REVENUE IMPACT OF A SALES TAX ON SERVICES

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REVENUE IMPACT OF A SALES TAX ON SERVICES

A Thesis

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Abstract

of

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California's Legislative Analyst Office recently pegged the state's deficit at $20 billion for fiscal year 2010-2011. Amongst the revenue-raising proposals under consideration is an expansion of the sales tax base to include services. Due to a paucity of research on the subject, policymakers tend to use crude estimates of the additional revenue that could be raised by taxing services. This thesis is an attempt to ground and refine these estimates.

I compiled a panel data set of sales and use tax revenue for 43 states over a period of 15 years in order to capture revenue fluctuations across multiple business cycles. To investigate the relationship between sales tax base and revenue, I used service base data available from the Federation of Tax Administrators and adjusted it to reflect the relative market size of each service industry in each represented state. Additionally, I controlled for a host of state-specific factors including, though not limited to, sales and use tax rate, household population, racial demographics, and per capita disposable income. For the econometric analysis, I employed a fixed effects regression model.

There are three major findings. First, potential revenue yields vary greatly both within and across particular service base categories. For example, estimates for admission and entertainment services range from $0.6 to $7.7 billion, while taxing transportation services could raise $4.8 to $20.2 billion. Second, according to an alternatives matrix calculated for California, transportation, lease and rental, and automotive services offer the best combination of political feasibility and revenue returns. Third, in the short-run, tax rate increases yield more revenue than base expansions.

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To Scott Vince, thank you for listening to my gripes.

To Andrew Jackson, it depends on what you mean by "equality".

To Square Enix, FF12 kept me sane.

The wisdom of man never yet contrived a system of taxation that would operate with perfect equality. – Andrew Jackson (1833)

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INTRODUCTION

California's Legislative Analyst Office (2009) recently pegged the state's deficit at $20 billion by the end of fiscal year 2010-2011. Attempts to close the gap through tax reform have thus far consistently met with failure. Amongst the revenue-raising proposals under consideration is an expansion of the sales tax base to include services. According to The Federation of Tax Administrators (2008) California currently taxes twenty-three services; various reform plans would increase that number to approximately twenty-nine services including appliance and furniture repair, vehicle repair, golf, veterinarian services, and admission to amusement parks and sporting events. California is by no means alone historically in pursuing this reform. Some states, such as South Dakota and Hawaii, have been successful in integrating an expanded tax base with established political and consumer habits; other states have not been as successful. Determining if such pursuits – if fulfilled – will satisfy the state's revenue needs is open for debate, and the goal of this thesis is to contribute to the discussion.

Arguably, the largest challenge in advocating tax policy reform is justifying revenue forecasts. In a letter to legislative leaders, Board of Equalization Chairwoman Judy Chu intimated the state could reap an additional $2.7b to $8.7b in sales tax revenue if California taxed a range of services already taxed by other states (Chu, 2008a). Unfortunately, her calculations assume the contributory elements of each state's sales tax revenue are uniform, yet factors such as unemployment rate, disposable income, tax rate, population demographics, and service industry market share surely make this assumption unwarranted. These considerations, then, beg the question: What is the potential impact to California's sales and use tax revenue that a tax on services can reasonably yield when controlling for these types of factors?

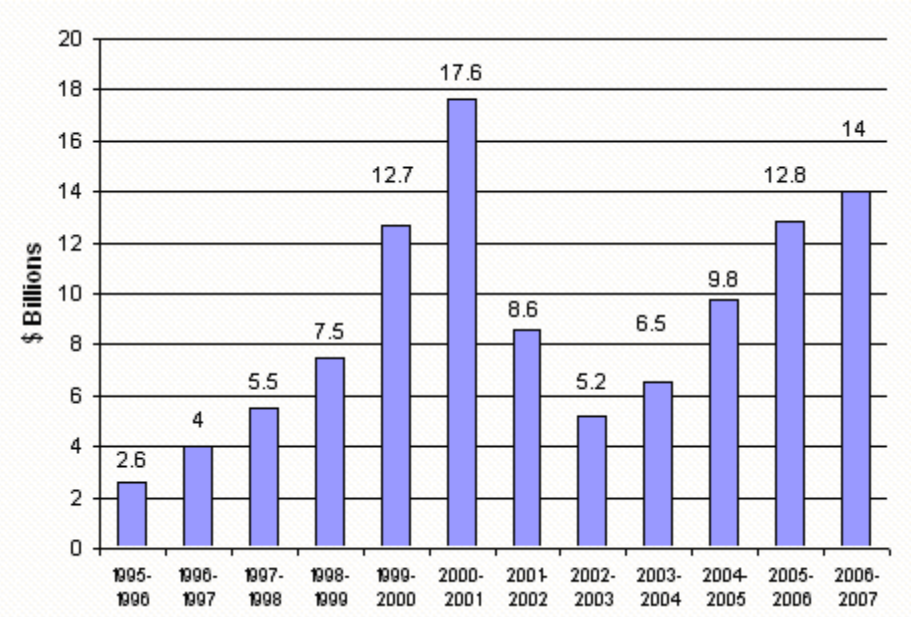
Using a fixed effect regression model on a panel dataset, this thesis serves as an initial attempt at answering the question. A better understanding of the relationship between generated revenue and extant taxed services across the states would prove useful in helping determine which types of services, if any, could lead to an improved revenue stream for California.

Background

Legislators introduced the current sales and use tax in 1933, and at the time its revenue shared the burden of supporting the general fund along with income tax. As a percentage of general fund revenues, sales and use tax receipts have continuously declined, however, in recent decades, prompting policymakers to embrace the income tax as the primary revenue source. From FY89 to FY98, income tax as a percentage of general fund revenues increased roughly 7 percent (from 45.4 percent to 52.7 percent) (Fitz, 2000); sales and use taxes dropped during the same period roughly 2.5 percent from 37.4 percent to 35.8 percent. Moreover, FY06 income tax composed 55 percent -- roughly $51b -- while sales and use tax composed 29 percent. This trend is cause for concern since $14b of the $51b came from taxes levied on stock options and capital gains, revenue which depends on the health of the economy. In other words, the fiscal health of the state is at the mercy of the ebb and flow of the stock market.

A brief history of the growing dependence on the income tax shows that the problem is cyclical. Graph 1.1 shows the rise and decline of income tax receipts preceding and following the dot-com market boom. As the market contracted in 2001, general fund revenue nose-dived into the red. Similar to the current deficit, legislative and executive forecasts believed the strong stream of revenue from income would continue. Subsequently, the state did not cut spending until *after* the market tanked (Legislative Analyst Office, 2002) at which time it became difficult to undo legislation obligating spending. These matters conspired to greet the state with a $12.5b deficit for FY02.

Graph 1.1 – California Tax Revenue from Stock Options and Capital Gains



Source: Center for Continuing Study of the California Economy, 2007

California's politicians and pundits have advocated tax reform as the best means of freeing the state from the shackles of market instability. Reform proposals range from closing income tax loopholes, abolishing inefficient corporate tax incentives and reevaluating property tax administration (California Tax Reform Association, 2003). However, despite these alternatives, tax reform debates tend to focus on the sales and use tax while concurrently only giving the other tax sources peripheral and incidental consideration. From her vantage point, Republican Board of Equalization member Michelle Steel (2008b) offered a possible explanation. Current law requires a two-thirds legislative approval threshold for any tax increase, which naturally would require a number of tax-averse law makers to support the reform in the absence of a super majority of tax-friendly lawmakers. However, the Board's statutory power allows it to interpret current law and establish tax regulations, which suggests that they could simply reclassify taxable conditions. Because current sales and use tax law is extremely complex, it is

also tends to be rather ambiguous. The Board could exploit the ambiguity and redefine tangible personal property to include some subset of services. Though the Board's present composition has a majority of tax-friendly Democrats, she does concede, however, that the issue would ultimately be decided by the courts, which may partially explain why the Board has yet to play this card.

History of Sales Tax on Services in California

California lawmakers have discussed a tax on services since at least 1909, more than two decades before the enactment of the sales tax on tangible property. Table 1.1 below highlights some of the legislation introduced throughout the last one hundred years intended to levy taxes on consumed services. Perhaps the most interesting target of past legislation has been admission tickets to sporting events and amusement parks, which have drawn considerable legislative attention. Indeed, having failed to levy taxes on these items in the past, history has seen fit to repeat itself today. Governor Schwarzenegger's recent proposal to close California's current budget deficit involves collecting taxes from admission tickets effective March 1, 2009, yet it is uncertain if legislators will revert a hundred years of skepticism and opt to side with the Governor on this issue.

The history of tax base reform extends beyond debate in the state legislature. In 2002 the California Commission on Tax Policy in the New Economy (2003, pp. 12-15) convened to review the state's tax and revenue programs in light of changing consumer behavior and the rapid changes in technology. Among the Commission's recommendations was the broadening of the sales tax to include services like vehicle repair, appliance/furniture repair, and veterinarian services, three services that have again found their way into the Governor's current tax reform proposal. Moreover, Governor Schwarzenegger in 2008 announced the appointment of members

to the Commission on the 21st Century Economy whose charged mission was strikingly similar to the previous Governor Davis-era Commission: establish a 21st century tax structure that fits with California's 21st century economy (Office of the Governor, 2008). With members appointed by

Table 1.1 - Examples of California Legislation on Service Taxation

Year	Bill	Service to be Taxed	Status
1909	SB 1202	insurance premiums	Died in Comm. on Insurance Laws
1931	AB 1920	admissions to sports games	Died in Comm. on Rev. and Tax.
1933	AB 1991	amusements and club dues/fees	Died in Comm. on Rev. and Tax.
	AB 2276	auto and cycle races winnings	Died in Comm. on Rev. and Tax.
	AB 2451	advertising	Died in Comm. on Rev. and Tax.
1935	AB 2095	event admissions	Died in Comm. on Rev. and Tax.
1937	AB 2572	exhibition of motion pictures	Died in Comm. on Rev. and Tax.
1939	AB 1613	admissions to amusement parks	Died in Comm. on Rev. and Tax.
	AB 2074	personal services	Died in Comm. on Rev. and Tax.
	AB 2230	event admissions	Died in Comm. on Rev. and Tax.
	AB 2231	amusements and club dues/fees	Died in Comm. on Rev. and Tax.
	SB 1121	personal services	Died in Comm. on Rev. and Tax.
1963	AB 2693	movies for television transmission	Died on file in Senate
	AB 2796	labor on installing sold property	Died in Comm. on Rev. and Tax.
1967	SB 1213	consumable services	Died in Comm. on Rev. and Tax.
1969	AB 1884	gas and electrical services	Died in Comm. on Rev. and Tax.
	AB 2046	repair services	Died in Comm. on Measures
	AB 2233	admission to sporting events	Died in Comm. on Rev. and Tax.
1985	SB 1343	motion picture production	Cancelled on author's request
1993	SB 611	professional sporting event organizers/pay-per-view broadcasts	Died in Senate
1995	AB 194	specified services	Died in Assembly
	SB 148	exemption of research and development services	Died in Senate
1997	AB 1614	exemption from taxation for internet access or online computer services	Chaptered
	SB 1013	adult entertainment services	Died in Senate
2003	SB 400	specialized services	Cancelled on author's request
2005	AB 9	specified services*	Died in Assembly

* including private club membership, use of (900) and (976) prefixes, marina services, computer programs, aircraft or limousine transportation, accounting or bookkeeping, legal services, security and detective services, engineering, and consulting services.

Source: Compiled by author from California Assembly journals.

the Governor and the Democrat-controlled Legislature, the group ultimately proposed a host of recommendations to reduce the volatility of state revenue including a restructuring of the income tax to a two tier system with low rates as well as an elimination of the state portion of the sales and use tax, which currently is 7.25% (Commission on the 21st Century Economy [COTCE], 2009). In place of the sales tax, the Commission recommended instituting a business net receipts tax, which determines tax liability of a good or service by subtracting the total production cost of externally purchased elements from the final cost of the good or service. Though Governor Schwarzenegger hailed the COTCE as a bipartisan endeavor, this did not alleviate the concerns of tax watchdog organizations (Frank, 2008). Indeed, even politicians remained skeptical. Board of Equalization Member Bill Leonard (2009) surmised that the commission may be a wolf in sheep's clothing for tax increases:

> The Governor and the Legislature made their appointments to the state's new tax commission last week. I hoped the body would seriously dissect the state's complex tax system, speak to reforms, and enhance justice for taxpayers. Unfortunately, my review of the appointees dashes my hopes. What I see looking down the list of commission is 2/3rds of them who are already disposed to tax increases. If it is not a set up, it is very close.

Following the publication of the final report, which 9 of the 14 members endorsed, the Commission's effort was subject to repeated scrutiny. The California Budget Project, for instance, quickly condemned the recommendations for shifting "the cost of financing state services from the wealthy to low- and middle-income Californians" (California Budget Project, 2009, p. 9). In defense of the Commission, however, they did not deny this reality. In fact, they argued, and correctly so, that limiting the revenue variability of the income tax requires enlarging the pool of contributing taxpayers (COTCE, 2009, p. 30), which implies a reduced burden on the wealthy few and an augmented burden on the less-wealth many.

Furthermore, Los Angeles Times columnist Michael Hiltzik added that the Commission's biggest failure was in its refusal to address Proposition 13 (Hiltzik, 2009). Though some have argued Proposition 13 has created unintended fiscal consequences that continue to inhibit revenue stability to this day (Chapman, 1998), it is generally acknowledged that the subject is a third rail in California politics (Wassmer, 2008), a state of affairs which provides a partial explanation for the Commission's refusal to take a stance. Additional criticism focused on the business net receipts tax, which, in its proposed incarnation, no state has heretofore implemented.[1] The potential difficulties arising from administering an untested tax as well as the legal obstacles which would most certainly follow compelled a group of renowned tax policy experts to publicly denounce the recommendation. One of the scholars, UCLA tax professor Kirk Stark, stated that "the problem with [the business net receipt tax] is it's a poorly designed substitute for a sales tax" (Bailey, 2009), an opinion which suggests that the state should find ways to adjust the current sales tax rather than replace it outright.

Taxes and Three Sources of Policy Wisdom

Bardach (2005) reminds us that policy analysis is fundamentally a social and political activity. Therefore, it is prudent to characterize successful tax reform as policy that is capable of uniting the contributing elements that constitute the policy-making process, namely, market, political, and expert input. Munger (2000) calls these elements "sources of wisdom" (p. 30), and he notes they are in constant conflict. Mitigating the ambitions of politicians are expert

[1] In 2008, Michigan instituted the Michigan Business Tax. A component of this tax is the Modified Gross Receipts Tax (MGRT), which is similar to the Business Net Receipts Tax (BNRT) proposed by the COTCE. There are two major differences between the taxes. The first is that the BNRT includes consumed services in the calculation of a businesses gross receipts; the MGRT does not. The second is that the MGRT is apportioned based on sales occurring in Michigan whereas the BNRT makes no such stipulation. Therefore, sales occurring outside of California would presumably be included, which would precipitate a host of legal issues regarding nexus.

recommendations and market demands. Likewise, expert advice often requires input from politicians and market forces to translate theory into pragmatic action. For this adumbration, consider economists as experts, consumers as the market, and general political interests of lawmakers as constituting the sources of wisdom.

Fiscal Perspective of Taxing Services

Fox and Murray (1988, p. 22) and Murray (1997, p. 201) argue that revenue growth from a successfully efficient service taxation program must consider two dimensions: revenue adequacy and revenue stability. Generally speaking, what makes a revenue stream adequate is its ability to satisfy increasing long-term public service demands. Stability meanwhile seeks to ensure a sufficiently funded short-term revenue growth pattern to consistently compensate for revolving business cycles. I consider economic dimensions of both in turn.

Revenue Adequacy

An adequate tax system will have long-run total income elasticity of revenue equal to long-run total income elasticity of expenditures (Fox and Murray, 1988, p. 22). Elasticity is a measure of how a tax system fares against changes in the economy. That is, it measures the sensitivity of a tax structure in good economic times, bad economic times, and over the long run by comparing the percentage change of two values over some period. For the present purposes, the two values are sales tax revenue and income, the latter of which reflects the overall health of the economy; growing economies will exhibit growth in median incomes and vice-versa. An elasticity equal to or close to 1 indicates that sales tax revenues vary directly proportional with income. Moreover, elasticities greater than 1 indicates that sales tax revenue has outpaced growth in income over the long run while an elasticity less than 1 indicates that sales tax revenue has not kept pace with growth in income (Fox, 2003); the former is called an elastic tax system, and the

latter is called an inelastic tax system. Meeting California's long-run expenditure goals requires an elastic tax system that produces revenue increasingly proportional to any desired increase in supplied public services.

On revenue adequacy grounds, in order to justify an increase in the sales tax base, the proposed structure must be more elastic than the current structure. My calculations of sales and use tax revenue vis-à-vis disposable income from 1991 to 2007 are in Appendix A. I first determined the elasticity of the current sales tax base to be 0.558, which indicates an extremely volatile revenue source. I then added to the tax base potential revenue generated from taxing all services save for medical and housing. There certainly would be many more exemptions than medical and housing; however, the point is to observe how the elasticity would change given the extreme circumstance. My calculations reveal with the expanded base an elasticity of 0.849, which is much less volatile than its predecessor.

In order to estimate California's revenue from a broadly expanded sales tax base, I used Economic Bureau of Analysis national data on consumed services for a given year and then divided the figure by California's population as a percentage of national population. I then added the figure to the known sales and use tax receipts for the corresponding year. Certainly calculating the expanded tax base in this way makes certain assumptions that force the insightful to question the resulting value. For instance, it assumes that consumption of services corresponds linearly with population. Moreover, the method assumes that only those individuals occurring in the population count consume services. A more critical line of reasoning might consider that the calculated elasticity hinges on inaccurate figures given California's large illegal immigrant population. Illegal immigrants that do not pay income tax nonetheless consume goods and services in the state. Therefore, the population of people that pay sales tax and the population of people that pay income tax do not fall into a neat one-to-one correspondence. Nevertheless,

revenue adequacy considerations need to account for the relative costs to society of furnishing public services to illegal immigrants in case their consumption patterns do not sufficiently offset their unpaid income taxes. A more accurate elasticity calculation would only use sales tax revenue generated by those individuals that pay income tax.

Revenue Stability

A stable revenue source is one in which the rate of revenue growth is relatively constant across the business cycle (Fox and Murray, 1988, p. 28), and constancy of growth is contingent upon the composition of the tax base. For instance, a base dominated percentage-wise by a fluctuating source such as income, which is a function of the market, often results in fluctuating revenue. In the case of California's current sales tax system, however, the base is composed of mainly retail purchases, and therefore the degree of revenue growth necessarily depends on the breadth and depth of the retail items included in the base.

Like revenue adequacy, economists often measure revenue stability in terms of revenue elasticity (Dye and Merriman, 2004, p. 3). However, whereas revenue adequacy only uses comparative measurements of long-run elasticity, stability requires comparisons of long- and short-run elasticities. The calculations by Bruce *et al.* (2006) in Table 1.2 reflect these elasticities for California using 1967 to 2000 revenue data. A stable revenue source will maintain a

Table 1.2 - California Tax Elasticities

	Long-Run Elasticity	Short-Run Elasticities	
		When Current Revenue Value is below Long-Run Equilibrium	When Current Revenue Value is above Long-Run Equilibrium
Sales Tax	0.833	-1.408	1.146
Personal Income Tax	1.749	-1.536	3.223

Source: Bruce *et al.* (2006), Table3

consistent elasticity, and clearly California's sales tax, like the income tax, is not stable. Moreover, while there is literature to suggest that an inelastic revenue system can nonetheless yield cyclically stable revenue (see Sobel and Holcombe, 1996), the revenue figures do not indicate that this exception applies to California's present sales and use tax program.

Political Perspective of Taxing Services

Though the bulk of California's retail sales tax base is composed of tangible goods, the state does levy it on some economically trivial services such as tuxedo rentals and the robust trade of gift wrapping. Table 1.3 in Appendix B displays a comparative listing of these services. Only nine other states tax fewer services (Alaska, Colorado, Illinois, Massachusetts, Montana, Nevada, New Hampshire, Oregon, and Virginia), and though most states do tax some services, with a few exceptions states do not tax services generally. Hellerstein (1988, p. 1) notes that the explanation for the limited scope of the sales tax base does not lie in the dictates of sound fiscal policy, which in the eyes of most observers would justify the extension of the sales tax to many services. Rather, it lies instead partly in history and partly in politics, dynamics in California which constitute the concern of this thesis.

With rare exception, debate concerning expansion of the sales tax to include services only surface during times of economic downturns when policymakers are looking to find alternative means to make up for lean revenue streams. Recessions have generally compelled a number of states to consider sales tax reform as a means of combating large budget deficits. Facing a $4.5b deficit in 2006 New Jersey lifted the sales tax exemption status of nineteen services including limousine services and tanning services (Anchin, 2006). In 2007, Maryland enacted a reform package in a special session to extend sales tax to computer services in order to arrest an increasing deficit of approximately $1.4b; the state repealed the tax before the July 2008

implementation date (Henchman, 2007). The same year Maryland increased its tax base, Michigan did as well in an attempt to close its $900 million deficit (Tuerck *et al.*, 2007, p. 2); it too later repealed the tax. Other states recently debating legislation involving this type of tax reform include Arizona, Illinois, Kentucky, Maine, and North Carolina.

California has found itself in massive budget deficits multiple times since the turn of the millennium. State political leaders often argue that base expansion is the best means of closing budget gaps without major cuts to social programs and services. The attempts to implement a tax on services by Sen. Florez (D) in 2003 and AB 9 sponsored by Rep. Coto (D) in 2005 were the most ambitious legislation pursued to these ends. Recently, however, state Board of Equalization Chairwoman Judy Chu (2008a) has championed the reform as a means of quickly saving the state government from insolvency since scaling back large amounts of spending (to the degree necessary to avoid insolvency) in a single fiscal year is difficult, if not impossible. Republicans and fiscal conservative tax watchdog groups, however, respond quickly; they insist a tax rate reduction should follow any base expansion (Lin, 2008), an opinion not generally shared by Democrats. The result is, thus, another political stalemate.

A recurring challenge amongst base expansion supports is enumerating a simple and fair list of taxable services. For many politicians this dilemma is at heart an issue of equity. Taxing some services while exempting others inexorably impacts interested parties disproportionately irregardless of the tax's design. In 2003, for instance, Senator Cedillo, Chairman of the Senate Revenue and Taxation Committee, proposed a tax on services to help eat up some of the projected $35 billion deficit by the end of fiscal year 2003-04. Though a proposal was never drafted by Sen. Cedillo,[2] the tax itself, were it to be implemented, was argued to be against the well-being of the poor as it would disproportionately impact them most compared to other

[2] Senator Florez sponsored legislation to this end in 2003 with SB 400.

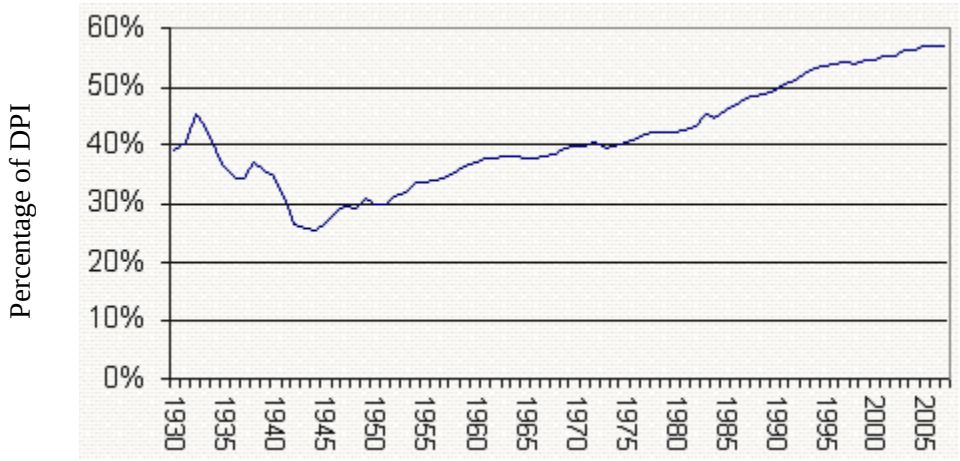
socioeconomic classes (Chorneau, 2003). The tax status of medical services was an issue as was the status of services consumed by businesses such as consulting and advertising services. Others argue that medical services ought to be exempt, as it would impose too high a burden on low-income wage earners (Nellen, 2008b). As for the latter types of services, California still sporadically flirts with the notion of taping these as sustainable revenue sources despite warnings that doing so will introduce potentially economic destabilizing inequities like tax pyramiding (California Chamber of Commerce, 2005; Chorneau, 2003), which would then adversely effect the image of policymakers. In order to honestly defend a particular political argument supporting an inequitable tax, there must be an antecedent philosophical defense of why one subset of society ought to enjoy the benefits of another subset's economic sacrifice. Indeed, lacking such a defense or failing to run a defense through a gauntlet of intellectual criticism may produce "long-range damage for quick political gain" (Mikesell, 2003, p. 286).

Consumer Perspective of Taxing Services

California's current structure of government finance does not provide a sustainable base of revenue (Coleman and Colantuono, 2003, p. 4). California's unstable financial revenue stream makes an expansion of the sales tax base an appealing alternative revenue source given changes in consumption behavior. As indicated in Graph 1.2, since the end of World War II (WWII), U.S. consumers have devoted an increasingly higher percentage of their disposable personal income (DPI) to the consumption of services. The shift in consumption of taxable goods to tax-free intangible services suggests that California adopt a tax policy consistent with the spending habits of its populace.

Any economically and politically motivated decision to expand the tax base invariably affects consumer behavior. A sales tax base expansion is tantamount to a rate increase, yet the

Graph 1.2 – Average Annual U.S. Household Expenditure on Services



Source: Bureau of Economic Analysis and author's calculations

former disadvantages consumers by reducing the number of tax-free goods and substitutable services whereas the latter does not. Price-sensitive consumers will seek the most cost minimizing alternative in order to maximize their utility subject to their budget constraints, which in case of base expansion might realistically entail a growth in "under the table" services. Certainly, if such a phenomenon were to occur, actual revenue collected will fall below even the most conservative estimates.

Alternatively, shoppers may prefer to purchase their goods and services from jurisdictions with lower or no sales tax. The advent of the internet as a medium of commerce only improves the efficiency with which consumers can substitute goods and services in order to evade paying higher costs because of additional taxes (Lenard and McGonegal, 2005). Presently, the sheer volume of consumers that use the internet to purchase goods and services effectively precludes the Board of Equalization from pursuing any legally owed use tax, which significantly

contributes to the $2b sales and use tax gap (Board of Equalization, 2007, p. 3); the cost to pursue use tax liability from the average e-shopper far exceeds the potential revenue returns.

It is uncertain how a tax on services will change consumption patterns. The internet allows for easier consumption of certain business services such as attorneys, accountants, and consultants, yet services such as gym memberships, veterinarian services, auto repair, and sporting and amusement park admissions certainly do not appear to be susceptible to substitution effects to the same degree. Fisher (2007, p. 388) argues that the resulting equal tax on commodities and services could leave the relative prices of all goods and services unchanged, in which case a substitution effect never occurs. However, Fisher's observation does not apply to all businesses. Consider gyms whose membership fees include the taxes paid by the business for equipment on top of which the customer would pay a service tax to use the equipment. This model ensures that gym memberships remain comparatively more expensive than their tangible goods counterparts sold in brick-and-mortar locations. There would be, then, a substitution effect present in the case of businesses like fitness clubs where consumers would consider the relative value of other expenses in order to decide between purchasing the service or purchasing the complementary equipment. The presence of any substitution effect requires lawmakers to satisfy their moral obligations ensuring that administrative regulations which complicate taxpayer spending decisions are kept simple and to a minimum.[3]

Yet these matters beg the question: what constitutes a service? After all, a fundamental rule of law stipulates that it must be clear and publicly accessible (Raz, 1979, p. 214). If I ask a veterinarian what might be wrong with my dog, does that constitute a consultation or a taxable service?[4] Would the answer change if I see my vet taking a jog, or if I see him inside a grocery

[3] Simplicity and impact minimization are two criteria of a good tax policy as argued by the American Institute of Certified Public Accounts (2001).
[4] As of the time of writing Governor Schwarzenegger's plan does not include a tax on consulting services.

store and stop to ask him? Or if I ask a financial advisor to make certain changes to my portfolio, is the state going to tax me for only the specific instance she performed a service, or levy the tax on the value added to the portfolio because of her performed service, or both? It also is extremely plausible to argue that the very act of providing tangible goods to consume is itself a service. Does that therefore mean I will pay a tax to the retailer for the privilege of retailing as well as a tax on the purchased tangible good?

Though these questions do not fall within the purview of the current research, I only make note of them to highlight the definitional problems of service taxation that have plagued tax administrators in other states as was noted in the beginning of this chapter. A similar fate threatens California if policymakers fail to hold clarity as an end itself. The more difficult it is to decipher when a service is or is not taxable then the more difficult it will be for lawmakers and tax administrators to meet their moral obligations to consumers of fair tax policy.

Overview

I have organized the logical flow of this thesis as follows. In Chapter Two I present a comprehensive literature review. I consider jointly the arguments in favor of taxing services as well as the arguments against. With respect to the former, various authors argue that a tax on services improves revenue stability, tax equity, and resource allocation. With respect to the latter, others argue that it would introduce inequities such as tax pyramiding, would be inherently discriminatory against businesses, and would suffer from incorrigible administrative obstacles. The review also takes stock of the relative paucity of econometric analyses on consumption taxes as they relate to incidence, elasticity and forecasting. I conclude with thoughts on how these efforts have shaped the current model.

In Chapter Three I articulate my rationale in constructing the employed model and in selecting the dependent variable. Additionally, I defend the legitimacy of the elected proxies. Furthermore, because a goal of the current research is to provide a better forecasting model than extant ones, I also spend some time discussing the expected results which later serve as a frame of reference for comparison with the actual outputs. I close the chapter with a discussion on the challenges of directly identifying a sound proxy for internet transactions, a variable that if included would improve consumption tax forecasting abilities significantly.

Moreover, Chapter Four is broken into two parts. In the first, I describe in further detail the explanatory data used in the model as well as some of the limitations of the fixed effect model. I also introduce variable names, descriptive statistics and correlation coefficients. In the second part, I present the initial and corrected results of the regression. The operative difference between the two is that I adjusted the latter results to correct for violations of classical assumptions such as multicollinearity, heteroskedasticity and endogeneity. I top off the chapter by detailing the steps I took to remedy the violations.

Finally, in Chapter Five I interpret the coefficients of the corrected results and provide alternative means of interpreting them comparatively including elasticities and confidence intervals. Additionally, I draw some general conclusions and implications for present and future tax policy in California followed by a detailed look at alternative means of mitigating the effects of e-commerce on sales tax revenue. I close the thesis by noting the limitations of the current research and suggestions for future research.

Chapter 2

LITERATURE REVIEW

Because the current research relies on the work of previous studies, and because I discuss many of the concepts substantially in future chapters, prudence demands a review of the literature. I have segmented the review into three parts relating to the sales tax on services debate. The first part considers a number of arguments advanced in favor of the expansion while the second part considers a number of arguments against. The third section briefly covers a number of the regression-based research that I used in constructing the employed model.

Arguments in Favor of Taxing Services

A cursory glance as the research reveals a host of rich and varied pro-expansion arguments. Expounded below are the more commonly advocated positions of reformists who promote a positive defense in favor of this type of tax policy.

Revenue Stability

Many commentators note that taxing services may provide a more sustainable long-run revenue source (see Brunori, 2003; Chu, 2008a, 2008b; Fox and Murray, 1988; Hendrix and Zodrow, 2004; Mazerov, 2003; Nellen, 2008a, 2008b; Quick and McKee, 1988). Mazerov, for instance, argues that the market for consumable services would not be as susceptible to declines during economic slowdowns since it is difficult for consumers to stockpile services; even in recessions, he notes, services must be purchased. Wicks (2008) takes the argument a step further adding that taxing medical services could represent recession-proof income, yet Bohm *et al.* (1993) finds that repair services are often pro-cyclical and hence more likely to destabilize sales tax revenues. On the other hand, rental and professional services (sans medical and legal services) tend not to decline during slow economic times, and thus are more likely stabilize revenues. This

inability to identify the scope of an ideal tax base on services causes Stark (2003) to muse that the uncertainty perhaps explains why advocates have tended to focus their arguments on issues its fairness and efficiency rather than its scope.

A broad base expansion to include services potentially could net California an additional $45b a year (Steel, 2008a). However, research conducted by Altig *et al.* (2001) reveals that while significant increases in revenue accompany a broad-based shift to a consumption tax, most of the revenue gains will be lost if the tax system maintains its original degree of progressivity and provide full transition relief to holders of existing assets. Moreover, Fox and Campbell (1984) conclude increases in revenue growth foster higher cyclical variability, a view questioned and qualified somewhat by Sobel and Holcombe (1996). I elaborate on the importance of their study in further detail later in the review.

Equity

Arguments in favor of taxing services from an equity standpoint often involve discussion of two principles: horizontal equity and vertical equity. Most of the sales tax reform literature deals with the former principle rather than the later. Both issues are covered.

Horizontal Equity

The principle of horizontal equity states that people with a similar ability to pay taxes should pay the same amount (see Cordes, 1999; Mazerov, 2003; Plotnick, 1985; Fisher, 2007). For instance, a person capable of purchasing a movie admission ticket and a person capable of purchasing a pay-per-view movie should pay the same tax. Any deviation from this rationale is a violation of the principle. Thus, any discrimination made between similar consumable tangible goods and consumable services violates the principle. Since the sales tax just is a general tax levied on consumption, any tax policy that singles out one medium of consumption over another

is inherently inequitable (Steuerle, 1999). Furthermore, consumers whose purchases reflect a high preference towards tangible goods are likely to pay a greater amount of sales tax than the consumer that spends a larger proportion of their disposable income on services. However, both consumers are satisfying their desires by consuming equal amounts of society's output. Therefore, given a sales tax's intended target is consumption, Cordes (1999), Fisher (2007), and Munger (2000) posit that there is no rational basis to not tax at least some consumable services.

Mazerov (2003, p. 14) notes that the structure of most states' sales tax system is regressive, a feature he argues is inequitable. That many states in general are dependent on sales tax receipts as primary sources of revenue only reinforces and promotes the inequalities. The regressivity of sales tax, he notes, is partly due to high-wage earners being able to save a larger portion of their income from consumption taxes by not spending it. Chu (2008b) and Nellen (2008b) suggest that the regressive nature of California's sales tax could be curbed by singling out only those services consumed by the affluent as taxable. However, Mazerov (2003, p. 14-15) argues against this line of thinking noting that shifts in household consumption is occurring at all income levels, not just among high-income earners. Therefore, he argues only a broad-based taxation of services will preserve the sales tax structure. Moreover, he argues that horizontal inequities created by taxing goods and exempting services are present across all income classes such that only broad expansion will relieve the inequities.

Vertical Equity

Vertical equity refers to the distribution of the burden of the tax amongst payers, and it is a companion principle to horizontal equity. Fulfillment of vertical equity stipulates that those with a greater ability to pay taxes pay a greater share of them. As discussed previously, California's current sales tax system which exempts most consumed services is highly regressive. Quick and McKee (1988, p. 401), Fox and Murray (1988, p. 29), Mazerov (2003, pp. 15-16), and Stark

(2003, p. 453-456) argue that sales tax expansion would reduce regressive effects since high-wage earners are more disposed to consume taxable services, yet Fox and Murray stipulate this only to be true in case of taxing strictly non-business services. Gold (1988, p. 28) echoes this line of thought and adds that taxing businesses remains clearly regressive at low income levels. Though the authors readily acknowledge that marginal equity implications are contingent upon the existing burden distribution and range of taxable services for a given state, they nonetheless generally conclude that sales tax expansion promotes vertical equitability if implemented thoughtfully.

Improvement of Resource Allocation

The argument that taxing services improves the allocation of resources stems from economic literature that maintains taxation on the basis of consumption is inherently preferable to taxation on the basis of income. Hendrix and Zodrow (2003, p 415), for example, remark that consumption taxes do not discourage individual saving and do not create tax disincentives to investment in contrast to income-based taxes. Also, Mazerov (2003, p.19) suggests that not taxing services creates an artificial incentive to purchase services rather than tangible goods. He notes that some consumers may choose to repair older cars and appliances rather than replace them with more energy-efficient or less polluting alternatives – the so-called "jalopy effect". Moreover, Oppenheimer (2008, p. 50) observes that the failure to tax services produces an incentive for consumers to bundle transactions – that is, purchasing tangible goods concurrently with purchased services – in order to avoid paying the additional duty. In some states, if the true object of consumption is the service, the entire bundle of goods – tangible and intangible – remains sales tax free, a condition that misrepresents the quantity of goods consumed.

These attempts to avoid taxes also produce economic distortions by forcing states to steadily increase their sales tax rate to compensate for lost revenue (Mazerov, 2003, p. 19); however, Burton and Mastromarco (1997) argue that a broad consumption tax would immediately force a decline in interest rates, which would stimulate consumption and, hence, revenue. Maintaining unnecessarily high tax rates on goods resulting from under-taxation of services stimulates inefficient revenue-raising activities such as tax motivated interstate shopping (Mazerov, 2003, p. 19). This view is shared by Lenard and McGonegal (2005, p. 21), yet they remain skeptical about how expansion of the tax base will resolve the problems associated with sales tax evasion and e-commerce.

Arguments Against Taxing Services

Though literature supporting expansion of the sales tax base is robust, there exists substantial arguments and counterarguments opposing the reform on multiple grounds. Nellen (2008b), for instance, cautions only imposing a tax on services so long as it does not overly inhibit business production or exacerbate legal issues. These problems arose for Texas in 1982 when they began taxing select business services – debt collection, security services, and so forth. The politically motivated tax policies resulted in a highly inconsistent system, which created substantial administrative problems and inequities (Hamilton, 1988, p. 411). Moreover, the services often considered prime for taxation – legal services, medical services, engineering services – were never seriously threatened.

Many researchers and commentators have documented the disadvantages of expanding the sales tax base to include services. Expounded below are the more commonly advocated positions of reformists who have sought to reject this type of tax policy.

Tax Pyramiding

Tax pyramiding refers to the compounding nature of some consumption taxes. Mikesell (1999, p. 52) observes that the general retail sales tax is not as prone to pyramiding since the tax is levied once on only the final good, yet Fox and Murray (1988, p. 29) note that this is misleading since production costs of a tangible good includes taxes levied on input factors. Failure to implement sales tax reform thoughtfully and carefully will certainly exacerbate pyramiding effects (Oppenheimer, 2008).

Amongst the many problems pyramiding introduces into a tax system is the failure to maintain tax transparency (Nellen, 2007). The National Conference of State Legislators (2007) urges states to maintain a high degree of transparency in their tax systems. Specifically, they maintain that revenue systems should be accountable to taxpayers. They also promulgate that any proposed tax amendments with sunset provisions receive regular and publicized review to ensure that the tax(es) remain efficient and effective in achieving its ends.

The Institute on Taxation and Economic Policy (2007), however, argues that the issue of transparency only arises in a gross receipts tax system. A sales tax on tangible goods such as a chair is transparent since the taxpayer only pays one tax one time on the final good. However, as Nellen (2008a) points out, expanding the sales tax base to include services if done carelessly and without proper planning will introduce pyramiding into California's sales tax system, and hence will inhibit transparency. Stark (2003, p. 456) suggests that exemptions for intermediately consumed services could be implemented to offset any pyramiding effects. However, Siegfried and Smith (1991) maintain that the service industries with the greatest revenue potential such as advertising, freight, utilities, and business and professional services produce most of their output for intermediate use, which suggests that legislatures may be less inclined to implement broad exemptions.

Fleenor and Chamberlain (2006) maintain an alternative to exemptions may be to tax only the value added to a product at each stage of its production as opposed to the full value added from all previous stages, a solution explicitly endorsed by California's COTCE and obvious in their proposal of the business net receipt tax. The value-added approach is often argued to be ideal in case of taxing financial services; though, disagreements are common on the taxing method (see Merrill and Edwards, 1996; Poddar and English, 1997; Grubert and Mackie, 2000). Sheffrin (1996) concludes, however, that general value-added taxes would lead to higher tax rates, which tend to be politically unpopular globally considering their high noncompliance rate and the difficulties involved in enforcing them.

Discriminatory Against Businesses

Doerr (2003) and the California Taxpayers Association (2003) argue that taxing services is discriminatory against private enterprises in competition with the government. The U.S. Postal Service would be tax-exempt, yet UPS and FedEx services would be taxable. Moreover, CSU and UC institutions would be exempt, yet Stanford and USC would not be. Oppenheimer (2008, p. 52) further adds that the discrimination also extends to small business. Large businesses keep many services – lawyers, accountants, janitors, etc. – in-house; small businesses must contract out, thereby creating a competitive disadvantage.

The ability to provide services via the internet also appears to foster discrimination against certain types of businesses though not based on size but rather on location. As discussed in more detail below, Lenard and McGonegal (2005) report that states offering price-sensitive consumers lower prices by not taxing transactions are at a competitive advantage over states that do collect sales tax. Ultimately, however, the impact to businesses within a state that taxes services depends almost exclusively on the existing burden distribution and range of taxable services (Quick and Mckee, 1988, p. 401).

Administrative Issues

Oppenheimer (2008, p. 51) notes two burdens of a tax on services that threaten to undermine its effective administration: the cost to taxpayers to comply and the cost to state agencies to enforce. Compelling small and large businesses to track consumption statistics in order to file returns presents an opportunity for chaos to flourish. Doerr (2003) goes to far as to suggest that baby-sitters, student car washes, and kids that mow lawns may have to not only charge taxes for their services but also file with the state.

Enforcement of a tax on services can be equally problematic. Not only would an auditing system be costly and difficult to streamline considering the wide array of types of services (Oppenheimer, 2008, p. 51), but also educating businesses on their new tax obligations would require an extremely lengthy and costly amnesty program (Steel, 2008c). Fox (1992, p.37) adds that an expanded base will force small and inexperienced businesses to file causing a dramatic increase in auditing. Since many service providers are mobile, auditing would become more expensive and cumbersome.

Defining what exactly constitutes a service and when the service is taxable is also of great importance. This problem plagued Texas in the 1980's. Hamilton (1988, p. 411) notes that debt collection services if performed by a collection firm is taxable, yet the same service performed by a lawyer is not taxable. Similarly, insurance adjustments performed by an insurance company are taxable, yet those performed by an in-house adjuster are not. The state's Comptroller's office faced enormous problems in implementing the tax because of the inability to isolate the necessary and sufficient conditions that define a taxable service and those individuals liable to perform them (Hamilton, 1988, p. 412).

Moreover, lawmakers could exacerbate potential administrative problems associated with taxing retail services if they decide to tax business services. Mazerov (2003, p. 23) argues that in

the absence of clear administrating rules, businesses will tend to develop their own ad hoc approaches to charging or paying the tax. In addition, in cases where services transcend state boundaries, if rules for dealing with purchases are inconsistent, compounded tax incidence is likely. Either circumstance will undoubtedly lead to increases in costly litigation.

Cline *et al.* (2005, pp. 5-6) further argue that taxing business services introduces the problem of identifying the location of consumption. While a sales tax on tangible goods is determined based on the site of consumption, it can be more complicated with certain services such as legal or consulting services. The authors posit that a purchaser can contract a service in one state, have it performed in a second, have it delivered to a client in a third, and have it distributed by the client to business in other states. The problem becomes, then, determining in which jurisdiction consumers enjoyed the service and where does the taxable sale occur.

These administrative problems have subverted multiple states' attempts, including Texas, to implement a tax on services. In 1990, Massachusetts repealed its tax on services because of an inability to define terms such as "legal services", "engineering services", and "business" (Aldridge, 2007). In 2008 Maryland repealed its tax on computer services because of numerous challenges to its implementation (Comptroller of Maryland, 2008).

Econometric Research

Econometric analyses have been widely applied to various taxes at the federal, state, and local levels. Literature analyzing the manifold dimensions of tax policy is readily available for further reflection on taxes such as income or property, yet the literature is comparatively scant on sales tax. I provide background on the limited studies with respect to sales tax incidence, elasticity, and forecasting as well as a brief discussion how these efforts have inspired the current model.

Sales Tax Incidence

Often implemented consumption taxes take a variety of forms including as a gross-receipts tax, general sales tax, or a value-added tax (VAT). Furthermore, such taxes can occur at multiple levels including local, state, and federal. Lowery (1987), for instance, tested the incidence of state sales tax and state income tax; he found that the earlier a broad-based tax is adopted, the greater the association with a more progressive tax system. Metcalf (1997) meanwhile tested the incidence of a national retail sales tax and concluded that it would be more regressive than the current income tax.

Of the aforementioned types of sales tax, regression analyses to determine the degree of incidence (i.e. regressivity) of VATs are the most common. Caspersen and Metcalf (1994), for instance, showed that the distributional impact of a VAT is dependent upon the chosen measurement of income as an explanatory variable. Traditional regression models, which use annual income measures, determine the degree of incidence to be highly regressive. They argue instead that the correct measure of income is income over the life of an individual since people earn lower incomes in the beginning and end points in their life, and the highest during the middle. Cross-sectional analysis using annual income will include young and old people who are not poor from the point of view of their whole life. Annual measures of income, thus, are not accurate measures of VAT's regressive effects.

Interestingly, Go *et al.* (2005) appear to confirm this conclusion with results from a study on VAT incidence in South Africa; however, they used cross-sectional annual income in their model. If Caspersen and Metcalf are correct in their assessment of the appropriate measure of income tax as an explanatory variable, then the South Africa study should have been highly regressive as the traditional econometric model stipulates; it should not have corroborated the lifetime income study.

The answer to this quandary, I think, lies in Caspersen and Metcalf's assumptions of how a VAT functions. A European-style VAT – the type employed in South Africa – offers tax rebates to certain industries. Calculating the incidence of the VAT with and without these rebates will drastically affect the regressivity of the tax. Instead, the apparent conflict arises due to the nature of the VAT. VAT debates in the United States generally have not involved considerations for tax rebates on intermediary inputs.

While general sales taxes and VATs have garnered much attention, regression analyses of gross-receipt tax incidence are not as prevalent. Furthermore, literature on sales tax tends to present the tax as compulsory, which presumably is why studying its distributional burden is so important. Though we are obligated to pay income and property taxes, we are not bound to pay sales tax; we pay it largely based upon our own personal consuming decisions, which are in our control. It would seem more appropriate then to study not how the sales tax burdens various demographics, but rather how various demographics contribute to sales tax revenue. Both of these pursuits stand as worthwhile research endeavors to fill in the epistemic gaps.

Sales Tax Elasticity

Traditionally, economists employ the model developed by Groves and Kahn (1952) in which the log level of revenue from a particular tax correlates with the log level of income in order to determine revenue elasticity. The authors, and a chain of successive researchers, have assumed that the resulting elasticity is an accurate measurement of long-run growth adequacy and short-run revenue variability (pp. 99-101). However, models developed by Dye and McGuire (1991) and Sobel and Holcombe (1996) have come to challenge this previously widely accepted approach.

Dye and McGuire used national aggregate time series data to estimate trends in growth potential and trend deviations for components of the state general sales and income tax bases.

Their work shows that a particular composition of tax base components can yield a state of affairs in which growth and variability are inversely related. Their results also offer insight into current California tax policy aimed at increasing the sales tax base to include select services. The researchers note that inclusion of personal consumer services in the base tends to generate greater variability at a slower growth rate compared to other types of non-personal services (p. 64). Thus, while a broader base will decrease variability and increase growth potential, the cost of the broader base is a shift in a marginally decreasing growth potential.

Sobel and Holcombe noted two key flaws with the traditional model. First, because income and tax revenues systematically tend upwards in time, regressing tax revenues on income only identifies their long-term relationship, not their short-run variability. Second, the traditional regression model produces asymptotically biased elasticity estimates that create artificially high R^2 values (p. 536). Their revised model stipulates using two separate regressions, each with a unique variable transformation to account for proper trend differentiations between each model. The results of their approach are intriguing as they show that the traditional model has erroneously concluded that particular excise taxes, for instance, are unstable. Their revised model shows that the instability in some cases has been grossly exaggerated or nonexistent.

The importance of Dye and McGuire and Sobel and Holcombe's effort notwithstanding, the data used in their models tempers the value of their work since both sets of researchers fail to use actual state tax structures in their analyses. Dye and McGuire employ national datasets to approximate tax bases for all states, which naturally ignores structural tax differences between states that could affect elasticity measurements. Sobel and Holcombe, on the other hand, proxy the sales tax base with national total retail sales and nonfood retail sales, yet retail sales included in tax bases differ dramatically across states. These limitations represent an opportunity to build

on the authors' groundbreaking methodologies with future research. Filling both holes is possible through a fifty-state elasticity analysis with actual state data rather than non-tax proxies.

Revenue Forecasting

Literature on sales tax revenue forecasting falls under the more general research category of tax revenue forecasting. Amongst the more popular revenue forecasting methods is ARIMA (autoregressive integrated moving-average), which ignores explanatory variables and predicts future values in a response time-series as a linear combination of its own past values, past errors, and current and past values of other time-series. Russo (2007) employed the method in order to forecast sales tax base erosion. His research indicates that in order to sustain the current ratio of revenue to income in a typical sales tax state, the median sales tax rate will have to increase 1% by 2017 (p. 16).

While employment of ARIMA (and its variants) is common, it is by no means the only forecasting model. Fullerton (1989) popularized a composite model of multiple forecasts formats. He study Idaho's retail sales tax receipts for two specified time intervals and conducted two separate forecasts on each; one using a single-equation ARIMA model, the other using a composite model built from the single-equation model and a time-series univariate ARIMA model. He observes that while the single-equation model produced an accurate estimate of future revenue, the composite ARIMA model nonetheless produced a superior estimate. The percent errors of each model tell a convincing story; the former generated percent errors of 7.9, 3.6, 5.3, and 2.5 from 1982 through 1985, respectively, while the latter generated errors of 2.5, -2.6, -0.1, and 0.6, respectively.

Though ARIMA and composite models have dominated forecasting, they appear to be limited in their ability to capture other variables that may affect sales tax revenue other than income such as the size of the unemployed population. The obvious relationship is simply that

high unemployment means less sales tax revenue, yet the degree of the relationship has gone unstudied. Measuring the degree of the relationship will require different models besides ARIMA or composite forecasting in order to account for unknown conditions. We would not know, for instance, what the unemployed population would spend on taxable goods and services were they employed. Variances in unemployment populations will affect forecasted revenue data. Hence, capturing the counterfactual spending habits becomes important for producing a more accurate forecast.

Discussion

Though the depth of the econometric literature on sales tax is shallow, there are nevertheless valuable insights that help shape the construction and rationale of my model. Caspersen and Metcalf's (1994) claim that best and most accurate measure of income is lifetime rather than annual suggests that older and younger generations will have different contributions to sales and use tax revenue than middle-aged generations. Thus, my model, while still using annual income per capita, controls for the population of these respective age brackets over time. Moreover, the model dodges Sobel and Holcombe's (1996) criticism of Dye and McGuire (1991) by using data for individual states. By using aggregated service tax data of each state, the model also avoids criticisms of cross-state tax base differences. Lastly, state revenue forecasting methods, whether they use ARIMA or some other model type, ought to consider the impact of factors such as projected unemployment and the overall health of the state economy, factors which cannot accurately be predicted by extrapolating into the future based on past error. Economic downturns that produced record high levels of unemployment in 2001 and 2008 make this point apparent. In each of these cases, rapid growth in particular economic sectors – technology and sub-prime mortgaging, respectively – clouded forecasting abilities to accurately

determine when economic bubbles would burst and to what degree the subsequent decline would impact unemployment and sales and use tax revenue in general. Because consumption preferences intuitively seem to be dependent upon employment status and the health of the economy, I include them as controlling variables.

The contribution to the general field of sales tax research by the aforementioned authors has been immense. Incidence, elasticity, and forecasting will continue to dominate tax policy discussions into the foreseeable future. This review has revealed epistemic gaps that may inhibit the implementation of quality tax policy. The dynamic nature of the sales tax, and of the legislatures that impose them, provides a rich environment to continue to develop and hone the models that sound policy demands. Indeed, lawmakers should consider these issues carefully as a number of studies reveal positive relationships between taxpayer views on sales taxes with their views on politicians (see Beck and Dye, 1982; Kinsey *et al.*, 1991).

Chapter 3

REGRESSION MODEL

The regression model is the product of methodologies and insights employed in past sales tax revenue research as outlined in the review. The model deviates from past research with respect to the scope of the dependent variable, the inclusion of services in the sales tax base, and the inclusion of consumption preference demographics. Before revealing the causal model, I defend the rationale supporting these differences.

Dependent Variable

The variable of interest is sales and use tax revenue as measured across the applicable states from 1992 through 2007. Past research on sales tax revenue, whether on matters of elasticity, growth variability, or forecasting, generally includes biased revenue data; the fault lies in including revenue from states with gross receipts taxes (GRTs) in general sales tax datasets. In such cases where researchers have used aggregated state data or cross-state comparisons, skewed coefficients are the result, for the models treat the revenue yielded by the two consumption taxes similarly despite their nature and effects being dramatically different. To address this concern, I have left out of the dataset states that levy broad-based GRTs, namely, Delaware, Hawaii, New Mexico, and Washington.[5] Prior to 2007 a handful of states either instituted or repealed their GRTs including Indiana, Kentucky, Michigan, New Jersey, Ohio, and Texas. I have excluded the periods when these states levied broad GRTs. In theory, excluding GRTs should return more accurate results.

There are two additional noteworthy attributes of the dependent variable. First, to improve internal reliability I use annual sales and use tax revenue for a fifteen year period from

[5] There are many other states that levy gross receipt taxes such as Mississippi and Alabama; however, they do not broadly apply them across many industries. Therefore, I chose to include these states in the dataset.

1992 through 2007. This strategy is appealing as it includes the revenue data relative to the progression of approximately two business cycles of varying temporal lengths, as defined by the National Bureau of Economic Research.[6] Second, to ensure comparability of results across states I use SUT revenue per capita rather than the non-weighted alternative. Together these should maximize the interpretive power of the model's outputs.

Services in the Tax Base

Based on Federation of Tax Administrators (FTA) survey data, the number of services taxed by a particular state are compiled into general categories, namely, industrial and mining, construction, transportation, storage, residential utilities, finance, insurance and real estate (hereafter, FIRE), personal, business, computer, automotive, admissions and amusements, professional, leases and rentals, and fabrication and repair. Table 3.1 in Appendix B enumerates the specific services subsumed under each category and their respective NAICS code.

In an effort to make services more comparable across industries and states, I weighted each type of service. Without weights, it would be implied that all taxed services in a given industry for a particular state would return the same amount of revenue, but certainly a tax on health club membership fees will not return the same amount of revenue as a tax on tuxedo rentals if for no other reason that generally more of the former is consumed in a given state than the latter. It was determined that the most accurate method of weighting would be through a supply-side proxy such as the number of people employed in a specific service category. Employment data was garnered from two of the U.S. Census Bureau's Economic Census, the 1997 and the 2002 censuses; 2002 data was used to fill in any gaps from the 1997 census as well

[6] The National Bureau of Economic Research (2008) reported a business cycle peak in July 1990 and lasted eight months until March 1991. Another peak occurred in March 2001 and lasted another eight months until November 2001. The final peak considered came in December 2007. For further information, see http://www.nber.org/cycles.html

as account for computer service data which had not been previously surveyed. This method is preferred over using strictly 2002 data because of the state of the economy in the early 2000's which would not have provided as accurate of a determination of the relative market share of individual service categories. In other words, between the two, the 1997 census provides the best data under normal economic conditions.

After collecting the employment data, I calculated the relative distribution of employment in a particular industry based upon the FTA survey data compiled in 1992, 1996 and 2004. For instance, from 1992 to 1995 Idaho taxed one service in the personal services industry, namely, health club memberships, yet this service only constituted 5% of the total industry as defined in Table 3.1. As of the 1996 FTA survey, though, Idaho began taxing a second industry, namely, tuxedo rentals, yet the two services together only account for roughly 6.2% of the personal services industry. See Table 3.2 in Appendix B for a more detailed breakdown of the market share of select service industries for each respective state.

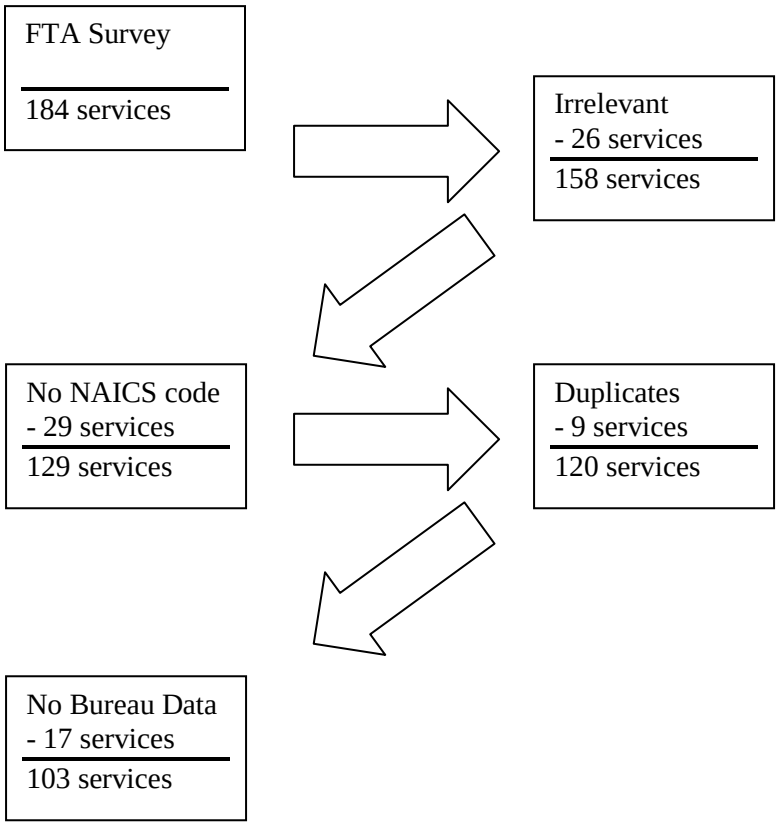
Moreover, because FTA surveys only take place roughly every four years,[7] there are periods where changes in the number of services taxed in any given state go unnoticed to the rest of the world. Admittedly, my model does not capture annual changes. To fill the gap in these instances, I assume the tax base goes unchanged in the intervening time. So, for instance, having conducted surveys in 1992, 1996, 2004, and 2007, my dataset assumes that the number of services taxed between 1996 and 2003 remained unchanged. While this most certainly is improbable, presumably any changes have limited market impact for any given year, and therefore the overall impact of this practice on the regression coefficients is most likely insignificant.

[7] There was no survey conducted in 2000.

The original FTA survey is more comprehensive than the services captured in my model. Of the 184 services in the survey, I only used data for 103 of them for various reasons. At the outset, I eliminated 26 services (such as seismograph and geophysical services) due largely to their economic irrelevance or restricted applicability. In addition, because employment data from the Economic Censuses was limited, I modified the service list to reflect data availability. To this end, I omitted twenty-nine services that did not have a corresponding NAICS code in the Economic Censuses. Additionally, I eliminated nine services because they had multiple descriptions but identical NAICS codes. In some of these nine instances it was also prudent to combine services because of inconsistent reporting, which was the case with taxing admission fees to college sporting events and professional sporting events. Lastly, there was no employment data for seventeen services. Subsequently, I removed them as well. Graph 3.1 below depicts the amendments to the original FTA survey.

One additional observation is in order before continuing. There is an obvious gap in econometric analyses that seek to determine the connection between taxable services and sales tax revenue. Past research focuses instead on equity issues with respect to regressive taxation or unfair impacts to businesses. In other words, they have concentrated on revenue elasticity changes with respect to widened tax bases to study tax burden distribution as a percentage of taxpayer income. Furthermore, the forecasting methods for determining revenue from a services tax base are also crude. Chu (2008), for instance, simply applies California's sales tax rate to the service tax bases in other states to derive an estimate of future revenue. This approach is unreliable as it ignores differences between states' tax administration policies and taxpayer consumption habits. The employed model does not concern itself with incidence and equity, but rather with the impact to state sales tax revenue in general. This perspective aims to offer a different approach to sales tax policy discussions with the hope of spurring more accurate

Graph 3.1 – FTA Survey Amendment Process Flow Chart



forecasting methods, amongst other things.

Consumption Demographics

Another feature of the model involves controlling for consumption habits of various socio-economic groups. While the state and year dummy variables provide a certain minimum level of control of these variables in so far as they reflect the actual demographic composition of a particular state at a particular time, this degree of control is nevertheless insufficient for broad predictions. Clearly the socio-economic makeup of California's populace is dramatically different from Utah's or Maine's, and therefore the model must control for the differential composition of

the populace. Using U.S. Census Bureau data, I specifically include the population percentage of African American, Hispanic, Asian and Pacific Islanders, young adults (18-24), adults (25-54), and senior adults (55+). Researchers have tended to ignore investigating the consumption preferences of social subsets in part, perhaps, because the more moral and politically relevant discussion is on tax burden distribution across income demographics. The intention of the currently employed model is not to take a normative stand on tax policy, but purely to offer a partial description of the contributory demographics. To this end, the main purpose of these controls is to separate the independent influences of service components.

Causal Model

The expression used to explore the correlation between sales and use tax revenue and inclusion of services in the tax base is a function of inputs with the following specifications (expected effects are in parentheses):

> *SUT Revenue* = *f*[tax rate, ability to consume, consumption demographics, service tax base, other control variables, fixed effects]

where:

> *SUT Revenue* = *f*[annual SUT revenue for each state]
>
> *Tax Rate* = *f*[annual SUT rate for each state (+)]
>
> *Ability to consume* = *f*[annual disposable income per capita for each state (θ), annual total population for each state (θ), annual number of households for each state (+), annual Gini coefficient for each state (+)]
>
> *Consumption demographics* = *f*[% African American (+), % Asian/Pacific Islander (+), % Hispanic (+), % young adults 18-24 (+), % adults 25-54 (θ), % senior adults 55+ (θ)]
>
> *Service tax base* = *f*[total market size of taxed construction services (+), total market size of taxed transportation services (+), total market size of taxed storage services (+), total market size of taxed residential utility services (+), total market size of taxed of finance, insurance, and real estate services (+), total market size of taxed personal services (+), total market size of taxed business services (+), total market size of taxed computer

services (+), total market size of taxed automotive services (+), total market size of taxed admission and amusement services (+), total market size of taxed professional services (+), total market size of taxed lease and rental services (+), total market size of taxed fabrication, installation, and repair services (+)]

Other Variables = *f*[annual real gross domestic product (+), unemployment rate (-)]

Fixed Effects = *f*[state dummy variables, year dummy variables]

Rationale of Expected Effects

The expected effects are articulated via symbols – "+" (positive), "-" (negative), and "0̸" (non-zero) – and are based on past research and intuition. It is reasonable that increases in the sales and use tax rate will yield increases in revenue, yet it is uncertain if an increase in disposable income per capita will yields the same effect; its direction depends on factors such as income tax rates and savings rate, which my model does not capture. Holding these unchanged, however, increases in disposable income should result in increased consumption and, hence, increased tax revenue. The same reasoning applies to increases in population. States with narrow service tax bases are less likely to see increases in sales and use tax revenue as population increases since on average Americans tend to consume more services than tangible goods (Mazerov, 2003, p. 2). However, a large enough population influx or exodus could produce a positive effect depending upon what type of consumers came or went; states tax more tangible goods than services by a large margin.

Since at least Davies (1959), it researchers generally accept that sales taxes, whether levied on tangible goods or services, are regressive. This suggests that increases in lower income populations will positively affect sales and use tax revenue since they dedicate most of their disposable income to taxable goods. DeNavas-Walt *et al.* (2008) also report that Asian groups have higher median incomes than African American and Hispanic groups, which suggests they have a higher propensity to consume taxable goods and services. Meanwhile, I speculate that the

consumption patterns of young adults centers around tangible goods while the other age groups consume an array of tangible goods and services. Increases in younger populations, then, ought to yield positive sales and use tax growth while the effects of the other generations can be positive or negative depending upon the extant tax base of the state in question. Furthermore, as the general trend has been towards an increase in consuming services while income inequality has concurrently grown across generations, I expect the regression results to return a positive relationship between the Gini coefficient and revenue.

The revenue effects of taxing services are highly contingent upon circumstances that are not directly controllable by policymakers. Business, computer, and professional services, for example, could yield a short-run revenue increase, but the taxes could incentivize businesses to move services in-house, which in the long-run would cut revenue. The initial revenue influx would not be sustainable. Since only large businesses would be able to move the services in-house, small businesses pay the brunt of the tax, which could force them to close (Doerr, 2003). This would surely reduce sales and use tax revenue especially in case the business is retail. The same reasoning applies to personal services, entertainment, and repair services; though, in the case of personal and entertainment services the elasticity of demand of the particular service is far more crucial in determining short-run and long-run revenue yields. The current economic slump supports this inference. A *New York Times* article recently revealed that the movie industry has seen a 17% boost in sales with the general hypothesis that movie tickets and the like offer a cheaper alternative to recession escaping vacations (Cieply and Barnes, 2009). Moreover, (most) utility services are close to a necessity, which indicates an extremely high elasticity. Consequently a broad tax on them would create a long-run positive revenue stream.

There is also a substitution effect that may occur for some services, which could result in continued lost revenue. As consumers face the rising costs of local services, the internet provides

a means to purchase some services without incurring taxes such as lawyers, accountants, computer services, and broadband video purchases, for instance. The slow reaction of state tax administration bodies and legislatures to adapt to the rapid growth of internet transactions threatens to severely restrict the amount of generated revenue in case substitution takes place. Because the employed model exploits dummy variables for years spanning the exponential growth of e-commerce, the regression results will properly reflect the increased usage. Generally speaking, though, despite the negative correlation between augmented internet transactions and sales and use tax revenue, any increase in the sales tax base to include services ought to result in more revenue.

Moreover, I use real gross domestic product (RGDP) as a proxy of the health of a particular state's economy. Increases in RGDP suggest increases in disposable income, which suggests the possibility for greater consumption. Thus, I expect a positive relationship. On the other hand, for the unemployment rate, I expect a negative relationship; unemployment decreases disposable income, which cuts into consumption.

Controlling for E-Commerce

It ought to be apparent that the employed model fails to include an exceptional variable that if included would produce a more sound analysis as well as provide firmer grounds with which to discuss policy ramifications. I am referring specifically to the effects of the burgeoning electronic economy. I have chosen to withhold including a variable for e-commerce transactions for two reasons. The first is that the data estimates of sales tax revenue loss due to remote sales on a state by state basis is at best highly suspect and at worst patently unreliable, an opinion held by multiple sources (See United States Government Accountability Office, 2000; Garrett, 2000, pp. 4-5; Hawkins and Eppright, 2000, pp. 8-9).

Nevertheless, various academics have attempted to quantify reliable estimates, yet the fruits of their efforts do not satisfy the intuitive element of revenue modeling despite their models' mathematical robustness. For instance, Bruce and Fox (2001, p. 4) compute revenue loss by estimating the reductions in sales tax base attributable only to e-commerce and then multiplying the figure by the state-specific tax rate. Unfortunately, there is no direct method of determining the proportion of revenue loss caused only by remote sales. Instead the authors rely on an amalgamation of forecast models, arbitrary tax base identification methods, and questionable and unqualified conjectures. Recently, though, the United Kingdom's Office for National Statistics (2009) has been surveying businesses to track what percentage of their sales are via the internet. This approach, which is still in an experimental stage, appears promising; though, the results are obviously susceptible to charges of various sorts of bias because of the employment of surveys. However, the survey method, like Bruce and Fox's forecast method, does not allow direct calculation of lost revenue due to e-commerce.

These difficulties notwithstanding, ultimately what prevents the inclusion of lost revenue data is a highly dubious assumption endemic to all indirect internet sales data models: that consumers are in full compliance with their respective state's sales and use tax laws.[8] While this assumption may be necessary for producing baseline estimates, the risk that follows is a biased coefficient that underestimates the plight of sales and use tax revenue in light of the exponential growth of technology. If we assume that every taxpayer either voluntarily remits or has taxes compulsorily applied to every remote purchase regardless of the geographic location of the point of sale in full accordance with the laws of their state, any consequent revenue loss is the product of legal loopholes or omissions, and not the result of economic or tax administration factors. In reality, however, California, for instance, incurred a $1.2 billion tax gap due to e-commerce sales

[8] Bruce and Fox (2001) admit this assumption in footnote 6 (p. 7).

due largely to consumers' failure of compliance (California Board of Equalization, 2007). If California's Board of Equalization assumed in their calculation that everyone followed the law, the tax gap would be zero or close to zero. Underestimating the resultant coefficient so severely inhibits the development of practical policy solutions.

The second reason why I have excluded a variable for the effects of e-commerce is that the focus of the current study is on taxable services, yet presumably the majority of internet transactions involve tangible goods instead. This is not to suggest that services offered remotely do not impact consumer behavior. Indeed, it is conceivable that many services can be offered remotely as previously noted; however, the overwhelming consumption patterns of businesses and individuals clearly involves services that cannot be employed remotely such as health club membership, janitors, auto repair and the like. I speak to the impact of e-commerce on sales and use tax revenue in the concluding chapter, but suffice it to restate that the dummy variables included help control for differential internet purchase tendencies across states and over time.

Chapter 4

DATA AND RESULTS

Whereas in the previous chapter I detailed the specifics of the employed model, in this chapter I describe the data used. Additionally, I present the results of both the initial (uncorrected) model as well as the corrected model. Consequently, I divide the sections of this chapter by these subject matters.

Regression Data

The explanatory data used in the regression requires vetting to ensure sufficient justification for their use. The inclusion of variables such as sales and use tax rate and population does not require a strong defense. There is a rather obvious correlation between tax revenue and the rate levied; though, this correlation can be either positive or negative depending upon the magnitude of the rate, the size of the rate base, and the timing of the implementation as Laffer (2004) famously showed. Moreover, population size and tax revenue generation go hand in hand. However, there are individuals counted in the population which do not directly consume any taxable goods and services such as children and, furthermore, as Yu and Liu (2007) found, divorced families tend to consumption more goods than do their non-divorced counterparts. Because of these considerations, the model must also control for the total number of households per state per year in order to capture the effect of household proliferation and non-direct consumption of taxable goods and services that population data alone does not provide.

The use of per capita disposable income rather than median disposable income in the regression could give some cause for concern. Ultimately, I think certain concerns will be unavoidable regardless of the chosen measure. Using the median rather than the average naturally provides the benefit of not letting outliers influence the outcome, yet the median does not allow

for accurate cross-state comparisons. For example, Rhode Island's 2007 median income was $70,187 as reported by the U.S. Census Bureau (2008). California's median income for the same year was $67,484, yet its population was thirty-six times larger than Rhode Island's. Income adjusted for population is a benefit of using per capita measures; however, the drawback is that income will be skewed higher in case the state has a substantial population of high-income earners or skewed lower in case the state has a substantial population of low-income or non-income earners. There is no perfect measure of income free of defect. I have chosen to use the per capita measure to allow for controlled comparisons for two reasons. The first is that the potential for bias ought nevertheless to be highly diluted due to the number of states and length of period used in the dataset. The second is that the use of median income already receives widespread support in tax literature as the preferred measure with comparatively little argued to the contrary, the aforementioned work by Caspersen and Metcalf (1994) being a notable exception.

Along with controls for income I include a proxy for income dispersion, specifically, the Gini coefficient. It is perhaps more common to see researchers use population percentages of rich and poor for dispersion, but this metric is too static and does not carry a lot of interesting interpretive power. For instance, if it is found to be the case that an increase in the population percentage of the rich correlates to a complementary increase in revenue, the conclusion might be that the state is better off, fiscally speaking, if it can make everyone economically better off, which is a vacuous conclusion considering this is what lawmakers claim to be doing anyway. On the other hand, if the Gini coefficient is found to be positively correlated with sales tax revenue – that is, if revenue rises as income dispersion becomes more unequal – then the conclusion might be that the state is better off, again, fiscally speaking, with income inequality than with income equality, an implication which is more interesting and with more far-reaching consequences.

Furthermore, the inclusion of consumption demographics serves two purposes. The first purpose, as noted previously in Chapter 3, is to allow for an additional layer of control for states with differentially distributed population demographics. Certainly some states are more diverse than others, and a model capturing generated revenue ought to incorporate this state of affairs. The second purpose is to explore a hypothesis implicit in the first purpose, namely, that different ethnic and age groups consume taxable goods and services differently. Thus, more accurate forecasts of state sales tax revenue will consider the consumption demographics of its population. However, it is important to note that the regressed effect on tax revenue relative to ethnicity and age is only a crude estimate since controls for the individual groups' income per capita and household data go uncontrolled.

A final note about the panel dataset involves explaining the abundance of included dummy variables that do not properly factor into a general prediction of sales and use tax revenue following a base expansion. Sales and use tax revenues are not static, but dynamic. Their ebb and flow is as much a product of the variables included in the dataset as well as a host of external socio-economic, political, administrative, and psychological factors. The intent of the dummy variables is to control for these differences that may manifest themselves uniquely in a particular state at a particular time. In other words, the modeling schema fixes the effects of intra-state dynamics. Omitting the dummies would yield results naïvely concluding that all states' sales and use tax revenue vary similarly through time, the very mistake that Chu (2008) makes. Unfortunately, as Yaffee (2003) points out, fixing effects with dummy variables can introduce multicollinearity, which will drain the model of statistical power to test parameters. I discuss multicollinearity, checks for its incidence, and its remedies in detail later. At this stage, however, it is prudent to acknowledge that I anticipate high $\overline{R}^2$ and that in this instance the metric is not necessarily a true indication of its intended measure.

I have posted in Appendix C various statistics intended to aid in understanding the initial dataset. Table 4.1 lists the variables, a brief description of each as well as the source of the data. Table 4.2 highlights the resultant descriptive statistics of the dataset. Meanwhile, Table 4.3 is a correlation matrix detailing the relationship between explanatory variables (excluding the dummy variables representing states and years). Within the matrix are light grey cells which uniquely identify variables with excessive correlation coefficients based on the 0.8 threshold observed by Studenmund (2006, p. 257). Depending on the significance levels of these variables returned by the regression results, the high degree of correlation may signal a problem requiring remedying, which I discuss in further detail next.

Results

Because there are a number of highly correlated variables in the dataset (as noted in the previous section), I initially present uncorrected regression results in four considered functional forms, namely, log-semi-log, lin-semi-log, log-linear, and linear.[9] I then mount a defense in favor of the log-linear specification. After considering the problems common to regression datasets – multicollinearity, heteroskedasticity, and endogeneity – and adjusting for them respectively, I offer the corrected results. For the sake of simplicity, I have omitted the state and year dummy variable results from the regression results.

Initial (Uncorrected) Results

The literature reviewed in Chapter 2 provided substantial guidance in building the currently employed panel dataset as well as supplying the conceptual foundations of tax revenue analysis. However, due to the lack of regression research specifically investigating the revenue

[9] Explain the difference between the forms

implications of a general sales tax on services, I was uncertain to what degree past efforts would be helpful in determining the best functional form to accurately explain the data. This concern prompted me to run the initial regression using the aforementioned forms; Table 4.4 below displays the results.

The regression specifications adopted for each form are as follows ("DV" denotes dummy variables, and I have omitted their enumeration hereon for simplicity):

Log-SemiLog

$$\ln(SUTREV) = \alpha_1 + \beta_1\ln(SUTRT_{it}) + \beta_2\ln(HOUSE_{it}) + \beta_3\ln(POPUL_{it}) + \beta_4(YOUNG_{it}) + \beta_5(ADULT_{it}) + \beta_6(SENIOR_{it}) + \beta_7(AFRAMER_{it}) + \beta_8(HISPAN_{it}) + \beta_9(ASIAN_{it}) + \beta_{10}\ln(DISINC_{it}) + \beta_{11}\ln(RGDP_{it}) + \beta_{12}\ln(UEMPRT_{it}) + \beta_{14}(GINI_{it}) + \beta_{15}(CONST_{it}) + \beta_{16}(UTILI_{it}) + \beta_{17}(TRANS_{it}) + \beta_{18}(STOR_{it}) + \beta_{19}(FIRE_{it}) + \beta_{20}(PERSON_{it}) + \beta_{21}(COMP_{it}) + \beta_{22}(ADMIS_{it}) + \beta_{23}(BUSI_{it}) + \beta_{24}(AUTO_{it}) + \beta_{25}(PROF_{it}) + \beta_{26}(LESREN_{it}) + \beta_{27}(REPAIR_{it}) + DVs + \varepsilon_{it}$$

Lin-SemiLog

$$SUTREV = \alpha_1 + \beta_1\ln(SUTRT_{it}) + \beta_2\ln(HOUSE_{it}) + \beta_3\ln(POPUL_{it}) + \beta_4(YOUNG_{it}) + \beta_5(ADULT_{it}) + \beta_6(SENIOR_{it}) + \beta_7(AFRAMER_{it}) + \beta_8(HISPAN_{it}) + \beta_9(ASIAN_{it}) + \beta_{10}\ln(DISINC_{it}) + \beta_{11}\ln(RGDP_{it}) + \beta_{12}\ln(UEMPRT_{it}) + \beta_{14}(GINI_{it}) + \beta_{15}(CONST_{it}) + \beta_{16}(UTILI_{it}) + \beta_{17}(TRANS_{it}) + \beta_{18}(STOR_{it}) + \beta_{19}(FIRE_{it}) + \beta_{20}(PERSON_{it}) + \beta_{21}(COMP_{it}) + \beta_{22}(ADMIS_{it}) + \beta_{23}(BUSI_{it}) + \beta_{24}(AUTO_{it}) + \beta_{25}(PROF_{it}) + \beta_{26}(LESREN_{it}) + \beta_{27}(REPAIR_{it}) + DVs + \varepsilon_{it}$$

Log-Linear

$$\ln(SUTREV) = \alpha_1 + \beta_1(SUTRT_{it}) + \beta_2(HOUSE_{it}) + \beta_3(POPUL_{it}) + \beta_4(YOUNG_{it}) + \beta_5(ADULT_{it}) + \beta_6(SENIOR_{it}) + \beta_7(AFRAMER_{it}) + \beta_8(HISPAN_{it}) + \beta_9(ASIAN_{it}) + \beta_{10}(DISINC_{it}) + \beta_{11}(RGDP_{it}) + \beta_{12}(UEMPRT_{it}) + \beta_{14}(GINI_{it}) + \beta_{15}(CONST_{it}) + \beta_{16}(UTILI_{it}) + \beta_{17}(TRANS_{it}) + \beta_{18}(STOR_{it}) + \beta_{19}(FIRE_{it}) + \beta_{20}(PERSON_{it}) + \beta_{21}(COMP_{it}) + \beta_{22}(ADMIS_{it}) + \beta_{23}(BUSI_{it}) + \beta_{24}(AUTO_{it}) + \beta_{25}(PROF_{it}) + \beta_{26}(LESREN_{it}) + \beta_{27}(REPAIR_{it}) + DVs + \varepsilon_{it}$$

Linear

$$SUTREV = \alpha_1 + \beta_1(SUTRT_{it}) + \beta_2(HOUSE_{it}) + \beta_3(POPUL_{it}) + \beta_4(YOUNG_{it}) + \beta_5(ADULT_{it}) + \beta_6(SENIOR_{it}) + \beta_7(AFRAMER_{it}) + \beta_8(HISPAN_{it}) + \beta_9(ASIAN_{it}) + \beta_{10}(DISINC_{it}) + \beta_{11}(RGDP_{it}) + \beta_{12}(UEMPRT_{it}) + \beta_{14}(GINI_{it}) + \beta_{15}(CONST_{it}) + \beta_{16}(UTILI_{it}) + \beta_{17}(TRANS_{it}) + \beta_{18}(STOR_{it}) + \beta_{19}(FIRE_{it}) + \beta_{20}(PERSON_{it}) + \beta_{21}(COMP_{it}) + \beta_{22}(ADMIS_{it}) + \beta_{23}(BUSI_{it}) + \beta_{24}(AUTO_{it}) + \beta_{25}(PROF_{it}) + \beta_{26}(LESREN_{it}) + \beta_{27}(REPAIR_{it}) + DVs + \varepsilon_{it}$$

In electing the best functional form, I paid special attention to the work by Chang (1979). With Tennessee as a case study, he showed using a Box-Cox transformation that the more commonly employed functional forms for sales tax revenue – log-linear and linear – may not be the most accurate methods of forecasting. The purpose of a Box-Cox transformation is to take a set of data that is not normally distributed and transform it into something that is approximately normally distributed by using the maximum likelihood method to identify a statistical parameter,

Table 4.4 – Initial (Uncorrected) Regression Results†

Label[1]	Log-SemiLog	Lin-SemiLog	Log-Linear	Linear	VIF
(constant)	1.88	-3180569	18.0***	5342253***	
	(2.42)	(18804320)	(.284)	(1424643)	
SUTRT (ln)	.587***	3645909***	.123***	450218***	23.1
	(.056)	(472834)	(.012)	(58800)	
HOUSE (ln)	.403**	1133266	-1.35×10^{-8}	2.09***	2349.7
	(.164)	(1381494)	(4.77×10^{-8})	(.239)	
POPUL (ln)	.022	40433	4.32×10^{-9}	.003	226.9
	(.027)	(227808)	(5.70×10^{-9})	(.029)	
DISINC (ln)	1.09***	-658306	1.88×10^{-5}***	8.98	59.8
	(.119)	(1002851)	(3.34×10^{-6})	(16.8)	
UEMPRT (ln)	-.070***	-417637**	-.020***	-60229*	7.5
	(.022)	(185257)	(.005)	(25102)	
RGDP (ln)	.064	1691118***	-2.79×10^{-8}	11.0***	466.8
	(.062)	(523395)	(2.23×10^{-7})	(1.12)	
YOUNG	-.020	2786499***	.027	155796	620.9
	(.034)	(283649)	(.041)	(204833)	
ADULT	.013	-2022012***	.014	-474739***	1773.7
	(.010)	(87600)	(.016)	(79027)	
SENIOR	-.003	1781416***	-.009	726592***	485.9
	(.012)	(100886)	(.017)	(84530)	
AFRAMER	-.001	588855***	-.005	-21978	798.6
	(.004)	(35621)	(.007)	(33020)	
HISPAN	-.004	1193342***	.004	49237	1178.0
	(.007)	(61289)	(.012)	(59235)	
ASIAN	-.046	5151369***	-.157***	1766432***	1268.9
	(.036)	(304876)	(.050)	(249072)	
GINI	-.361	-3715958	-1.00**	-9154211***	15.6
	(.451)	(3788446)	(.477)	(2392700)	

[1] Labels denoted by (ln) were used in their log form for the semi-log analyses
† Revenue measured in thousands of dollars.
***Significant at 99% level **Significant at 95% level *Significant at 90% level

Table 4.4 – Initial (Uncorrected) Regression Results *(cont.)*†

Label[1]	Log-Semi-Log	Lin-Semi-Log	Log-Linear	Linear	VIF
CONST	.022	-1042233***	.035	-158787	28.9
	(.031)	(261462)	(.033)	(166392)	
TRANS	.176***	-43601	.264***	342993	18.9
	(.047)	(396979)	(.049)	(242705)	
STOR	.005	-3244377***	-.076	188091	170.6
	(.133)	(1116016)	(.144)	(719303)	
UTILI	.125***	-713084**	.127***	-229856	26.6
	(.036)	(302234)	(.039)	(194928)	
PERSON	.199**	2441136***	.166*	1729252***	82.0
	(.094)	(786490)	(.099)	(479490)	
COMP	-.021	126746	-.032	564589***	11.6
	(.028)	(239166)	(.030)	(144905)	
ADMIS	.016	-1272677***	.085*	478606**	37.0
	(.041)	(346154)	(.045)	(218003)	
BUSI	.021	1438046***	.-.017	3115	5.6
	(.038)	(318658)	(.042)	(90947)	
AUTO	.163**	1450638***	.134*	99426	162.8
	(.064)	(536310)	(.069)	(341490)	
LESREN	.244**	-3997928***	.278**	358352	51.6
	(.101)	(851006)	(.111)	(556193)	
REPAIR	-.043	-987694**	-.065	42846	116.2
	(.050)	(423313)	(.054)	(267152)	
PROF	-1.13**	-30684014***	1.85***	-11584424***	179.8
	(.575)	(5539429)	(.711)	(3530832)	
FIRE	-.886**	-14781919***	-.729	-12853086***	431.2
	(.437)	(3670919)	(.463)	(2303412)	
R^2	.997	.989	.997	.996	
Adj R^2	.997	.988	.996	.995	
N	648	648	648	648	

[1] Labels denoted by (ln) were used in their log form for the semi-log analyses
† Revenue measured in thousands of dollars.
***Significant at 99% level **Significant at 95% level *Significant at 90% level

λ, defined by

$$y(\lambda) = \begin{cases} \dfrac{y^{\lambda} - 1}{\lambda}, & if \lambda \neq 0 \\ \log y, & if \lambda = 0 \end{cases}$$

Based on the parameters, it is clear that if $\lambda = 1$, then the resultant functional form is linear whereas if $\lambda = 0$, then it is logarithmic. In Chang's study, he calculated $\lambda = -.22$, which suggests

that the best functional form for calculating Tennessee's sales and use tax revenue was neither log-linear nor linear. He then ran the sample data through three regressions – a log-linear with a Box-Cox transformation, a log-linear without, and a linear without – and compared all three outcomes to actual data. The mean square percentage error for the Box-Cox transformation was 1% as opposed to 4% and 7% for the other models, respectively.

Unfortunately, this degree of confidence in selecting the best form is only attainable *ex post facto*. Certainly, though, forecasting budget analysts do not have access to future data in real time, and presuming that a regression using Box-Cox transformations will almost always produce more accurate forecasts in the face of mutable economic conditions and shifting sales tax bases is probably not reasonable. Analysts must use some criterion to choose amongst functional forms without the advantage of having actual data at one's disposal. Chang appears to be aware of this, for he states that the true model from a set of alternative specifications, assuming normality, is the formulation with the highest $\overline{R}^2$ (p. 12). Yet, this solution appears to immediately preclude the use of Box-Cox transformations in fixed effect regressions like the one presently conducted because the $\overline{R}^2$ is inflated due to the prevalence of dummy variables and not necessarily to the explanatory power of the substantive dependent variables; omitting relevant dependent variables such as income and population nevertheless will produce a similar $\overline{R}^2$ compared to a model in which they are properly included (assuming both models account for fixed effects). Moreover, it is likely that fixed effect regressions will return nearly similar $\overline{R}^2$s regardless of the chosen functional form, which is apparent in Table 4.4. Thus, reliance on $\overline{R}^2$ to adjudicate between forms is unreasonable in this instance (and perhaps in general given other considerations).

Despite the success of Chang's model for forecasting sales and use tax revenue using time-series data, there appears to be some difficulties in applying it to panel data.[10]

Selection of the most appropriate form instead necessitated appeal to economy theory and statistical significance, the latter of which received greater weight. With respect to the first consideration, as outlined in Chapter 3 economic theory suggests that base expansions will yield increases in revenue. The revenue certainly will increase at a decreasing rate over time, but an increase over the previous base should be apparent nonetheless. Thus, the model returning the most significant and positive variables is superior. Based on this criterion, the log-linear model wins out; seven of the thirteen service variables are positive and significant. Though the other three models produced more significant variable, a portion of these are negatively associated with revenue, yet it is incomprehensible that a base expansion would yield a revenue decrease given the model specifications. The log-linear form's negative coefficients are concurrently non-significant, so they do not indicate a model failure.

It is also worthwhile to consider the effects of the non-service variables. Both log-semi-log and log-linear models capture the essence of so-called Engel curves. Much like household consumption expenditures, it is reasonable to expect total sales and use tax revenue to increase at a decreasing rate as disposable income increases, or, as in the case of expanding tax bases, when a base is sufficiently large enough to render a substitution effect irrelevant or inconvenient. As incomes grow and potential substitutions are out of reach, a smaller percent of income goes to consumption and a larger percent goes to savings. Both models capture this state of affairs. Therefore, there is no further reasonable evidence suggesting that the log-semi-log form is superior to the log-linear form.

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[10] Though not explicitly stated, Chang seems to infer this same conclusion: "the sales and use tax revenue of *a state* [my italics] should be estimated by the general functional form rather than by the simpler log-linear or linear form" (p. 17).

Secondary (Corrected) Results

Facing these results, I ran secondary regressions to adjust for the statistical phenomenon noted in this chapter's opening paragraph. I consider each in turn, and previous model adjustments are the framework for successive models.

Multicollinearity

The correlation matrix displayed in Table 4.3 (see Appendix C) clearly shows a number of variables (population, household, real GDP, adult population, and young adult population) moving closer together above the acceptance .800 threshold. That the model has returned such a high $\overline{R}^2$ as well as produced enormous variance inflation factors (VIFs), a measure of the severity of error variance, for these variables is a dead giveaway for extreme multicollinearity. In a fixed effect model on a panel dataset, this result should not be surprising given the large number of dummy variables required to control for various observational idiosyncrasies (Yaffee, 2003). However, the dummies are necessary for capturing fixed effects, so the measures to mitigate multicollinearity ought to instead focus on remedying the high correlations amongst the variables which are not statistically significant and have high VIFs.

I took three steps to remedy the collinear ailment. First, I removed the variable controlling for real GDP (RGDP); it correlates highly with the unemployment rate variable (UEMPRT), and it was non-significant. In addition, though I did not consider it at the time I constructed the model and data, gross domestic product and unemployment rates reflect the same economic state of affairs, namely, the health of the economy. Second, I merged the young adult (YOUNG) and adult (ADULT) population variables into a new variable, PRIME – the annual percentage of a state's population composed of 18-54 year olds. Not only did YOUNG and ADULT correlate beyond the acceptable threshold, but they both were not significant. Lastly, I

eliminated the two major population variables, total household population (HOUSE) and total population (TOTAL). After running multiple models with a combination of each, each set of results produced significant negative coefficients. As noted before, this runs contrary to economic theory. In addition, after removing both variables, the coefficient values and error terms of the remaining variable changed negligibly. This suggests that HOUSE and POPUL were superfluous. Table 4.5 displays the results following these adjustments.

Table 4.5 – Corrections for Multicollinearity

Label	Log-Linear	VIF	Label	Log-Linear	VIF
(constant)	18.25*** (.304)		TRANS	.319*** (.055)	18.6
SUTRT	.122*** (.013)	21.1	STOR	-.097 (.160)	159.7
DISINC	$1.82x10^{-5}$*** ($3.61x10^{-6}$)	52.7	UTILI	.137*** (.044)	25.4
UEMPRT	-.022*** (.006)	7.3	PERSON	.185 (.113)	86.2
PRIME	.017*** (.006)	245.3	COMP	-.054 (.033)	11.4
SENIOR	-.011 (.014)	250.3	ADMIS	.097** (.049)	35.6
AFRAMER	-.007 (.005)	348.6	BUSI	-.008 (.045)	19.8
HISPAN	-.001 (.009)	482.0	AUTO	.094 (.072)	135.7
ASIAN	-.137*** (.038)	616.2	LESREN	.232* (.119)	50.0
GINI	-1.50*** (.545)	15.5	REPAIR	-.039 (.054)	89.8
CONST	.034 (.037)	27.8	PROF	1.48** (.704)	135.4
			FIRE	-.386 (.528)	429.6

R^2 = .997
Adj-R^2 = .996
N = 648
***Significant at 99% level **Significant at 95% level *Significant at 90% level

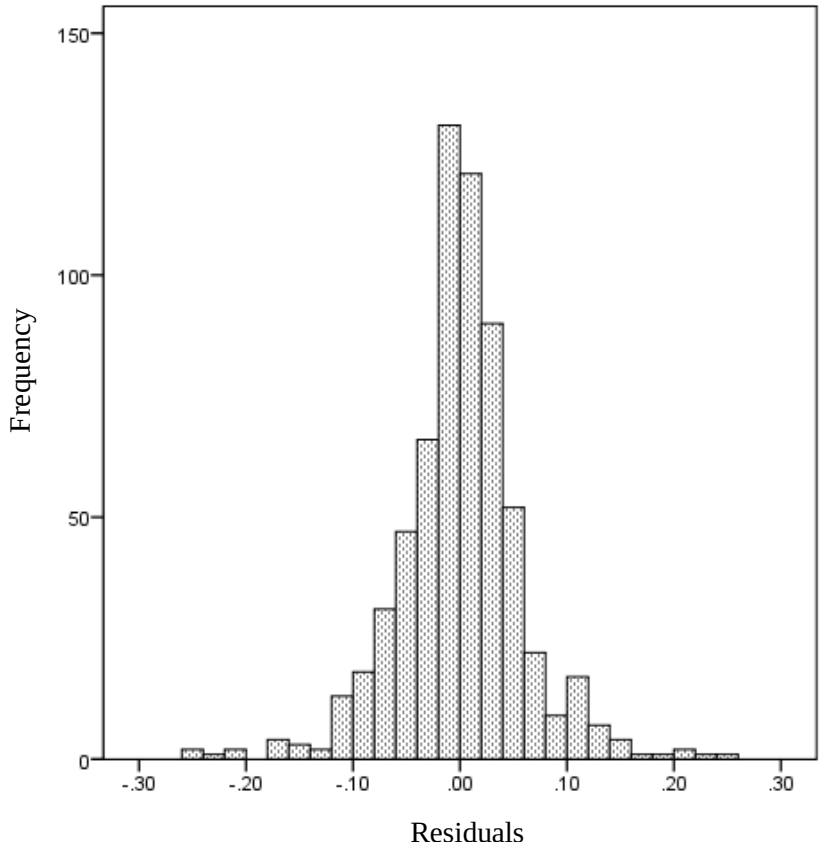
Heteroskedasticity

Ideally, the variance between actual and predicted values will remain constant not just at any given point in time but also through time. In other words, panel data ought to be homoskedasitic with constant serial correlation. Violation of these classical assumptions bias estimators; we would not be able to rely on the reported significance and standard errors of some (or all) of the coefficients or their corresponding test parameters. Accurate reporting of these elements is vital to producing meaningful elasticities and confidence intervals for revenue forecasting. Though it is certainly unreasonable to assume homoskedasticity in panel data, steps are nonetheless necessary to test its incidence.

There are a number of diagnostic tests to check for heteroskedasticity, but the nature of the current data renders most of them unfeasible. The Park Test requires running the residuals from the original regression against a proportionality factor, *Z*, that one believes to be the cause of the inconstant variance. A *t*-statistic significantly different from zero allows us to reject the null hypothesis of homoskedasticity. Unfortunately, this test requires the user to guess *Z*, and though one could run a Park Test on every independent variable to see which is most differs from zero, some econometricians have suggested this method is unadvisable (see Studenmund, 2006, p. 360). The White Test, meanwhile, does not require guessing since it involves a more general approach. After obtaining the original regression's residuals, one would run a second regression using the residuals as the dependent variable and each of the following as independent variables: (a) each independent from the original regression, (b) the square of each independent, and (c) the cross-product of each independent. Unfortunately, for large datasets, such as the present one, so many independent variables may be required that the degrees of freedom become negative, which makes the test useless. Finally, another approach is the Koenker-Bassett (KB) test, which regresses the squared residuals against the square fitted values of the dependent variable. This is

useful for non-normally distributed residuals, but as Graph 4.1 below shows, the present residuals are fairly nicely distributed.

Graph 4.1 – Residual Distribution



The obvious normal distribution demands use of the Breusch-Pagan Test, which judges if the residual variance is a function of the independent variables. The Breusch-Pagan test uses a chi-square statistic to measure the extent to which two categorical variables relate; a low chi-square indicates the observed relationship could be due to chance alone while a high chi-square indicates that chance alone does not adequately explain observational differences in expected and actual outcomes. In the case of a high chi-square, modeling, data, or analyst error could conspire with chance to exaggerate the relationship.

Similar to the other heteroskedasiticty tests, we adopt tests parameters for a null hypothesis of homoskedasiticity. The results of the test are

χ^2 (79) = 367.8

$\alpha > \chi^2$ = .000

The resultant chi-square value is extremely high indicating a strong relationship between the regression residuals and the independent variables. Moreover, the high statistical significance implies the value is unlikely the product of random chance alone. Therefore, we must reject the null hypothesis of homoskedasticity, and infer the presence of an inconstant error term.

Theoretically, there are two solutions to heteroskedasticity – eliminate it or mitigate its effects. Given that my model contains not only a vast array of population variables but also dummy variables that capture omitted state-specific and time-specific variations, it is doubtful that I can eliminate heteroskedasticity altogether. Instead, it is more practical to mitigate its effects using robust standard errors. Generally speaking, robust statistics relax the otherwise strict classical assumptions of ordinary least squares in order to generate statistically reliable error estimates. With respect to the violation of a constant error term, ordinary least square regressions that use robust standard errors return identical coefficient magnitudes as regressions that use normal standard errors. The difference between the two is the size of the error term. Since the error term dictates the magnitude of testing parameters, elasticities, and confidence intervals, robust standard errors will give more accurate results than normal standard errors. Table 4.6 below details the results.

Endogeneity

The problem of endogeneity arises when regressed variables correlate with the models' error terms. Econometricians call such correlated variables "endogenous" while

Table 4.6 – Corrections for Heteroskedasticity

Label	Log-Linear	Label	Log-Linear
(constant)	18.25***	TRANS	.319***
	(.304)		(.060)
SUTRT	.122***	STOR	-.097
	(.013)		(.139)
DISINC	$1.82x10^{-5}$***	UTILI	.137***
	($5.62x10^{-6}$)		(.053)
UEMPRT	-.022***	PERSON	.185
	(.006)		(.117)
PRIME	.017***	COMP	-.054
	(.005)		(.037)
SENIOR	-.011	ADMIS	.097**
	(.012)		(.045)
AFRAMER	-.007	BUSI	-.008
	(.004)		(.038)
HISPAN	-.001	AUTO	.094
	(.007)		(.071)
ASIAN	-.137***	LESREN	.232*
	(.034)		(.140)
GINI	-1.50**	REPAIR	-.039
	(.608)		(.043)
CONST	.034	PROF	1.48**
	(.038)		(.594)
		FIRE	-.386
			(.439)

R^2 = .997
Adj-R^2 = .996
N = 648
***Significant at 99% level **Significant at 95% level *Significant at 90% level

uncorrelated variables are known as "exogenous". Blundell and Powell (2003, p. 312) observe that endogeneity can often arise from a number of sources including mistakes in measurements, sample selection, heterogeneous treatment effects, correlated random effects in panel dataset, and simultaneous equations. Regardless of its source, however, the presence of endogenous variables violates a fundamental assumption of OLS, namely, that all explanatory variables remain uncorrelated with the regression error term (Baltagi, 2008, p. 150).

Endogeneity in sales tax revenue forecasting models is likely in case the tax rate *and* a proxy for consumption behavior are included in the specification, for the tax rate partly determines consumption behavior. However, given that the current model does not provide a proxy for consumption, but rather only a proxy for the ability to consume as measured by disposable income, there is no strong superficial evidence that endogeneity is a concern. Moreover, as Graham *et al.* (1998) showed, the prevalence and persistence of endogenous variables is instead more likely to occur in personal and corporate income tax regression.

Chapter 5

CONCLUSION

In this concluding chapter, I integrate the results of my model with the economic and political tax landscapes described throughout the first and second chapters. Not only will this tie in my efforts with the literature, but it also will allow us to consider tax policy implications within the context of applied research. In enumerating the implications, I place special emphasis on the revenue impacts for California. Given the state's relatively narrow tax base many of the findings may be applicable to other states with similar tax structures. Furthermore, I give substantial consideration to e-commerce and means of mitigating its effects. The chapter closes with suggestions for future research. It is necessary to begin, however, with a discussion of how to properly interpret the final regression results.

Interpreting the Data

Our first step in making sense of the data is to interpret the results of the model. Moreover, it is often useful to consider the results of revenue models in terms of confidence intervals, as this metrics improve the means of assessing tax efficacy. As a reference, see Table 5.1, 5.2, and 5.3 below for the final coefficients, confidence intervals, and revenue estimates. I discuss these metrics in turn. Though I do not explicitly state it on every occasion, from this point forward all results and interpretations hold under conditions of *ceteris paribus* – or when holding all other included explanatory variables constant.

Coefficients

There are two appropriate interpretations for the service coefficients depending upon their magnitude. If the absolute value of the coefficient is greater than 0.1, a unit increase in the

service variable results in a percentage increase (or decrease) of SUT revenue equal to the product of the exponentiated value of X minus one and the change in base, or $[\Delta base \cdot (\exp(X) - 1)]$. If the absolute value is greater than 0.1, however, it is sufficient to adopt a more straight-forward interpretation, namely, a unit increase in the service variable results in a $(\Delta base \cdot X)$ percentage increase (or decrease) of SUT revenue.

Recall that the coefficients of a particular service industry reflect approximate revenue gains assuming that the state levies a tax on all the services – that is, 100% of the market – in that industry as defined by Table 3.1. Construction of the service data presumes an empty base initially, so the $\Delta base$ for the typical state with no pre-existing service base reflects full expansion – that is, from 0 (or 0%) to 1 (or 100%). Therefore, for a coefficient whose absolute value is greater than 0.1, a 100% increase in a service tax base from no services to all services results in a $[100 \cdot (\exp(X) - 1)]$ percent increase in SUT revenue. For example, for a typical state that does not tax any admission or entertainment services, $(|X| < 0.1)$, if they were to tax all of the ten services in that category, the yield would be about 9.7% in total SUT revenue. For utility services, $(|X| > 0.1)$, it would be about 14.7%.

However, if in case a typical state already has a tax base including services, the revenue returns of increasing the base would be equal to the difference between 1 (or 100%) and the extant base size multiplied by the coefficient. Consider a typical state that already has a utilities sales tax base that composes, say, 45% of the total utilities market as defined by Table 3.1. In this instance, $\Delta base$ is not 100, but rather 55, or a $[55 \cdot (\exp(X) - 1)]$ percent increase in SUT revenue, if the absolute value of the coefficient is greater than 0.1, or $(55 \cdot X)$ otherwise.

Within any particular state the coefficient values allow limited, but reasonable, comparison of policy implications. The 12.2% increase, for instance, in revenue stemming from a

unit increase in the tax rate is roughly half as much as the potential revenues gains were the tax base on leases and rentals increased 100% (26.1%) or roughly 1/27th as much were the tax base on professional services increased 100%. This narrow and unrefined interpretation suggests that a state could achieve some sense of fiscal efficiency by taxing, say, only professional services since its revenue potential yield is greater than the other services combined. Again, however, this assumes that the state in question (a) has a tax base accounted for in the model and (b) currently does not levy a tax on any services in either the lease and rental or the professional industry. The marginal revenue gains from an expanded service tax base decrease as the size of the base increases. In other words, the 12.2% increase due to a unit rate hike is roughly equal to the revenue gains in case the tax base of the total lease and rental service market increased from 50% to 100%. It is also worth noting that this analysis ignores the political dimensions of tax policy. A base expansion may yield more revenue, and, therefore, be economically justified, yet politics may preclude base expansion as viable policy as I noted has been the case for many states in the opening chapter.

With the understanding that coefficients alone are not the most accurate metric for assessing revenue impacts, Table 5.1 below displays estimated revenue impacts for California were the state to levy a tax on services. Additionally, non-significant coefficients are not credible estimators, and therefore their effects are indistinguishable from zero below the ninety percent confidence level. Thus, I only calculate estimated revenue for services above ninety percent. Since policymakers often measure success well below a ninety percent threshold, I estimate the revenue impacts for the typical state using a more relaxed standard in the next section.

The state tax rate (6.25%) and baseline revenue estimate ($32.67b) are from fiscal year 2006-2007 according to the *2008 California Statistical Abstract* (California Department of Finance, 2009, Table M-10).

Table 5.1 – California Sales Tax Revenue Estimates with Service Base Expansion

Industry	Coefficient	Current Taxed Market Size	ΔTaxed Market Size	Revenue Estimate
Transportation	.319***	0%	100%	$ 12.3b
Utilities	.137***	0%	100%	$ 4.80b
Admissions/ Entertainment	.097**	14.0%	86.0%	$ 2.72b
Leases/ Rentals	.232*	19.5%	79.5%	$ 6.78b
Professional	1.48**	0%	100%	$ 110.8b

***Significant at 99% level **Significant at 95% level *Significant at 90% level

Confidence Intervals

Confidence intervals provide an additional perspective of the data that aligns better with our everyday expectations of revenue performance. Revenue growth is neither static nor constant, and its ebb and flow is contingent upon a host of predictors not properly included in this research. Coefficients suggest exactness, but often what is more practical for policymakers are ranges of revenue that they should reasonably expect given a certain set of circumstances. The confidence intervals in Table 5.2 below provide this information.

The intervals are the product of the error margin and a given confidence level, which allows one to consider the range of revenue within a specified degree of certainty. I adopted a commonly accepted minimum confidence threshold of 90%, which means that 90% of the time the resultant revenue will fall within the range in question. Statisticians and economists have widely accepted the ninety percent threshold as a standard, but it may be too high for lawmakers. In practical terms, lawmakers may be happy with being correct two times out of three or two times out of four, which implies using thresholds of 66% and 50%, respectively. For example, with 66% confidence, given that all other variables remain unchanged, implementing a sales tax

on 100% of the transportation service market will yield $[100 \cdot (\exp(.261) - 1)]$ percent to $[100 \cdot (\exp(.337) - 1)]$ percent of the typical state's total sales tax. Furthermore, if a state already levies a tax on a certain percentage of a service market, we need to multiply the coefficient by the proposed base change first before computing the intervals.

Table 5.2 – Service Base Confidence Intervals

Industry	Coefficient	90% $t_c = 1.647$	66% $t_c = .969$	50% $t_c = .675$
Construction	.034	-.029 ↔ .097	-.003 ↔ .071	.008 ↔ .060
	(.038)			
Transportation	.319***	.220 ↔ .418	.261 ↔ .377	.279 ↔ .360
	(.060)			
Storage	-.097	-.326 ↔ .132	-.232 ↔ .038	-.191 ↔ -.003
	(.139)			
Utilities	.137***	.050 ↔ .224	.086 ↔ .188	.101 ↔ .173
	(.053)			
Personal	.185	.008 ↔ .378	.072 ↔ .298	.106 ↔ .264
	(.117)			
Computer	-.054	-.115 ↔ .007	-.018 ↔ -.090	-.079 ↔ -.029
	(.037)			
Admis./Ent.	.097**	.023 ↔ .171	.053 ↔ .141	.067 ↔ .127
	(.045)			
Business	-.008	-.071 ↔ .055	-.045 ↔ .029	-.034 ↔ .018
	(.038)			
Automotive	.094	-.023 ↔ .211	.025 ↔ .163	.046 ↔ .142
	(.071)			
Leases	.232*	.001 ↔ .463	.096 ↔ .368	.138 ↔ .327
	(.140)			
Repair	-.039	-.110 ↔ .032	-.081 ↔ .003	-.068 ↔ -.010
	(.043)			
Professional	1.48**	.502 ↔ 2.46	.904 ↔ 2.06	.1.08 ↔ 1.88
	(.594)			
FIRE	-.386	-1.11 ↔ .337	-.811 ↔ .039	-.682 ↔ -.090
	(.439)			

90%: $t_c = 1.647$ 66%: $t_c = .969$ 50%: $t_c = .675$
***Significant at 99% level **Significant at 95% level *Significant at 90% level

Narrowing the intervals by decreasing our confidence in the estimates also provides the advantage of giving many of the non-significant coefficients a positive range of effects. Though the estimates produced have a lower probability of occurrence, nevertheless, the values align better with our theoretical expectations of a base expansion. Despite trimming our confidence to the 50% level, however, some services remained negative – namely, storage, computer, business, repair, and finance, insurance, and real estate – which is not surprising consider their negative coefficient magnitudes. Thus, there is little policy value we can glean with respect to the revenue impact of taxing these services until future efforts root out the sources producing the statistical non-significance.

Note that the error margins for the statistically non-significant services either exceed or nearly exceed the coefficients. This has the unfortunate effect of making the ranges comparatively larger than the ranges for significant variables, which makes one extreme just as likely as the other. Thus, the larger the range of the confidence interval, the less accurate the expected value of a particular course of action will be. It is beholden upon the reader to instead interpret the confidence intervals for the non-significant coefficients conservatively and with skepticism. Table 5.3 lists the revenue estimates for California from Table 5.1 across the three considered interval levels. I have omitted the services enumerated above that failed to breach the positive range at the 50% confidence level.

Tale of Two Policies: Rate Increase or Base Expansion?

Since analysts and politicians often speak of sales tax base expansions in conjunction with rate decreases, it seems prudent to investigate the revenue returns of the hypothetical disjunction: rate increase or base expansion? One avenue of approach is to examine relative

Table 5.3 – California Sales Tax Revenue Interval Estimates with Service Base Expansion

α	Industry	Coefficient	ΔTaxed Market Size	Revenue Estimate
90%	Transportation	.319***	100%	\$4.81b ↔ \$20.2b
	Utilities	.137***	100%	\$1.63b ↔ \$11.1b
	Personal	.185	87.7%	\$229m ↔ \$19.5b
	Admis./Ent.	.097**	86%	\$646m ↔ \$7.7b
	Leases	.232*	79.5%	\$26.0m ↔ \$22.8b
66%	Automotive	.094	100%	\$817m ↔ \$8.03b
50%	Construction	.034	100%	\$261m ↔ \$1.96b
	Professional	1.48**	100%	\$31.6b ↔ \$213.4b

***Significant at 99% level **Significant at 95% level *Significant at 90% level

elasticities.

Elasticity is a ratio measure of the relative change in one variable with respect to a relative change in another variable. Generally, economists determine sales tax elasticity by comparing sales and use tax revenue against changes in income. For the present purposes, however, the intent is not to derive sales tax elasticity in general but rather to determine the elasticity of the constituent determinants that contribute to sales and use tax revenue given a tax base that includes a host of commonly consumed services.

In the simplest terms, elasticity falls into two categories: ratios equal or greater to 1 and ratios less than 1. If the ratio is of the former category, the relationship between the goods is elastic; if the latter, it is said to be inelastic. Using sales tax relative to consumer income as an example, an elastic revenue system is one in which raised revenue increases faster than income. That is, the marginal change in sales and use tax revenue outpaces the marginal change in consumer income. Likewise, an inelastic system is one in which income increases faster than revenue. If we assume that the government's main goal is to raise as much revenue as possible

(ignoring all other considerations such as equity), an elastic sales tax policy is preferred over an inelastic one, and if an elastic policy is unreachable, an inelastic policy closer to 1 is preferred over one that is further.

The elasticities calculated here do not reflect a relationship between consumer income and service consumption, but rather the relationship between total sales and use tax revenue and service base size. The elasticity of a particular service industry for the typical state is a product of the service's coefficient and its mean market size. Properly speaking, the elasticities herein do not measure relative changes in revenue with respect to tax base expansions explicitly. Rather, it measures relative changes in revenue with respect to changes in the market size of the taxed service base. This implies that sales tax revenue increases could either be the product of a base expansion with the service market volume remaining unchanged, an in increase (or contraction) of market volume with base expansion remaining unchanged, or some combination of both. Reviewing the elasticities of the services in Table 5.4, then, the correct interpretation is that a 1% increase in, say, the transportation services market volume – and not necessarily the amount of services taxed in the transportation industry – yields a .007% increase in sales and use tax revenue as evaluated at the mean transportation service base.

It is apparent that all services considered are inelastic. Interestingly, most of the services move similarly with respect to revenue with the notable exception being lease and rental services. This suggests that leases and rentals offer a more stable revenue source than the other services. Furthermore, even though the previous coefficient analysis showed that taxing professional services could potentially return the largest total amount of additional sales tax revenue, the elasticity analysis shows that the revenue potential is unstable.

If we consider the number of services captured in each industry, the elasticities for transportation and utilities are appealing; both industries contain fewer services in their base than

personal services, business services, professional services, and finance, yet their elasticity is comparable if not higher. This state of affairs highlights the importance of determining the size of the taxable market prior to estimating revenue generation. Failure to do so will not only imply that all services in a particular category have equal market share, which is false, but will also grossly exaggerate tax elasticity.

Armed with this background, we are in a position to better answer the disjunction. It is clear from Table 5.4 that the tax rate elasticity exceeds all of the considered service base variables substantially; a one percent increase in the rate yields a .634 percent increase in sales and use tax revenue. In fact, the sum of the service base elasticities (.488) still fails to exceed the returns of a rate increase. Based on the premise that revenue yield is the primary criterion of tax policy, tax rate increases offer a larger short-run return than do base expansions. It may turn out that long-run yields favor base expansion over rate increases; the present study is silent on this point. Additional research is necessary to uncover reasonable long-run yields of both policy options in order to reach a more informed decision.

Table 5.4 – Elasticities of Service Base Variables and Tax Rate

Industry	Coefficient	Mean	Elasticity
Construction	.034	.193	.007
Transportation	.319***	.075	.024
Utilities	.137***	.555	.076
Personal	.185	.204	.038
Admis/Ent	.097**	.65	.063
Automotive	.094	.433	.041
Leases	.232*	.917	.213
Professional	1.48**	.008	.012
FIRE	-.386	.036	.014
Tax Rate	.122***	5.2	.634

***Significant at 99% level **Significant at 95% level *Significant at 90% level

Services in Context: An Evaluation Matrix

We can use the revenue estimates above to help evaluate the worthiness of taxing a particular service. The most-straightforward means of doing this is to employ an evaluation matrix. The main purpose of the matrix is to place the potential revenue returns in the larger context of political feasibility, compliance costs, and regressivity. I judge each service against these criteria and award a justified value between one and eight. I then allocated weights to each value based upon my subjective assessment of the data contained in this research; compliance cost and regressivity received negative weights. After multiplying the value of each criterion against its weight and finding the aggregate, I multiplied the criteria score by the revenue estimates. We can then use the resultant adjusted total score to compare the worthiness of services against each other. It should be apparent that the reader should not interpret the matrix as applied science, but merely as an educated opinion. Table 5.5 displays the evaluation matrix.

The three criteria selected appear to be the most common concerns vocalized by tax policy experts as detailed in Chapter 2. The political failures Florida, Massachusettes, Texas, and others experienced highlight the importance of considering if California's political landscape is ripe for this type of reform. I found it important, however, to divide the political feasibility criterion into two subcomponents, namely, California political feasibility and other states political feasibility. It is not uncommon for politicians, analysts, and educators to argue that California should tax a particular service simply because a preponderance of other states do as well. It is an unimaginative and spurious argument, for political feasibility does not hold true across states; what is possible in Wisconsin may not be in Nevada, and so on. However, if large contingents of other states levy a tax on a service, it does provide political traction for other states similar to the snowballing effect experienced when nearly all states adopted an income and sales tax during and

following the Great Depression. Therefore, it makes sense to have two disparate criteria for inter-state and intra-state feasibility.

I determined the value of each criterion by consulting data from various sources. I judged the regressive impact of a particular tax, for instance, using the Consumer Expenditure Survey

Table 5.5 – Evaluation Matrix

	Transportation		Utilities		Personal		Admis./Ent.	
	Weight	Value	Weight	Value	Weight	Value	Weight	Value
Gross Revenue		7.18		1.63		.229		.646
CA Feasibility (+)	0.1	7	0.0625	3	0.125	6	0.0625	2
Other Feasibility (+)	0.25	2	0.125	6	0.025	4	0.075	7
Compliance (-)	0.05	7	0.05	1	0.1	6	0.05	2
Regressivity (-)	0.25	7	0.25	8	0.125	5	0.125	6
Adjusted Score		3.43		(0.99)		(0.95)		(0.24)

	Leases		Professional		Automotive		Construction	
	Weight	Value	Weight	Value	Weight	Value	Weight	Value
Gross Revenue		0.026		31.6		0.817		0.261
CA Feasibility (+)	0.4	8	0	1	0.125	5	0.125	4
Other Feasibility (+)	0.025	8	0.375	1	0.1	5	0.025	3
Compliance (-)	0.05	3	0.6	8	0.05	4	0.05	5
Regressivity (-)	0.0625	1	0.0625	4	0.0625	3	0.0625	2
Adjusted Score		0.07		(9.24)		0.62		(0.17)

(CES) compiled by the Bureau of Labor Statistics (2008). The CES polls individuals about their spending habits and income levels, and then analysts break down these patterns by income quintiles. If lower quintile earners spend a higher proportion of their income on the particular service than do the higher quintiles, the tax is regressive. A cursory glance at the CES revealed that lower quintiles spend a higher percentage of their income on utilities and transportation services. Thus, these services received values of eight and seven, respectively.

For the political feasibility criteria, I consulted Table 1.3 to determine how many services in a particular industry California currently taxes and the average number of states that also tax it. Service industries that presently incur many taxes received higher values. Interestingly, all of the states under consideration tax some composition of the lease and rental industry. This suggests that because a substantial tax base already exists that expanding it within the industry is easier than expanding it to include other currently non-taxed industries.

Evaluating compliance costs for each service is complicated. Taxpayers would like to enjoy more than a dollar worth of benefits for every dollar of tax paid. We may be more inclined to pay a higher gas tax, for instance, if we knew the money would repair the freeway we drive everyday to work. Overtime the utility we derive from driving a well-maintained highway exceeds the burden of the tax. However, taxpayer expectations frequently ignore the costs associated with collecting and disbursing tax funds to their intended ends. A taxpayer may expect more than a dollar worth of benefits for every dollar paid, but administering the tax eats up a portion of each dollar. This implies that to enjoy a dollar worth of benefits, a taxpayer must pay more than $1 in taxes. A similar analysis holds for prices of goods and services from private businesses; the added burden of compliance for businesses will increase the cost of consumables. Economists call the amount allocated for administration “dead-weight loss”, and it stands as a moral imperative to minimize its incidence.

It is unlikely that California, or any typical state, would enjoy any of the higher range revenue estimates listed in Table 5.3 because of significant dead-weight loss (Brunori, 2005, p. 64). The experiences of other states offer one line of justification for this assertion with Florida's 1987 experience being especially enlightening. As written, the law vaguely stipulated that multistate businesses self-accrued and remitted all use tax to the Department of Revenue based on "the extent to which their benefit is enjoyed in Florida" and that Florida service providers "selling to purchasers without any nexus are absolved from collecting the tax if the purchase executes an affidavit stating that the purchaser has no Florida nexus or obtains an exempt purchase permit" (Senate Finance, Tax, and Claims Committee, 1987, p. 2). Additionally, the law allowed for fifty-eight special exemptions as well as a host of provisions detailing specific nexus and tax reporting conditions for nine other services. Yet many businesses claimed that even if they were reasonably able to determine if their trade fell into any of the number of exemptions or provisions it would not change the fact that accounting systems did not allow for the type of coding necessary to determine total services purchased and sold. Moreover, businesses also claimed they would incur enormous expenses simply to update accounting software to properly categorize apportionable or allocable tax (Francis, 1988, p. 138). More recent compliance studies have found these concerns to be with merit, as businesses regularly report that their largest contingent of expenses is due to distinguishing between taxable and non-taxable goods and services (Merrill *et al*., 2006, p. 3).

On the state's end, the dead-weight loss associated with a tax generally comes from administration and legal costs. Administratively, Florida added two-hundred forty new positions to the Department of Revenue at an initial annual budget of $6 million, which compared to the $1.3 billion predicted by the legislators certainly seems extremely efficient. Indeed, the administration-cost-to-revenue ratio is about .46 percent. However, Fox and Murray (1988, p. 32) determined that administrative costs for other states may deviate from Florida's experience and

fall with the .75 to 1 percent range. Part of this increase, they feel, will stem from additional legal action that will require administrators to perpetually update policy and regulations, which inexorably begins to augment to the magnitude of the dead-weight loss. Given the litigious disposition of Californians in conjunction with a severely over-burdened court system, it is not unreasonable to stipulate that the potential costs would easily exceed one percent.

Unfortunately, there are no estimates of the costs Florida incurred due to recurrent lawsuits. What is evident, though, is that nearly all professional service industries threatened with a tax filed a lawsuit. The Florida Bar sued arguing that the tax on attorneys was unconstitutional since it restricted citizen access to the courts; newspaper firms sued arguing that the tax violated the First Amendment because it was discriminatory against the press; private out-of-state businesses sued arguing violations of Due Process and Commerce Clauses. Because the legislature repealed the tax six months after it began, there is no way of knowing how much of a drain on the court system these lawsuits would have become. It does suggest, though, that taxing professional services more than any other industry will result in the highest compliance costs.

According to the matrix, transportation services, leases and rental services, and automotive services (excluding labor) are the best options for base expansion. Unsurprisingly, professional services are the least efficient source of revenue. In light of transportation service's high rating, it is prudent to note that the matrix does not consider overall economic impact of base expansion. Many lease and rental and automotive services are inelastic; the consumers that regularly participate in these markets will not overhaul their demand pattern despite the small price increase presumably. However, transportation services, as defined in this research, include services (i.e. intra-state courier services) that can have broad economic impact beyond a disaggregated market of consumers. For instance, the increase in price may dissuade some firms from delivering to the state or re-routing transports to more tax-friendly destinations. There is no

sound way to account for this impact, so I did not include it. Were I to have sufficient faith in the metrics of a macro-economic cost criterion and included it, certainly transportation would cease to be a worthwhile option for base expansion.

Policy Implications

The background provided in this chapter offers a canvas with which to consider the manifold policy implications of the current project. For the sake of discussion, I assume the noted alternatives to collect sales tax from internet transactions are untenable, and, therefore, the only means of satisfying revenue, efficiency, and equity demands are through careful manipulation of preexisting tax components including, though not limited to, rate, base, and administration.

Revenue and Shifting Demographics

As the landscape of population demographics shift towards increasing numbers of seniors, the stability of California's current sales and use tax structure will decline. Indeed, the detrimental effects extend beyond simple increases in adult population, for today's internet-savvy adults are tomorrow's internet-savvy seniors, a current segment of society that is averse to participating in e-commerce (Akhter, 2003). In time, as demographics across the board become more comfortable with internet transactions, e-commerce sales and use tax liabilities will drastically increase. A recent forecasting study on e-commerce revenue loss by Bruce *et al.* (2009) supports this assertion; they determined that California stands to miss out on approximately $1.25b in 2009 and $2.11b by 2012. However, as it turns out, I think the loss by 2012 will be greater than this projection, assuming that tax policy does not change in the intervening time. In actuality, the current senior population acts as a hedge against revenue loss,

but eventually an internet-savvy older generation will replace the present internet-averse older generation; the buffer against loss will wane and then disappear entirely.

Local Impacts of Base Expansion

There are at least two major political hurdles which have received sporadic, yet insufficient, attention in scholarly literature were the tax base indeed expanded in California: the impact to local financing and the impact to land use development.[11] The former problem arises from the current Bradley-Burns sales tax system that reallocates 1% of the base state sales tax rate to local jurisdictions where the sale occurred. Because current Board of Equalization regulations allow for corporations to establish a single place of business where no physical goods are delivered to the consumer, but rather only where the negotiating and final sale take place, the region that serves as the single point of sale receives revenue for sales occurring throughout the state. Actual delivery of goods may occur in other jurisdictions, but only those localities in which sales agreements conclude reap the revenue.[12]

This state of affairs creates a strong incentive for local governments to lure businesses away from other cities and counties. And, indeed, California cities appear to use sales tax rebates as the primary incentive to attract businesses. For example, the City of Fillmore recently established a relationship with a consultation firm where the city promises to pay the firm 85% of the 1% Bradley-Burns rebated dollars from business they brought into the city that generated revenue. The City of Livermore filed suit against Fillmore for using this practice for luring business from the former jurisdiction to the latter (Schifanelli, 2008). Other California cities with established revenue sharing policies include Corona, Huntington Beach, Los Angeles, Manteca,

[11] Lewis and Barbour (1999) nicely cover the impact of retail sales tax on land use planning by local jurisdictions, one of the few research pieces on the topic. See Chapter 4, pp. 67-80 especially pp. 71-77.
[12] The sale of jet fuel is an exception to this rule. Monies from the sale of jet fuel are allocated to the jurisdictions where the fuel is delivered.

Oakland, Sacramento, San Francisco, and Tracy. The City of Modesto recently created revenue sharing deals with multiple petroleum corporations including General Petroleum, Maxum Petroleum, Boyett Petroleum, and Breshears Petroleum. Under the deal with General, the company will receive 65% of its sales tax back if its revenues exceed $25 million a quarter with the balance going to the city to fund various projects and services (Ashton, 2008).

Though revenue sharing allows jurisdictions to increase budget allocation for education and human services programs, unproductive competition between cities is often the result. California's Legislative Analyst Office (2008) describes the problem aptly:

> The main result of the various incentives offered to the business is simply a relocation of the retail activity from one community to another—with no net gain in economic output or efficiency to the region or state as a whole. In addition, the cost of the economic incentives drain local government resources that otherwise would be available for public purposes.

Given widespread budget deficits across the state, it should not be surprising if revenue sharing deals become an established norm of local financing in the future. However, recently enacted legislation is intended to ensure that revenue sharing is severely limited if not eliminated completed. Assembly Bill (AB) 697 signed into law effective October 1, 2008 precludes cities and corporations from consolidating sales offices into a single jurisdiction for the sole purpose of receiving rebated sales tax. Indeed, some noted that Modesto rushed through the approval process of its revenue sharing deal with the petroleum companies in order to beat the effective date of AB 697 (Modesto Bee, 2008). Yet, the drafted language is sufficiently vague to the point where legal interpretations will allow revenue sharing to continue.

The second political hurdle arises as a corollary of the first. In order to attract the retail businesses, cities and counties must plan land use accordingly. The desire to attract sales tax generating businesses leads to inefficient land use policy; local leaders give priority of the best land to retail development rather than housing, schools, parks, state-use, or federal-use projects

(Legislative Analyst Office, 2008). Moreover, this reduction in supply increases the cost of land, a consequence which presents itself as a negative externality affecting the state and taxpayers.

These issues have only applied to retail businesses selling tangible goods since mostly tangible goods heretofore are taxable; however, the expansion of the sales tax base to include services will only exacerbate these problems. Moreover, AB 697 applies only to retailers, yet it is uncertain if this refers to retailers of tangible goods as well as service providers. Since most of the service transactions taking place in California are business-to-business services and not business-to-customer, presumably any service provider falling into this category could easily consolidate a sales office into a single jurisdiction for benefit of rebated sales tax (this assumes that at least some business-to-business services are taxable). Collaboration between state and local governments is necessary in order to mitigate the negative effects of these issues. Failure to do so will undoubtedly result in local governments continuing to participate in unproductive competition at the expense of taxpayers.

Timing and Tax Rate

The past experience of other states as well as California affords a rich opportunity to evaluate the economic conditions under which it is not advisable to attempt a base expansion. Texas and Florida both turned to a tax on services in the 1980's to save them from deficits, yet it failed in both cases. In the case of Texas, the tax failed to meet the revenue forecasts for various reasons already considered (Hamilton, 1988); Florida's failure came at the hands of an impressive and well-implemented public anti-tax campaign. Minnesota and Massachusetts tried in the 1990's and failed. New Jersey had a short-lived broad tax on services and Maryland repealed its sales tax on computer services before the implementation date. All of the legislatures championed the reform as solutions to budget deficits. Failed attempts in California in 2003 following the

recession the previous year only reinforce the assertion that economic downturns are not conducive to tax base expansions, regardless if it in fact is a solution to budget deficits.[13]

In all of these instances noted above, legislatures eventually increased the tax rate rather than expand the base, which suggests that the latter is more politically attractive and logistically feasible. Revenue-wise, the current research supports the experience of Texas that a rate increase will generate more funds than most combinations of services in a base expansion, holding all else equal; though, the compromise appears to be an exacerbation of fiscal instability. In light of California's enormous deficit, the Governor approved a rate increase to 8.25% as opposed to base expansion. Whether by design or coincidence, the decision falls neatly in sync with past experiences, and presumably saved the state from a costly tax experiment.

Capturing Revenue from E-commerce

The effect of the internet on the relationship between population and sales tax revenue for states with a narrow base is staggering. Plugging the internet revenue sieve may go a long way to making the debate of base expansion moot. Implementing policy to reduce California's $2b use tax liability gap (California Board of Equalization, 2007, p. 3), though, has proven difficult if not simply impractical thus far. Indeed, because regulating the internet is not a practical policy solution in the U.S., and because any business without substantial nexus in a particular state is not required to remit any sales tax (see *Quill Corp. vs. North Dakota*, 1992), state governments have generally been at a loss on how to capture the revenue (Hellerstein and Swain, 2005, p. 1). Despite the obstacles, though, the last five years have seen the rise of two creative and prescient policy options which may aid California in collecting taxes from e-commerce transactions. The

[13] Interestingly, Florida exists as the only instance known by the author to attempt a tax on services under auspicious economic conditions. The policy still failed. See Nabors (2002).

first is to join the Streamlined Sales Tax Project, a multi-national tax movement; the second is to redefine an out-of-state company's nexus conditions.

Streamlined Sales Tax Project

The Streamlined Sales Tax Project (hereafter, SSTP or Project) has sought to bring state governments together to overcome administrative obstacles by implementing a uniform sales tax code. Membership in the Project also requires states to collect and remit sales tax on internet commerce destined outside of their jurisdiction, yet reviews of California joining the Project have been mixed. Proponents of California membership are quick to point out the flaws in depending on 1933 tax standards that do not apply as easily in an economy dependent on cyberspace (California Tax Reform Association, 2005). Tax policy for the new economy should reflect consumer behavior. If a state taxes tangible goods such as CDs or DVDs are taxed, then they should also downloaded music and movies; likewise with movie rentals and movie admission tickets (Chu, 2008b). Joining the Project would allow California to better adjust their revenue source to the changing economy.

However, Lenard and McGonegal (2005) argue that internet shoppers are extremely price sensitive and additional charges such as shipping and taxes on purchases greatly influence from where a customer buys their goods (p. 21). Thus, states that impose no sales tax – Alaska, Delaware, Montana, New Hampshire, and Oregon – do not benefit from joining the Project and consequently would enjoy an economic competitive advantage over states that do join. Their research further indicates that about 24% of the $123b in annual remote sales – or $29b – would shift to zero-sales-tax states (p. 22). Furthermore, Readmond (2005, p. 2) notes that joining the Project removes a state's autonomy to shape their own tax code. Prior to joining the Project, Minnesota, for example, only taxed the price of the good, not shipping, handling, or postage.

After joining the SSTP, Minnesota was required to collect taxes on the shipping, handling, and postage as well for all in-state and out-of-state purchases. Furthermore, membership in the SSTP requires a state to change their tax law to be more uniform with other member states. California's Board of Equalization notes that conforming to many of the provisions of the Project would require revision to most, if not all, of the state's Revenue and Taxation Code (Board of Equalization, 2006). For most of these reasons, California has refused to seek active membership with the group.

Redefining Nexus Conditions

A second alternative method would see the state legislature expand the conditions for nexus fulfillment. Under the Commerce Clause in the Constitution, and reinforced by *Quill*, a state can only collect taxes from a transaction if there is sufficient evidence that the transaction occurs within the state's taxing jurisdiction. A business can usually satisfy this condition by having a physical presence within the jurisdiction, or if the state establishes that an out-of-state company has agents acting on the company's behalf within the state (see *Borders Online v. California Board of Equalization*, 2005).

Recent legislation – dubbed the "Amazon tax" – enacted in New York serves as a case study in applying this reform option. In order to collect sales tax from e-commerce giant Amazon.com, who does not have a physical presence in the state, New York law as of June 1, 2008 stipulates that nexus is satisfied if the affiliates of an online retailer have a physical presence and if they also provide the seller with over $10,000 worth of business annually. Out-of-state businesses which fail to properly remit sales taxes to New York risk audits and billing for back taxes. The state Supreme Court dismissed a lawsuit filed by Amazon.com and Overstock.com to stop the tax in January 2009 (Soltis, 2009).

Analysts estimate that New York's new tax policy could generate $50 million a year in revenues, barely a fraction of the state's $26 billion budget deficit (Hansell, 2008). The relative scant returns of the policy have left some wondering about the net cost of implementing the program itself or whether the policy has a chance at life in California. Pieler (2008) notes that chasing every theoretically collectible dollar always costs more revenue than it gains, an argument echoed by California's Board of Equalization (2007, p. 3). Meanwhile, the Board of Equalization concedes that New York law sufficiently differs from California law to prevent enacting the policy unless the legislature makes certain legal amendments most notably to the nature of rebuttal presumptions. Businesses in New York must prove to the state the absence of nexus else it is assumed that all businesses have it; this presumption does not exist in California. Furthermore, though the California legislature passed an Amazon tax in early 2009, Governor Schwarzenegger vetoed the legislation stating that

> After passing the largest tax increase in California history, it makes absolutely no sense to go back to the taxpayers to solve the current shortfall - that's why yesterday I vetoed the majority vote tax increase passed by the legislature. am pleased to announce Overstock.com has reversed its decision and will continue to do business with affiliates here in California. I will continue to fight to keep jobs and businesses in California (Office of the Governor of California, 2009).

The veto, however, does not suggest that the tax is unpopular in general, but simply that the timing of its implementation is unpopular.

Suggestions for Future Research

Throughout the paper I have made mention of the numerous limitations of the employed model as well as the appropriate qualifications necessary to properly understand the results. These limitations and qualifications provide ample room to further study the relationship between sales and use tax revenue and services. For instance, a more thorough dataset including specific services rather than simply categories of services would offer a much clearer picture of the

contributory effects of a particular service base. Moreover, composite datasets which include states with low and high numbers of taxable services often make unbiased results catered to a particular state impossible. Thus, while the results show a high degree of confidence in the relationship between admission and revenue, it does so relative to all the states put together, not one individual state or even like states. A better understanding of state-specific effects would require studying only those states that are relatively similar in consumption habits, rate, tax base, and revenue. A third avenue of research that I think would be worthwhile is an extension of work carried out by Bruce *et al.* (2006), but rather than looking at long-run and short-run elasticities of a state's current sales tax, project what the respective elasticities would be in case of base expansion. Lastly, the implementation of certain policies that deviate dramatically from their predecessors often force administrative bodies to shift their attention quickly and often haphazardly, which creates organizational instability and effectively puts an administration at a logistical disadvantage from the word "go". It would be extremely intriguing to determine the profile of a tax administrative body that is able to adjust methodically and smoothly to tax policy shocks.

APPENDIX A

Elasticity of Sales Tax with Base Expansion Excluding Housing and Medical

Annual Elasticities of Sales and Use Tax Revenue and Disposable Personal Income

	SUT (in thousands) [R]		DPI (in millions) [Y]
1991	$ 17,582,575.00	1991	$ 583,635.00
1992	$ 16,611,816.00	1992	$ 618,161.00
1993	$ 16,204,633.00	1993	$ 627,594.00
1994	$ 16,283,952.00	1994	$ 646,814.00
1995	$ 17,525,022.00	1995	$ 673,964.00
1996	$ 18,434,781.00	1996	$ 704,752.00
1997	$ 19,554,527.00	1997	$ 740,458.00
1998	$ 21,011,061.00	1998	$ 800,228.00
1999	$ 23,457,385.00	1999	$ 840,397.00
2000	$ 24,298,292.00	2000	$ 908,421.00
2001	$ 23,816,406.00	2001	$ 949,844.00
2002	$ 24,899,025.00	2002	$ 1,001,232.00
2003	$ 26,505,911.00	2003	$ 1,042,151.00
2004	$ 29,957,136.00	2004	$ 1,112,900.00
2005	$ 32,199,800.00	2005	$ 1,166,007.00
2006	$ 27,445,000.00	2006	$ 1,247,072.00
2007	$ 27,100,000.00	2007	$ 1,303,723.00

1991-2007	
%ΔR =	0.426
%ΔY =	0.763
E =	0.558

Annual Elasticities of Sales and Use Tax Revenue and Disposable Personal Income
(with sales tax base expansion)

SUT (in thousands) [R]			DPI (in millions) [Y]		
1991	$	26,951,395.00	1991	$	583,635.00
1992	$	26,837,979.75	1992	$	618,161.00
1993	$	27,111,673.00	1993	$	627,594.00
1994	$	27,861,522.00	1994	$	646,814.00
1995	$	29,669,210.00	1995	$	673,964.00
1996	$	31,485,540.75	1996	$	704,752.00
1997	$	33,574,571.50	1997	$	740,458.00
1998	$	36,040,969.25	1998	$	800,228.00
1999	$	39,737,035.00	1999	$	840,397.00
2000	$	42,073,343.25	2000	$	908,421.00
2001	$	42,412,500.00	2001	$	949,844.00
2002	$	44,134,656.75	2002	$	1,001,232.00
2003	$	46,768,596.00	2003	$	1,042,151.00
2004	$	51,541,196.00	2004	$	1,112,900.00
2005	$	55,151,425.00	2005	$	1,166,007.00
2006	$	51,716,062.50	2006	$	1,247,072.00
2007	$	52,795,125.00	2007	$	1,303,723.00

1991-07	
$\%\Delta R =$	0.648
$\%\Delta Y =$	0.763
$E =$	0.849

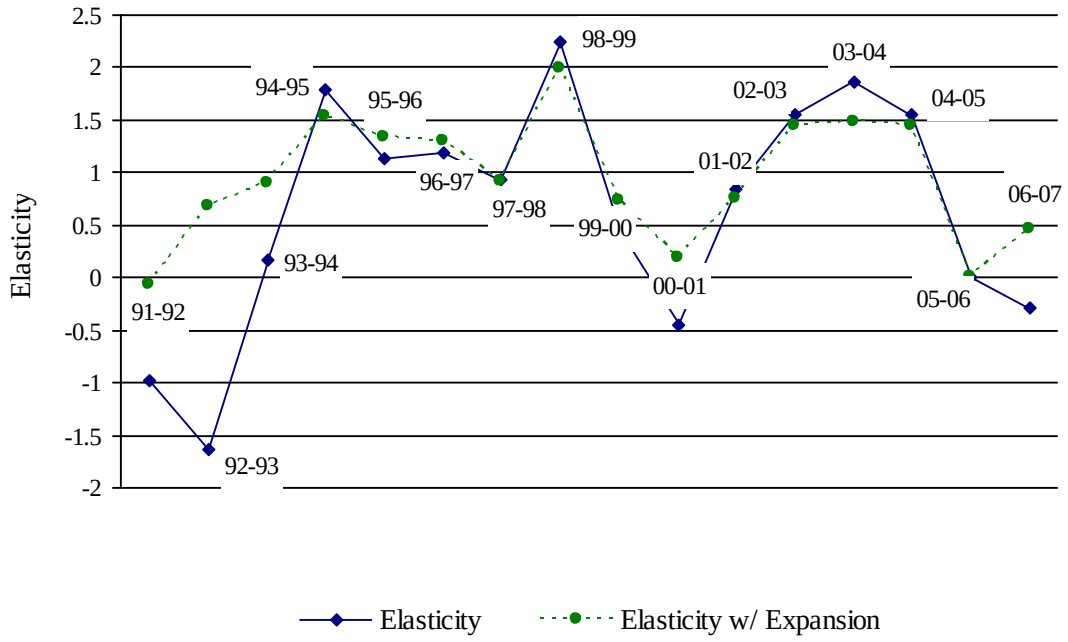
Sources:
California Statistical Abstract [SUT revenue]
California State Budget [2008-09 SUT revenue]
U.S. Department of Commerce, Bureau of Economic Analysis [disposable income]

Tax Base Expansion Revenue

	Services ex. Housing and Medical - National (in billions)	CA Population as Percentage of U.S. Population	Consumed Services as Percentage of CA Population (in billions)	Revenues from Tax on Services at 7.75% (in thousands)
1991	1007.4	12.0%	120.89	$ 9,368,820.00
1992	1090.5	12.1%	131.95	$ 10,226,163.75
1993	1172.8	12.0%	140.74	$ 10,907,040.00
1994	1244.9	12.0%	149.39	$ 11,577,570.00
1995	1316.8	11.9%	156.70	$ 12,144,188.00
1996	1415.1	11.9%	168.40	$ 13,050,759.75
1997	1520.2	11.9%	180.90	$ 14,020,044.50
1998	1629.7	11.9%	193.93	$ 15,029,908.25
1999	1750.5	12.0%	210.06	$ 16,279,650.00
2000	1895.5	12.1%	229.36	$ 17,775,051.25
2001	1966.8	12.2%	239.95	$ 18,596,094.00
2002	2017.9	12.3%	248.20	$ 19,235,631.75
2003	2108.5	12.4%	261.45	$ 20,262,685.00
2004	2246.0	12.4%	278.50	$ 21,584,060.00
2005	2369.2	12.5%	296.15	$ 22,951,625.00
2006	2505.4	12.5%	313.18	$ 24,271,062.50
2007	2652.4	12.5%	331.55	$ 25,695,125.00

Source:
U.S. Dept. of Commerce
Bureau of Economic Analysis
California Statistical Abstract

Estimated Annual Elasticity of Current SUT
with Service Base Expansion and Without, 1991-2007



APPENDIX B

Service Base Data

Table 1.3 - Services Subject to Sales Tax in California and Other States as of 2007

Industry	Service	Does CATax?	Other States that Tax
Construction	• Carpentry, painting, plumbing and similar	N	13
	• Construction service (grading, etc.)	N	12
	• Water well drilling	N	10
Transportation	• Intrastate transportation of persons	N	11
	• Income from taxi operations	N	8
	• Intrastate courier service	N	7
Storage	• Food storage	N	10
	• Household goods storage	N	13
	• Mini-storage	N	14
	• Cold storage	N	13
	• Marina (docking, storage, cleaning, repair)	N	17
	• Marina towing services (incl. tugboats)	N	8
	• Travel agent services	N	4
	• Packing and crating	N	10
Utilities (residential)	• Intra- and interstate telephone & telegraph	N	41
	• Cellular telephone services	N	44
	• Electricity	N	22
	• Water	N	12
	• Natural gas	N	22
	• Sewer and refuse	N	11
Finance, Insurance and Real Estate (FIRE)	• Service charges of banking institutions	N	3
	• Insurance services	N	6
	• Investment counseling	N	6
	• Loan broker fees	N	3
	• Sales agents (real estate or personal)	N	5
	• Real estate management fees (rental agents)	N	5
	• Real estate title abstract services	N	8
Professional	• Accounting and bookkeeping	N	5
	• Architects	N	5
	• Attorneys	N	5
	• Dentists	N	4
	• Engineers	N	5
	• Land surveying	N	7
	• Medical test laboratories	N	4
	• Nursing services out-of-hospital	N	4
	• Physicians	N	4

Table 1.3 - Services Subject to State Tax in California and Other States as of 2007 *(cont.)*

Industry	Service	Does California Tax?	No. of Other States that Tax
Personal	• Barber shops and beauty parlors	N	7
	• Carpet and upholstery cleaning	N	19
	• Diaper service	N	23
	• Income from funeral services	N	13
	• Garment services (altering & repairing)	N	20
	• Gift and package wrapping service	Y	21
	• Health clubs, tanning parlors, reducing salons	N	22
	• Laundry and dry cleaning, coin-op	N	6
	• Laundry and dry cleaning, non-coin op	N	22
	• Massage services	N	11
	• Shoe repair	N	20
	• Swimming pool cleaning & maintenance	N	17
	• Tax return preparation	N	6
	• Tuxedo rental	Y	38
	• Water softening and conditioning	N	13
Business	• Billboard advertising	N	4
	• Radio & television, national advertising	N	2
	• Advertising agency fees (not ad placement)	N	11
	• Armored car services	N	16
	• Check & debt collection	N	8
	• Commercial art and graphic design.	Y	23
	• Commercial linen supply	N	33
	• Credit information, credit bureaus	N	13
	• Employment agencies	N	10
	• Interior design and decorating	N	11
	• Maintenance and janitorial services	N	19
	• Exterminating (includes termite services)	N	21
	• Photocopying services	Y	43
	• Photo finishing	Y	44
	• Private investigation (detective) services	N	16
	• Secretarial and court reporting services	N	8
	• Sign construction and installation	Y	31
	• Telemarketing services on contract	N	6
	• Telephone answering service	N	20
	• Temporary help agencies	N	10
	• Test laboratories (excluding medical)	N	8
	• Tire recapping and repairing	N	28
	• Window cleaning	N	19
Fabrication, Installation and Repair	• Labor charges on repairs to motor vehicles	N	21
	• Labor on electronic equip repair	N	24
	• Labor charges repairs tangible property	N	24

Table 1.3 - Services Subject to State Tax in California and Other States as of 2007 (cont.)

Industry	Service	Does California Tax?	No. of Other States that Tax
Admission and Amusements	• Pari-mutuel racing events.	N	29
	• Amusement park admission & rides	N	36
	• Billiard parlors	N	27
	• Bowling alleys	N	27
	• Circuses and fairs -- admission and games	N	34
	• Admission to college and/or professional sports events	N	22
	• Membership fees in private clubs.	N	23
	• Admission to cultural events	N	31
	• Pinball and other mechanical amusements	N	19
	• Rental of video tapes for home viewing	Y	45
Leases and Rentals	• Personal property, short and long term (generally)	Y	45
	• Bulldozers, draglines and const. mach., short and long term	Y	45
	• Automobile rental	Y	48
	• Limousine service (with driver)	N	16
	• Aircraft rental to individual pilots, short term and long term	Y	40
	• Chartered flights (with pilot)	N	9
	• Hotels, motels, lodging houses	Y	49
	• Trailer parks - overnight	N	29
Computer	• Software - package or canned program	N	47
	• Software - modifications to canned program	N	29
	• Internet Service Providers-Dialup, DSL, or other	N	12
	• Information services	N	13
	• Data processing services	N	9
Automotive	• Automotive washing and waxing.	N	21
	• Auto service. except repairs, incl. painting & lube	N	25
	• Parking lots & garages	N	21

Source: Federation of Tax Administrators (2008)

Table 3.1 – Services by Category

Note: an * denotes use of 2002 economic census employment data.

Industry	NAICS	Service Type
Construction	238*	• Carpentry, painting, plumbing and similar trades
	23593	• Construction service (grading, excavating, etc.)
	23581	• Water well drilling
Transportation	485	• Income from intrastate transportation of persons
	48531	• Income from taxi operations
	492	• Intrastate courier service
Storage	49313	• Food storage
	49311	• Household goods storage
	53113	• Mini-storage
	49312	• Cold storage
	71393	• Marina Service (docking, storage, cleaning, repair)
	48833	• Marina towing services (incl. tugboats)
	56151	• Travel agent services
	488991	• Packing and crating
Utilities (residential)	5171*	• Intra- and interstate telephone and telegraph
	51721*	• Cellular telephone services
	2211	• Electricity
	22131	• Water
	48621/22121	• Natural gas
	22132/562	• Sewer and refuse
Finance, Insurance and Real Estate (FIRE)	522	• Service charges of banking institutions
	524	• Insurance services
	52392/3	• Investment counseling
	52231	• Loan broker fees
	5312	• Property sales agents (real estate or personal)
	5313	• Real estate management fees (rental agents)
	541191	• Real estate title abstract services

Table 3.1 – Services by Category (*cont.)*

Personal	812111/2	• Barber shops and beauty parlors
	56174	• Carpet and upholstery cleaning
	812331	• Diaper service
	81221	• Income from funeral services
	81149	• Garment services (altering and repairing)
	5619	• Gift and package wrapping service
	81219	• Health clubs, tanning parlors, reducing salons
	81231	• Laundry and dry cleaning services, coin-op
	81232	• Laundry and dry cleaning services, non-coin op
	81299	• Massage services
	81143	• Shoe repair
	56179	• Swimming pool cleaning and maintenance
	541213	• Tax return preparation
	53222	• Tuxedo rental
	56199	• Water softening and conditioning
Business	54185	• Billboard advertising
	54184	• Radio and television, national advertising
	54181	• Advertising agency fees (not ad placement)
	561613	• Armored car services
	56144	• Check and debt collection
	54143	• Commercial art and graphic design
	812331	• Commercial linen supply
	56145	• Credit information, credit bureaus
	56131	• Employment agencies
	54141	• Interior design and decorating
	56172	• Maintenance and janitorial services
	56171	• Exterminating (includes termite services)
	561439	• Photocopying services
	81292	• Photo finishing
	561612	• Private investigation (detective) services
	56141/561492	• Secretarial and court reporting services
	54189	• Sign construction and installation
	561422	• Telemarketing services on contract
	561421	• Telephone answering service
	56132	• Temporary help agencies
	54138	• Test laboratories (excluding medical)
	811198	• Tire recapping and repairing
	56179	• Window cleaning

Table 3.1 – Services by Category (*cont.)*

Computer	5112*	• Software - package or canned program
	541511*	• Software - modifications to canned program
	518111*	• Internet Service Providers-Dialup, DSL, or other
	519190*	• Information services
	518210*	• Data processing services
Automotive	811192	• Automotive washing and waxing.
	81119	• Auto service. except repairs, incl. painting and lube
	81293	• Parking lots and garages
Admission and Amusements	711212	• Pari-mutuel racing events.
	71311	• Amusement park admission and rides
	71399	• Billiard parlors
	71395	• Bowling alleys
	7113	• Circuses and fairs -- admission and games
	7112/71121	• Admission to college and/or professional sports events
	71391	• Membership fees in private clubs
	7111	• Admission to cultural events
	71312	• Pinball and other mechanical amusements
	53223	• Rental of video tapes for home viewing
Professional	5412	• Accounting and bookkeeping
	54131	• Architects
	5411	• Attorneys
	6212	• Dentists
	54133	• Engineers
	54137	• Land surveying
	6215	• Medical test laboratories
	62311	• Nursing services out-of-hospital
	6211	• Physicians
Leases and Rentals	5322	• Personal property, short and long term (generally)
	532412	• Bulldozers, draglines and const. mach., short and long term
	532111/2	• Automobile rental
	48532	• Limousine service (with driver)
	532411	• Aircraft rental to individual pilots, short term and long term
	48121	• Chartered flights (with pilot)
	72111/9	• Hotels, motels, lodging houses
	7212	• Trailer parks - overnight
Fabrication, Installation and Repair	811111	• Labor charges on repairs to motor vehicles
	8112	• Labor on radio/TV repairs; other electronic equip.
	811	• Labor charges - repairs other tangible property

Table 3.2 – Market Share of Taxed Services by State (1992,2007)

	Construction	Transportation	Storage	Utilities	Personal
ALABA	(0,0)	(0,0)	(0,0)	(.997,.997)	(.039,.039)
ARIZO	(1,1)	(.255,1)	(.178,.178)	(.887,.887)	(.006,.046)
ARKAN	(0,0)	(0,0)	(.058,.355)	(.901,1)	(0,.095)
CALIF	(0,0)	(0,0)	(0,0)	(0,0)	(.010,.123)
COLOR	(0,0)	(0,0)	(0,0)	(.560,.670)	(0,0)
CONNE	(1,1)	(0,0)	(0,.139)	(.378,.449)	(.095,.094)
FLORI	(0,0)	(0,0)	(.380,.380)	(0,.216)	(.064,.108)
GEORG	(0,0)	(.074,.074)	(0,0)	(.819,.932)	(.272,.279)
IDAHO	(0,0)	(0,0)	(0,0)	(0,0)	(.055,.062)
ILLIN	(0,0)	(0,0)	(0,0)	(.745,.844)	(0,0)
INDIA*	(0,0)	(0,0)	(.069,.069)	(.830,.830)	(0,0)
IOWA	(1,1)	(0,.205)	(.563,.563)	(.874,.917)	(.241,.241)
KANSA	(0,1)	(0,0)	(.024,.024)	(0,0)	(.534,.534)
KENTU**	(0,0)	(0,0)	(0,0)	(.222,.350)	(.018,.018)
LOUIS	(0,0)	(0,0)	(.034,.034)	(0,.404)	(.395,.514)
MAINE	(0,0)	(0,0)	(0,0)	(.705,.814)	(0,0)
MARYL	(0,0)	(0,0)	(.017,.017)	(0,.126)	(.124,.124)
MASSA	(0,0)	(0,0)	(0,0)	(.350,.613)	(0,0)
MICHI†	(0,0)	(0,0)	(0,0)	(.784,.844)	(.019,.129)
MINNE	(0,0)	(0,0)	(0,0)	(.914,.840)	(.253,.253)
MISSI	(1,1)	(0,0)	(.617,.617)	(.486,.486)	(.264,.264)
MISSO	(0,0)	(.480,.480)	(.058,.058)	(.490,.541)	(0,.039)
NEBRA	(0,.978)	(0,0)	(0,0)	(.834,1)	(.059,.298)
NEVAD	(0,0)	(0,0)	(0,0)	(0,0)	(.054,.009)
NEWJ	(0,0)	(0,0)	(.576,.576)	(0,.651)	(.010,.010)
NEWY	(0,0)	(0,0)	(.270,.269)	(.537,.474)	(.022,.215)
NORTHC	(0,0)	(0,0)	(0,0)	(.758,.814)	(.327,.303)
NORTHD	(0,0)	(0,0)	(0,0)	(.436,.470)	(.012,.012)
OHIO**	(0,0)	(0,.186)	(.063,.162)	(.348,.427)	(.109,.154)
OKLAH	(0,0)	(.119,.092)	(0,0)	(.369,.544)	(0,0)
PENNS	(0,0)	(0,0)	(.011,.011)	(.394,.394)	(.154,.359)
RHODE	(0,0)	(0,0)	(0,0)	(.388,.412)	(0,0)
SOUTHC	(0,0)	(0,0)	(0,0)	(.330,.493)	(.290,.290)
SOUTHD	(1,1)	(0,.655)	(.434,.434)	(.954,.977)	(.962,.962)
TENNE	(0,0)	(0,0)	(.075,.075)	(.384,.650)	(.210,.210)
TEXAS⊗	(.995,.995)	(0,0)	(.056,.056)	(.668,.668)	(.375,.375)
UTAH	(0,0)	(0,0)	(.018,.018)	(.426,.521)	(0,0)
VERMO	(0,0)	(0,0)	(0,0)	(0,0)	(0,.035)
VIRGIN	(0,0)	(0,0)	(0,0)	(0,0)	(.088,.088)
WESTV	(.943,.943)	(0,0)	(1,1)	(.836,.836)	(.429,.429)
WISCO	(0,0)	(0,0)	(.100,.100)	(.766,.831)	(.429,.429)
WYOMI	(0,0)	(.623,1)	(0,0)	(.869,.934)	(.215,.215)

*(2002,2007) **(1992,2004) †(1992,2006) ⊗(1992,2005)

Table 3.2 – Market Share of Taxed Services by State (1992,2007) *(cont.)*

	Admission	Business	Automotive	Leases/Rentals	Repair
ALABA	(.873,.873)	(.031,.033)	(0,0)	(.995,.993)	(0,0)
ARIZO	(.924,1)	(.036,.036)	(.127,.127)	(1,.994)	(0,0)
ARKAN	(.801,.801)	(.036,.287)	(.987,1)	(.994,.994)	(1,1)
CALIF	(.140,.140)	(.036,.060)	(0,0)	(.192,.195)	(0,0)
COLOR	(.235,.235)	(.010,.010)	(0,0)	(.994,.987)	(0,0)
CONNE	(.235,.235)	(.893,.893)	(0,0)	(.993,.987)	(0,0)
FLORI	(.746,1)	(.028,.305)	(1,1)	(.989,.989)	(1,1)
GEORG	(.757,.764)	(.054,.054)	(0,0)	(.998,.998)	(0,0)
IDAHO	(.831,.831)	(.007,.029)	(0,0)	(.998,.998)	(0,0)
ILLIN	(0,0)	(.009,.009)	(0,0)	(.746,.772)	(0,0)
INDIA*	(.244,.244)	(.018,.018)	(0,0)	(.987,.987)	(0,0)
IOWA	(.841,1)	(.656,.656)	(1,1)	(.972,.975)	(1,1)
KANSA	(1,1)	(.116,.117)	(.988,.988)	(.980,.980)	(1,1)
KENTU**	(.423,.423)	(.017,.017)	(0,0)	(.733,.733)	(0,0)
LOUIS	(.882,.882)	(.033,.035)	(.434,.514)	(.926,.923)	(1,1)
MAINE	(.103,.103)	(.103,.103)	(0,0)	(.830,.830)	(0,0)
MARYL	(.710,.710)	(.336,.336)	(0,0)	(.974,.974)	(0,0)
MASSA	(.293,.293)	(.037,.037)	(0,0)	(.939,.939)	(0,0)
MICHI†	(.258,.258)	(.069,.085)	(0,0)	(.922,.922)	(0,0)
MINNE	(1,1)	(.339,.343)	(1,1)	(.757,.757)	(0,0)
MISSI	(.583,.583)	(.087,.087)	(1,1)	(.988,.988)	(1,1)
MISSO	(.706,.830)	(.021,.021)	(0,0)	(1,.990)	(0,0)
NEBRA	(.976,.976)	(.041,.041)	(0,.874)	(.983,.994)	(0,.679)
NEVAD	(.158,.593)	(.066,.024)	(.322,.322)	(.433,.899)	(0,0)
NEWJ	(.505,.505)	(.339,.357)	(.665,.665)	(.867,.867)	(1,1)
NEWY	(.566,.566)	(.184,.382)	(1,1)	(.914,.914)	(1,1)
NORTHC	(.550,.550)	(.413,.420)	(0,0)	(.966,.966)	(0,0)
NORTHD	(.930,1)	(.086,.086)	(0,0)	(.941,.986)	(0,0)
OHIO**	(.201,.412)	(.034,.836)	(.748,.748)	(.985,.985)	(1,1)
OKLAH	(1,1)	(.045,.045)	(.827,.173)	(.973,.973)	(1,0)
PENNS	(.185,.185)	(.048,.767)	(.822,.822)	(.949,.949)	(1,1)
RHODE	(.250,.250)	(.051,.051)	((0,0)	(.978,.978)	(0,0)
SOUTHC	(.142,.775)	(.017,.037)	(0,0)	(.995,.995)	(1,1)
SOUTHD	(1,1)	(.987,.987)	(1,1)	(1,.999)	(1,1)
TENNE	(.947,.947)	(.048,.057)	(1,1)	(.988,.988)	(1,1)
TEXAS⊗	(.930,.930)	(.321,.321)	(.185,.185)	(.955,.955)	(.803,.803)
UTAH	(.707,.969)	(.051,.054)	(.883,.883)	(.472,.472)	(.309,1)
VERMO	(.940,.982)	(.053,.081)	(0,0)	(.970,.970)	(0,0)
VIRGIN	(.211,.211)	(.020,.026)	(0,0)	(.947,.947)	(0,0)
WESTV	(1,1)	(.867,.867)	(1,1)	(.993,.993)	(1,1)
WISCO	(1,1)	(.081,.087)	(1,1)	(.989,.989)	(1,1)
WYOMI	(.096,.096)	(.081,.081)	(.939,.939)	(1,.998)	(1,1)

*(2002,2007) **(1992,2004) †(1992,2006) ⊗(1992,2005)

Table 3.2 – Market Share of Taxed Services by State (1992,2007) *(cont.)*

	Professional	FIRE	Computer
ALABA	(0,0)	(0,0)	(0,.143)
ARIZO	(0,0)	(0,0)	(.216,.216)
ARKAN	(0,0)	(0,0)	(.024,.024)
CALIF	(0,0)	(0,0)	(.391,.624)
COLOR	(0,0)	(0,0)	(.601,.601)
CONNE	(0,0)	(0,0)	(.972,.972)
FLORI	(0,0)	(0,0)	(.209,.229)
GEORG	(0,0)	(0,0)	(.481,.481)
IDAHO	(0,0)	(0,0)	(.482,.259)
ILLIN	(0,0)	(0,0)	(.614,.614)
INDIA*	(0,0)	(0,0)	(.509,.509)
IOWA	(0,0)	(.417,.417)	(.176,.176)
KANSA	(0,0)	(0,0)	(.480,.480_
KENTU**	(0,0)	(0,0)	(.084,.104)
LOUIS	(0,0)	(0,0)	(.336,.336)
MAINE	(0,0)	(0,0)	(.334,.192)
MARYL	(0,0)	(0,0)	(.607,.607)
MASSA	(0,0)	(0,0)	(0,0)
MICHI†	(0,0)	(0,0)	(.207,.207)
MINNE	(0,0)	(0,0)	(.568,.568)
MISSI	(0,0)	(0,0)	(.399,.399)
MISSO	(0,0)	(0,0)	(.497,.532)
NEBRA	(0,0)	(0,0)	(.545,.545)
NEVAD	(0,0)	(0,0)	(.210,.210)
NEWJ	(0,0)	(0,0)	(0,1)
NEWY	(0,0)	(0,.079)	(.957,.224)
NORTHC	(0,0)	(0,0)	(.674,.364)
NORTHD	(0,0)	(0,0)	(.441,.448)
OHIO**	(0,0)	(0,0)	(.960,.595)
OKLAH	(0,0)	(0,0)	(.370,.370)
PENNS	(0,0)	(0,0)	(.242,.580)
RHODE	(0,0)	(0,0)	(.970,.970)
SOUTHC	(0,0)	(0,0)	(.775,.775)
SOUTHD	(.297,.297)	(.327,.327)	(1,1)
TENNE	(0,0)	(0,0)	(.448,.448)
TEXAS⊗	(.012,.012)	(.388,.388)	(1,1)
UTAH	(0,0)	(0,0)	(.328,.328)
VERMO	(0,0)	(0,0)	(.509,.509)
VIRGIN	(0,0)	(0,0)	(.149,.149)
WESTV	(0,0)	(.350,.350)	(.367,.367)
WISCO	(0,0)	(0,0)	(.460,.484)
WYOMI	(0,0)	(0,0)	(.267,.267)

*(2002,2007) **(1992,2004) †(1992,2006) ⊗(1992,2005)

APPENDIX C

Variable Data

Table 4.1 – Variable Labels and Descriptions

Label	Description	Source
Dependent Variable		
LNSUTREV	Log sales and use tax revenue in thousands	Census Bureau
Rate		
SUTRT	sales and use tax percent rate	The Tax Foundation, ACIR
Ability to Consume		
DISINC	per capita disposable income in current dollars	BEA
POPUL	estimated population	Census Bureau
HOUSE	estimated total number of households	Census Bureau
GINI	annual Gini coefficient for the *n*th state	Census Bureau
Consumption Demographics		
YOUNG	estimated percentage population aged 18-24	Census Bureau
ADULT	estimated percentage population aged 25-54	Census Bureau
SENIOR	estimated percentage population aged 55+	Census Bureau
AFRAMER	estimated total African American percentage population	Census Bureau
HISPAN	estimated total Hispanic (of any race) percentage population	Census Bureau
ASIAN	estimated total Asian or pacific islander percentage population	Census Bureau
Service Tax Base		
CONST	market size of taxed construction services	FTA
UTILI	market size of taxed residential utility services	FTA
STOR	market size of taxed storage services	FTA
FIRE	market size of taxed finance, insurance and real estate services	FTA
PERSON	market size of taxed personal services	FTA
BUSI	market size of taxed business services	FTA
COMP	market size of taxed computer services	FTA
AUTO	market size of taxed automotive services	FTA
ADMIS	market size of taxed admission/entertain services	FTA
PROFES	market size of taxed professional services	FTA
LESREN	market size of taxed lease and rental services	FTA
REPAIR	market size of taxed fabrication and repair services	FTA
Controlling Variables		
RGDP	real state GDP in chained 2000 dollars in thousands	BEA
UEMPRT	unemployment rate (seasonally adjusted)	Census Bureau

FTA = Federation of Tax Administrators BEA = Bureau of Economic Analysis
ACIR = American Council on Intergovernmental Relations

Table 4.1 – Variable Labels and Descriptions *(cont.)*

Label	Description	Source
Dummies		
ALABAM	1 if Alabama, 0 otherwise	
ARKANS	1 if Arkansas, 0 otherwise	
CALIFO	1 if California, 0 otherwise	
COLORA	1 if Colorado, 0 otherwise	
CONNEC	1 if Connecticut, 0 otherwise	
FLORID	1 if Florida, 0 otherwise	
GEORGI	1 if Georgia, 0 otherwise	
IDAHO	1 if Idaho, 0 otherwise	
ILLINO	1 if Illinois, 0 otherwise	
INDIAN	1 if Indiana, 0 otherwise	
IOWA	1 if Iowa, 0 otherwise	
KANSAS	1 if Kansas, 0 otherwise	
KENTUC	1 if Kentucky, 0 otherwise	
LOUISI	1 if Louisiana, 0 otherwise	
MAINE	1 if Maine, 0 otherwise	
MARYLA	1 if Maryland, 0 otherwise	
MASSAC	1 if Massachusetts, 0 otherwise	
MICHIG	1 if Michigan, 0 otherwise	
MINNES	1 if Minnesota, 0 otherwise	
MISSIS	1 if Mississippi, 0 otherwise	
MISSOU	1 if Missouri, 0 otherwise	
NEBRAS	1 if Nebraska, 0 otherwise	
NEVADA	1 if Nevada, 0 otherwise	
NEWJER	1 if New Jersey, 0 otherwise	
NEWYOR	1 if New York, 0 otherwise	
NORTHC	1 if North Carolina, 0 otherwise	
NORTHD	1 if North Dakota, 0 otherwise	
OHIO	1 if Ohio, 0 otherwise	
OKLAHO	1 if Oklahoma, 0 otherwise	
PENNSY	1 if Pennsylvania, 0 otherwise	
RHODEI	1 if Rhode Island, 0 otherwise	
SOUTHC	1 if South Carolina, 0 otherwise	
SOUTHD	1 if South Dakota, 0 otherwise	
TENNES	1 if Tennessee, 0 otherwise	
TEXAS	1 if Texas, 0 otherwise	
UTAH	1 if Utah, 0 otherwise	
VERMON	1 if Vermont, 0 otherwise	
VIRGIN	1 if Virginia, 0 otherwise	
WESTVI	1 if West Virginia, 0 otherwise	
WISCON	1 if Wisconsin, 0 otherwise	

Table 4.1 – Variable Labels and Descriptions *(cont.)*

Label	Description	Source
1992	1 if 1992, 0 otherwise	
1993	1 if 1993, 0 otherwise	
1994	1 if 1994, 0 otherwise	
1995	1 if 1995, 0 otherwise	
1996	1 if 1995, 0 otherwise	
1997	1 if 1997, 0 otherwise	
1998	1 if 1998, 0 otherwise	
1999	1 if 1999, 0 otherwise	
2000	1 if 2000, 0 otherwise	
2001	1 if 2001, 0 otherwise	
2002	1 if 2002, 0 otherwise	
2003	1 if 2003, 0 otherwise	
2004	1 if 2004, 0 otherwise	
2005	1 if 2005, 0 otherwise	
2006	1 if 2006, 0 otherwise	
2007	1 if 2007, 0 otherwise	

Table 4.2 – Descriptive Statistics

	Mean	Std. Dev.	Min	Max
LNSUTREV	21.51	1.03	18.9	24.2
SUTRT	5.20	0.99	2.9	7.25
HOUSE	2507131	2459692	183133	$1.33x10^7$
POPUL	6127623	6403065	466251	$3.64x10^7$
YOUNG	11.51	1.48	9.0	21.4
ADULT	45.49	6.47	35.8	99
PRIME	57.01	7.73	47	120.4
SENIOR	22.86	3.17	14.4	42.4
AFRAMER	11.62	10.39	0.3	39.6
HISPAN	5.52	7.04	0.5	32.6
ASIAN	1.70	1.74	0.3	11.2
DISINC	23963	5599	13319	45179
RGDP	203837	234310	14010	1548966
UEMPRT	4.94	1.32	2.3	9.5
GINI	0.44	0.02	0.391	0.499
CONST	0.19	0.39	0	1
TRANS	0.07	0.22	0	1
STOR	0.11	0.22	0	1
UTILI	0.55	0.32	0	1
PERSON	0.20	0.23	0	0.962
COMP	0.46	0.29	0	1
ADMIS	0.65	0.34	0	1
BUSI	0.21	0.27	0.007	0.987
AUTO	0.43	0.45	0	1
LESREN	0.92	0.16	0.192	1
REPAIR	0.46	0.49	0	1
PROF	0.01	0.05	0	0.297
FIRE	0.04	0.11	0	0.417
ALABA	0.02	0.16	0	1
ARIZO	0.02	0.16	0	1
ARKAN	0.02	0.16	0	1
CALIF	0.02	0.16	0	1
COLOR	0.02	0.16	0	1
CONNE	0.02	0.16	0	1

Table 4.2 – Descriptive Statistics *(cont.)*

FLORI	0.02	0.16	0	1
GEORG	0.02	0.16	0	1
IDAHO	0.02	0.16	0	1
ILLIN	0.02	0.16	0	1
INDI	0.01	0.10	0	1
IOWA	0.02	0.16	0	1
KANSA	0.02	0.16	0	1
KENTU	0.02	0.14	0	1
LOUIS	0.02	0.16	0	1
MAINE	0.02	0.16	0	1
MARYL	0.02	0.16	0	1
MASSA	0.02	0.16	0	1
MICHI	0.02	0.15	0	1
MINNE	0.02	0.16	0	1
MISSI	0.02	0.16	0	1
MISSO	0.02	0.16	0	1
NEBRA	0.02	0.16	0	1
NEVAD	0.02	0.16	0	1
NEWJ	0.02	0.13	0	1
NEWY	0.02	0.16	0	1
NORTHC	0.02	0.16	0	1
NORTHD	0.02	0.16	0	1
OHIO	0.02	0.14	0	1
OKLAH	0.02	0.16	0	1
PENNS	0.02	0.16	0	1
RHODE	0.02	0.16	0	1
SOUTHC	0.02	0.16	0	1
SOUTHD	0.02	0.16	0	1
TENNE	0.02	0.16	0	1
TEXAS	0.02	0.15	0	1
UTAH	0.02	0.16	0	1
VERMO	0.02	0.16	0	1
VIRGIN	0.02	0.16	0	1
WESTV	0.02	0.16	0	1
WISCO	0.02	0.16	0	1

Table 4.2 – Descriptive Statistics *(cont.)*

Y92	0.06	0.24	0	1
Y93	0.06	0.24	0	1
Y94	0.06	0.24	0	1
Y95	0.06	0.24	0	1
Y96	0.06	0.24	0	1
Y97	0.06	0.24	0	1
Y98	0.06	0.24	0	1
Y99	0.06	0.24	0	1
Y00	0.06	0.24	0	1
Y01	0.06	0.24	0	1
Y02	0.06	0.24	0	1
Y03	0.06	0.24	0	1
Y04	0.06	0.24	0	1
Y05	0.06	0.24	0	1
Y06	0.06	0.24	0	1

Table 4.3 – Correlation Matrix

	SUTREV	SUTRT	HOUSE	POPUL	DISINC	UEMPRT	RGDP
SUTREV	1						
SUTRT	0.281*** .000	1					
HOUSE	.747*** .000	.087** .027	1				
POPUL	.744*** .000	.085** .031	.993*** .000	1			
DISINC	.286*** .000	.071* .073	.225*** .000	.193*** .000	1		
UEMPRT	.227*** .000	.065* .096	.343*** .000	.357*** .000	-.198*** .000	1	
RGDP	.754*** .000	.078** .048	.985*** .000	.982*** .000	.329*** .000	.308*** .000	1
YOUNG	.156*** .000	.034 .382	.163*** .000	.167*** .000	.336* .000	.033 .401	.206*** .000
ADULT	.167*** .000	.002 .951	.149*** .000	.140*** .000	.453*** .000	.042 .282	.208*** .000
SENIOR	.122*** .002	.265*** .000	.078** .046	.041 .292	.350*** .000	-.161*** .000	.068* .082
AFRAM	.146*** .000	-.094** .017	.439*** .000	.433*** .000	-.024 .535	.270*** .000	.396*** .000
HISPAN	.678*** .000	.142*** .000	.429*** .000	.452*** .000	.215*** .000	.296*** .000	.479*** .000
ASIAN	.676*** .000	.168*** .000	.457*** .000	.481*** .000	.310*** .000	.214*** .000	.526*** .000
GINI	.400*** .000	.084** .032	.525*** .000	.515*** .000	.135*** .001	.288*** .000	.506*** .000

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

Table 4.3 – Correlation Matrix *(cont.)*

	YOUNG	ADULT	SENIOR	AFRAM	HISPAN	ASIAN	GINI
SUTREV							
SUTRT							
HOUSE							
POPUL							
DISINC							
UEMPRT							
RGDP							
YOUNG	1						
ADULT	.819*** .000	1					
SENIOR	.333*** .000	.485*** .000	1				
AFRAM	.314*** .000	.152*** .000	-.037 .344	1			
HISPAN	.269*** .000	.394*** .000	.073* .065	-.112*** .004	1		
ASIAN	.360*** .000	.426*** .000	-.007 .868	-.007 .867	.702*** .000	1	
GINI	.112** .004	.030 .445	.128*** .001	.562*** .000	.234*** .000	.172*** .000	1

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

Table 4.3 – Correlation Matrix *(cont.)*

	SUTREV	SUTRT	HOUSE	POPUL	DISINC	UEMPRT
CONST	-.062	.179***	-.140***	-.126***	-.037	-.132***
	.116	.000	.000	.001	.349	.001
TRANS	-.122***	-.237***	-.232***	-.217***	.000	-.116***
	.002	.000	.000	.000	.999	.003
STOR	-.016	.179***	-.052	-.056	-.133***	-.090**
	.681	.000	.184	.159	.001	.023
UTILI	-.088**	-.117***	-.035	-.042	.066*	-.202***
	.026	.003	.376	.287	.092	.000
PERSON	-.082**	-.085**	-.122***	-.124***	-.118***	-.283***
	.036	.031	.002	.002	.003	.000
COMP	.132***	.064	.051	.049	.118***	.028
	.001	.104	.199	.211	.003	.480
ADMIS	-.050	.086**	-.007	.002	.029	-.102***
	.201	.030	.849	.951	.457	.009
BUSI	.023	.108***	-.005	-.023	.157***	-.271***
	.564	.006	.897	.566	.000	.000
AUTO	-.017	.131***	-.049	-.053	-.043	-.124***
	.665	.001	.215	.177	.278	.002
LESREN	-.497***	-.255***	-.240***	-.268***	-.027	-.144***
	.000	.000	.000	.000	.489	.000
REPAIR	.042	.052	.044	.034	-.079**	.010
	.281	.182	.266	.382	.045	.805
PROF	-.102***	-.189***	-.262***	-.258***	-.021	-.223***
	.009	.000	.000	.000	.588	.000
FIRE	.016	.032	-.073*	-0.073*	-.091**	-.209***
	.689	.417	.064	.063	.020	.000

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

Table 4.3 – Correlation Matrix *(cont.)*

	RGDP	YOUNG	ADULT	SENIOR	AFRAM	HISPAN
CONST	-.137***	-.174***	-.210***	.068*	-.113***	.136***
	.000	.000	.000	.083	.004	.001
TRANS	-.199***	-.200***	-.110***	-.047	-.241***	.147**
	.000	.000	.005	.236	.000	.147***
STOR	-.103***	-.239***	-.239***	.244***	.017	-0.072*
	.009	.000	.000	.000	.668	.069
UTILI	-.025	-.194***	-.201***	-.093**	-.091**	-.128***
	.521	.000	.000	.018	.021	.001
PERSON	-.142***	-.153***	-.238***	.028	-.036	-.200***
	.000	.000	.000	.476	.356	.000
COMP	.083**	-.046	-.058	-0.068*	-.041	.152***
	.034	.237	.139	.086	.300	.000
ADMIS	.005	-.128***	-.081**	.081**	.002	-.001
	.902	.001	.038	.039	.958	.983
BUSI	.004	-.222***	-.136***	.208***	-.189***	-.098**
	.927	.000	.001	.000	.000	.012
AUTO	-.059	-.275***	-.214***	.170***	-.120***	-.142***
	.137	.000	.000	.000	.002	.000
LESREN	-.275***	-.179***	-0.074*	.273***	.176***	-.401***
	.000	.000	.061	.000	.000	.000
REPAIR	.016	-.274***	-.265***	.106***	.112***	-.096**
	.683	.000	.000	.007	.004	.015
PROF	-.248***	-.121***	-.116***	.086**	-.169***	-.088**
	.000	.002	.003	.029	.000	.025
FIRE	-.092**	-.160***	-.155***	.088**	-.215***	.100**
	.019	.000	.000	.025	.000	.011

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

Table 4.3 – Correlation Matrix *(cont.)*

	ASIAN	GINI	CONST	TRANS	STOR	UTILI
CONST	-.169***	.084**	1			
	.000	.032				
TRANS	-.131***	-.145***	.293***	1		
	.001	.000	.000			
STOR	-.146***	.159***	.555***	.068*	1	
	.000	.000	.000	.085		
UTILI	-.268***	-.045	.239***	.289***	.192***	1
	.000	.249	.000	.000	.000	
PERSON	-.217***	-.135**	.550***	.094**	.520***	.271***
	.000	.001	.000	.016	.000	.000
COMP	.051	.041	.221***	.028	-.117***	.103***
	.193	.302	.000	.478	.003	.009
ADMIS	-.027	.013	.104***	.001	.375***	.010
	.498	.741	.008	.985	.000	.790
BUSI	-.116***	-.015	.474***	.027	.467***	.307***
	.003	.712	.000	.499	.000	.000
AUTO	-.182***	-.001	.367***	.051	.537***	.178***
	.000	.974	.000	.195	.000	.000
LESREN	-.708***	.032	.201***	.156***	.175***	.125***
	.000	.415	.000	.000	.000	.001
REPAIR	-.240***	.197***	.382***	.013	.505***	.086**
	.000	.000	.000	.733	.000	.029
PROF	-.111***	-.117***	.339***	.303***	.229***	.208***
	.005	.003	.000	.000	.000	.000
FIRE	-.120***	-.042	.649***	.097**	.602***	.285***
	.002	.287	.000	.014	.000	.000

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

Table 4.3 – Correlation Matrix *(cont.)*

	PERSON	COMP	ADMIS	BUSI	AUTO	LESREN
CONST						
TRANS						
STOR						
UTILI						
PERSON	1					
COMP	.221*** .000	1				
ADMIS	.075* .058	-.155*** .000	1			
BUSI	.480*** .000	.344*** .000	.136*** .001	1		
AUTO	.517*** .000	.048 .218	.220*** .000	.428*** .000	1	
LESREN	.122*** .002	.065* .099	.089** .024	.144*** .000	.096** .015	1
REPAIR	.531*** .000	.169*** .000	.259*** .000	.375*** .000	.825*** .000	.247*** .000
PROF	.531*** .000	.310*** .000	.054 .167	.401*** .000	.196*** .000	.085** .030
FIRE	.714*** .000	.178*** .000	.094** .017	.525*** .000	.278*** .000	.130*** .001

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

Table 4.3 – Correlation Matrix *(cont.)*

	REPAIR	PROF	FIRE
CONST			
TRANS			
STOR			
UTILI			
PERSON			
COMP			
ADMIS			
BUSI			
AUTO			
LESREN			
REPAIR	1		
PROF	.180*** .000	1	
FIRE	.336*** .000	.441*** .000	1

***Significant at 99% level ** Significant at 95% level *Significant at 90% level

BIBLIOGRAPHY

Akhter, S. (2003). Digital Divide and Purchase Intention: Why Demographic Psychology Matters. *Journal of Economic Psychology*, *24*, 321-27.

Aldridge, V. (2007). Letter to Ann Gordon. Tallahassee, FL: Florida Department of Revenue. Retrieved January 22, 2009 from http://www.floridatbrc.org/pdf/11_5_07DORHandout.pdf

Altig, D., Auerbach, A., Kotlikoff, L., Smetters, K., and Walliser, J. (2001). Simulating U.S. Tax Reform. *American Economic Review*, 91, 574-95.

American Institute of Certified Public Accountants. (2001). *Guiding Principles of Good Tax Policy: A Framework for Evaluating Tax Proposals*. New York, NY: Author. Retrieved July 15, 2009 from http://ftp.aicpa.org/public/download/members/div/tax/3-01.pdf

Anchin. (2006). New Jersey Residents Face Sales/Use Tax Increase. *The Anchin Advantage*. Retrieved February 27, 2009 from http://www.anchin.com/pdf/tax-alert-1006.pdf

Ashton, A. (2008, September 10). Tax rebate for General Petroleum OK'd. *Modesto Bee*. Retrieved January 26, 2009 from http://www.modbee.com/local/story/424611.html

Bailey, E. (2009, September 21). Tax commission report falls flat, but it's a start. *Los Angeles Times*. Retrieved November 9, 2009 from http://www.latimes.com/news/local/la-me-taxes21-2009sep21,0,551778.story?page=1

Baltagi, B. (2008). *Econometrics* (4th ed.). Berlin: Springer Publishing.

Bardach, E. (2005). *Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*. Washington, DC: Congressional Quarterly, Inc.

Beck, P. and Dye, T. (1982). Sources of Public Opinion on Taxes: the Florida Case. *The Journal of Politics*, *44* (1), 172-82.

Blundell, R. and Powell, J. (2003). Endogeneity in Nonparametric and Semiparametric Regression Models. In M. Dewatripont, L. P. Hansen, & S. J. Turnovsky (Eds.), *Advances in Economics and Econometrics* (pp. 312-357). Cambridge: Cambridge University Press.

Bohm, R., and Craig, E. (1988). Sales Tax Base Modification, Revenue Stability, and Equity. *Proceedings of the Annual Conference on Taxation.* Columbus, OH: National Tax Association-Tax Institute of America.

Bruce, D. and Fox, W. (2001). *State and Local Tax Revenue Loss from E-commerce: Updated Estimates*. Retrieved July 5, 2009 from http://cber.utk.edu/ecomm/ecom0901.pdf

Bruce, D., Fox, W., and Tuttle, M. (2006). Tax Base Elasticities: A Multi-State Analysis of Long-Run and Short-Run Dynamics. *Southern Economic Journal*, 73 (2), 315-343.

Bruce, D., Fox, W. F., and Luna, L. (2009). State and Local Government Sales Tax Revenue Losses from Electronic Commerce. Retrieved July 22, 2009 from http://www.streamlinedsalestax.org/Execitive%20Committee/Previous_meetings/4_13_09/SSTP%20e-commerce%202009%20REV041309.pdf

Brunori, D. (2003). *Local Tax Policy: A Federalist Perspective*. Washington, DC: The Urban Institute Press.

Brunori, D. (2005). *State Tax Policy: A Political Perspective*. Washington, DC: The Urban Institute Press.

Burton, D. and Mastromarco, D. (1997). Emancipating America from the Income Tax: How a National Sales Tax Would Work. *Policy Analysis No. 272*. Retrieved January 7, 2009 from http://www.cato.org/pub_display.php?pub_id=1131&full=1

California Board of Equalization. (2006). Streamlined Sales Tax Project: SSUT Agreement Section Analysis. Retrieved October 5, 2008 from http://www.boe.ca.gov/sstp/pdf/Section302AnalysisRevenueEstimate3-22-06.pdf

California Board of Equalization. (2007) Addressing the Tax Gap. Retrieved October 5, 2008 from http://www.boe.ca.gov/news/pdf/gapdoc.pdf

California Budget Project. (2009). COTCE Proposals Would Increase Budget Gaps, Tax Low- and Middle-Income Californians. Retrieved November 9, 2009 from http://www.cbp.org/pdfs/2009/CaliforniaBudgetBites/090911_CBP_Analysis_Cotce_proposals.pdf

California Chamber of Commerce. (2005, April 22). Letter to Assemblymember Coto. Retrieved February 18, 2009 from http://ct2k2.capitoltrack.com/05/viewdoc.asp?docid=9772

California Commission on Tax Policy in the New Economy. (2003). *Final Report*. Sacramento, CA. Retrieved June 2, 2009 from http://www.library.ca.gov/crb/catax/Docs/2003-12_FinalReport.pdf

California Department of Finance. (2009). *2008 California Statistical Abstract*. Sacramento, CA: Author, Table M-10.

California Taxpayer Association. (2003). Spending Lobby Wants to Tax Services; Taxpayers Disagree. *Caltaxletter: News and Analysis from the California Taxpayer's Association, XVI* (14). Retrieved October 5, 2008 from http://www.caltax.org/newweb/documents/2003/SalesTax4-11-03.pdf

California Tax Reform Association. (2003). Recommendations on Tax Policy. Retrieved January 15, 2009 from http://www.ccrwf.org/working/TaxPolicyRecs2003.pdf

California Tax Reform Association. (2005). Tax Policy for the 21st Century: Resolving California's Long-Term Structural Deficit. Retrieved October 20, 2008 from http://caltaxreform.org/wp-content/uploads/2006/08/TaxPolicyin21stCentury1.pdf

Caspersen, E. and Metcalf, G. (1994). Is a Value Added Tax Regressive? Annual Versus Lifetime Incidence Measures. *National Tax Journal*, *47* (4), 731-46.

Center for Continuing Study of the California Economy. (2007). "Is California A High Tax State?" Retrieved September 17, 2009 from http://www.ccsce.com/pdf/Numbers-oct07-HighTaxState.pdf

Chang, H. (1979). Functional Forms and the Estimation of a State's Sales Tax Revenue: Tennessee as a Case Study. *The Annals of Regional Science*, *13* (2), 8-18.

Chapman, J. (1998). Proposition 13: Some Unintended Consequences: *Tenth Annual Envisioning California Conference*. Sacramento, CA: Public Policy Institute of California.

Chorneau, T. (2003, April 10). Place For Sales Tax on Services Gets Mixed Reviews at Hearing. *San Diego Union Tribune*. Retrieved February 10, 2009 from http://www.caltax.org/Chorneau-PlanSalesTaxServiceGetsMixedReviews4-10-03.pdf

Chu, J. (2008a). Letter to California Legislators. Sacramento, CA: California Board of Equalization. Copy available on request.

Chu, J. (2008b, June 2) Resolve Deficit By Taxing Services Like Movie Tickets. *San Jose Mercury News*. Retrieved October 1, 2008 from http://www.boe.ca.gov/members/jchu/sales_tax_article.html

Cieply, M. and Barnes, B. (2009, February 28). In Downturn, Americans Flock to the Movies. *New York Times*. Retrieved May 11, 2009 from http://www.nytimes.com/2009/03/01/movies/01films.html?_r=1&hp

Cline, R., Mikesell, J., Neubig, T., and Philliips, A. (2005, January 25). Sales Taxation of Business Inputs: Existing Tax Distortions and the Consequences of Extending the Sales Tax to Business Services. *COST Special Report: Sales Taxation on Business Inputs*. Washington, DC: Council on State Taxation. Retrieved from http://statetax.org/StateTaxLibrary.aspx?id=17768

Coleman, M. and Colantuono, M. (2003, August). Local Fiscal Authority and Stability: Control

and Risk in California City Revenues. *Western City*. Sacramento, CA: Western City. Retrieved from http://www.cllaw.us/papers/LocalFiscalAuthorityStability.pdf

Comptroller of Maryland. (2008). Franchot Pulls Draft "Tech Tax" Regulations from Website. Retrieved January 22, 2009 from http://www.marylandtaxes.com/publications/nr/current/pr18.asp

Commission on the 21st Century Economy. (2009). *Final Report*. Sacramento, C.A. Retrieved October 18, 2009 from http://www.cotce.ca.gov/

Cordes, J. (1999). Horizontal Equity. In *The Encyclopedia of Taxation and Tax Policy* (pp. 195-196). Washington, DC: Urban Institute Press.

Davies, D. (1959). An Empirical Test of Sales Tax Regressivity. *The Journal of Political Economy*, *67* (1), 72-78.

DeNavas-Walt, C., Proctor, B., and Smith, J. (2008). Income, Poverty, and Health Insurance Coverage in the United States: 2007. Washington, DC: U.S. Census Bureau. Retrieved March 27, 2009 from http://www.census.gov/prod/2008pubs/p60-235.pdf

Doerr, D. (2003). Notion of Expanding the State Sales Tax Does a Disservice to Us All. *California Taxpayer Association Commentary*. Retrieved October 4, 2008 from http://www.caltax.org/documents/2003/1.2003.Doerr-NotionExpandingSalesTax.03.htm

Dye, R. and McGuire, T. (1991). Growth and Variability of State Individual Income and General Sales Taxes. *National Tax Journal*¸ *44* (1), 55-66.

Dye, R. and Merriman, D. (2004). State Revenue Stability: Alternative Conceptualizations: *97th Annual National Tax Association Conference*. Minneapolis, MN: National Tax Association.

Federation of Tax Administrators. (2008). *By the Numbers: FTA Survey of Services Taxation--Update*. Retrieved from http://www.taxadmin.org/fta/pub/services/btn/0708.html

Fisher, R. (2007). *State and Local Public Finance*. Mason, Ohio: Thomson South-Western.

Fitz, J. (2000, July). Economic Perspective: Summary of Recent Economic Developments. Retrieved September 19, 2009 from http://www.boe.ca.gov/news/pdf/ep7-00.pdf

Fleenor, P. and Chamerblain, A. (2006). Tax Pyramiding: The Economic Consequences of Gross Receipts Taxes. *Tax Foundation Special Report No. 147*. Washington, DC: Tax Foundation.

Fox, W. and Campbell, C. (1984). Stability of the State Sales Tax Income Elasticity. *National Tax Journal, 37* (2), 201-12.

Fox, W. and Murray, M. (1988). Economic Aspects of Taxing Services. *National Tax Journal, 41* (1), 19-36.

Fox, W. (1992). *Sales Taxation*. Santa Barbara, CA: Greenwood Publishing Group.

Fox, W. (2003). Three Characteristics of Tax Structures Have Combined To the Current State Fiscal Crises. *Tax Analysts*. Retrieved December 28, 2008 from http://www.taxpolicycenter.org/UploadedPDF/1000607.pdf

Francis, J. (1988). The Florida Sales Tax on Services: What Really Went Wrong?. In Stephen D. Gold. (Ed.), *The Unfinished Agenda for State Tax Reform* (pp. 129-149). Washington, DC: The National Conference of State Legislators.

Frank, S. (2008, December 12). Tax Commission Appointed, Legislative GOP Not Allowed Seat at Table. *California Political News and Views*. Retrieved from http://capoliticalnews.com/s/spip.php?breve6892

Fullerton, T. (1989). A Composite Approach to Forecasting State Government Revenues: Case Study of the Idaho Sales Tax. *International Journal of Forecasting, 5*, 373-80.

Garret, T. (2000). *Taxing Electronic Commerce—Issues for Local Governments and Retailers*. Manhattan, KS: Kansas State University Department of Agricultural Economics. Retrieved July 6, 2009 from http://www.oznet.ksu.edu/library/agec2/ep73.pdf

Go, D., Kearney, M., Robinson, S., and Thierfelder, K. (2004). An Analysis of South Africa's Value Added Tax. *World Bank Policy Research Working Paper 3671*. Washington, DC: World Bank.

Gold, S. (1988). The Blizzard of 1987: A Year of Tax Reform Activity in the States. *Publius, 18* (3), 17-35.

Graham, J., Lemmon, M., and Schallheim, J. (1998). Debt, Leases, Taxes, and the Endogeneity of Corporate Tax Status. *The Journal of Finance, 53* (1), 131-62.

Groves, H. and Kahn, C. (1952). The Stability of State and Local Tax Yields. *The American Economic Review, 42* (1), 87-102.

Grubert, H. and Mackie, J. (2000). Must Financial Services be Taxed Under a Consumption Tax? *National Tax Journal, 53* (1), 23-40.

Hamilton, B. (1988). Comments on the Taxation of Services Under State Sales Taxes. *National Tax Journal, 41* (3), 411-13.

Hansell, S. (2008, July 30). New York Senate Teases Amazon Customers With Sales Tax Repeal. *New York Times*. Retrieved October 6, 2008 from http://bits.blogs.nytimes.com/2008/07/30/new-york-senate-teases-amazon customers-with-sales-tax-repeal-bill/

Hawkins, R. and Eppright, D. (2001). Evidence on Sales Tax Revenue Erosion in Florida. *Proceedings of the 93rd Annual Conference on Taxation*. Retrieved July 6, 2009 from http://uwf.edu/rhawkins/research/nta2.pdf

Hellerstein, W. (1988). Florida's Sales Tax on Services. *National Tax Journal, 41* (1), 1-18.

Hellerstein, W. and Swain, J. (2005). The Political Economy of the Streamlined Sales and Use Tax Agreement. *National Tax Journal, 58* (3), 605-19.

Henchman, J. (2007, December 17). Maryland Covertly Singles Out Computer Services for New Tax. *Tax Foundation Blog*. Washington, DC: Tax Foundation. Retrieved April 2, 2009 from http://www.taxfoundation.org/blog/show/22809.html

Hendrix, M. and Zodrow, G. (2003). Sales Taxation of Services: An Economic Perspective. *Florida State University Law Review, 30* (411), 411-33.

Hiltzik, M. (2009, October 5). State Tax Reform Panel Blew Its Opportunity. *Los Angeles Times*. Retrieved November 9, 2009 from http://www.latimes.com/business/la-fi-hiltzik5-2009oct05,0,2647838.column

Institute on Taxation and Economic Policy. (2007). Broad-Based Gross Receipts Taxes: A Worthwhile Alternative? *Policy Brief #40.* Washington, DC: Author. Retrieved April 3, 2009 from http://www.itepnet.org/pb40grt.pdf

Jackson, A. (1833). The Ordinance of South Carolina on the Subject of the Tariff. In J Elliot (Ed.), *The Debates in the Several State Conventions on the Adoption of the Federal Constitution, Volume 4* (582-592). Washington, DC: United States Congress.

Kinsey, K., Grasmick, H., and Smith, K. (1991). Framing Justice: Taxpayer Evaluations of Personal Tax Burdens. *Law & Society Review, 25* (4), 845-73.

Laffer, A. (2004). The Laffer Curve: Past, Present, and Future. *The Heritage Foundation Backgrounder #1765*. Washington DC: The Heritage Foundation.

Legislative Analyst Office. (2002). *The 2002-03 Budget Bill: Perspectives and Issues*. Sacramento, CA: Author. Retrieved September 22, 2009 from http://www.lao.ca.gov/analysis_2002/2002_pandi/pi_part_1_anl02.html

Legislative Analyst Office. (2008, June 16). *Allocating Local Sales Taxes*. Sacramento, CA: Author. Retrieved October 8, 2008 from http://www.lao.ca.gov/2007/sales_tax/sales_tax_012407.pdf

Legislative Analyst Office. (2009, November 18). *California's Fiscal Outlook: The 2010-11 Budget*. Sacramento, CA: Author. Retrieved December 1, 2009 from http://lao.ca.gov/2009/bud/fiscal_outlook/fiscal_outlook_111809.pdf

Lenard, L. and McGonegal, S. (2005). The Streamlined Sales Tax Project: An Initiative Whose Time Has Not Come. *The Milken Institute Review*, 18-26. Retrieved October 20, 2008 from http://www.pff.org/issues-pubs/articles/050502lenardmilken.pdf

Leonard, B. (2008, December 15). New Tax Commission=New Taxes? *The Leonard Letter*. Retrieved January 7, 2008 from http://billleonard.org/

Lewis, P. and Barbour, E. (1999). California Cities and the Local Sales Tax. Sacramento, CA: Public Policy Institute of California.

Lin, J. (2008, April 27). Wider, Not Higher, Sales Tax Seen As Budget Fix. *Sacramento Bee*. Retrieved October 1, 2008 from http://www.sacbee.com/111/story/892911.html

Lowery, D. (1987). The Distribution of Tax Burdens in the American States: The Determinants of Fiscal Incidence. *Political Research Quarterly, 40* (1), 137-58.

Mazerov, M. (2003). Expanding Sales Taxation of Services: Options and Issues. *Center on Budget and Policy Priorities*. Retrieved October 18, 2008 from http://www.cbpp.org/3-24-03sfp.pdf

McKee, M. and Quick, P. (1988). Sales Tax on Services: Revenue or Reform? *National Tax Journal, 41* (3), 395-409.

Merrill, P. and Edwards, C. (1996). Cash-Flow Taxation of Financial Services. *National Tax Journal, 49* (3), 487-500.

Merrill, P., Ma, Q., Scheurn, F., Mustaq, A., Slemrod, J., and Erard, B. (2006). *Retail Sales Tax Compliance Costs: A National Estimate*. New York, NY: PriceWaterhouse Coopers.

Metcalf, G. (1997). The National Sales Tax: Who Bears the Burden? *Policy Analysis No.* 289.

Washington, DC: CATO Institute. Retrieved March 5, 2009 from http://www.cato.org/pub_display.php?pub_id=1148

Mikesell, J. (1999). The American Retail Sales Tax: Considerations on Their Structure, Operations, and Potential as a Foundation for a Federal Sales Tax. In J. Slemrod (Ed.), *Tax Policy in the Real World* (pp. 43-59). Cambridge: Cambridge University Press.

Mikesell, J. (2003). *Fiscal Administration* (6th ed.). Belmont, CA: Thomson-Wadsworth.

Modesto Bee. (2008, September 8). Sweet sales tax deal could turn sour for city. Retrieved January 26, 2009 from http://www.modbee.com/opinion/story/423109.html

Munger, M. (2000). *Analyzing Policy: Choices, Conflicts, and Practices*. New York, NY: W. W. Norton

Murray, M. (1997). Moving the Retail Sales Tax to a Retail Tax: Optimal Tax Considerations. In M. Murray and W. Fox. (Eds.), *Sales Tax in the 21st Century* (pp. 193-203). Washington, DC: Greenwood Publishing Group.

Musgrave, R. (1959). *The Theory of Public Finance*. New York: McGraw Hill.

National Conference of State Legislatures. (2007). Principles of a High-Quality State Revenue System. Washington, DC: Author. Retrieved January 23, 2009 from http://www.ncsl.org/Default.aspx?TabId=12673#principles

Nabors, R. (2002). Opportunity Lost: Tax Reform and the 1997-1998 Constitution Revision Commission. *Florida State University Law Review, 30*, 477-86.

Nellen, A. (2007, June 27). Tax Pyramiding. *The 21st Century Taxation Blog*. Retrieved December 15, 2008 from http://www.newamerica.net/blog/21st-century-taxation/2008/tax-pyramiding-2123

Nellen, A. (2008a, February 28). Obstacles to Taxing Services – Are They Insurmountable?

AICPA Corporate Tax Insider. Retrieved December 31, 2008 from http://www.cpa2biz.com/Content/media/PRODUCER_CONTENT/Newsletters/Articles_2008/CorpTax/Insurmountable.jsp

Nellen, A. (2008b, June 29). Taxing Some Services Could Help if It's Fair and Simple. *San Jose Mercury News*. Retrieved October 1, 2008 from http://www.newamerica.net/publications/articles/2008/taxing_some_services_could_help_if_its_fair_and_simple_7461

Office of the Governor of California. (2008, October 30). *Executive Order: S-12-08*. Sacramento, CA: Author. Retrieved January 4, 2009 from http://gov.ca.gov/executive-order/10928

Office of the Governor of California. (2009, July 1). *Governor Schwarzenegger Remains Committed to No New Taxes, Announces Overstock.com Will Continue to do Business in California*. Sacramento, CA: Author. Retrieved July 28, 2009 from http://gov.ca.gov/press-release/12650/

Oppenheimer, J. (2008). Is a Sales Tax on Services the Future Revenue Generator for State and Local Governments? Retrieved April 20, 2009 from http://www.uhyadvisors-us.com/uhy/Portals/0/SALT_JSTA_Oppenheimer_Jan-Feb08.pdf

Pieler, G. (2008). New York: Double-Dealing on Retail Taxes. *Ideas: Innovative Insights on Today's Policy Debates No. 49*. Retrieved October 13, 2008 from http://www.ipi.org/ipi%5CIPIPublications.nsf/PublicationLookupFullText/4CF2405FC896FAD68625749100738BDA

Plotnick, R. (1985). A Comparison of Measures of Horizontal Inequity. In M. David and T. Smeeding (Eds.), *Horizontal Equity, Uncertainty, and Economic Well-Being* (pp. 239-68). Chicago: University of Chicago Press.

Poddar, S. and English, M. (1997). Taxation of Financial Services Under a Value-Added Tax: Applying the Cash-Flow Approach. *National Tax Journal, 50* (1), 89-112.

Raz, J. (1979). The Rule of Law and Its Virtue. *The Authority of Law*. Oxford: Clarendon Press.

Readmond, T. (2005). The Streamlined Sales Tax Proposal: A Tax Increase Under the Radar. *Americans For Tax Reform: Policy Brief*. Retrieved October 12, 2008 from http://www.atr.org/content/pdf/2005/dec/120704ot_SSTPpb.pdf

Russo, B. (2007). Is Past Prologue? Prospect for State and Local Sales Tax Bases. Retrieved March 16, 2009 from http://www.belkcollege.uncc.edu/brusso/workingpaper%20pdf/Is%20Past%20Prologue.pdf

Schifanelli, J. (2008, September 24). Sales Tax Revenue Sharing. *The Fillmore Gazette*. Retrieved September 2, 2009 from http://www.fillmoregazette.com/front-page/sales-tax-revenue-sharing

Senate Finance, Tax, and Claims Committee. (1987). *Summary: CS/SB 777 by Senator Deratany, as passed. Sales Tax on Services*. Tallahassee, FL: Author.

Sheffrin, S. (1996). Should the Federal Income Tax Be Replaced with a National Sales or Value-added Tax? *California Policy Research Center*. Retrieved May 2, 2009 from http://www.iga.ucdavis.edu/Research/CSLT/Publications/NationalSalesorValue-addedTax.pdf/view

Siegfried, J. and Smith, P. (1991). The Distributional Effects of a Sales Tax on Services. *National Tax Journal, 44* (1), 41-53.

Sobel, R. and Holcombe, R. (1996). Measuring the Growth and Variability of Tax Bases Over the Business Cycle. *National Tax Journal, 49* (4), 535-52.

Soltis, A. (2009, January 14). Court OKs State's Amazon Tax. *New York Post*. Retrieved February 2, 2009 from

http://www.nypost.com/seven/01142009/news/regionalnews/court_oks_states_amazon_tax_150054.htm

Stark, K. (2003). The Uneasy Case for Extending the Sales Tax to Services. *Florida University Law Review, 30* (435), 435-65.

Steel, M. (2008a, May 7). The Democrats' $45 Billion Service Tax. *The Flash Report*. Retrieved October 1, 2008 from http://www.flashreport.org/featured-columns-library0b.php?faID=2008050701172835

Steel, M. (2008b, May 14). Sales Tax on Services Would Hurt the Desert. *The Desert Sun*. Retrived December 12, 2009 from http://www.boe.ca.gov/members/msteel/news/DesertSun_SOS_051408.pdf

Steel, M. (2008c, June 9). Sales Tax on Services Could Bypass Two-Thirds Legislative Vote. *The Flash Report*. Retrieved January 15, 2009 from http://www.flashreport.org/featured-columns-library0b.php?faID=2008060901132400

Steuerle, C. E. (1999). And Equal (Tax) Justice for All? (Part 2 of 8). *Economic Perspective*. Washington, DC: Tax Policy Center. Retrived February 2, 2009 from http://www.taxpolicycenter.org/publications/url.cfm?ID=1000149

Studenmund, A. (2006). *Using Econometrics: A Practical Guide* (5th Edition). New York, NY: Addison-Wesley.

Tuereck, D., Bachman, P., and Jacob, S. (2007). *Fiscal Federalism: The National FairTax and the States*. Boston, MA: The Beacon Hill Institute at Suffolk University.

United Kingdom Office of National Statistics. (2009). Internet Retail Sales – December 2008. Retrieved July 10, 2009 from http://www.statistics.gov.uk/pdfdir/irs0109.pdf

United States Government Accountability Office. (2000). *Sales Taxes: Electronic Commerce Growth Presents Challenges; Revenue Losses are Uncertain*. Washington, DC: Author. Retrieved from http://www.gao.gov/new.items/g600165.pdf

United States Census Bureau. (2008). State Median Income by Family Size. Washington, DC: Author. Retrieved from http://www.census.gov/hhes/www/income/statemedfaminc.html

Wassmer, R. (2008). California's State and Local Revenue Structure after Proposition 13: Is Denial an Appropriate Way to Cope? Retrieved November 10, 2009 from http://www.csus.edu/indiv/w/wassmerr/denial.pdf

Wicks, E. (2008). Can A Sales Tax on Medical Services Help Fund State Coverage Expansions? *Robert Wood Johnson Foundation: State Coverage Initiatives*. Retrieved October 21, 2008 from http://www.statecoverage.net/pdf/salestax0708.pdf

Yaffee, R. (2003). A Primer for Panel Data Analysis. *Connect: Information Technology at NYU* Retrieved May 11, 2009 from http://www.nyu.edu/its/pubs/connect/fall03/pdfs/yaffee_primer.pdf

Yu, E. and Liu, J. (2007). Environmental Impacts of Divorce. *Proceedings of the National Academy of Sciences*, *104* (51), 20629-20634.