lack of transparency and an inability for the state to recapture their investment outside of any induced economic

activity. CAPCOs were also viewed as being inefficient, because they tended to get a low return for the tax credits (Senior official, Maryland Department of Business and Economic Development. Telephone interview. October 17, 2014).

The idea for the InvestMaryland program came from the Maryland Department of Business and Economic Development. Senior officials in the department lobbied for the program against the efforts of the CAPCOs. However, a private auctioneer ran the auction and the InvestMaryland program was and still is managed by an independent board. The goal of the auction was to raise at least $70 million of investment funding through the auction of $100 million in tax credits. The auction was held in 2012, but the payment for the credits and the rate at which they could but claimed were spread out over time. Payments were divided into thirds, to be paid in 2012, 2013, and 2014. The value of the credits was divided into fifths: 20% could be claimed in each year rom 2014 to 2018. This timing was designed with the expectation by the time credits could be claimed, the State would be getting a return on their investment.

The auctioneer Grant Street Group coordinated the sale, marketing, bidder training, and the development of an online auction platform for the sale of the credits. The website that they created for the auction was called BidMaryland.com. Like Oregon, Maryland used a multiunit auction, but it differed in that they used a uniform price auction, otherwise known as a clearing price auction. It is similar to other multiunit auctions in that the winning bids are the top bids that exhaust the supply of the tax credits. However, instead of paying the amount bid for the tax credits, everyone pays the lowest winning bid, known as the clearing price. It also differed from the Oregon auction in that the bidders could see the

bids of the other participants in real time on the online platform. Bidders could respond to bidding behavior by issuing a new bid, though earlier bids remained in effect due to the multi-unit nature of the auction.

The auction was open on March 15, 2012 from 11 AM to 12:15 PM. The tax credits were sold in increments of $100,000 and each bid had to be for a minimum of 10 credits. There was a minimum price for the credits of $0.70 per dollar of credit and a maximum price of $1.00 per dollar of credit. (The Oregon auction had no maximum price.) In the event of a tie, the bid with the earlier time stamp was awarded the tax credits. Unlike in Oregon, only insurance companies were invited to participate in the auction. They were selected for their predictable tax liabilities and their history of buying tax credits under the CAPCO model.

## 3 Background

There are many tools with which governments are able to provide financial assistance in pursuit of a policy goal. These include "direct grants, loans, interest subsidies, guarantees of loan repayment or interest payments, insurance on investments, and so on" (Surrey 1970, 713). These methods are called budgetary or direct expenditures. However, tax incentives and other measures that reduce income tax liability can also be used to achieve policy goals and have the same budgetary impact as direct expenditures. In the 1960s, Assistant Secretary of the Treasury and renowned tax scholar Stanley Surrey noted that many tax preferences resemble spending. He introduced the concept of tax expenditures to capture provisions in the tax code that go beyond trying to measure the tax base. In 1974,

the United States Congress mandated that these tax expenditures be recorded annually as part of the federal budget (McBride 2013, 1). According to Surrey:

> "`tax expenditure' has been used to describe those special provisions of the federal income tax system which represent government expenditures made through that system to achieve various social and economic objectives. These special provisions provide deductions, credits, exclusions, exemptions, deferrals, and preferential rates, and serve ends similar in nature to those served by direct government expenditures or loan programs" (Surrey 1970, 706).

It is important to note that this definition restricts tax expenditures to preferences in the income tax system, whether for individuals or corporations, and does not include other ways with which governments collect revenue such as sales taxes or lotteries. (One could argue that the concept applies equally to other forms of tax collection, but for this paper the focus is on provisions in the income tax code.)

The concept of tax expenditures is controversial because it requires the establishment of a baseline, "normative" tax in order to determine which tax provisions are deviations from the norm (Bittker 1968; Brown 1976; McBride 2013; Thuronyi 1988). In other words, it is difficult to draw a strict distinction between which measures are simply attempts to accurately measure the tax base and which are established with other goals in mind. As a result, it is hard to develop a strong legal footing for treating tax expenditures any differently than other elements of the tax code. According to Thuronyi (1988), "Although Surrey's concept of tax expenditures has gained official recognition, it has not been fully integrated into the budget-making process and has largely failed to attain its goals" (p. 1155). Still, the concept has proven to be a useful rhetorical device for drawing attention to the budgetary equivalence of tax breaks and spending programs (Bittker 1968;

Brown 1976; Sugin 1999; Thuronyi 1988). It is hoped that by recognizing this equivalence and removing the institutional barriers that separate tax expenditures from similar spending programs, governments would be better able to manage their budgets and to assess whether the associated policy goals would be better served by an alternative delivery mechanism. Both of the states with tax credit auctions—Oregon and Maryland—have to varying degrees made attempts to include tax expenditures in the budget process.

At the federal level of the United States government, the number of tax expenditures has been on an upward trend. According to both the Treasury and the Joint Committee on Taxation (JCT), "the number of tax expenditures remained steady following the Tax Reform Act of 1986, then began increasing in the mid to late 1990s. Treasury reports indicate there were 119 tax expenditures in 1986, 131 in 1999, and 169 in 2013. JCT reports indicate a similar trajectory, though with more tax expenditures in any one year" (McBride 2013, 4). As of 2013, the tax expenditure budget was $1.2 trillion, "which represents real dollar growth of 44 percent since 1986 and 96 percent growth since 1991 when tax expenditures were at their lowest" (McBride 2013, 1). An analysis by the U.S. Government Accountability Office (GAO) shows the amount of money forgone as tax expenditures reaching the amount of discretionary spending.

There are many plausible reasons why tax expenditures have increased in popularity. At the most basic level, there is a general sentiment among researchers that tax preferences are "perceived as a 'costless form of subsidy' because the government merely refrains from collecting taxes from eligible individuals rather than redistributing funds" (Pitts and Wittenbach 1981, 335). This sentiment was echoed by Thuronyi (1988), who

sensed that politicians often view them not as new spending, but as "an appropriate way to reduce the burden on tax payers who would otherwise be hard hit by the highest rates of the tax code" (p. 1177).

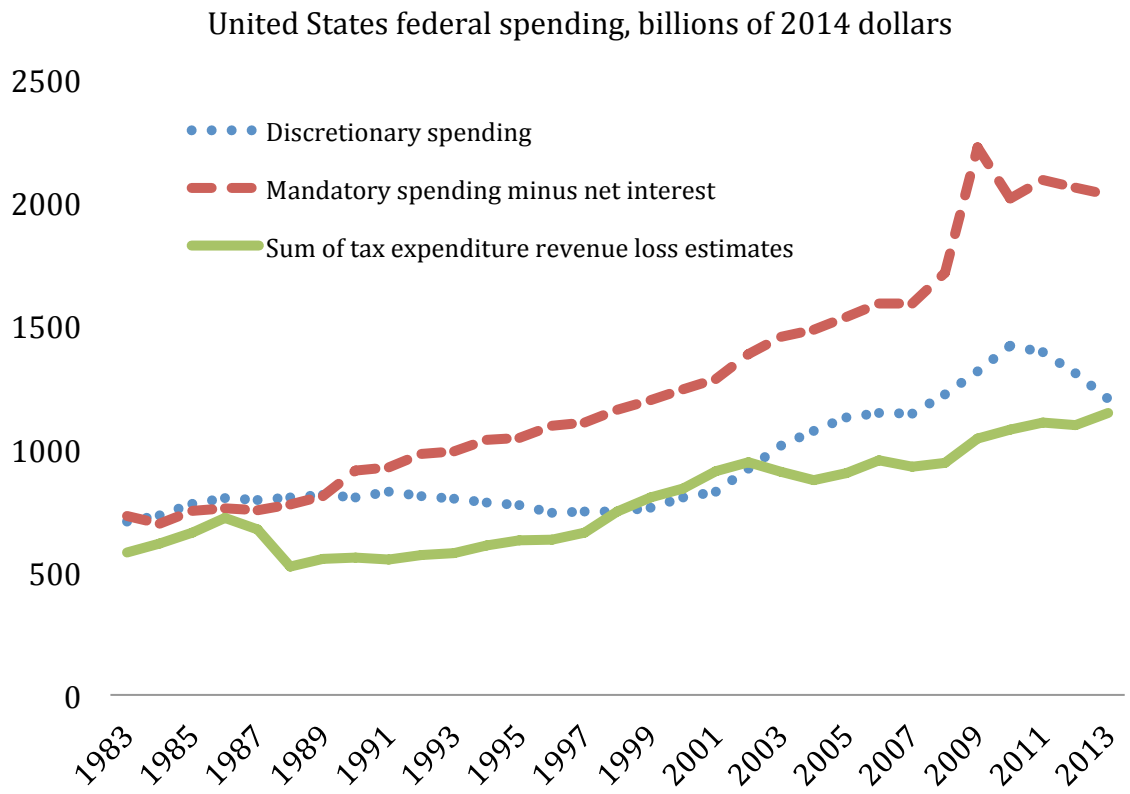



Figure 3.1 "Tax expenditures approach size of discretionary spending." GAO analysis of Treasury estimates and OMB historical data.

There are also strategic reasons to choose a tax expenditure in place of direct spending. For one, they seem to make it easier for political parties to reach a compromise. Henry Aaron (1969) observed that the popularity of the tax devices "derives from a peculiar alliance among conservatives, who find attractive the alleged reduction in the role of government that would follow from extensive use of tax credits, and liberals anxious to

solve social and economic problems - by whatever means - before it is too late." There are also different political processes for tax legislation and direct expenditures which by comparison make tax preferences seem easier to pass and implement (Aaron 1969; Surrey 1970). For example, "Walter W. Heller has commented on the seductive appeal of getting governmental assistance via Internal Revenue Code rather through the appropriations process:

> The back door to government subsidies marked 'tax relief' is easier to push open than the front door marked 'expenditures' or the side door marked 'loans, guarantees, and insurance.' Rather than run the gauntlet of the Budget Bureau and the congressional Appropriations Committees, groups seeking subsidies turn to the tax committees of Congress for Government support without Government interference. Often, they do so with the tacit or expressed support of the substantive committees dealing with small business, agriculture, foreign investments, natural resources, and the like…The very groups that use this back door are often among the most insistent advocates of responsible and informed Government budgeting. Yet here is a whole catacombs of Government benefits which are largely hidden from public view, let alone, periodic review. Once embedded in the tax structure, the preferential provisions are treated as inalienable vested rights, impervious to changes in tax rates, economic policy, and technology" (Bittker 1968, 244–245).

Other possible reasons why tax expenditures are politically appealing (which according to Surrey are falsely claimed) include a perceived ability to encourage private initiative with a reduced role for government (Aaron 1969; Surrey 1970) and the belief that they are simple and involve little government involvement (Surrey 1970). Since changes in the tax code are not usually subject to the same strict budgetary review as direct spending programs, Bittker (1968) felt politicians could also be motivated by a sense that tax preferences are harder to remove. However, evidence from Haselswerdt (2014), suggests that tax preferences are in fact less durable. In the end, its hard to say with confidence what

is truly motivating a group of politicians when they opt for a tax expenditure over a direct expenditure for achieving a particular policy goal. Unfortunately, there is a gap in the political science literature on empirical treatments of this topic.

Despite the apparent political appeal of tax preferences, they have many shortcomings when compared to direct expenditures. One problem with tax incentives is that they result in windfall payments to taxpayers who would engage in the desired activity even in the absence of the program (Pitts and Wittenbach 1981; Surrey 1970). Pitts (1981) found that the Residential Energy Tax Credit was a windfall to at least 39% of participants who did not even know about the credit before engaging in the desired behavior. This problem is likely to arise in any attempt to incentivize behavior change. However, the relative proportion of windfall payments may be greater when using the income tax incentives, because the reward is separated by time from the desired behavior. For example, Diamond (2009) found that upfront rebates or sales tax wavers were more effective in influencing hybrid vehicle adoption than delayed rebates or tax credits.

Other problems with the tax preferences are more unique to the income tax approach. Perhaps the biggest problem is that they are inequitable: they are worth more to taxpayers who are already more well-off (Pitts and Wittenbach 1981; Surrey 1970; Thuronyi 1988). Thuryoni (1988) calls this an "upside-down" subsidy because benefits from the tax expenditures tend to increase with the recipients' wealth. Tax expenditures usually only benefit people with enough tax liability to cover the value of the expenditure. If it is structured as a deduction or exclusion, the value of the benefit directly increases with the marginal tax rate. In addition, "the after-the-fact nature of the credit requires that

recipients bear the entire initial cost" (Pitts and Wittenbach 1981, 336). In their analysis of the Residential Energy Tax Credit, Pitts and Wittenbach (1981) found that the credit did not benefit lower-income families due to an inability to bear the up-front costs and their low tax liability. This problem is not unique to individuals; it is also faced by corporations. Firms that are just getting started or who are experiencing net losses may have little to no tax liability and thus are unable to take advantage of most tax benefits. Carrying the credits forward to future years devalues the credit due to inflation and carrying them backwards is often not an option if they had no previous taxes to offset (Barry 1982).

Yet the problem with using tax benefits to achieve non-tax related policy goals does not end there. They complicate tax laws and strain the tax system's administrative resources (Thuronyi 1988); they often involve unlimited or uncertain costs (Surrey 1970; Thuronyi 1988); they commonly evade budgetary review, causing many to forget that dollars are being spent (Surrey 1970; Thuronyi 1988); they keep tax rates high by reducing the tax base and revenues (Surrey 1970); and they separate the consideration, administration, and budgeting of government programs from other people and agencies in the relevant subject area. For example, tax preferences are usually the domain of a separate committee for taxes, which may not be well versed in the particular policy domain. Also, the revenue department, as opposed to the subject-area agency, administers tax benefits. This makes it difficult to evaluate program effectiveness and coordinate with related programs (Surrey 1970; Thuronyi 1988). In the word of Stanley S. Surrey (1970), "Overall, therefore, a resort to tax incentives greatly decreases the ability of the Government to maintain control over the management of its priorities" (p. 731).

Tax benefit monetization schemes have become an increasingly popular way to avoid some of the problems that tax credits pose. These are ways in which businesses and individuals can receive the full value of a tax benefit regardless of their level of tax liability, minus any transaction costs. The list of tax benefit monetization schemes includes transferable tax credits, refundable tax credits, tax rebates, and the applications of tax credits against a tax that is not income-based. Of these, the clearest examples are transferable tax credits and refundable tax credits. Transferable tax credits provide a mechanism to sell tax credits to a third party. As of 2011, they were used by at least twenty states (Brownell 2011). Examples at the federal level include the Low Income Housing Tax Credit and the New Markets Tax Credit. In the case of refundable tax credits, "if the credit is greater than the tax liability, the excess credit is treated as an overpayment of taxes and refundable to the tax payer " (Brownell 2011, 12). The most well-known example of a refundable tax credit is the Earned Income Tax Credit (EITC).

Tax credit auctions are a new way to monetize tax credits. All of the tax credit monetization schemes mentioned earlier only address issues related to insufficient tax liability or the timing of when funds are dispersed. Tax credit auctions go a step further by allowing for more flexibility in the choice of a delivery mechanism and for the administration by the relevant government agency. The funds created by all of the tax credit auctions run to date were administered by the state office that is firmly situated in the related policy arena. In addition, the delivery mechanisms, which include venture capital, government loans, and competitive grants, are very diverse. However, tax credit auctions are not well-known and have not been the subject of any studies. This report

begins to fill that gap by providing a detailed description of these auctions and answering some key questions related to equity, efficiency, and best practices.

# 4 Methods

We performed a mixed-methods case study of all instances of the use of a tax credit auction at the state level in the United States from 2011 to 2014. During this time, only Maryland and Oregon made use of a tax credit auction, with Maryland conducting one auction and Oregon conducting thirteen. We used a variety of data sources including interviews, data on the auctions bids, government documents, and government statistics.

## 4.1 Data Sources

The analysis relied heavily on information gathered during interviews. A total of seven interviews were conducted using a purposive sample of senior-level government officials with direct insight into the development and implementation of the tax credit auctions. Interviews were conducted with current staff at the Oregon Department of Revenue (1), the Oregon Legislative Revenue Office (1), the Oregon Governor's Office of Film & Television (1) and the Pennsylvania Department of Community and Economic Development (1). There were also interviews with former staff from the Oregon Department of Energy (1) and the Maryland Department of Business and Economic Development (2). We used a semi-structured interview protocol, which included questions about the motivation for the tax credit auctions, auction attributes, bidding behavior, how people have benefitted from the credits, and auction marketing. These interviews were conducted between October and December of 2014. All interviews took place over the

telephone. After speaking with someone responsible for the implementation of the tax credit monetization program for Innovate in PA, we discovered that they had chosen not to use an auction mechanism and we removed Pennsylvania from our list of cases.

Quantitative data on the individual auction bids were collected from publicly available data for the one auction held in Maryland and all thirteen auctions held in Oregon up to the end of 2014. Data from Maryland included the amount bid per $1 of tax credit, the time stamp, the total amount awarded, the total amount due, the insurance company name, the result of the bid, and the market clearing price. Data from Oregon included auction-level information on the number of credits available, the number of credits remaining (if any), and the associated fund. We also obtained bid-level data on the date received, the bidder's name (if a winning bid), the bidder's zip code (if a winning bid), the number of credits (called increments) bid on, the bid amount, and the result of the bid. For losing bids, identifying information was not retained. Since this data is publicly available, confidentiality was not a major concern, though the identities of the bidders are not ascertainable from this analysis.

We obtained data on the distribution of tax liability in Oregon by AGI from the Oregon Department of Revenue for the tax year 2013 and the distribution of Oregonians using itemized deductions by income from the Internal Revenue Services (IRS) for tax year 2012. We also got data from the IRS on the average AGI by zip code for tax year 2012 (SOI Tax Stats - Individual Income Tax Statistics - 2012 ZIP Code Data).

## 4.2 Analysis

The interviews were the primary data source to determine the motivation behind the use of tax credit auctions. They also played a supporting role in discerning the reasons taxpayers in Oregon sometimes overbid on the credits and how the auctions were marketed. All interviews were fully transcribed. We performed a thematic analysis of the interview data to determine the most consistent responses to our questions and common attributes to the accounts they gave. The explanations for the use of tax credit auctions were also compared to theories of policy adoption and the use of tax expenditures to determine which theories accord with the interviewees' observations. Due to the small number of interviews (N=7), we did not turn our interviews into quantitative data with content coding. Rather, we used qualitative content analysis to identify themes and patterns and describe situations. We do not purport to give definitive, mechanistic answers to these questions. We are simply relaying the current understanding of tax credit auctions among practitioners on the ground.

We performed simulations of the interaction of state and federal taxes to determine whether the responses to the interview questions could explain patterns in the bidding data. First, we created a table that shows the net change in income for households with different initial taxable incomes. For each of these levels, we looked at the net effect if they won a single tax credit by bidding either $490 (scenario 1) or $510 (scenario 2). To simplify the analysis, we restricted our attention to taxpayers filing single returns. We used the IRS tax tables for single taxpayers in 2012 in order to determine the effect of taking deductions on the federal tax return for the amount paid for the Oregon tax credits.

For our simulations of the interaction of state and federal taxes, it was necessary to assume that the person filed using itemized deductions, because the federal tax benefit is obtained through one or two deductions. When the tax liability is equal to or less than the standard deduction, it is not prudent to itemize deductions. As a result, the net change in income would not exceed the difference between the bid and the face value of the tax credit. In addition, many people do not qualify for enough deductions to benefit from itemized deductions. They are in the same position as the people with low tax liability.

We also ran simulations to determine the optimal bid and quantity of tax credits for someone with an AGI of $200,000. We modeled their net income assuming that they bid the same amount for all tax credits (and won them all), the only deduction they took was the deduction associated with the Oregon tax credits, and they filed as a single. (These are all conservative assumptions. The net effect on income is likely to be more positive than what we predict.) To further simplify the model, we set a maximum quantity of tax credits such that the total face value of the credits did not exceed their Oregon tax liability.

Next, we examined who can receive the greatest benefit from the tax credit auction. We obtained data on the distribution of Oregon tax liability by AGI from the Oregon Department of Revenue for the Oregon tax year 2013. This information was used to determine the percent of the Oregon population that does not have enough tax liability to take advantage of the credit. Using data from the IRS for tax year 2012, we were also able to determine the distribution by income of which Oregonians used itemized deductions.

Using zip code as a proxy for income, we estimated the extent to which the tax credits are being bought by the wealthiest Oregonians. Using ordinary least squares regression, we

modeled the total number of tax credits by zip code as a function of the average AGI and the number of federal tax filings. This could only be done for winning bids since zip codes were not available for losing bids. We also excluded data on businesses, which comprise 11 of the 1,398 winning bids (0.8%) and 528 of the 67,410 tax credits (0.8%). Three entries (0.2%) were removed due to data entry errors. We calculated the total number of tax credits purchased by zip code. This was combined with 2012 data from the IRS on the average AGI by zip code and the number of tax filings by zip code.

Next, we determined whether certain factors are associated with an increased price paid for the tax credits. The first of these was marketing. We hypothesize a causal model in which marketing increased the participation rate and the participation rate increased the average bid. Using the Spearman rank correlation test, which was chosen because it is robust to outliers, we test the significance of the correlation between the participation rate and the average bid. Qualitative analysis was used to determine which agencies more actively market their auctions. Finally, we compared participation rate of the auctions that were heavily marketed to those that were not. The other factor we considered was auction design. We present the differences in the way that the Oregon and Maryland auctions were run as well as the difference in the average bids. The data are not adequate to statistically test whether one auction design generates more revenue than another, but the data are suggestive that auction design is an important factor to consider.

# 5 Results

## 5.1 Motivation

The rational decision making model, which borrows heavily from economics, portrays decision makers as value-neutral actors, acting with complete information, to determine the best solution to a well-defined policy problem. In the early days of the study of public administration, this model was promoted as the most scientific way to address policy making. With the 1959 publication of "The Science of 'Muddling Through'", Charles E. Lindblom argued that this portrayal of decision-making is both inaccurate and often unattainable. Policy decisions require weighing conflicting values, which can vary in importance depending on the context. In addition, decision makers have limited time and resources to create a full list of policy options, which could be inexhaustible, and to acquire the information needed to determine their effectiveness. He portrayed decision making instead as a process of making "successive limited comparisons" (Lindblom 1959, 81). This came to be known as the incremental model of decision-making. Lindblom portrayed decision makers as limiting the list of policy options to only those that differ by a small degree. It is then only necessary to conduct an inquiry into the attributes along which they differ. Instead of selecting the "best" policy based on the ability to most efficiently attain the desired ends, the "best" policy is one that policy makers can agree on. Thus, through a process of small changes and trial and error, policies gradually evolve in a manner that is technically and politically feasible.

Incrementalism has not been found to be an accurate portrayal of every policy decision (Sabatier 2007), but it is descriptive of the decision process in this instance. Both the Maryland auction and the first Oregon auctions, which were invented independently from each other, were cases of improvements on a prior system. The basic idea for the policy mechanism remained the same: the state would issue a certain number of tax credits, which could then be monetized to fund the related program. By continuing the use of tax credits, the political economy of funding the government programs was more or less unchanged. The difference was only in the monetization scheme, which was found in both cases to be lacking.

The case of the Oregon Production Investment Fund is the clearest example. The Office of Film & Television previously sold tax credits in order to fund grants for local film production, but from 2005 to 2011 they sold the credits themselves at a 10% discount. This was portrayed as offering a tax credit in return for a "donation." So in order to get a $1,000 tax credit it took a $900 donation. According to an Oregon administrator "people looked at that and thought that was inefficient because the state could just give through the direct appropriate process" (Senior Official, Oregon Legislative Revenue Office. Telephone interview. November 12, 2014). As a result, there was public pressure to increase the efficiency of the monetization scheme. Another administrator said that at this time:

> "the point was made that if we went to an online auction system it was possible that they would sell at even less of a discount amount and we could, you know, get a better return on our money …In 2012, we set the 5% discount as the maximum discount that anyone could get…and then left it up to the market what it would be after that. It has always been better than the 5% discount" (Senior Official, Oregon Governor's Office of Film & Television. Telephone interview. November 21, 2014).

Since selling credits at a 10% discount was found to not be economically efficient, the Office of Film & Television switched to an auction system with a maximum 5% discount. The auction introduced a market mechanism, which improved the efficiency even further. Some might argue that the most rational approach would have been to start from scratch and pass a bill to allocate the money through direct appropriations. Instead, however, they made an incremental change that increased efficiency but did not completely address the loss of government funds.

The Oregon Department of Energy (DOE) faced a similar but more complicated problem. Previously, they allowed recipients of the Business Energy Tax Credit (BETC) to monetize their own tax credits using the so-called pass-through option. In essence, this made the tax credits transferable. However, instead of negotiating their own rates, these credits were sold at the so-called "pass-through rate." As of October, 2013, this rate was set to 67.73%. This program was highly controversial. It came under fire from the media and others due to ballooning costs, problems with the projects they funded, and loopholes that allowed developers to qualify for multiple credits (Sickinger 2014). It was also criticized for reducing the tax paid by corporations, such as Walmart, with only weak ties to Oregon in their role as pass through partners (Cheeseman 2010). Unfortunately, no one at the DOE was willing to speak to why they switched to an auction system, perhaps due to the highly public failure of the BETC program. However, one former employee strongly asserted that to understand why they currently use an auction system, one must first understand what went wrong with the BETC (Former Senior Official, Oregon Department of Energy. Telephone interview. December 5, 2014). The auction system corrected several problems

with the BETC by limiting the amount government funds available for business energy projects, increasing the efficiency of tax credit monetization well above 67.73%, and introducing greater transparency. The salient point, though, is that the related program continued to be funded through tax expenditures, but decision makers chose an alternative method of tax credit monetization. The development of the Renewable Energy Development Grant Auction is thus a story of trial and error and incremental changes.

In Maryland, the tax credit auction to fund InvestMaryland was designed to improve upon the Certified Capital Companies (CAPCO) model of state-supported venture capital investment (Former Senior Official, Maryland Department of Business and Economic Development. Telephone interview. October 17, 2014). Under the CAPCO model, insurance companies are encouraged to invest in the CAPCOs in return for tax credits on their premium tax liabilities. In most states that used the CAPCO model, the insurance companies received tax benefits worth 100% of the amount they invested with the CAPCO. The CAPCOs would negotiate their own deals with the insurance companies and then invest the money with qualified businesses in the state (Barkley, Markley, and Rubin 2001, 351).

Staff at the Maryland Department of Business and Economic Development found fault with this model since in most cases, the CAPCOs were not required to return any of the capital or the profits to the state (Former Senior Official, Maryland Department of Business and Economic Development. Telephone interview. October 17, 2014). The only benefit to the state resulted from induced economic activity, which in many cases was found to be limited. According to a study of CAPCOs conducted in 2001, “Publicly or privately managed funds will be less costly than CAPCOs because the cost to the state of its

investment in these funds will be offset to the extent that proceeds from the funds are distributed to the state as the principal or limited partner in the funds" (Barkley, Markley, and Rubin 2001, 361). The structure of the relationship between governments and the CAPCOs were found to result in nontransparent dealings with insurance companies. Consequently, the effective prices for the tax credits were as low as 70% of their value (Former Senior Official, Maryland Department of Business and Economic Development. Telephone interview. October 17, 2014). Looking to improve upon this model, officials in Maryland decided that they would sell tax credits at a discount but then allow the state to profit from the investments at normal market rates. According to one of the people who designed the policy:

> "…the way I looked at it was if we're going to use tax credits to fund these types of activities lets be very efficient about it, so lets look at running an auction that's heavily marketed, that's transparent, lets bring in a professional auctioneer to make sure that we get the most efficient price for the sale of that tax credit" (Former Senior Official, Maryland Department of Business and Economic Development. Telephone interview. October 17, 2014).

In the end, the final program was very different from the CAPCO model, but CAPCOs were the source of inspiration. Also, many of the key details remained the same: Maryland adopted the use of tax expenditures and they looked to insurance companies, which have a predictable tax liability, to monetize those tax expenditures. The key differences are that they removed the third party—the CAPCO—in order to deliver greater value to the state and they used an auction in place of backroom deals in order to get the best price for the tax credits. According to another official who helped design the program:

> "The tax auction was a combination of us thinking about these early stage companies as well as some innovative ways to take a program that was

> already being used and tweak it to suit our purposes in Maryland… By eliminating the CAPCOs we were really able to create a public-private partnership knowing that the money would come back to the state and …not have to worry about a third party" (Former Senior Official, Maryland Department of Business and Economic Development. Telephone interview. November 7, 2014).

This analysis leaves one important question unanswered: why use tax expenditures in the first place when it would appear to be more economically efficient to fund the programs directly using direct expenditures from the general fund? In the case of InvestMaryland, it was believed that if they timed the rate at which the tax credits were eligible to be redeemed with the rate at which the investments would start to turn a profit, then the whole program would be revenue neutral. The tax credits provided an established mechanism with which to time the state's expenditures. Also, the insurance companies had a history of working with tax credits under the CAPCO model. A good analogy is to think of the money InvestMaryland received from the insurance companies as a loan, the cost of which was the difference between the price and the value of the tax credits. They then paid the insurance companies back in tax credits, but far enough into the future to expect to have enough money coming in from the investments to offset the tax expenditures. In the words a senior economic development official:

> "If we invested in company Y in 2012 and the first tax credits for those investments come in 2016, hopefully that company is producing economic growth in 2016 that matches whatever the tax credit was worth in that year. On top of that, by the way, … we were venture investors; we were looking for a company to pay that money back to the state apart from economic growth" (Former Senior Official, Maryland Department of Business and Economic Development. Telephone interview. October 17, 2014).

For the Renewable Energy Development Grant Auction and the Oregon Production Investment Fund Tax Credit Auction, which were established under the same law, the story

is a bit more complicated. It is tempting to say, as Henry Aaron did in 1969, that tax credits provide a means to satisfy both conservatives, who wish to cut taxes, and liberals, who wish to create new government programs. However, this oversimplifies the situation. In Oregon, they found that the preference for tax credits and the desire for these programs did not divide along partisan lines. However, the politics lined up such that there were more votes in favor of taking the tax credit approach. According to an observer in the Legislative Revenue Office, this was because the program essentially allows taxpayers to decide if they want to support these programs. In his words:

> "Some people were in their comfort zone, saying well I don't want to appropriate the money, but I'm willing to vote for a tax credit and let taxpayers decide if they want their tax dollars going to this function… So I write a $1000 check to the Office of Film and Video and I know how those dollars are going to be used and I get a $1000 credit. I'm being very kind of loose with the numbers. But then I know that $1000 of my tax obligations to the State are being used for this function that I believe in" (Senior Official, Oregon Legislative Revenue Office. Telephone interview. November 12, 2014)

There was also a more pessimistic explanation of why Oregon chose to fund the programs using tax credits. According to one observer, it has been brought up several times in the legislature that it would be more efficient to directly allocate the money to these programs. His understanding of why they do not do so is that there is not enough room in the budget to fund the programs upfront. "So basically they are just borrowing from the future through this tax credit thing so that allows them to fund the program without having to have that money directly available up front" (Senior Official, Oregon Governor's Office of Film & Television. Telephone interview. November 21, 2014) Finally, there is also a process-oriented reason why tax credits are sometimes preferred. Typically, tax credits are

up for review every six years while direct appropriations are reviewed every two years. As an example, consider a tax credit worth $1,000 that is sold for $970. Many people argue that this is an efficiency loss of $30. However, "from the Congress's standpoint, what they're purchasing [with the efficiency loss] is that part of the process they want to go through" (Senior Official, Oregon Legislative Revenue Office. Telephone Interview. November 12, 2014). Some people argue that the $30 that is lost is buying an additional four years before the program is up for reconsideration (Senior Official, Oregon Legislative Revenue Office. Telephone Interview. November 12, 2014).

In the end, it is difficult to determine with certainty which factors caused decision makers in Oregon to choose tax credits over direct expenditures. However, all of the possible explanations that were given share a common theme: political expediency. This approach was able to gather the most votes by appealing to those who always vote for tax breaks, those with an interest in the program, and those who viewed the selling of tax credits as a way to allow taxpayers to decide where their money is going. Tax credits are also expedient because they side-step budget process and are not reviewed as frequently as direct expenditures.

## 5.2 Bidding Behavior in Oregon

Something unusual has been going on with how Oregonians bid on the tax credits. The tax credits they are auctioning off have a face value of $500 a piece. The prior prediction based on game theory is that people will bid $500 or less for these credits. $500 is a Nash Equilibrium in this case. Assuming that one person bids $480 on a tax credit, the best

response of an opposing player is to bid $480.01. This can continue back and forth until the value of winning the credit, which is equal to the difference between the bid and $500, is reduced to zero. Assuming that the tax credit has a pure common value of $500, it makes no sense to bid more than $500, since the bidder would be losing money. However, in Oregon, many people bid more than $500. Table 5.1 shows the percent of bids that were over $500 and the average bid amount for bids exceeding $500 for each of the auctions. Overall, 12.8% of the tax increments were bought for more than their face value. This leads us to conclude that the bidders are deriving some value from the tax credit beyond the monetary value of the credit itself.

Table 5.1 Proportion of people bidding over $500, the median bid over $500, and the mean bid per increment for all bids over $500

| Auction | Proportion (%) | Median($) | Mean Bid Per Increment ($) |
|---|---|---|---|
| October, 2011 | 8.3 | 551.25 | 552.33 |
| December, 2011 | 0.0 | NA | NA |
| July, 2012 | 26.3 | 501.00 | 505.45 |
| September, 2012 | 13.8 | 501.00 | 501.33 |
| October, 2012 | 40.0 | 505.00 | 504.57 |
| July, 2013 | 20.9 | 502.00 | 503.67 |
| August, 2013 | 0.0 | NA | NA |
| October, 2013 | 5.3 | 501.00 | 502.43 |
| November, 2013 | 1.5 | 501.00 | 501.00 |
| January, 2014 | 0.0 | NA | NA |
| July, 2014 | 5.5 | 501.00 | 503.89 |
| September, 2014 | 6.6 | 506.00 | 506.71 |
| October, 2014 | 9.4 | 503.00 | 506.78 |

There are many theories circulating in Oregon as to how taxpayers are benefiting from the purchase of these tax credits. The most common theory is that auction winners are benefiting from an interaction between state and federal tax codes (Senior Official, Oregon Legislative Revenue Office. Telephone Interview. November 12, 2014). This sentiment was echoed in all of the interviews as well as in a meeting between tax professionals and the Oregon Department of Revenue (Tax Practitioner Liaison Meeting, Oregon Department of Revenue, October 26, 2012. [minutes]). It is generally believed that people can claim the amount under $500 dollars on their federal taxes as a deduction under "state income taxes paid." The amount over $500 can be claimed on their federal taxes as a charitable donation (Senior Official, Oregon Department of Revenue. Telephone Interview. December 5, 2014). For people subject to the Alternative Minimum Tax (AMT), there is a desire to claim the full bid amount as a charitable donation since the AMT rules do not permit deductions for state income taxes paid. The IRS has not weighed in on this issue, and it is still an open question whether this is permissible (Senior Official, Oregon Department of Revenue. Telephone Interview. December 5, 2014). This leads to three possible scenarios, depending on whether the person bid over or under $500. In all three cases, taxpayers are able to deduct the full amount they bid for the credit despite the fact that $500 is essentially refunded once they claim the credit.

***Scenario 1:*** *Someone bids on a $500 tax credit for $500 or less. They claim a federal deduction for the amount bid under "state income taxes paid" (Federal Schedule A Line 5.) This deduction is not carried over onto Oregon taxes (Oregon Income Tax Line 24). They then get a tax credit on their Oregon taxes for $500.*

***Scenario 2:*** *Someone bids on a $500 tax credit for more than $500. They claim a federal deduction for state income taxes paid for the amount of $500. This deduction is not carried over onto Oregon taxes (Oregon Income Tax Line 24). They also claim a federal deduction for charitable giving for the amount over $500. This amount must be added to their reported income for Oregon tax purposes under Line 10 "other additions." They then get a tax credit on their Oregon taxes for $500.*

***Scenario 3****: Someone bids on a $500 tax credit for any amount over $475. They claim a federal deduction for the amount bid under "charitable deduction." This amount must be added to their reported income for Oregon tax purposes under Line 10 "other additions." They then get a tax credit on their Oregon taxes for $500.*

In any of these scenarios, if the taxpayer gets a refund from the State of Oregon, then the value of the tax credit is reported on a form called the 1099-G for "Certain Government Payments." The taxpayer must claim this amount as income on the following year's federal income tax, canceling out the effect of claiming the amount paid for the credit as "state income taxes paid." Conversely, if at the end of the year the amount you owe in taxes is greater than what you have paid over the year, a 1099-G is not issued. This means that those who owe taxes when they file and must pay out of pocket can obtain the maximum benefit of purchasing the credit. Since we are interested in how people extract value from the purchase of the credits, the analysis in this section will restrict attention to people in this latter category.

To provide concrete examples, we created a matrix of potential outcomes. This table shows the net change in income for households with different initial taxable incomes. For

each of these levels, we looked at the net effect if they won a single tax credit by bidding either $490 (scenario 1) or $510 (scenario 2). We assume that they file using the traditional tax system and not the AMT, but the effect would be similar under the AMT if they claim the full amount as a charitable deduction. The resulting change in net income is reported in Table 5.2.

Table 5.2 Net income change when claiming bid as a federal deduction for tax year 2012

| Taxable Income | Net Change with $490 bid | Net Change with $510 bid |
|---|---|---|
| $25,000 | $85 | $73 |
| $50,000 | $135 | $127 |
| $75,000 | $135 | $127 |
| $100,000 | $143 | $123 |
| $200,000 | -$98 | -$112 |
| $500,000 | $182 | $169 |

This table also reveals a few interesting features of the Oregon tax credits. First, people who are able to claim the bid amount as a deduction get a much larger benefit than the face value of the credits. Also, they are able to profit even when over bidding. This may explain why there are so many instances of bids over $500. Second, the value of obtaining a tax credit generally increases with income. This makes sense given the progressive nature of our tax system. There is a strange discrepancy for the person with a taxable income of exactly $200,000. In this person's case, the deductions moves him/her from the "Tax Computation Worksheet" to the tax tables, resulting in a higher tax liability.

We can make this model a bit more realistic by incorporating a range of bids and various quantities demanded. This introduces the effect of moving between tax brackets.

People can reduce their tax rate if they can sufficiently lower their taxable income by taking deductions. As a result, it may be advantageous for some people to buy multiple Oregon tax credits if they can claim them as deductions on their federal tax return. As an example, we look at the change in net income for someone who in 2014 had a taxable income of $200,000 before claiming the deductions associations with the auctions. The following table explains the set of calculations to arrive at the final tax.

Table 5.3 Tax calculations for optimization simulation for tax year 2014

| **Federal Tax** |
|---|
| Start: $200,000 |
| Subtract amount of the bid times the number of credits |
| If between 100,000 and 186,356 multiply by 0.28 and then subtract 6,824 |
| If greater than 186,356 multiply by 0.33 and then subtract 17,538 |

We simulated what would happen if this person won a range of tax credits up to their Oregon state tax liability. Assuming that their Oregon taxable income is also $200,000, their liability is $17,538, for a maximum of 37 credits. (In reality, people can purchase more credits than they can use and then carry them forward to future years, but we are interested in the effect during a single tax year.) We allowed the bid to have a range between the minimum bid of $475 and $575.

The best outcome occurs when the simulated person buys all 37 credits at the minimum bid of $475. This would increase this person's after tax income by about $6,280. However, in auctions that sell out, $475 is too low of a bid to win the credits. If the person bids over $500, which is the anomaly that we're interested in, they are more or less guaranteed to win the credits. In 11 of the 13 auctions, the lowest winning bid was less

than $500. The exception is a 2012 auction that had an unusually high ratio of increments bid on to increments available. In this case the lowest winning bid was $501. Restricting the range of bids to at least $501, the optimum occurs when the taxpayer purchases all 37 credits for $501. This results in net benefit of about $5,800. This is consistent with the data, since $501 is the most common bid over $500 with 46% of the over-bids. Yet, 8.4% of the bids over $500 were over $510. However, some state officials in Oregon believe the people who made very large bids either made mistakes or were acting illegally.

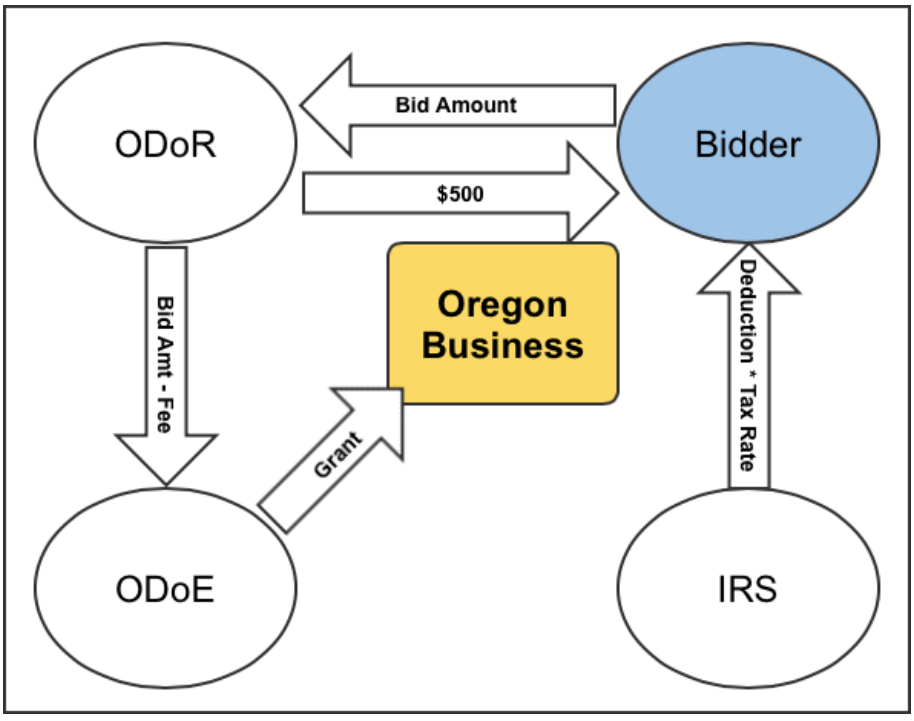
## 5.3 Equity Considerations

It is important to remember that tax credit auctions involve two distinct populations. The first is the population of people and businesses that are targeted by the related policy. They receive loans or cash payments from the associated funds. For the Maryland auction, this population consisted of Maryland businesses in the seed stage of development. The second population is those taxpayers that bid on the tax credits in the auction. In Maryland, they were insurance companies with tax liabilities in the state. These two populations are highlighted for the case of the Oregon Renewable Energy Development Grant auction in Figure 5.1.

In terms of the first population, the use of the tax credit auctions ameliorates several of the problems associated with simply providing tax incentives. For example, they get around the problem of needing enough tax liability to receive the subsidy and the funds are not limited to being dispersed during tax season. In these ways and others, the program is more equitable than traditional tax incentives. These benefits could also be obtained

through direct outlays, but as discussed in the motivation section, tax expenditures provide political and procedural advantages. However, the use of tax credit auctions is not costless. Clearly, there is a loss of funds from the sale of tax credits at less than their face value, but we found that they also confer tax advantages in an inequitable, regressive manner. This is not as pertinent in Maryland, where insurance companies were the sole recipients of the tax credits (although, one could question whether the insurance companies should have received tax breaks). In Oregon, the regressive characteristic is more apparent because all taxpayers are permitted to bid on the credits.

Figure 5.1 Money flows for the Renewable Energy Development Grant auction




Among taxpayers filing as single in Oregon, only people with an Adjusted Gross Income (AGI) around $15,000 and above have enough tax liability on average to benefit from a $500 tax credit. For taxpayers filing jointly, this number rises to $25,000. Overall, roughly

30% of taxpayers are unable to benefit from the credit. In addition, there are differences in the quantity of tax credits that people with different taxable incomes are able to make us of. This means that the size of subsidy is a direct function of income: the higher your income, the more credits you are able to use.

Table 5.4 Net state tax by AGI level in thousands, full-year single returns, Oregon 2013

| AGI Level ($000) | Net Tax |
|---|---|
| 0-5 | 21 |
| 5-10 | 130 |
| 10-15 | 377 |
| 15-20 | 721 |
| 20-25 | 1,060 |
| 25-30 | 1,395 |
| 30-35 | 1,715 |
| 35-40 | 2,024 |
| 40-45 | 2,302 |
| 45-50 | 2,569 |
| 50-60 | 2,938 |
| 60-70 | 3,553 |
| 70-80 | 4,292 |
| 80-90 | 5,081 |
| 90-100 | 5,831 |
| 100-250 | 9,684 |
| 250-500 | 26,911 |
| 500 + | 104,830 |

As explored in section 5.2, people who do not get an Oregon tax refund at the end of the tax year are able to increase the value of the tax credit substantially by taking deductions on their federal tax return. This introduces another income contingent constraint on who benefits from these credits: whether the person has enough tax liability to justify itemizing

deductions. Not only do people who itemize deductions receive additional value from the tax credits, they have an advantage in the tax credit auction because it is rational for them to bid more than the face value of the credits. For example, the hypothetical person with a taxable income of $200,000 generated $5,800 from the use of 37 tax credits even when bidding $501, and in most cases would be guaranteed to win all 37. Compare this to someone who bids on 37 tax credits at $480 but does not itemize deductions. At best, they would earn $1,184 ($20*37) and at worst would lose the auction and get nothing. This brings us to the question of who itemizes deductions. In 2012, about 38% of all Oregon taxpayers used itemized deductions on their federal return. As shown in table 6.5, the likelihood of using itemized deduction is an increasing function of income. So once again, a taxpayer's ability to benefit from the tax credits, and the size of the benefit that they receive, is shown to be regressive in nature.

Table 5.5 Percent of Oregon taxpayers using itemized deductions on their federal returns by AGI, 2012

| AGI | Percent Using Itemized Deductions |
|---|---|
| Under $1 | 0.00% |
| $1 - $10,000 | 6.93% |
| $10,000 - $25,000 | 12.57% |
| $25,000 - $50,000 | 28.36% |
| $50,000 - $75,000 | 56.32% |
| $75,000 - $100,000 | 76.70% |
| $100,000 - $200,000 | 91.00% |
| $200,000 - $500,000 | 98.00% |
| $500,000 - $1,000,000 | 98.89% |
| $1,000,000 or more | 99.28% |

Using zip code as a proxy for income, we can get a sense for the extent to which the tax credits are being bought by the wealthiest Oregonians. Using ordinary least squares regression, we modeled the total number of tax credits purchased by zip code as a function of the zip code's average AGI and the number of federal tax filings. Average AGI by zip code was found to be a highly significant (p-value ≈ 0) predictor of tax credit uptake. A $1,000 increase in a zip code's average AGI is associated with 22.1 additional tax credits purchased in that area (95% CI = [19.3, 24.9]).

Table 5.6 Summary of OLS regression of tax credit uptake by zip code, 2011-2014

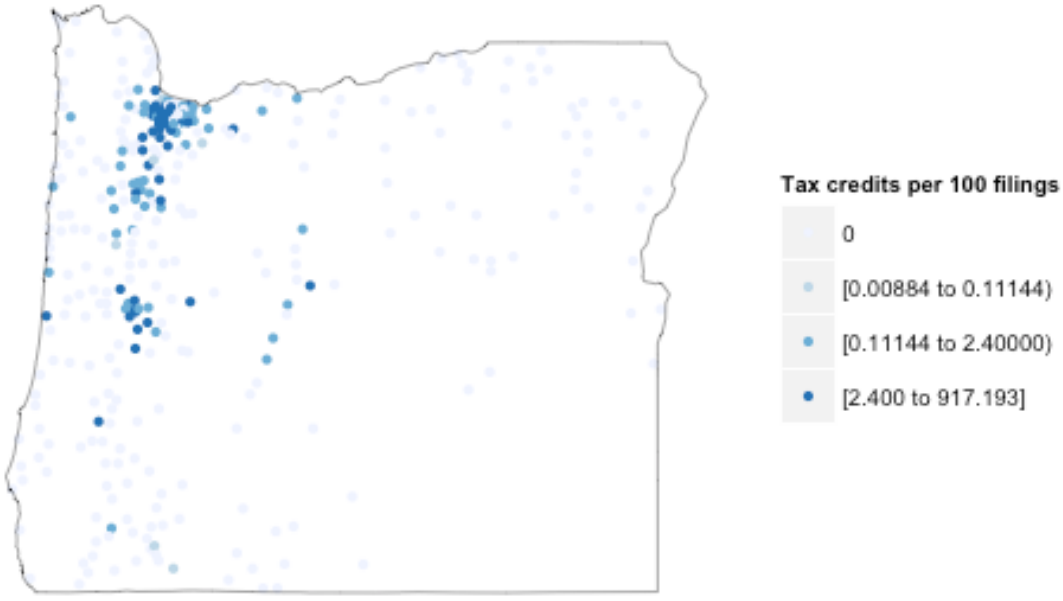
| Coefficient | Estimate | Standard Error | P-Value |
|---|---|---|---|
| (Intercept) | -1046 | 76.06 | <0.0001 |
| Average AGI | 22.1 | 1.43 | <0.0001 |
| Number of tax filings | 0.02 | 0.004 | <0.0001 |
| Multiple R-squared: 0.4741, Adjusted R-squared: 0.4711 | | | |
| F-statistic: 157.8 on 2 and 350 df, p-value: <0.0001 | | | |

Figure 5.2 shows the number of tax credits by zip code, normalized by the total number of tax filings. The zip code with the highest uptake rate is 97204 in Portland where there are just 570 individual taxpayers, yet 5,228 tax credits were purchased from 2011 to 2014. This zip code has a mean AGI of $217 thousand.

Thus, the Oregon tax credit auctions are consistent with Thuryoni's (1988) observation that tax expenditures provide an "upside-down" subsidy, despite the use of a monetization scheme. For the population of people who are targeted by the associated programs, this is not an issue because the tax credits are monetized. Yet, for the population of people who purchase the tax credits, the benefits from the tax expenditures tend to increase with the recipients' wealth. The tax credits only benefit people with enough tax

liability to cover the face value of the credits and if they claim the cost of the credits as a federal deduction, the value of the benefit directly increases with the marginal tax rate.

Figure 5.2 Number of tax credits purchased from 2011 to 2014 per 100 tax filings in 2012 by zip code




## 5.4 Auction Efficiency

### 5.4.1 Marketing

Auction theory predicts that as the number of bidders increases, the winning bids converge to the true value of the item (Wilson 1977). If this theory is correct, auctions with higher participation rates should also have higher winning bids. This result is supported by the data on the Oregon auctions. In Oregon, there were often not enough bids to cover all of the available tax credits. In other words, they frequently did not sell out. For auctions that did sell out, the average bid was $492.85. For auctions that did not sell out, the average bid

was $489.84. This difference of $3.01 provides strong statistical evidence that auctions that sell out have higher average bids than those that do not (p-value = $3.95 * 10^{-6}$). If you only include winning bids, the difference increases to $6.71. We can also compare the average bid to the participation rate, sometimes called the coverage rate, which we measured as the number of credits bid on divided by the total number of credits available times 100%. The participation rate for 11 of the 13 auctions was between 5% and 125%. There was one unusual auction for which there were 3,608 credits bid on but only 662 available, producing a participation rate of 545%. With this outlier included, the Pearson's correlation coefficient is 0.66, but without out it, it is 0.78. The Spearman rank correlation test, which is robust to outliers since it reduces a value to its rank, produces a p-value of 0.004. This provides strong evidence that there is an association between the participation rate and the average bid.

Based on government documents and interviews with the state officials at the Film Office, the Legislative Revenue Office, and the Department of Revenue, it appears that the Film Office more actively markets their auctions than the ODoE. According to one observer: "Film is very good at their advertising. Energy puts something on their website and I think that's it, as far as I know. And we talk to Energy and say how Film is doing a good job going out to the practitioner community and out to the supporters of their division, and sharing their purpose, and doing a good job at advertising" (Senior official, Oregon Department of Revenue. Telephone interview. November 21, 2014). The ODoE also sold out its tax credits 25% of the time (N=8), while the Film Office sold out its tax credits 80% of the time (N=5). Likewise, the average participation rate was 76% for the ODoE while it was 197% for the

Film Office. This data is strongly suggestive that the more active marketing conducted by the Film Office increased their participation rate. As predicted by the correlation between participation rate and marketing, the Film Office also had a higher average bid than the ODoE. Film had an average bid of $491.95 and the ODoE had an average bid of $488.34, for a difference of $3.61 per tax credit. Based on these results, marketing seems to be an important factor to consider when trying to maximize the amount of money raised from a tax credit auction.

### 5.4.2 Auction Design

There are some major differences between the Oregon auctions and the Maryland auction (see table Table 5.7). One is that the Oregon auctions are open to anyone with a tax liability while in Maryland only insurance companies were invited to participate in the auction. Another is that the Oregon auctions are pay-as-bid or discriminatory price auctions while Maryland used a uniform price auction. Yet another is that Oregon and Maryland had different minimum and maximum bids.

Oregon and Maryland also have very different average bids; in Oregon the average bid is $0.98 per $1.00 of credit versus Maryland where there was an average bid of $0.80 (although bidders in Maryland ended up paying the market clearing price of $0.84). Since Oregon and Maryland are the two cases of the use of the tax credit auction, the data are not adequate to statistically test whether one auction design is generates more revenue than another. In addition, there is a major confounding factor that makes it difficult to compare the two auctions; in Oregon, the tax credits can be used for that year's taxes while in

Maryland, bidders must wait three years to even begin redeeming the credits. This time delay makes the Maryland tax credits less valuable than the Oregon credits. However, prior research suggests that auction design can explain at least some of this discrepancy.

In theory, a uniform price auction should generate at least the same amount of revenue as the discriminatory price auction on average (Friedman 1960; McAfee and McMillan 1987; Milgrom 1989). This is based on the idea that a uniform price will encourage bidders to bid more aggressively than in a discriminatory price auction. This result is also predicted by William Vickrey's revenue equivalence theorem that various auction formats should yield the same revenue. However, some empirical studies have revealed discriminatory price auctions resulting in higher prices than uniform price auctions (Bower and Bunn 2001; Simon 1994). Another study shows the opposite result (Tenorio 1993). Ultimately, the difference seems to depend on the situation and the types of bidders. Given that the Vickrey's revenue equivalence theorem seldom holds in practice, it is not surprising that the Maryland auction and the Oregon auction yielded different average bids.

Table 5.7 Auction rules in Oregon and Maryland

| **Oregon** | **Maryland** |
|---|---|
| Sealed-Bid | Open Auction |
| Discriminatory Price | Uniform Price |
| Open to all taxpayers | Open only to insurance companies |
| Minimum bid $0.95 per $1.00 | Minimum bid $0.70 per $1.00 |
| No maximum bid | Maximum bid $1.00 per $1.00 |

# 6 Discussion and Recommendations

Tax credit auctions enable governments to use tax expenditures to run programs as if they were funded by direct outlays. This provides greater flexibility in the way that the programs are administered and avoids problems associated with other types of tax expenditures. Among the present cases of the use of the tax credit auctions, the funds have been converted into venture capital, competitive grants, and a revolving loan fund. In these ways, the governments were better able to match the funds' delivery mechanisms to the policy goals.

However, the tax credit auctions are not without their own problems. It is good for some, but perhaps not so good for others, that they largely side-step the budget process and avoid review. In the federal setting, studies conducted by the U.S. Government Accountability Office (GAO) have determined that "once enacted, tax expenditures and their relative contributions toward achieving federal missions and goals are often less visible than spending programs, which are subject to more systematic review" (*Tax Expenditures: Background and Evaluation Criteria and Questions* 2012, 1) "As a result, policymakers have few opportunities to make explicit comparisons or trade-offs between tax expenditures and federal spending programs" (*Tax Policy: Tax Expenditures Deserve More Scrutiny* 1994, 5). The GAO has identified several ways to subject tax expenditures to periodic review. These fall into the categories of program evaluation within the tax-writing committees, tax expenditure savings targets, and joint reviews of spending programs and related tax expenditures.

Currently, Oregon has incorporated review by including sunset provisions that force program expiration in the absence of reauthorization. Sunsets make tax expenditures more similar to direct outlays, which must be reauthorized each year, but can make long range planning difficult. Oregon seems to have addressed this problem by including a long time horizon: programs that started in 2011 are not up for sunset until 2018. Governments considering tax credit auctions should consider sunset provisions and other ways to integrate tax expenditures into their internal processes if they want to enable "consideration of trade-offs among direct and indirect spending programs within functional areas" (*Tax Policy: Tax Expenditures Deserve More Scrutiny* 1994, 71).

When choosing a tax credit auction, governments should determine the extent to which the program creates an unfunded liability. In the Oregon case, the state government was described as taking a loan from itself, yet was often doing so with nothing more than the promise of induced economic activity to offset the forgone revenue. When possible, governments should structure the program so as to recoup lost revenue, such as is the case with the Oregon Revolving Loan Fund and InvestMaryland. When this is not possible, governments need verifiable ways to offset lost revenue, such as spending cuts and tax increases.

There are a few ways in which governments that use tax credit auctions can attempt to increase the price paid for the credits. The first is to make efforts to increase the participation rate or coverage. The proactive and targeted marketing used by the Oregon Governor's Office of Film & Television was associated with a higher participation rate than the other Oregon auctions, and thus represents a current best practice in how to increase

the participation rate. In addition, they did so with without a marketing budget and limited personnel, building off of a network of connections they developed over time. Thus, marketing seems to represent the low-hanging fruit that could result in significant increases in program funding. Another, although more difficult, way to increase the revenue from an auction is to experiment with alternative auction designs. Our observations are consistent with a general consensus among auction theorists that the design of an auction can impact the amount of revenue that is generated. Possible attributes of the auction to tweak include who can participate, whether it is open or sealed-bid, how the price paid relates to the amounts bid (examples include uniform price and discriminatory price), the minimum bid, and whether there is a fee to participate in the auction. At the very least, our findings indicate that a maximum bid is ill-advised since there can be incentives to bid more than the face value of the credits.

The use of the tax credits can result in an inequitable redistribution of net taxes paid. This is mostly the result of the correlation between income and tax liability, meaning that the wealthier you are, the more tax credits from which you can benefit. This problem could be addressed by making the tax credits refundable or switching to direct outlays. In the Oregon case, we also found that inequity can arise through interactions between the federal and state tax code. It appears that some people are claiming an amount up to the value of the tax credit as "state income taxes paid" and anything over that as a charitable deduction. Under federal tax law, claiming the amount over the face value is permissible, since payments for the credits in excess of the fair market value constitute a charitable gift to a governmental organization. However, the deduction under "state income taxes paid" is

legally suspect, since that amount is paid back in the form of a tax credit. In fact, when taxpayers get a 1099-G for the amount refunded from their state taxes, this credit must be claimed in the following year's federal tax return as income. However, people who pay their taxes at the end of the year, such as businesses owners and the self-employed, never receive a 1099-G. As a result, they are able to claim a deduction for an expenditure that is refunded to them.

There is also legal uncertainty with regards to claiming the full bid amount as a charitable deduction in order to reduce the amount of Alternative Minimum Tax (AMT). It seems like the fair market value of the tax credit is $500. It follows the only amount that could be claimed as a credit is any amount over $500. However, the IRS has not yet weighed in on this issue. A decision from the IRS would help Oregon taxpayers by providing legal certainty for their actions. A decision against this practice would benefit the federal government by recapturing lost revenue and would lessen the degree to which the tax credits create an upside-down subsidy. However, such a ruling could also hurt the programs that use tax credit auctions by reducing the incentive to overbid and thus reducing the amount of revenue that the auctions generate.

Tax credit auctions are still a very new policy mechanism, existing for only four years at the time of this study. They have also been implemented in only two U.S. states. Consequently, the results of this study are limited in their generalizability. In addition, some of the descriptive statistics that we collected from the IRS and the ODoR may be slightly biased for assessing tax credit eligibility by the inclusion of the tax credits in the data. Overall, however, the aims of this research are mostly descriptive. We have provided

an overview of the current use of tax credit auctions, highlighted some of their advantages and disadvantages, and suggested some best practices for governments considering adopting this policy tool. Future explanatory research would be needed to make causal arguments. In particular, this study warrants future research to determine the most efficient and most equitable auction designs.

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# APPENDIX: INTERVIEW QUESTIONS

1) Do you mind if I record our conversation for my personal reference?
2) To what extent would you like to remain anonymous?
3) Could you briefly describe your involvement with _____?
4) What about the tax credit auction made it an attractive option to raise money for _____?
    a. Were other options considered?
    b. If so, why were they abandoned?
    c. (If not brought up): What role did politics play in the selection of a tax credit auction?
5) How was the tax credit auction designed (what was the format)?
    a. Who designed it?
    b. What were the design considerations?
    c. Were there any costs to participate in the auction?
6) How was it advertised?
    a. What considerations went to the messaging?
7) Are there incentives that increase the value of the tax credit to the bidders? (ex. federal tax credit of charitable donation)
8) If it was run more than once:
    a. How has the response rate changed over that time?
    b. How has the marketing changed over that time?
    c. Have any factors been found to increase or decrease the amount raised as a percentage of the total value of the tax credits?
9) Do you know of any other state tax credit auctions?
10) Is there anything we haven't covered that you would like to mention?
11) Is there anything you would have done differently?
12) Is there anyone else I should interview?