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Integrating California's Climate Change and Fiscal Goals: The Known, the Unknown, and the Possible

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Introduction

California's tax system is notoriously complex. Its heavy reliance on the income tax makes it vulnerable during recessions. Proposition 13, which substantially disconnected assessed property values for taxation from actual market value, perverts the housing market and land use. Moreover, the increased embrace of use taxes and impact fees at all levels of government to compensate for chronic revenue shortfalls creates an unwieldy tax and revenue system.

Less well understood is how the system affects the state's climate change policy goals. Despite decades of retooling regulations and creating incentives to encourage energy efficiency and renewable energy use, California public officials have yet to take a hard look at how its tax structure affects the state's ability to meet greenhouse gas (GHG) emissions reduction targets.

The Global Warming Solutions Act of 2006 (Assembly Bill, or AB, 32) established the benchmark goal of reducing the state's carbon emissions to below 1990 levels by 2020. In implementing this standard, the California Air Resources Board (ARB) has emphasized the primacy of vehicle fuel economy and low-carbon fuel standards, with sustainable land use and transportation planning as a smaller third element (Barbour and Deakin 2012). Recognizing the role good planning can play in achieving AB32 goals, California enacted Senate Bill 375 (SB 375), requiring the ARB to set regional GHG reduction targets for passenger vehicles and light-duty trucks, which together produce about 40 percent of the state's greenhouse gases.

The bill also requires metropolitan planning organizations to develop Sustainable Communities Strategies as part of their regional transportation planning process, integrating land use, transportation, and housing planning in order to achieve these targets. Many regions are pursuing more compact infill development, often near public transit, as a key strategy to achieve these reductions, based on the theory that such development patterns will produce fewer GHG emissions than more sprawling development, and that they will encourage less reliance on private vehicle travel, which will also reduce emissions.

This paper examines the relationship between California's fiscal structure and its climate change goals, specifically, the travel reduction targets for passenger vehicles. California's imbalanced tax structure may contribute to inefficient land-use patterns, thus increasing vehicle miles traveled (VMT). With the world watching the implementation of California's landmark climate change legislation, and preliminary findings suggesting considerable success in meeting the targets, it is time to revisit the tax code to determine how it is supporting (or hindering) the attainment of climate change policy goals.

Relying primarily on existing research, this paper develops a conceptual framework and offers new empirical analysis for evaluating the tax structure in relation to patterns of urbanization in California. This task entails detective work; though the relationship between land development and VMT is well understood, there is little systematic evidence about how fiscal structure shapes development patterns. Section II provides a brief overview of GHG emissions in California, while Section III examines California's unique fiscal structure and what its mix of sales, property, and personal and corporate income taxes means for fiscal stability, economic growth, and social equity. Section IV looks specifically at the relationship between fiscal structure and urban development patterns, describing how each type of tax likely affects density, land-use type, land costs, and new construction.

After a review of the literature on development and VMT in Section V, Section VI provides a conceptual model of the relationships and focuses specifically on property and sales tax dependence, analyzing their relationship with new development and VMT. Section VII provides an overview of currently proposed reforms, while Section VIII concludes by developing four principles for tax reform legislation that would support climate change goals.

California and Climate Change

In 2012, California emitted about 459 million metric tons in greenhouse gases (California ARB 2014).¹ Although it ranks second in the country (to Texas) in terms of total emissions, California is 45th in per capita emissions. Considered in comparison to the countries of the world, California had the 38th largest per capita emissions (in 2010), and it ranks 8th (tied with Ireland) among OECD countries.²

Many different sectors contribute to GHGs, led by transportation, industrial uses, and electricity generation (Figure 1). In turn, different development patterns shape emissions in these sectors. For instance, 90 percent of the transportation contribution comes from on-road vehicles; passenger vehicles alone account for 26 percent of GHG emissions in California. The residential and commercial sectors contribute to emissions primarily through the use of fuel for building needs, such as heating and air conditioning. Compact, mixed-use development reduces emissions, and overall cities have smaller carbon footprints than suburbs, as discussed further in Section V (Gomez-Ibañez et al. 2009; Jones and Kammen 2014).

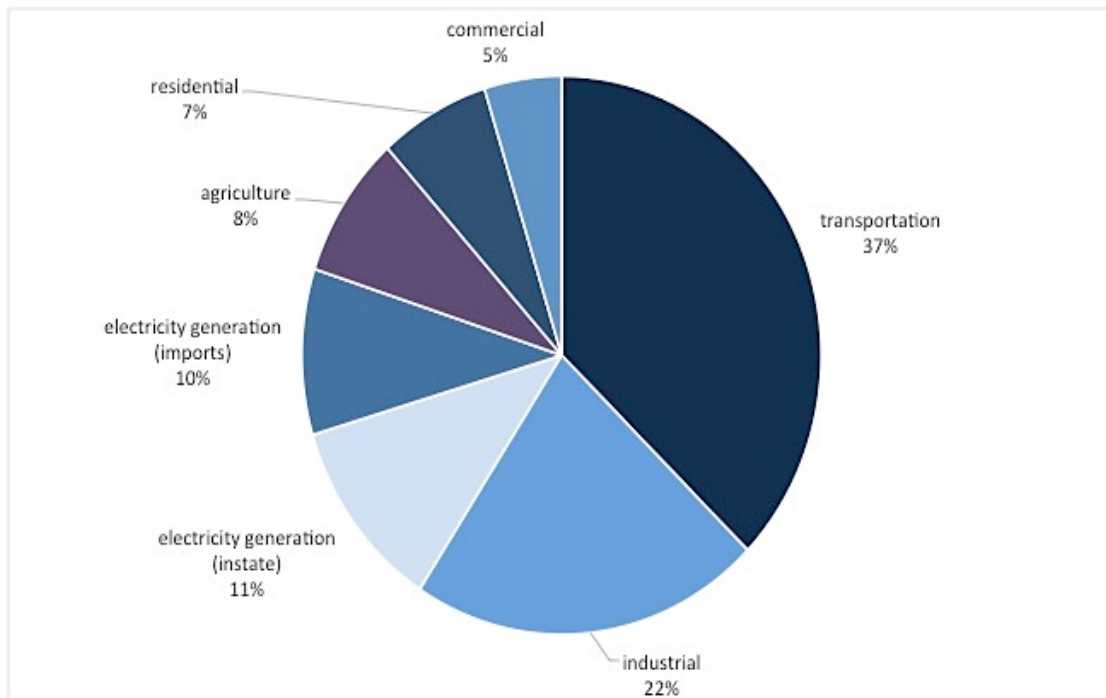
A substantial literature, discussed in detail below, establishes that adopting more compact development patterns can reduce GHG emissions, although there is considerable uncertainty about how much, with a range of one to 11 percent by 2050 relative to base case conditions according to a recent National Academies report (Gomez-Ibañez et al. 2009). For perspective, a modest increase in emissions and fuel efficiency standards could reduce GHG by about 17 percent by 2050 (Greene and Plotnick 2011). Overall, California expects sustainable communities to account for about 8.5 percent of the reduction in greenhouse gases, compared to 66 percent from the emissions rules for passenger vehicles and light-duty trucks (the so-called Pavley standards) and 26 percent from cleaner fuels (California Air Resources Board 2008).

Under SB 375, most of California's large metropolitan planning organizations (MPOs) have adopted targets for 2020 of about 7 percent reduction in GHG emissions. But as Barbour and

¹ Emissions here are measured as tonnes of carbon dioxide equivalent (MMTCO₂e).

² OECD.Stat database. Accessed at <https://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG>.

Figure 1. Sources of Greenhouse Gas Emissions, California, 2012.



Source: California ARB, 2014.

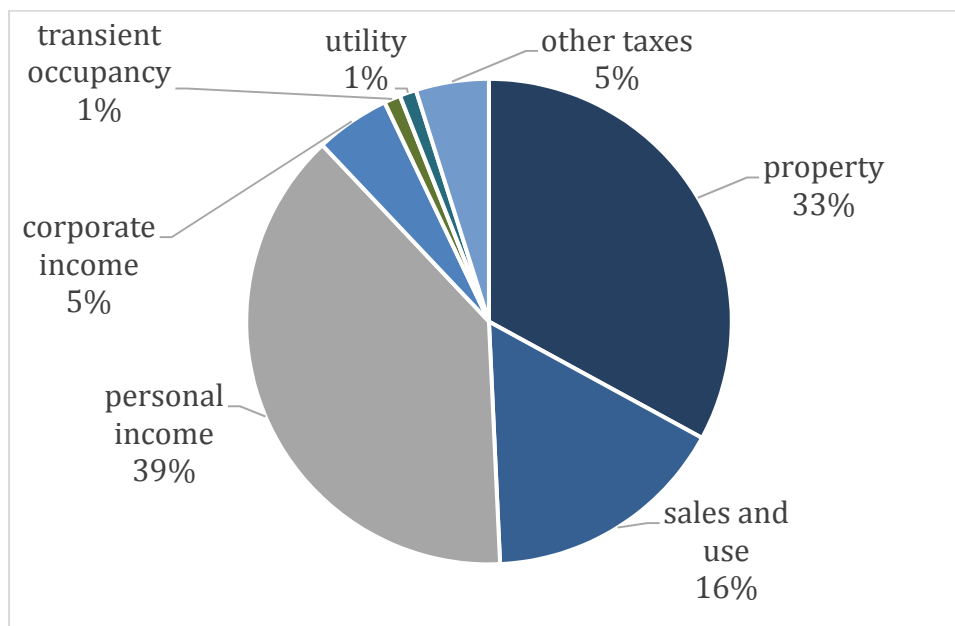
Deakin (2012) note, changes in land-use patterns—as well as travel behavior—take decades to implement and materialize, and emissions reductions may turn out to be much larger in scale. Even if more compact development only reduces GHG emissions slightly, in order to mitigate climate change we need to adopt a comprehensive array of policy interventions in sectors including not just energy, transport, buildings, industry, and agriculture/forestry/other land use, but also human settlements and infrastructure (Intergovernmental Panel on Climate Change 2014).

California's Fiscal Structure

A first step is to examine the overall tax revenue intake of the state of California and its cities to support public services (Figure 2). The vast majority (88 percent) of tax revenues come from just three sources: property tax, sales and use tax, and personal income tax.³ The two most likely candidates to influence development patterns, as discussed further below, are the property and

³ A use tax is imposed on the use, storage, or consumption of merchandise purchased outside the state. Note that this does not include local government revenue such as special fees and charges, as well as intergovernmental transfers and the gasoline tax (considered a special tax outside of the General Fund). Estimated from California State Controller's Office, "Statement of General Fund Cash Receipts and Disbursements," June 2014. Accessed at <http://www.sco.ca.gov/Files-ARD/CASH/fy1314_july.pdf>.

Figure 2. Tax Revenue Collected by the State of California and Its Cities.



Source: Data is for 2013–2014 fiscal year. State Controller’s Office.

sales tax, which in recent years have been yielding about \$80 billion per year combined. Currently, roughly one-fifth of property and sales tax revenues come back to California jurisdictions, which rely heavily on a variety of revenue sources.⁴ The remainder of property tax revenues is distributed to schools, counties, and special districts, while the other sales taxes go into the state’s general fund.

Taxation has changed over time: California is increasingly dependent on the personal income tax due in part to the business cycle, which inflates incomes at its peak, and also to Proposition 30, the temporary increase in tax rates for the wealthiest households.⁵ The share from corporate income, property, and sales and use taxes has generally declined slightly (again, with exact shares depending on the business cycle). Because of Proposition 13’s cap on property tax assessment, California has experienced much slower growth in property tax revenues than other states (Gamate 2009).⁶ But like the rest of the country, California has experienced a slow decline in sales tax revenue per capita, due to a shift in economic activity from the consumption of goods to services (Coleman 2015).

⁴ In 2013–2014, California cities (in the aggregate, with considerable variation from place to place) obtained just 34 percent of their overall revenues from taxes, with other sources including intergovernmental transfers, licenses and permits, fines, service charges, and special benefit assessments.

⁵ This has raised over \$7 billion per year (California Forward 2015).

⁶ Proposition 13 rolled back property assessments to 1975 values; capped annual increases in value to a maximum of 2 percent until the time of sale, when reassessment can occur; and limited the county assessed property tax rates to 1 percent. It also set in place a new requirement for a two-thirds supermajority to raise revenue.

The following subsections explore the relationship between California's mix of taxes and three outcomes: fiscal stability, economic growth, and social equity.

Fiscal Stability

Reliance on the personal income tax, as well as sales and use taxes, has several well-established impacts (Auerbach 2010; Citrin 2009). It creates fiscal volatility because state budget revenues fluctuate widely in response to the business cycle, and reliance on capital gains tax means even more instability (Gamage 2009). Revenue from the personal income tax is particularly cyclical because of the progressivity of the California tax code, with its disproportionate reliance on high-income households to provide revenues; in contrast, property tax is a more stable revenue generator over time (Auerbach 2010). At the same time, consumption patterns shift with incomes, causing sales tax revenues to fluctuate. The reliance on personal income tax also means that both state and local governments depend heavily on taxes collected at the state level for revenues, a centralized system that reduces local autonomy.

Economic Growth

Research on the relationship between taxes and economic growth yields mixed results, perhaps in part because such research tends to be ideologically driven. Tax burden, particularly personal income tax, generally reduces income growth at the state level, but effects fluctuate by time period, with little impact over the long term, and high income tax rates have inconsistent effects on economic growth (Gale, Krupkin, and Rueben 2015; Ojede and Yamarik 2012; Reed 2008; Reed and Rogers 2004; Yamarik 2000).

Relatively few studies examine the growth effects of sales and property taxes, and those that do produce mixed results. Measuring total production, average productivity, investment, and labor at the state level, Yamarik (2000) found that personal income and property taxes reduce growth but sales taxes have no effect (or effects that disappear over time, according to Hageman, Bobek, and Luna 2015). Yet, for long-run income growth, property and sales tax rates have negative effects (Ojede and Yamarik 2012). Overall, there is more evidence that the property tax dampens growth than the sales tax.

Even when higher taxes impede income growth, spending the new revenue for public services may more than compensate, and thus justify the taxation. If governments improve education, infrastructure, health, and public safety, net growth should be the result (Helms 1985; Mofidi and Stone 1990; Stansel 2008, Stansel and Swaleheen 2008). These studies tend to emphasize the importance of spending on education and highways and find benefits from reducing transfer or welfare payments (Helms 1985; Stansel and Swaleheen 2008).

Social Equity

A rich literature discusses the equity impacts of taxation, i.e., the fairness of the tax system for taxpayers of different income levels: for instance, high sales taxes have a negative equity impact, since a flat tax is regressive for low-income consumers, while the income tax can be adjusted with lower marginal rates for the low-income. The focus here is on the equity impacts of the property tax, since many studies explore the effect of Proposition 13 on schools, public sector hiring, and social service provision, which may shape development patterns. Section III of this

article addresses the specific effects of Proposition 13 on urban form, segregation, and housing costs.

Proposition 13, as well as the subsequent Serrano decisions in the California Supreme Court, has resulted in greater equity in school funding (Fischel 2004; Gervais and Rayford 2012). In states where cities must rely on local tax revenues to fund their schools, school support reflects the underlying fiscal capacity of the municipalities; in other words, wealthy communities have more money for schools than poor cities. But in California, where the state provides a large share of school support, K-12 funding is distributed more equally across municipalities. At the same time, overall per pupil spending has declined since Proposition 13, in part because of fiscal instability (Barbour 2007). Moreover, states with property tax limitations must rely on local voters to pass bond measures to fund school construction, which can create new inequalities if poorer districts are less willing to approve extra fees (Barbour 2007; Wallin and Zabel 2011).

States with tax systems like California's are more likely to limit public sector hiring and wages than states without property tax limits (Poterba and Rueben 1995). Even controlling for conservative sentiment, and correcting for endogeneity, property tax limits result in less qualified teachers and larger class sizes, with an impact on student performance (Figlio and Rueben 2001).

A reduction in property tax revenue that is uncompensated by revenue increases from other sources will, by definition, diminish public service provision if the public sector cannot cut costs (Zodrow and Mieszkowski 1986), and early research suggested that property tax cuts related to Proposition 13 resulted in cutbacks to social services (Terrell 1981). Though State Bill (SB) 154 devised a property tax reapportionment system that provided a bailout for local governments post Proposition 13, it enacted minimum service levels for public safety that for some cities meant diverting revenue from other services (Chapman and Kirlin 1979). Counties may struggle to maintain levels of service for health, welfare, and criminal justice, particularly if they are unable to replace lost property tax revenue with sales tax revenue or to cut costs (Sokolow 1993). In sum, Proposition 13 has likely worsened inequities in education and social service provision across California.

Moving Forward: Optimizing the State Tax Structure for Stability, Growth, and Equity

Because of its reliance on the personal income tax, California experiences volatility in revenue generation and has developed a more centralized system of government revenues and spending than it had when it relied more on the property tax, a more direct, local system. Yet, the tax structure in California is noted for progressivity, with a personal income tax system that has a steep marginal tax rate structure and numerous income credits and tax exemptions for low-income households; nearly half of its income tax revenue comes from the top 1 percent of income earners (Auerbach 2010; COTCE 2009).⁷ Such a progressive tax system has not been shown to dampen income growth, and may in fact reduce inequality (Leigh 2008).

At the same time, the centralized structure of government finance in California results in less efficiency in government, greater democracy, and altered spending priorities for public goods and services. Centralization makes it challenging for localities to offer bundles of public goods and services that meet resident demands, a process that, as Tiebout (1956) suggested, tends to sort residents according to their preferences. With the state making many decisions about funding levels for local public goods, local governments are less able to respond to community pref-

⁷ Auerbach (2010, 12) notes however that this figure may mask "true tax incidence," i.e., burdens and benefits imposed particularly by the property and corporate income taxes.

erences (Auerbach 2010). The shift from reliance on local property taxes to state income taxes may have created new burdens on the budget: for instance, one important Proposition 13 legacy may have been to increase the state's borrowing costs (Poterba and Rueben 1999). California has gained what Citrin (2009, 8) calls "an incoherent, dysfunctional system of budgeting that makes it harder to react flexibly in times of fiscal stress."

By limiting the ability of local governments to raise revenue through the property tax, Proposition 13 has transferred power, and fiscal responsibility, from local governments to the state. Yet, it has also enhanced direct democracy in California (Citrin 2009). Arguably, property tax limits do not harm local service provision so long as local voters have the power to override the tax limit when necessary; the limits imposed by Proposition 13 can thus prevent excessive spending by local governments and allow voters to choose the most desirable services (Cutler, Elmen-dorf, and Zeckhauser 1999; McGuire 1999).⁸

As localities have scrambled to make up for lost property tax revenue through parcel taxes, special fees, and new sales taxes, they have, by and large, managed to keep revenue and spending constant (Barbour 2007; Citrin 2009). But the new system of raising revenue has had impacts on what local governments can prioritize and achieve. In general, voters have been more likely to approve bonding and fees for school facilities, transportation, and fire protection than parks and libraries (Rueben and Cerdán 2003). Counties have experienced considerable success at raising sales taxes for transportation, funds that now provide a significant share of local transportation revenue in the state (Barbour 2007). Local option transportation sales taxes provide an opportunity to leverage transportation match funding from the state and federal government and respond to local priorities (Green, Neiman, Bockman, and Sirotnik 2013).

The next section turns to how this mix of taxes shapes local land development patterns, specifically density, use, cost, and location. The level of property, sales, and other taxes incentivizes particular types of development, which in turn shapes VMT. Understanding these relationships can help us devise some basic principles for how California and its municipalities can share revenues in order to reduce GHG gas emissions while at the same time accommodating growth.

Impacts of California Fiscal Structure on Development Patterns

How do different types of taxes—sales, property, and other—affect urban form, especially the type and intensity of development? To answer that question, this section looks first at whether local government reliance on the sales and property tax lead to the "fiscalization of land use," the tendency for local governments to make local land-use decisions to maximize revenue generation through the attraction of tax-generating uses and the reduction of government service costs. Next, it examines how reliance on property taxes may shape density, location, and land use.

There is little or no literature on the impacts of state personal or corporate income tax on physical development patterns, so these are not discussed. However, an extensive literature on firm location decision-making does suggest that corporate income tax and related incentives only impact firm location on the margin (Gottlieb 1995; Peters and Fisher 2004). Factors such as firm productivity, availability of skilled labor, and local amenities are more important in both firm

⁸ However, as noted above, Proposition 13 enacted a new supermajority requirement that makes it difficult should voters want to raise revenue.

relocation and startups (Brouwer, Mariotti, and van Ommeren 2004; Chapple and Makarewicz 2010).⁹

Sales Taxes

The state of California collects locally levied sales taxes that range from 7.5 to 10 percent depending on the city and returns 1 percent to the municipality known as the “situs rule” or the Bradley-Burns law. For the average city, sales tax revenue makes up a small share (8 percent) of total revenues and just one-fourth of tax revenues. The value of the 1 percent is primarily that it is not dedicated to specific purposes but can be used at the city’s discretion (Lewis 2001a).

That cities embrace the fiscalization of land use is common wisdom among California planners, yet there are just two (possibly outdated) studies that attempt to measure it (Lewis 2001a, Wassmer 2002). In theory, the desire to improve city finances may lead cities to rezone land for retail or other taxable uses or respond more favorably to development proposals that bring new tax revenues. Even so, it should not affect retailer location, which occurs according to retail market logic (Lewis 2001a). Further, it will not impact economic growth at the aggregate (regional) level, but rather redistribute retailers among municipalities (*ibid.*).¹⁰

Still, given a variety of land-use choices, California city managers prefer retail followed by office, mixed use, and light industrial, with multifamily residential and heavy industrial at the end of the list (Lewis 2001a). If local governments follow up on their preferences—a hypothesis not tested in this study—they may overzone for retail, underzone for residential and industrial uses, or target more incentives to retail uses (Lewis and Barbour 1999; Lewis 2001a). This in turn could lead to development patterns that increase VMT, as discussed further below.

Cities and suburbs adopt different approaches to the fiscalization of land use. The city manager survey found that, when asked their preferences for development, city managers in suburban municipalities tend to rank retail land use higher than those in central cities (Lewis 2001b). Reliance on sales tax revenue has a significant and positive influence on suburban retail activity, although urban growth boundaries can reduce this retail sprawl over time (Wassmer 2002). Because of their increase in retail, suburbs gain business taxes and franchise or license fees as well (*ibid.*).

One recent change in the California sales tax is the collection of tax on Internet sales. The response by wholesaler/retailer giant Amazon was to shift its warehousing to California since there was no longer a financial incentive to locate in Nevada or Arizona (A. Auerbach, personal communication). As e-commerce business models shift to same-day delivery, there is increasing pressure for warehouse space (Chapple 2015a). To the extent that sales occur from these sites, cities may be motivated to attract high-revenue warehouses.

In sum, though there is minimal evidence, reliance on sales tax shaped by state tax policy seems to increase retail activity in suburbs, possibly because cities make land use decisions on a fiscal basis. Cities attracted to the sales tax generation potential of big box retail and auto malls may accommodate their demands for large, highway-accessible lots, often on the urban fringe—i.e., sprawl—which then increases VMT. Though e-commerce may be reshaping development, its share of the market is still small, at 5 or 6 percent (U.S. Bureau of the Census 2012).

⁹ The lack of research may be due, simply, to the minimal impact of the state income tax, which is very low relative to the federal income tax.

¹⁰ However, if certain land uses important to the regional economy are systematically undersupplied, a region may experience negative impacts, as in the case of an undersupply of multifamily housing driving up the cost of housing for low-income households.

On the other hand, local transportation sales taxes may lead to greater density and less auto use, to the extent that they fund public transportation rather than roads (Goldman and Wachs 2003). Some projects cross county borders (e.g., Metrolink rail in Los Angeles, Orange, and Riverside counties) (Crabbe, Hiatt, Poliwka, and Wachs 2005). This improvement in regional connectivity, whether via transit or highway, may generate economic growth, particularly in the form of new, denser job centers. However, to the extent that the sales tax burden falls on non-users of transportation, it will be less equitable than user fees, such as the gasoline tax (Wachs 2003a).

Property Taxes

There is considerably more research on the impact of property taxes on development patterns, focusing on density and location, use, and land costs.

Urban economics suggests a relationship between property taxation and development (albeit not yet thoroughly tested): higher property tax rates create a disincentive to develop at higher densities, so development accommodates population via urban spatial expansion (Brueckner and Kim 2003). But high property taxes also have contradictory effects. At the same time land is developed at lower densities, households may consume less housing, thus reducing urban sprawl. Brueckner and Kim (2003) suggest that the sprawl impacts will slightly outweigh density effects.

Wassmer's (2002) analysis of fiscalization found that the relationship between property tax share and suburban retail sales is negligible, possibly confirming Brueckner and Kim's result; in other words, property tax limits could be limiting fiscalization and by implication, sprawl. Local jurisdictions have little incentive to boost property values long-term because they get so little property tax revenue back from the state.

Property tax limits may change taxpayer behavior by altering consumption choices, specifically, delaying new property purchases and existing property improvements (Taylor 2012). Proposition 13 likely limits household mobility, as potential movers are discouraged by the higher assessments of newly purchased property. Because of the property assessment cap, long-term homeowners enjoy a significant tax break relative to newcomers, the so-called "welcome stranger" effect (Crane 1991); this disparity ratio (the ratio of market to assessed value) can reach four or five at the peak of the economic cycle, but softens at the trough (Sheffrin and Sexton 1998). To the extent that homeowners are not mobile, i.e., low-income or elderly, they will realize this benefit, at the expense of renters and newcomers (O'Sullivan, Sexton, and Sheffrin 1994).

In order to improve housing choices for older residents, amendments to Proposition 13 have allowed long-term homeowners of age 55 or more to export their original property tax rate to a new house. Research has shown that at age 55, homeowners are 25 percent more likely to move than at age 54, confirming the "lock-in" effect of Proposition 13 (Ferreira 2010). Though earlier research did not find a mobility impact, housing price increases have likely changed the decision-making dynamic for movers (*ibid.*). At the same time, Proposition 13 insulates homeowners from the potential displacement effect of escalating tax burdens due to housing price increases and gentrification in California's core urban areas (Chapple 2015b).

Potential negative impacts of this lack of household mobility include the dampening of the economy, jobs-housing mismatch, and increases in neighborhood segregation. Relatively high housing prices for newcomers discourage in-migration and hinder economic growth. Employed homeowners may be disincentivized from relocating near to work, or take suboptimal jobs near home, because of the new property tax burden. Long-term homeowners who are low-income

(and under 55) may not be able to afford to move, if the housing costs and increase in property taxes at the new location exceed the real estate transaction costs plus the built-up equity in the home. In part because of Proposition 13, higher-income communities may incorporate as separate cities in order not to pay for services for low-income residents, thereby increasing segregation (Hogen-Esch 2011). Of these impacts, the increasing distance between home and work has been most clearly shown to increase VMT (Ewing and Cervero 2010).

Reliance on property taxes shapes land use as well. To maximize the ratio of property tax revenue to services, city officials prioritize the retention and new development of retail, office, and high-end residences, fearing that tax revenues generated from multi-family developments will not fully cover the costs local governments incur in providing residents with services (Lewis 2001a).¹¹ Subsidized housing managed by non-profits or the public sector does not contribute property tax, creating a disincentive to build affordable housing and, in turn, likely exacerbating commutes for low-wage workers with little flexibility in employment. Still, the potential for property tax revenues can lead government to support relatively more balanced development (i.e., residential in addition to retail and office) than sales tax, which only encourages retail development (ibid.). This in turn should lead to lower VMT (Ewing and Cervero 2010).

Property tax rates can be a tool to incentivize development; high property tax burdens on agricultural land can create pressure to convert farmland to higher density development (Polyakov and Zhang 2008). This is the argument put forward by proponents of a land value tax, a split-rate property tax with a higher tax rate on land than improvements. In theory, this tax would discourage holding land for speculation by taxing the windfall or unearned income from land based on its location. Though more than 30 countries have implemented land taxes, evidence to date of its effect on development is light; land value tax seems to incentivize development slightly, and probably reduces sprawl (Dye and England 2010). If it is shown to lead to more compact development, the land value tax could be a valuable tool to reduce VMT.

Perhaps the best-established effect of Proposition 13 is how it raises overall housing prices. This occurs for a couple reasons: the increased reliance on development impact fees and the capitalization of property tax savings into land value (Chapman and Kirilin 1979; Rosen 1982). In turn, increased home prices create price pressures on the rental market.

Finally, it should be noted that California long relied on a specific tool to change development patterns via the property tax: redevelopment. Eliminated by Governor Jerry Brown in 2012, redevelopment policy and its primary financing tool, tax increment finance, were mechanisms that allowed local governments to declare areas blighted, target urban renewal initiatives, and recapture any subsequent growth in property taxes. Without redevelopment, it has become challenging for cities to incentivize more density and infill development.

Other Taxes

Among other local and state taxes, the two that clearly shape development patterns are impact fees and gas taxes. To replace property tax revenue, cities rely on a variety of fees, developer exactions, and benefit assessment districts to finance services and infrastructure (Bell 1987; Deakin 1988; Koyama 1990). Development impact fees increase the cost of construction, thereby increasing housing prices (Ihlanfeldt and Shaughnessy 2004). At least in theory, impact fees and

¹¹ Although cities are correct that housing development results in a net fiscal loss, the loss per unit is actually lower for multifamily than for single-family development (Schildt 2011).

assessment districts should incentivize developers to build more density and shift to commercial or industrial use, in order to help pay for the new costs (Misczynski 1986).

Increasing the gas tax should, at least in theory, encourage denser development patterns, encourage a shift from auto to transit commute modes, and support the construction or operation of transit systems, which in turn may facilitate density (Wachs 2003b).¹² In general, though it is regressive with respect to income, the gas tax is more effective (and less regressive) than the transportation sales tax because only drivers pay (*ibid.*). Still, overall fuel costs play a much greater role in shaping development than these taxes. In fact, Salon, Boarnet, and Mokhtarian (2014) show that outside of central cities, increasing gasoline prices has a bigger effect on reducing VMT than other factors such as transit use and job proximity.

Another transportation tax that might affect development is the vehicle license fee. Because it originally was allocated to local governments on a per capita basis, it was an incentive for urban development, because smaller places with more people fared well. However, Governor Schwarzenegger reduced the fee in 2003, and it may not be politically feasible to raise it again. Ironically, the state has backfilled the lost vehicle license fee revenue using growth in property tax assessments, which results in considerably more revenue for localities with considerable property sales or improvements.¹³

Research Moving Forward

The literature on the effects of tax systems on development patterns generally yields mixed results: California's fiscal mix incentivizes sprawl in some ways while leading to more compact development in others. Property tax limits in California have most likely increased housing and land costs, which could result in sprawl. Yet, at the same time, less reliance on the property tax by local governments most likely reduces sprawl. The desire for more property tax revenue might also cause a shift to high-end housing and commercial development, but there is little research on this to date.

Proposition 13 has also reduced household mobility, both the in-migration of new households and the intrastate migration of low-income households, and increased community stability, preventing the displacement that can occur with rising housing prices and taxes. The fiscalization effects of the sales tax are also mixed; there is some weak evidence that it leads to sprawl, but also suggestions that it may slow in response to growth controls. Though the gas tax is a promising tax mechanism to encourage more compact development patterns, its effects are minor compared to overall fuel prices.

Much of this academic debate over the development effects of taxation took place from the 1980s through the early 2000s, and there has been very little research since. Recent decades have brought rapid population growth to California (nine million new residents since 1990, for a total of 38 million), as well as multiple economic booms (typically followed by busts). In the bigger picture, changing demographics and preferences are creating new demand for livable neighborhoods and central city living, though the majority of households still prefer living in single-family homes on large lots (Chapple 2015b; Nelson 2013). This creates a need to re-examine the

¹² It should be noted that its biggest impact on VMT is likely to come not from denser development patterns but encouraging a switch to more fuel-efficient vehicles.

¹³ According to Fred Silva (personal communication, September 18, 2015), the backfill would have been \$4 billion but is now \$7 billion because of growth in property values.

relationship between fiscal structure and development patterns, and to outline a new research agenda to guide policy-making for taxation and climate change.

Implications of Development Patterns for VMT

In contrast to the literature on fiscal structure, the literature on the relationship between development patterns and VMT (and its share of GHG emissions) is recent and quite extensive. Compact, mixed-use development has both direct and indirect impacts reducing GHG emissions, not just from reductions in VMT but also more energy efficient buildings, smaller vehicles, and more efficient truck delivery patterns; these impacts are likely to increase over time (Gomez-Ibañez et al. 2009). In general, the higher the density of a neighborhood, the lower the VMT. At the same time, higher neighborhood density also increases congestion, which may in turn contribute to GHG emissions.

In sprawling regions, drivers drive greater distances (Ewing and Cervero 2010). There are extreme differences in average VMT in different types of neighborhoods: in suburbs dominated by single-family housing, the average household drives 60 miles per day, while in dense central cities daily household VMT is 17 miles and in urban areas with high transit, 27 miles (Salon et al. 2014). Low-density, high-VMT suburbs likely also house a disproportionate share of big-box retail. These neighborhoods reflect a broad range of factors beyond density alone that appear to synergistically affect travel behavior.

The effectiveness of land-use interventions to reduce VMT varies by neighborhood type, but in general, impacts are low. Doubling residential density could reduce VMT by 5 percent to 12 percent, with the greatest opportunities coming from the inner-ring suburbs (Gomez-Ibañez et al. 2009). A recent study by the California ARB (Salon et al. 2014) found a potential reduction of seven percent if five different mechanisms are used in concert, with half of the reduction due to the use of pricing mechanisms.

Neighborhoods with a high level of local job access have lower VMT, but changes in job access will have a much larger impact in suburban single-family neighborhoods than in cities that already have job accessibility (Salon et al. 2014). In their meta-analysis of more than 50 studies, Ewing and Cervero (2010) also find that reducing VMT is not a simple matter of increasing population and job densities. To have a major impact on VMT requires transformation of the built environment along several dimensions, particularly by improving accessibility to jobs, proximity to downtown, and connectivity of the street network (*ibid.*). Some interventions are more effective than others, for instance jobs/housing balance reduces VMT more than housing-retail-service mixing (Cervero and Duncan 2006).

Transportation policy can shape VMT and GHG emissions, most obviously by incentivizing use of zero emission vehicles, but also via transit and pricing. In general, the availability of public transit reduces VMT, but only slightly (Hymel 2014, Salon et al. 2014). Higher gas prices have more of impact: e.g., a 50 percent increase in fuel prices should lead to a 5 percent decrease in VMT per adult, increasing to a 7.5 decrease over time (Hymel 2014). Pricing mechanisms will be most effective in neighborhoods where there are attractive transport alternatives, i.e., in denser neighborhoods with transit.

Finally, growth in both income and employment matters as well. More affluent households drive more, while the higher the unemployment rate, the lower the VMT (Hymel 2014). More economic activity increases production and consumption, leading to more VMT from goods movement.

The spatial distribution of carbon footprints mirrors that of VMT. Living in the suburbs leads to higher carbon footprints, about 25 percent higher in large suburbs than in large cities (Jones and Kammen 2014). The larger the metropolitan area, however, the larger the carbon footprint per household because of the more extensive suburbanization, which offsets the benefits of increased density in the core (*ibid.*). In California, household transportation, rather than electricity use, accounts for a disproportionate share of the carbon footprint, whether because energy production is less carbon intensive or other factors are causing GHG emissions (*ibid.*).

This suggests the importance of strategies that target VMT specifically, in addition to the carbon footprint more broadly. One path, as suggested by the evidence and supported by SB 375, is more compact, mixed-use development. However, California has long struggled to build infill development, and housing development in particular is lagging behind (California Legislative Analyst's Office 2015; Landis et al. 2006).

Understanding the Relationships: Fiscal Structure, Development Patterns, and VMT

Tax policy shapes local investment and development policy, which then affect the density, cost, use, and location of land development. This in turn leads to various outcomes for fiscal stability, economic growth, and equity, as well as vehicle miles traveled (Figure 3). There is existing research on some, but not all, of these relationships, and no work to date has examined them comprehensively. Yet, the literature does give a sense of the direction of the relationships.

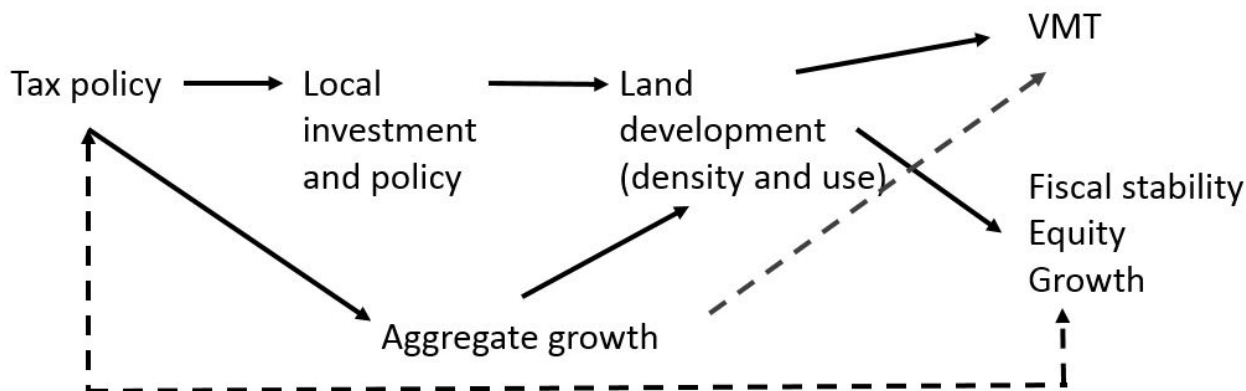
California's reliance on the income tax not only means more volatility and local reliance on the state for revenues, but less ability to respond to local needs efficiently. Though the state's fiscal mix may hinder economic growth slightly, the evidence is quite mixed, and in the end, what will matter most is how revenues are spent, particularly on education and transportation. Likewise, equity impacts are mixed: the progressive personal income tax benefits low-income households and centralizing revenues helps to equalize spending across school districts; but the decline of services likely has adverse equity impacts.

This fiscal structure probably has mixed impacts on VMT as well, if anything resulting in more car travel. More income in the hands of low-income California taxpayers makes housing (and cars) more affordable, but may encourage living farther away from jobs. More state spending on highways (to the extent that it results from this fiscal structure) probably increases VMT, and poorer local services means traveling longer distances to obtain assistance. Even when focusing specifically on the relationship between land development and VMT, there are mixed results: It is still unclear whether decreased reliance on property tax and increased reliance on sales tax means more or less sprawl or infill development. Proposition 13 reduces household mobility, which probably does increase VMT by hindering workers from living near work.

Research on the feedback loops (the dotted lines in Figure 3) is insufficient to draw firm conclusions. For instance, an extensive literature establishes the cost of sprawl, including VMT (Burchell et al. 2005; Carruthers and Ulfarsson 2008). These costs—new infrastructure, extra maintenance and services, environmental impacts, health impacts, fuel costs, and opportunity costs—likely place stress on municipal finances, which then could result in more fiscalization of land use. Another relationship occurs as the region experiences aggregate growth, which results in more land development, and by implication, more VMT.

To begin to examine the relationships empirically, I link data on fiscal mix to the Salon et al. 2014 study, which provides VMT and VMT elasticities (i.e., the degree to which residents will

Figure 3. Fiscal Structure, Development Patterns and VMT: Modeling the Relationships.



change the amount they drive in response to various price or policy changes) for eight neighborhood types in California, with a sample size of 11,404 census tracts, 99 percent of all tracts in the state. Most California residents live in suburban multifamily or single-family neighborhoods, or urban high-transit or low-transit neighborhoods (rather than central city or rural areas).

As shown by Table 1, looking at 2004, the more urban neighborhoods, particularly central city and urban high transit, tend to receive very low sales tax revenues, relying more on property tax. In rural and suburban venues, the share of sales tax revenues is higher, in some cases double that from property tax.¹⁴ By 2014, the picture had changed, due to sharp increases in revenues from property taxes as real estate prices and transactions increased.¹⁵ The greatest beneficiaries of the increases are again rural and suburban areas, which are experiencing much sharper property tax revenue gains than are the urban areas in 2014, approaching the real estate cycle’s peak. Across almost all neighborhood types, reliance on the sales tax is declining slightly over time, mirroring the rest of the country.

Urban neighborhoods with a low sales tax share also have low VMT, while the lower-density suburbs and rural areas have much higher VMT. The last column in the table shows the elasticity of VMT calculated in the Salon et al. 2014 study, representing the effects of interventions in land use, transit and alternate mode availability, road density, and gas prices (and controlling for income, which may play an intervening role). If enacted, these five interventions, based on the elasticities estimated by Salon et al. (2014), would combine to reduce VMT in ranges from -1.1 miles per household in the central city, to -5.4 miles in low-density, single-family suburbs. In other words, the bang for the buck is greatest in suburbs, which also rely disproportionately on both property and sales tax revenue. Since previous, albeit minimal, evidence suggests a causal relationship between reliance on property and sales tax revenue and urban sprawl, both may be appropriate targets of tax reform to support climate change goals.

To analyze the relationship of tax dependency to infill development and fiscalization (and by implication, VMT reduction) for California census tracts, I created a dataset that first analyzes

¹⁴ Due to low sample sizes, this table excludes the “Preserved Land” neighborhood type.

¹⁵ This is also due to the state’s backfill of the vehicle license fee, mentioned above.

Table 1. Fiscal Mix and VMT by Neighborhood Type.

Neighborhood Type	Households (millions, 2000 Census)	Average share of revenues from property taxes, 2004	Average share of revenues from sales taxes, 2004	Average share of revenues from property taxes, 2014	Average share of revenues from sales taxes, 2014	Mean HH weekday VMT	Potential reduction in daily household VMT
Urban Low Transit Use	2.9	9.4%	13.3%	16.6%	11.7%	41.6	-2.3
Suburb Multi-family	3.05	8.5%	13.6%	15.6%	12.8%	41.6	-2.6
Central City	0.18	13.2%	2.6%	16.2%	2.3%	16.8	-1.1
Rural	0.98	7.9%	14.5%	14.6%	13.6%	50.1	-2.3
Suburb Single-family	2.82	10.5%	13.6%	18.5%	12.8%	58.8	-5.4
Urban High Transit Use	1.04	9.7%	5.7%	13.8%	5.0%	28.8	-2.3
Rural In Urban	0.5	7.0%	12.6%	13.8%	13.0%	41.7	-1.6

Sources: Adapted from Table 38 in Salon et al. (2014). Tax calculations by the author based on data from the State Controller’s Office.

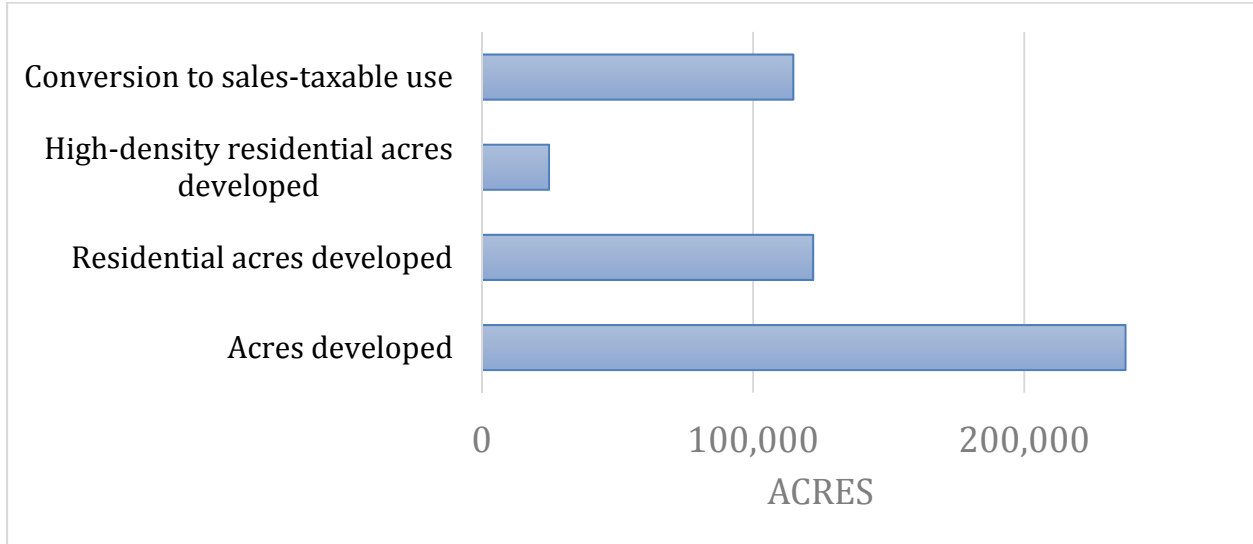
land-use change between 2007 and 2013 on all parcels in California, a total of about 1.2 million parcels, representing about 40 percent of acreage in the state, and then links land use to the Salon et al. dataset as well as tax data from the State Controller’s Office.¹⁶ Four constructed variables represent land-use change: development (overall and residential) on vacant or agricultural land, conversion from low-density use to high-density residential (defined as a triplex or greater), and conversion from a non-sales-taxable use to a sales-tax-generating use (i.e., land use fiscalization).

As noted previously, California communities struggle to develop more housing and infill development in particular. Overall, from 2007 to 2013, California saw the development of 240,000 acres (6 percent of the acreage in the database), of which 122,000 acres was residential (3 percent of acreage); the conversion of about 25,000 acres to high-density residential use (less than 1 percent of acreage); and the conversion of 115,000 acres of land to sales-taxable uses (about 3 percent of acreage) (Figure 4). To illustrate this, Figure 5 shows the new development in San Diego County, which has occurred largely outside of San Diego proper. Figure 6 shows the conversion of land from non-sales-taxable to sales-taxable uses in the Los Angeles region, which has occurred mostly in more suburban areas rather than Los Angeles per se. Figure 7 shows the conversion to high-density residential in the San Francisco Bay Area, indicating that many older core cities and some suburbs have almost doubled the amount of high-density acreage.

Understanding how communities differentiated by tax type approach new development can point to ways to adjust the tax system in order to reduce GHG emissions. Table 2 establishes a typology of tax dependency for California communities: low property-low sales tax, low

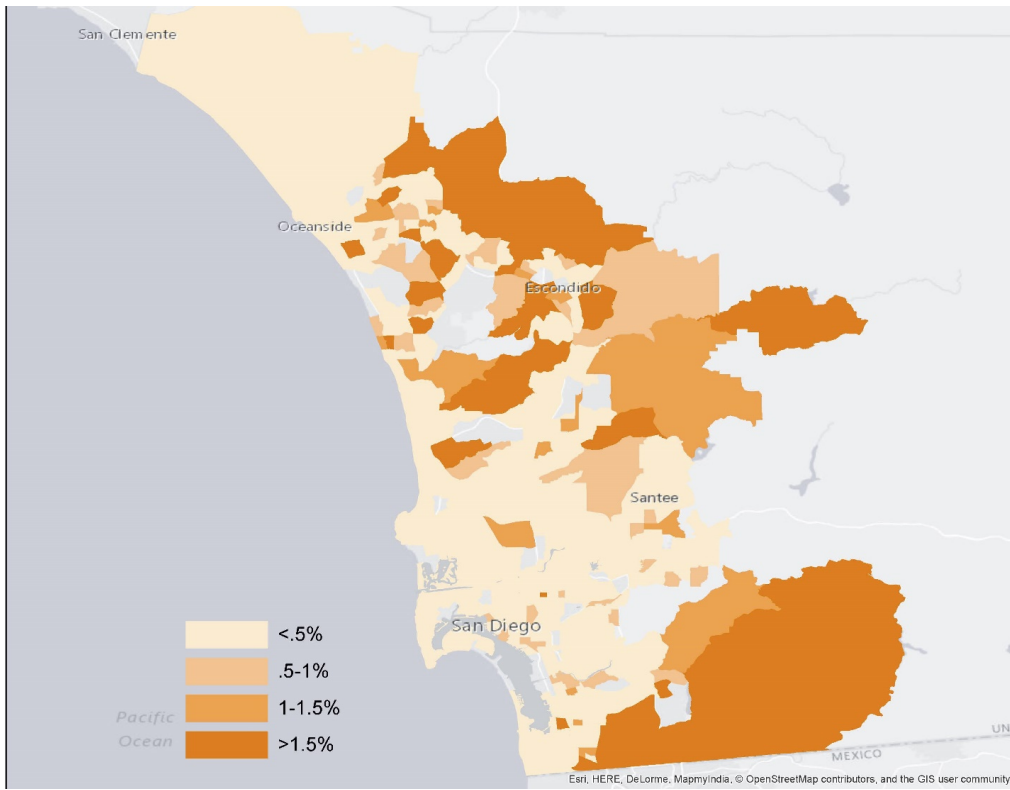
¹⁶ For this analysis, I use tax assessor parcel data from Dataquick. In both 2007 and 2013, 99.5 percent of parcels included the usecode, the field used to construct the four variables. It is not possible in this dataset to determine if a parcel has been subdivided, so the analysis will not include development that occurred on newly created parcels. Because of missing data in the lot size field, this analysis only includes about 4 million of California’s 10.5 million acres.

Figure 4. Development in California, 2007–2013.



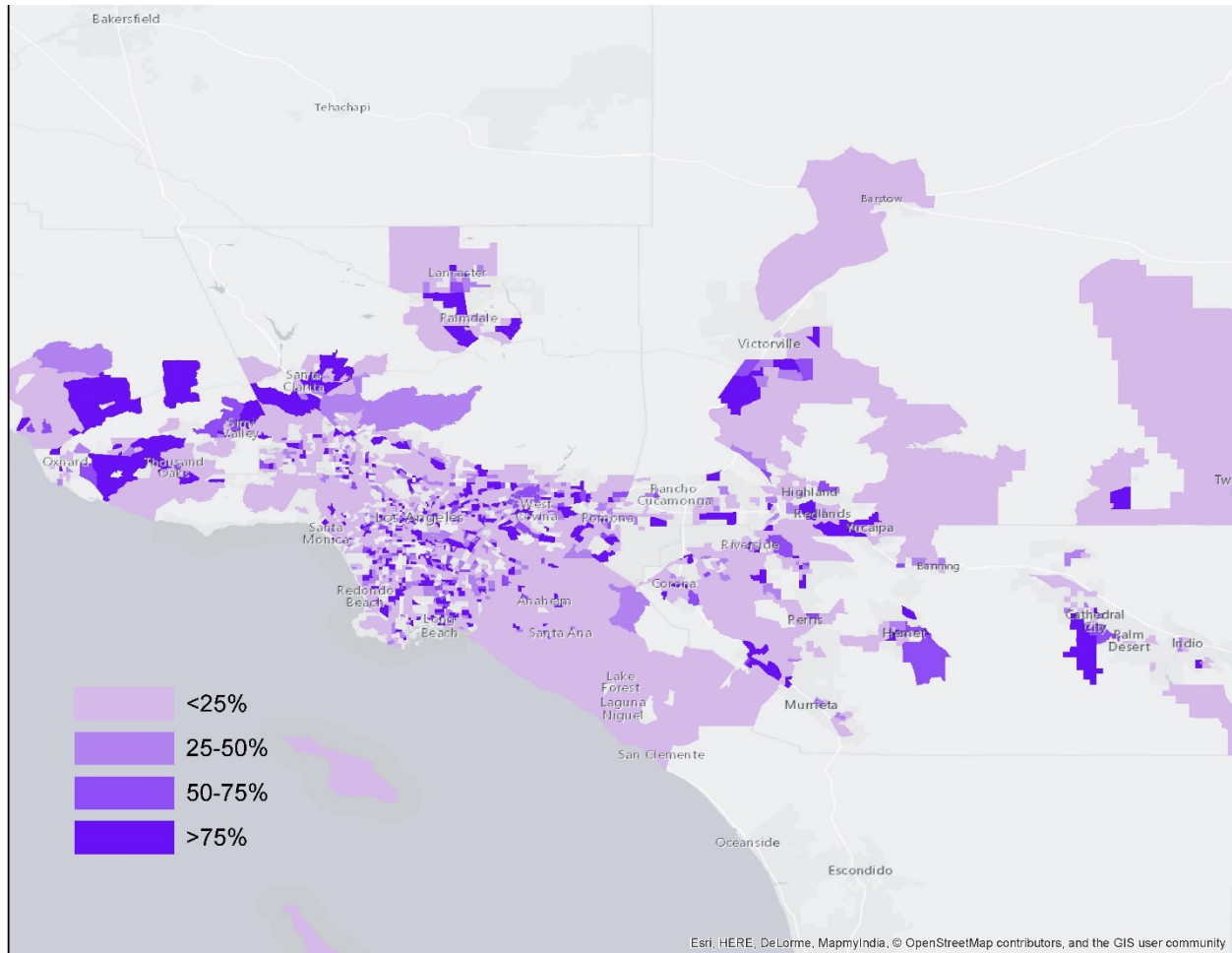
Source: Author's calculation, based upon county tax assessor's data from Dataquick.

Figure 5. Percentage of Vacant Land Developed in the San Diego Region, 2007–2013



Source: Author's calculation, based upon county tax assessor's data from Dataquick.

Figure 6. Share of Nonsales-Taxable Acreage Converted to Sales-Taxable Acreage, Los Angeles Region, 2007–2013



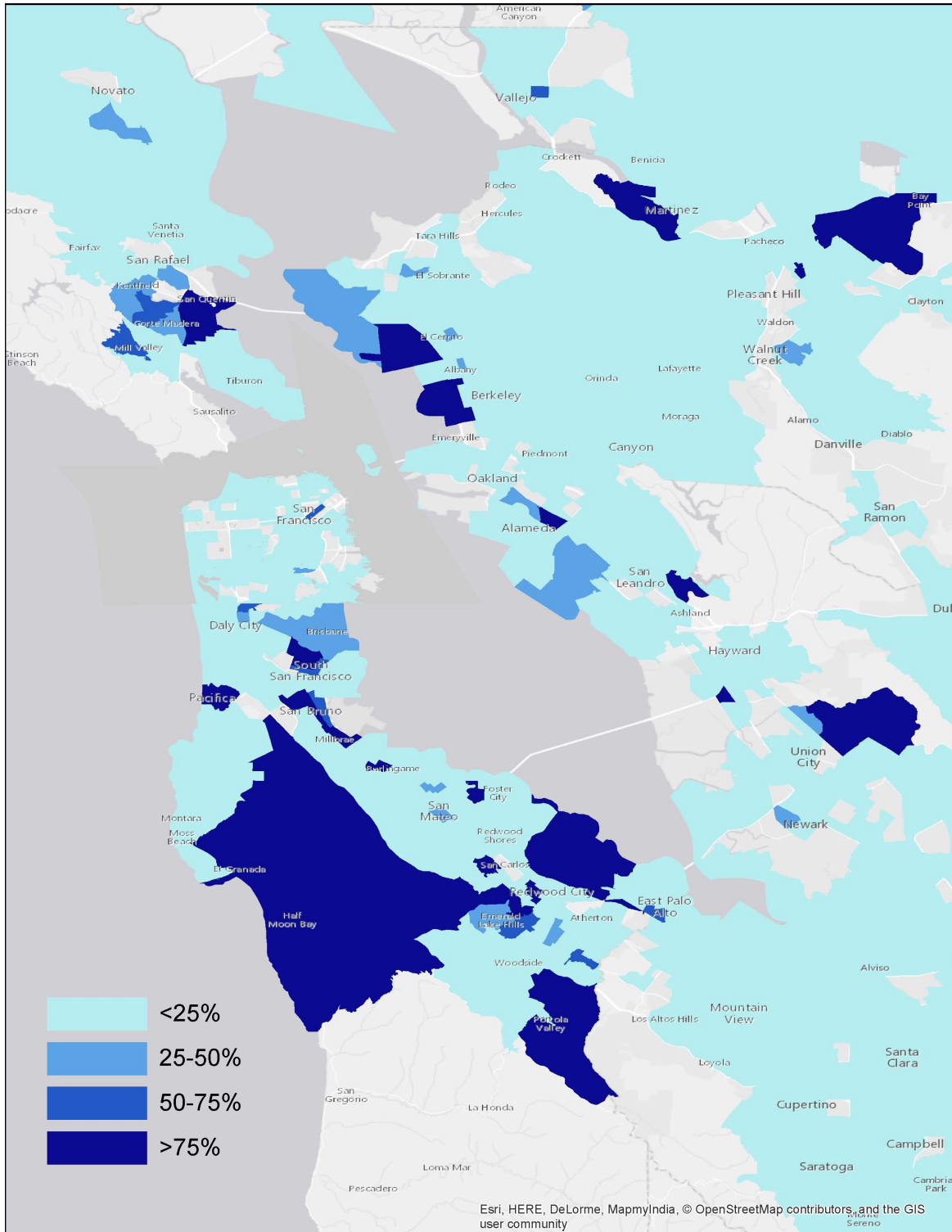
Source: Author’s calculation, based upon county tax assessor’s data from Dataquick.

property-high sales tax, high property-low sales tax, and high property-high sales tax, with the share of jurisdictions in each category.¹⁷

If the tax structure plays a role in incentivizing development, we should see a relationship between reliance on certain kinds of taxes and subsequent real estate activity. Indeed, there are significant differences in the likelihood of development and conversion on parcels depending on the initial tax context in the jurisdiction, i.e., the reliance on property and sales taxes (Appendix Table A1). In general, it is the jurisdictions with relatively low property and sales tax bases that then pursue most new development (Figure 8). New and infill development, both overall and residential, are most likely to occur in low property tax areas, while areas with high property taxes

¹⁷ Categories were established by determining the distribution of census tracts across quartiles based on share of 2004 revenues from property taxes and sales taxes. Choosing 2004 as the base year provides a context to look at conversions and infill from 2007 to 2013.

Figure 7. Percent Increase In High-Density Residential Acreage in the San Francisco Bay Area, 2007–2013



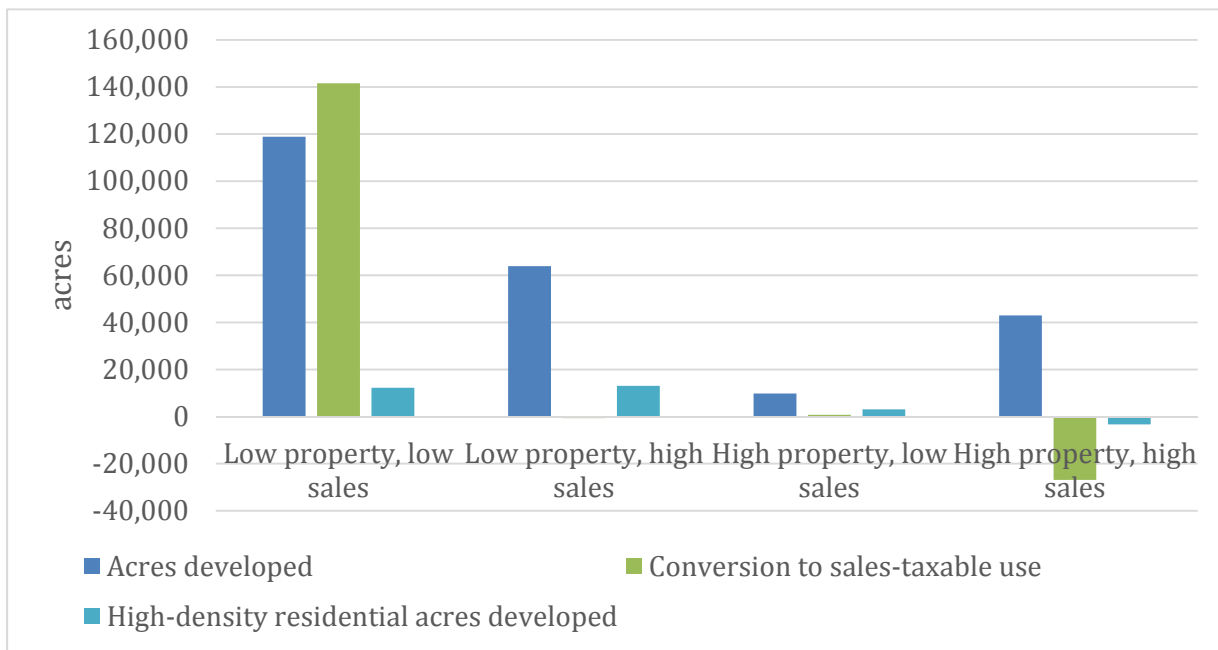
Source: Author's calculation, based upon county tax assessor's data from Dataquick.

Table 2. Typology of Tax Dependency with Share of Jurisdictions in Each Category (2004).

		Sales tax	
		Low	High
Property tax	Low	34%	21%
	High	10%	35%

Source: Author’s calculation, based upon county tax assessor’s data from Dataquick.

Figure 8. Development Patterns (2007–2013) by Tax Dependency Type (2004).



Source: Author’s calculation, based upon county tax assessor’s data from Dataquick.

and low sales taxes are least likely to encourage development. Conversion from nontaxable to taxable uses is most likely in areas with either low property and sales tax, or high property and sales tax. Most notably, all types of communities seem to encourage conversion to fiscally lucrative uses much more readily than infill and/or residential development.

Looking at specific neighborhood types (Appendix Table A2), some significant differences emerge:

- Suburban single-family neighborhoods with low property taxes are disproportionately likely to develop their vacant land with either commercial or low-density residential (perhaps because they have more vacant land than urban areas and can develop it more easily).
- Central cities, as well as urban low and high transit neighborhoods—both with relatively low property tax revenues—are most likely to add high-density residential development.

- Fiscalization of land use tends to occur in both suburban single family and urban low transit areas, even when sales tax revenues are high.

This analysis (albeit preliminary) suggests that jurisdictions that receive a low share of their revenues from property and sales taxes are more inclined to encourage infill development, particularly residential. Combined with findings from previous research, this can help guide potential tax reforms to spur more compact, mixed-use development in support of climate change policy. These findings suggest that obtaining more property tax may be an incentive for localities to permit more infill development, and could counter the fiscalization motive, which appears to be powerful.

Reforms should recognize not only the effectiveness of building infill in suburbs (i.e., the bang for the buck in terms of VMT reduction), but also the uneven inclination across suburbs to support more compact and/or residential development. That certain types of areas are not inclined to support infill development may be sub-optimal for climate change goals, and it may be possible to reallocate taxes in a way that incentivizes more compact development. Finally, given the slow progress in building new housing in California, any reforms should incentivize more new compact development. These then suggest three principles:

- Return more property tax to municipalities
- Share property and sales taxes regionally
- Avoid penalizing new development

Reforms on the Horizon?

Over the years, many reforms have reshaped the tax structure with some success. In the 1970s, the state passed SB 154 and AB 8 to rationalize property tax allocation after passage of Proposition 13; these backfilled for lost property tax revenues, and in the process gave the state new powers over local services (Gervais and Rayford 2012). Proposition 60 in 1986 allowed homeowners over 55 years of age to transport their home's assessed value to a new home within the same county, and Proposition 39 in 2000 lowered the supermajority requirement for school bonds to 55 percent. In 2004, Proposition 1A forbade further state government raids on local government revenue. At present, the reforms under discussion (and potentially relevant to climate change) are "split roll" property tax reform, expanding the sales tax, and fixes for the loss of redevelopment.¹⁸ Proposition 13 reform (beyond the split roll) is not likely to be on the table any time in the near future, especially any reform that endangers its low tax rates.

Split roll reform would mean either a constitutional amendment or statutory change to Proposition 13 to reassess commercial and industrial properties at their current market value. Loopholes in the original legislation make it possible for businesses to retain their property's assessed value upon sale if there is not a full transfer of ownership. As a result, over time, the share of property tax paid by homeowners has increased from about 32 to 39 percent, and residential property owners more broadly pay 72 percent (California Forward 2015; California Legislative

¹⁸ Not discussed here, but also under discussion is stabilizing the state budget. The easiest way to do this would be to move to a multi-year system for budgeting (Silva 2009). This would mean creating a reserve fund from boom tax years, or developing a five-year rolling fund that bases spending on average revenue collection.

Analyst's Office 2012). One recent study found that increasing commercial property assessments would raise \$8–10 billion in revenue (Ito, Scoggins, and Pastor 2015).¹⁹

The split roll reform could return more money to cities. To the extent that cities then use the money to encourage infill development or transit use, VMT might decrease. But at the same time, bigger businesses may be better positioned to absorb the tax increase, and newer businesses will be less impacted than older businesses because they will have already planned for higher real estate costs. Ultimately, if split roll reform is enacted, it may need to mitigate negative impacts on the stability of small, mom-and-pop businesses, particularly those that own their own property. In order to reduce VMT, the new legislation would need to find a way to leverage the tax to spur more infill development, perhaps via rebates.

Another area of interest is sales tax reform. To reduce the volatility of the state budget, California might rely more on sales tax, and the current proposal (Senator Hertzberg's SB 8) is to expand the sales tax to an excise tax on services, as several states have done in recognition of the increased consumption of services.²⁰ Yet, the key question is what gets taxed, i.e., targeting the final sales to households rather than business-to-business sales, which could have unintended cost effects that hurt mom-and-pops. The legislation would need to exempt specific services and providers, such as education and health, government and nonprofits that are providing critical basic services. It would need to target services that are not likely to respond by moving to Nevada. In other words, it would be more effective to tax the labor at the car repair shop than to tax accounting or legal services.²¹ Because sales taxes are regressive, any increase should be coupled with an increase in the earned income tax credit (EITC) for low-income families.

Many of these service businesses have small footprints and/or are located in mixed-use development. To the extent that fiscalization motivates cities in their land-use decision-making, this change could actually help to reduce VMT. A tax on services would raise costs for consumers (and businesses). This could decrease VMT if consumers adjust by buying more online, or by substituting cheaper, non-motorized modes to travel to the destination.

Finally, there are ongoing efforts to replace the redevelopment tool with infrastructure finance mechanisms that do not rely on the state's General Fund. Already, SB 628 has created new Enhanced Infrastructure Financing Districts (EIFD), enabling borrowing for infrastructure based on projected future property tax revenue within a local benefit district (The Planning Report 2015). The Public Finance Authority has the flexibility to assemble financing from different sources and can finance not only infrastructure but also economic development activities that meet a public purpose (*ibid.*).

If used strategically, the EIFD could have a direct impact on urban infill and VMT. It should facilitate development of underutilized areas within cities, and with its new flexibility, could be used strategically to meet the goals of SB 375 for the integration of transportation and land use planning.

Beyond these potential impacts on development patterns (and therefore on VMT), these recent and proposed reforms may support some of the policy principles outlined above. For in-

¹⁹ However, critics argue that businesses would find ways of responding to the law that significantly reduce the revenue.

²⁰ Auerbach (2010) identifies other possibilities for sales tax reform ties which are not currently under active discussion, advocating for targeting taxes to where products are consumed, not produced. One such alternative is a sales-apportioned tax on based on national value added (the "business net receipts tax").

²¹ Because sales taxes are regressive, any increase might be coupled with an increase in the earned income tax credit (EITC) for low-income families.

stance, the split roll reform should bring more property tax to municipalities and also provide more tax revenue to areas currently lacking it; while also encouraging new commercial development (since long-term property owners would no longer be subsidized). The proposed sales tax reforms should also create more revenue for areas with concentration of small service businesses rather than big-box retail. And the EIFD is a critical new tool to facilitate more compact development. Altogether, the reforms will not add up to more than a small reduction in GHG emissions in California. But the impacts are likely to be positive, and certainly warrant further study.

Towards Integration of California's Climate Change and Fiscal Goals

As a global leader in climate policy and sustainability planning, California needs to ensure that it generates tax revenue in a way that supports—or at least does not interfere with—its long-term strategic goals, including addressing climate change. Select reforms to the property and sales taxes may incentivize jurisdictions to embrace denser development. Of course, caution is warranted: it is not clear exactly how much adjusting the fiscal mix would reshape land development patterns. Moreover, California's tax, owing to its strong reliance on the income tax, is notably progressive, and most shifts away from reliance on the income tax risk making it less so. Perhaps most importantly, fuel efficiency standards are a much more effective way of reducing GHG emissions than changing travel behavior, via the tax code or other means (Greene and Plotkin 2011).

Yet, by not removing the barriers to compact development that are embedded in the tax code, we endanger our own GHG targets. And there is an even more compelling reason to integrate California's climate change and fiscal goals. California's biggest impact on global GHG emissions comes not through its ability to reduce its own emissions, but rather to influence others through policy innovation. Reforming the tax code, even if it will not have a large impact, still sends a signal that states and countries can change course and also address climate change goals throughout their regulatory structure.

Both theory and evidence suggest some basic principles that would help to incentivize new compact development where most needed within regions. To guide future tax reform to be consistent with climate policy, we should: (1) return more property tax to municipalities based on their willingness to build more compact, high-density development; (2) share property and/or sales tax regionally, rewarding jurisdictions that meet their regional housing obligations; (3) avoid penalizing new development; and (4) most importantly, connect future taxes directly to environmental goals. Each policy principle is discussed in turn below.

Return more property tax to municipalities based on their willingness to build more compact, high-density development. Because property tax revenues increase as the tax base grows, the prospect of receiving more property tax will incentivize localities to pursue development (Lewis 2001a). The analysis above showed that, in general, jurisdictions receiving a relatively low share of property tax were most inclined to infill vacant parcels and/or convert to high-density residential. Compared to the fiscalization of land use via the sales tax, which favors retail land uses, this kind of fiscalization may lead to development that is more balanced between commercial and residential uses, and thus more likely to reduce VMT (Barbour 2007, Lewis 2001a).

Controlling the property tax locally can result in more democratic self-government and responsiveness to local needs. The most effective way to get more property tax revenue back into

local hands is probably through a swap for sales tax revenue; however, attempts to enact such a swap have historically fallen short.²² One opportunity to revive this idea is through the proposed new excise tax on services (SB8). This tax could be swapped for property tax, which would be returned to jurisdictions that build more compact development.²³

Share tax revenues regionally, rewarding jurisdictions that meet their regional housing obligations. The idea of regional tax base sharing to even out fiscal disparities dates back to the Minneapolis-St. Paul region in the 1970s, though it has proven challenging to adopt elsewhere (Orfield 2002). Yet, by equalizing the tax share at the county level, it might be possible to lessen the fiscalization incentive. The county might redistribute sales tax revenues to local governments on a per capita basis, a policy that would incentivize residential growth (Lewis and Barbour 1999). Optimally, this would be enacted in conjunction with reforms that return more property tax to localities, so that governments would still have an incentive to pursue development. If this couldn't be done via the one percent rule, it would be important to eliminate the supermajority requirement for voter approval of new sales taxes (Grose 2015).²⁴

Another promising proposal would reallocate property tax through regional allocation boards, a solution that would avoid the inequities of relying exclusively on local governments, while allowing responsiveness to local needs (Gervais and Rayford 2012). These might be designated based upon electoral district boundaries (such as the state senate), with a mix of appointed and elected officials, with voting power allocated to be representative of the population (*ibid.*). The state could condition the return of property tax to jurisdictions on willingness to build high-density residential development according to their stated commitment in their Housing Element, per the Regional Housing Needs Assessment requirement.²⁵ To support these boards, the state could establish regional financing authorities, to align regional infrastructure spending with housing needs (California Forward 2015).

Avoid penalizing new development. Arguably, the local revenue system should incentivize more sustainable development patterns that build a mixture of housing and commercial development on underutilized land near existing infrastructure. Returning more property tax and sharing tax revenues should help encourage new development. In addition, the land value tax, which taxes vacant land at a significantly greater rate than improvements, is one prospect for incentivizing new development on infill land (Dye and England 2010). Although it may not necessarily change the timing of development, or the land use, it likely promotes higher density development (*ibid.*). This could be enacted without changing overall tax rates, but simply shifting most of the burden to the land. Still, the politics are challenging, as voters seem to oppose the taxation of unrealized capital gain, and there are unintended losers, such as golf courses (E.S.L. 2015, Hughes 2006).

Connect the tax system directly to environmental and sustainability goals. The most effective way to change behavior related to the environment is to link the tax directly to the behavior so as to make the activities less attractive or profitable. Though the gasoline tax is one exam-

²² State Controller Kathleen Connell, as well as the Speaker's Commission on State and Local Government Finance, both advocated this approach in 1999–2000 (see Coleman 2000). As Barbour (2007) points out, there is no research on the efficacy of the swap and it might have contradictory or uneven effects.

²³ I am indebted to Fred Silva for this idea.

²⁴ An Assembly Constitutional Amendment (ACA 4) was proposed this year to accomplish this.

²⁵ The Regional Housing Needs Assessment requires cities to ensure through their general plans that they can accommodate existing and future housing needs.

ple of a direct approach, even more effective would be a tax on VMT, as is currently being piloted in California and Oregon (Grose 2015); even more direct would be a carbon tax on vehicles. Though, again, the politics are challenging, an oil extraction tax would raise costs for consumers, encourage consumer interest in fuel-efficient vehicles, and thus reduce emissions (and VMT); California is one of the few states without one. In general, where new environmental taxes, whether such an extraction tax or the carbon tax, fall on low-income residents or small businesses, it would be possible to use tax credits (e.g., the EITC) to issue rebates. Already, much of California's system to support renewable energy and energy efficiency works through rebates and incentives.

Another obvious target for raising revenues is actual climate legislation. Cap-and-trade revenues already help subsidize new housing development, but work on a project-by-project basis, tied to transit, and thus are most effective in dense core areas. Instead, they could be converted into the municipality's share of property tax revenue on condition that they help finance infill development. Not only will cities respond to the stable flow of revenues, but also the new development will bring in new property tax revenues as well. Likewise, the state could finance SB 375, which is currently voluntary and largely unfunded. This would not have to be a guaranteed outlay but could be predicated on effective implementation of the law, in a "race to the top." Compliant municipalities would receive a larger share of the property tax, which the state would then backfill so that the school system does not lose revenue.

These four principles could lead to a specific set of legislative reforms. As this paper suggests, we do not yet possess the evidence to make the case for each reform. Future research should attempt to clarify the relationships between fiscal structure and VMT, as well as the carbon footprint more generally, to serve as the basis for modeling the potential effects of reform. One first step would be estimating the elasticity of VMT under different tax scenarios. However, as previous research has shown, it is challenging to control for and proxy for all the different intervening variables that are shaping development outcomes, and there is potential for endogeneity, as the feasibility of development may be shaping a municipality's reliance on a particular tax structure. More qualitative research might also clarify if and how cities would shift to more compact development patterns in response to specific tax reforms. At a minimum, the state should study any proposed tax reform to ensure that it does not conflict with climate change goals.

Yet, behavioral responses to policy shifts are not always predictable. California's past has shown that its legislators are not shy about passing bold climate change legislation. We should not hesitate to experiment with sensible tax code reforms that support our climate goals as well.

Appendix

Table A1. Infill and Conversion between 2007 and 2013 by Tax Dependency Type.

Average change in		1 - Low property, low sales	2 - Low property, high sales	3 - High property, low sales	4 - High property, high sales	
Overall infill	Acres	1.0%	0.9%	0.4%	0.9%	***
	Properties	0.8%	0.9%	0.5%	0.8%	**
Residential infill	Acres	0.3%	0.3%	0.1%	0.2%	**
	Properties	0.4%	0.4%	0.2%	0.3%	**
High- density residential	Acres	137.0%	27.4%	51.3%	15.7%	
	Properties	13.2%	7.8%	7.0%	20.7%	
Taxable uses	Acres	190.7%	58.4%	84.8%	69.8%	
	Properties	14.2%	9.9%	7.0%	30.7%	***

*** $p < .01$, ** $P < .05$, * $P < .10$

Table A2. Infill and Conversion between 2007 and 2013 by Tax Dependency and Neighborhood Type

		Urban Low Transit				Suburban Multi-Family				
Note: excludes findings where not significant.		1 - Low property, low sales	2 - Low property, high sales	3 - High property, low sales	4 - High property, high sales	1 - Low property, low sales	2 - Low property, high sales	3 - High property, low sales	4 - High property, high sales	
Average change in										
Overall infill	Acres									
	Properties	0.4%	0.4%	0.2%	0.2%	**				
Residential infill	Acres					0.1%	0.1%	0.0%	0.2%	**
	Properties	0.1%	0.1%	0.1%	0.0%	***				
High-density residential	Acres									
	Properties	6.2%	1.4%	3.4%	4.0%	***				
Taxable uses	Acres	28.7%	39.1%	76.3%	11.9%	*				
	Properties									
		Central City Urban				Suburban Single Family				
Average change in		1 - Low property, low sales	2 - Low property, high sales	3 - High property, low sales	4 - High property, high sales	1 - Low property, low sales	2 - Low property, high sales	3 - High property, low sales	4 - High property, high sales	
Overall infill	Acres									
	Properties					1.3%	1.4%	0.9%	0.8%	*
Residential infill	Acres					0.6%	0.8%	0.3%	0.3%	***
	Properties					1.0%	1.1%	0.6%	0.5%	***
High-density residential	Acres	76.5%		0.7%						***
	Properties									
Taxable uses	Acres									
	Properties					33.4%	20.1%	17.3%	76.5%	*
		Urban High Transit								
Average change in		1 - Low property, low sales	2 - Low property, high sales	3 - High property, low sales	4 - High property, high sales					
Overall infill	Acres									
	Properties	0.4%	0.7%	0.3%	0.3%	**				
Residential infill	Acres									
	Properties	0.1%	0.3%	0.1%	0.0%	*				
High-density residential	Acres	13.2%	6.5%	-0.5%	3.8%	***				
	Properties	10.1%	-5.2%	-1.0%	5.3%	*				
Taxable uses	Acres									
	Properties	7.4%	3.7%	1.8%	24.1%	***				

*** $p < .01$, ** $P < .05$, * $P < .10$

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