Research Statement of David Agrawal

1 Research Agenda

My research focuses on the nature and consequences of tax competition, the welfare effects of local policy, the effect of local government policy on the mobility of people and firms, and on the analysis of spatial relationships in public finance. These issues are related because "tax competition" is about how jurisdictions—cities, states/provinces, or countries—choose their policies, taking into account the fact that the location of business activity and investment, people and employment, sales of goods, and other economic activity are affected by tax policies. I incorporate aspects of fiscal federalism and spatial proximity into traditional theoretical and empirical models of tax competition by allowing for tax rates to vary not only across states, but within states. When taxes are set locally, the mobility of the tax base becomes an inherent constraint on tax policy. I often use local sales taxation to study tax competition, which has allowed me to gain expertise on consumption tax issues, resulting in work on the VAT and commodity taxes more generally.

Mobility of labor, firms, capital, and shopping has become increasingly easy given trends in globalization, deregulation of markets and opening of borders. My research studies how governments set fiscal policy in the presence of mobile agents and sheds light on estimating the extent of the effect of mobility in response to tax policy. Are tax bases subject to intense tax competition? How do place of taxation (nexus) rule changes within a federation affect mobility and fiscal policy? What are the tax rate and revenue consequences of interstate mobility? How does space and proximity to geographic borders affect mobility and tax competition? What are the welfare effects of tax competition and coordination? What policies can best tame tax competition?

In this research statement, I summarize the methods that my papers utilize: a combination of theoretical models and creative empirical identification strategies. I then summarize my most important papers and group them into three categories (tax competition, commodity taxation, and mobility) based on what I think is the primary contribution of the research, acknowledging that some papers may contribute to more than one or all of these groupings. The themes underlying these three categories form a coherent research agenda: local *taxation* requires governments to consider *mobility* of their tax base, which results in *tax competition* whereby governments account for the tax policies of their neighbors when determining what tax rate to set. All of these issues are summarized in my article "Local Policy Choices: Theory and Empirics" in the *Journal of Economic Literature*.

1.1 Methods: Theory and Empirics

As a researcher who works in both theoretical and empirical analysis, I am consistently trying to develop models that are rich enough to be applicable to a world with multiple competitors and multiple levels of government, but that are simple enough to yield sharp and intuitive answers to the big policy debates. In studying tax competition or mobility of the tax base, it is often difficult to determine causal effects because taxes are set endogenously with one's competitors. It must be ascertained whether the pattern of interaction of local governments' fiscal variables (or mobility of people and firms) is actually a result of a strategic process or a result of correlated but unobserved spatial shocks. For this reason, having a grounded theoretical model that sheds light on the specific nature of the strategic interaction is essential. My models also focus on unique institutional features (such as tax notches that occur at state borders or state-level nexus rules that govern where taxes are remitted) to enhance identification. This combination has helped improve the credibility of empirical estimates in the tax competition literature.

In addition to theoretical foundations, large municipal data sets are also necessary to study tax policy at the local level. Over the past several years, I have created several data sets that are unique enough to identify these effects. I have constructed a comprehensive national database of all local sales tax rates in the United States (county, town, and sub-municipal). I (with Marie-Laure Breuillé and Julie Le Gallo) have also cleaned and assembled data on local tax rates for all municipalities in France along with their cooperative agreements on municipal tax and spending that dates back to the 1930s. In addition, I've written tax calculators similar to NBER's TAXSIM to simulate personal income tax liabilities in Spain (with Dirk Foremny), wealth tax liabilities in Spain (with Dirk Foremny and Clara Martinez-Toledano), and personal income tax liabilities in Germany (with Elke Jahn and Eckhard Janeba). In addition, I've written a tax calculator that simulates nonresident or multijurisdictional income tax liabilities in the USA (with Kenneth Tester).

My future research agenda will focus on identifying the welfare effects of local policymaking. Despite empirical estimates quantifying tax competition, spillovers, fiscal externalities, and sorting, the voluminous literature on local policy choice lacks a unifying framework that combines them to quantify the welfare implications of decentralized policymaking. Future work will draw on the MVPF framework and structural modeling to determine the welfare effects of local policy. In addition, I plan to study the welfare effects of various tax coordination policies such as harmonization, minimum tax rates or intermunicipal cooperation.

As evidence on my work's impact, I have written two survey articles on local policy and fiscal federalism, **"Local Policy Choice: Theory and Empirics"** and "**Fiscal Federalism in the 21st Century**" in the *Annual Review of Economics*. I am co-editing the book "**Policy Responses to Tax Competition**" with James Poterba and Owen Zidar.

2 Research Topics

2.1 Welfare Effects of Local Policy Determination

While my prior work has show the existence and consequences of fiscal competition, my future work aims to quantify the welfare effects of decentralized policy. State and local governments set policy in an open economy setting where people, firms, goods, and factors are mobile across jurisdictions, where mobility and sorting results in capitalization, where fiscal policies of one jurisdiction have spillover effects on non-residents, where the costs of public services rise due to congestion, and where jurisdictions compete and possibly interact strategically with each other. These forces complicate whether local policies are "good" or "bad" from a welfare perspective. While the literature has made progress at quantifying each of these factors individually, it lacks a systematic framework to unify all the disparate causal effects of decentralized policymaking. But, such a framework is necessary for determining whether policies are "good" or "bad" and, the optimal amount of interventions necessary by central authorities.

A New Approach to Evaluating the Welfare Effects of Decentralized Policies (with Bill Hoyt and Tidiane Ly) *working paper*. Should K-12 education be decentralized? Should tax policies be decentralized? Are local policies under- or over-provided? How large are the spillover and interjurisdictional externalities from decentralized policy? Should the federal government subsidize (tax) local governments to encourage them to spend more (or less)? The welfare effects of local policies in the presences of interjurisdictional externalities, spillovers, and fiscal competition have eluded researchers and there is no systematic way to rank local policies by the extent of their under/overprovision due to these spillovers. This paper defines a new concept—the marginal corrective transfer—to quantify the external benefits and costs of decentralized policymaking. To construct this, we adapt the marginal value of public funds—the ratio of the marginal benefit of a policy to the marginal net cost to the government. A key insight of the paper is that the MVPF will be different and can be separately calculated from the perspective of a local government planner (not accounting for spillovers and interjurisdictional externalities) and a social or federal planner (accounting for those). Then, we define the marginal corrective transfer (MCT) as the transfer/tax from the federal government necessary to induce the local government to account for all the spillovers in benefits and costs on other jurisdictions—the wedge between local and social MVPF.

To calculate the social and local MVPF, we show that researchers must estimate the effect of the policy on mobility, interjurisdictional fiscal externalities, house prices and wages, spillover benefits, and the congestion costs of public services. The paper draws on standard tools in urban economics and derives conditions under which house price capitalization is a sufficient statistic for both the calculation of the all benefits and all costs of local policies. We then conducted several empirical applications related to K-12 spending, higher education, bidding for firms, levee building, property taxation, and wealth taxation. Focusing on K-12 education, many of the benefits of education spending and future tax revenues are not realized by the local jurisdiction enacting the policy. We empirically estimate a marginal corrective transfer of \$1.27. In other words, each additional dollar of education spending by a local government should be subsidized \$1.27 by the federal government. Conducting similar exercises for higher education, property tax cuts, flood protection, wealth taxation, and bidding for firms, we find MCTs of 0.287, 0.341, –0.550, –0.062, and −1.068, respectively. We conclude that human capital policies are likely to have the marginal dollar significantly underprovided by a decentralized policymaker, while decentralized tax and firm policies are excessively provided. The importance of this paper is the ability to rank order all local policies on the basis of their interjursdictional spillovers, allowing the federal government to determine where federal interventions are most necessary.

The Welfare Effects of Tax Competition and Coordination (with Tidiane Ly and Raphael Parchet) *working paper*. Some jurisdictions can compete so intensely for economic activity that they set a zero tax rate. This paper studies the welfare implications of strategic tax setting in the presence of such intense tax competition. We develop the first structural model of strategic tax competition, allowing jurisdictions decide both whether or not to levy a tax and the tax rate. Nesting a tax competition model inside of a structural model in the spirit of Suarez Serrato and Zidar, allows us to conduct counterfactual exercises and compare the welfare effects of tax harmonization and minimum tax rates. We apply our model to U.S. county sales taxes where 40% of jurisdictions do not levy a sales tax. We investigate the welfare effect of introducing a minimum tax that would require all zero-tax jurisdictions to set a positive tax rate, taking into account the endogenous response of the taxing jurisdictions and then compare it to the welfare effects of tax harmonization. Prior structural models assume tax rate are exogenous, but by allowing for endogenous policy determination, we can capture the welfare effects inclusive of the endogenous response to the coordination policies.

2.2 Tax Competition

Tax policy determination in an open economy setting, where the tax base is mobile across borders, raises interesting theoretical and empirical challenges. My research often focuses on tax competition over mobile shoppers and utilizes comprehensive national data on all local sales tax rates in the United States to test the predictions of theory. The U.S. context of highly decentralized commodity taxation provides a unique setting to study tax competition. However, it raises many challenges because (1) the locally mobile nature of the tax base makes pairwise (game theoretic) strategic interactions important and (2) geo-spatial relationships and discontinuous state tax policy notches at borders affect local governments. I empirically confirm the existence of strategic reactions in this setting, which differs from other recent studies of globally mobile capital that have failed to find the existence of strategic reactions. I have also begun a research agenda studying tax competition for capital in France among municipal governments, and the ability of intermunicipal cooperation to limit the fiscal externalities resulting from tax competition.

The Tax Gradient: Spatial Aspects of Fiscal Competition *American Economic Journal: Economic Policy*: This paper uses state borders to identify tax competition. Prior studies estimate the presence of strategic interactions between jurisdictions using a reduced form reaction function; the past approaches were not well suited to deal with endogeneity concerns. I exploit institutional and spatial aspects of the federalist tax system to construct a quasi-experimental regression discontinuity design. Identification is grounded in a theoretical model of local sales tax competition that predicts the pattern of local tax rates at state borders and across space away from those borders: (1) in the presence of tax competition, local sales taxes should be higher on the low-state-tax side of state borders than on the high-state-tax side and (2) in low-state-tax states, local sales taxes should fall as towns are further from the border but they should rise as towns are further from the border in high-state tax states. The regression discontinuity design verifies most of the theoretical predictions, confirming the existence of rational tax competition.

Local Fiscal Competition: An Application to Sales Taxation with Multiple Federations *Journal of Urban Economics*: The primary contribution of this paper is to develop theoretical and empirical models that are appropriate for testing for tax competition at the local level when competition occurs between multiple towns and multiple counties simultaneously. Theoretically, the paper discovers a new form of tax competition: diagonal tax competition. Diagonal tax competition is the effect of county tax rates on municipal tax rates in another county (i.e, the effect of Cook County's sales tax rate on Naperville city's—in Dupont County—tax rate). Diagonal strategic interactions differ from vertical competition because the jurisdictions do not share the same tax base. It also differs from horizontal competition because they occur between different levels of government. The empirical model confirms the existence and importance of these interactions especially for towns located near county borders. Accounting for this new type of tax competition will likely become important in future studies of empirical tax competition given that most decentralized governments allow for taxation at multiple levels.

Technology and Tax Systems (with David E. Wildasin) *Journal of Public Economics*: In the standard commodity tax competition model, all cross-border shopping occurs toward the lower tax (smaller) jurisdiction. This result is inconsistent with the empirical evidence where residents of small towns often times shop in larger jurisdictions (with higher tax rates). We reconcile this in a model that allows consumers to purchase specialized goods (sold at a point of agglomeration) and non-specialized goods (sold everywhere). Then, we introduce the possibility of online shopping to see whether the Internet affects towns differently. We show that, when vendors remit taxes at destination, online shopping raises tax rates in suburbs but lowers tax rates in cities. Intuitively, this arises because the Internet erodes large agglomerated jursidctions' ability to tax retail shopping centers and shifts it to smaller jurisdictions where some of the purchasers reside. The idea that online shopping facilitates tax collection and can increase tax rates and revenues is novel to the literature.

Tax Competition with Cooperation (with Marie-Laure Breuillé and Julie Le Gallo) *National Tax Journal* (R&R): We assemble panel data on all municipal tax rates across four tax bases in France. In France, municipalities have the authority to enter into cooperative entities with other municipalities in order to provide common public services. While they give up some tax autonomy to do this, several tax rates remain under municipal authority even in the presence of cooperation. We study whether tax competition is more intense with municipalities within the same cooperative group or with municipalities outside of the cooperative group. To deal with endogeneity of the spatial weights determining which municipalities cooperate or not, we employ a novel instrumental variable strategy using whether or not the municipalities cooperated as a part of syndicates in the 1930s to 1950s. We find that cooperation limits strategic interactions.

Will Destination-based Taxes Be Fully Exploited When Available? An Application to the U.S. Commodity Tax System (with Mohammed Mardan) *Journal of Public Economics*. The motivation for this paper is an interesting feature of municipal indirect taxes in the U.S. where in some states, a destination-based "use" tax is charged on purchases made outside the municipality. In some states, municipalities have the power to set both an origin-based tax (the sales tax) and a destination-based tax (the use tax). The first contribution of the paper is to set out, using a simple Kanbur and Keen (1993) type model, how a border municipality would behave in this competitive environment. If the use tax is not well-enforced, the municipal government would like to cut the use tax so as to get additional revenue from cross-border shoppers via a reduction in evasion. To test this, we show using panel data on local sales and use taxes, that an increase in the differential between the "home" state tax and the tax in the neighboring state increases the local sales and use tax differential in municipalities in municipalities without a ban.

Sensitivity versus Size: Implications for Tax Competition (with Mohammed Mardan) R&R *Theoretical Economics*. The conventional wisdom in the tax competition literature is that big jurisdictions set higher tax rates than small jurisdictions. We show this result arises due to two simplifying assumptions that imply tax-base sensitivities are equal across jurisdictions. Much of the game theoretic tax competition literature focuses on the case where two jurisdictions differ in size and have uniformly distributed populations. We show that regardless of the functional form of the population distribution, if only two jurisdictions compete, taxes are always higher in the larger jurisdiction. However, when more than two jurisdictions compete in commodity taxes and their populations are not uniformly distributed, tax-base sensitivities need not be equal across jurisdictions and small jurisdictions can set higher tax rates than big jurisdictions. Our analysis extends to capital and profit taxes, and, more generally, to various types of multi-player asymmetric competition. It challenges the conventional wisdom that size is the primary determinant of tax rates in an open economy.

2.3 Mobility

Broadly defined, tax-induced changes in shopping patters are a form of mobility. While issues of sales tax competition inherently require the tax base to be mobile across borders, my interests in the mobility of the tax base extends to other types of taxes. In particular, people or employment may be mobile across borders—especially sub-national borders in highly dense urban areas. Again, like nexus rules, place of taxation rules—whether income taxes are residence or employment based—play a key role in my research and help to determine if the mobile factor is people, jobs or both.

Relocation of the Rich: Migration in Response to Top Tax Rate Changes from Spanish Reforms (with Dirk Foremny) *Review of Economics and Statistics*. This paper investigates the migration responses of top earners to net-of-tax rate variation across regions in Spain. We use high quality administrative data and variation in tax rates brought about by a Spanish tax reform that decentralized individual income tax authority from the central government to the Spanish states. We provide compelling evidence of migration responses. But the stock elasticities imply that the mechanical effect of setting a lower tax rate dominates the added revenue received from any inflow of tax payers. To estimate these effects, we further test whether the migration response differs across various occupations and industries, finding substantial heterogeneity.

Commuting and Taxes: Theory, Empirics, and Welfare Implications (with William H. Hoyt) *The Economic Journal.* Tax policies often vary within cities. This decentralization sometimes results in an inefficient spatial structure of cities. To better understand the dynamics of these cities, we introduce geographic borders that allow for policies, regulations, and spending to vary not only across cities, but within cities. We show that commuting is a sufficient statistic to measure the spatial deadweight losses of taxes because it captures changes to residence, job location, and interjurisdictional travel. The idea that commuting is a sufficient statistic will allow future researchers to better estimate the spatial distortions of place-based policies. Using microdata from cross-border metropolitan areas, we show that high-income individuals are willing to have commutes that are one minute longer per day in order to pay lower taxes. Over the course of the year, at hourly wages, the value of the longer commute offsets approximately half of the tax savings.

State Taxation of Nonresident Income and the Location of Work (with Kenneth Tester) *American Economic Journal: Economic Policy*. Prior studies show that taxes matter for the residential locations of high-income earners. But, states raise a significant share of revenue from nonresidents. Using variation in state tax rates, we provide causal evidence on the effect of the net-of-tax rate on the location of labor supply. State taxes induce high-income earners to shift employment contracts to low-tax states without a residence change. The elasticity of working in a state is comparable to the residential mobility elasticity, and consistent with superstar phenomenon, increases with earnings. Our results suggest a novel margin of mobility responses for top-earners: the spatial relocation of labor supply by nonresidents.

Wealth Tax Mobility and Tax Coordination (with Dirk Foremny and Clara Martinez-Toledano) *American Economic Journal: Applied Economics*. We study the effects of decentralized wealth taxation on mobility. The prior literature has focused on the role of income tax differentials on mobility, but there is no reason a priori to believe that the response to decentralized wealth taxes will be the same. We exploit the reintroduction of the Spanish wealth tax, after which all regions except Madrid levied positive tax rates. We find the mobility elasticities to wealth taxes are within the range of prior estimates with respect to income taxes. However, wealth tax mobility responses generate losses to personal income tax revenues that are six times larger than the direct losses to wealth taxes. Thus, when considering the fiscal externalities from wealth taxation, it is important to consider the effects on other tax bases.

Taxes and Telework: The Incidence of State Income Taxes in a Work-from-Home Economy (with Jan Brueckner) working paper. Taxation of teleworkers poses new challenges for local public finance, because telework decouples the location of work and the place of residence. As a result, individuals can alter both their residential and employment location in response to taxation. Critical to which margin of response will be dominant are the sourcing rules for the taxation of teleworkers. While many states tax teleworkers under the residence principle, states like New York (and more recently Massachusetts) assert taxing rights in the state where the employer is located. Depending on the tax credits in place, double taxation is possible. In this paper, we study the incidence and mobility effects resulting from source versus residence based taxation when residence and employment are decoupled. The paper provides policy guidance for states seeking to reform their tax laws following the work from home revolution.

Do Commuting Subsidies Drive Workers to Better Firms? (with Elke Jahn and Eckhard

Janeba) working paper. An unappreciated possible benefit of commuting subsidies is that they can expand the choice set of feasible jobs for workers in a way that facilitates better job match quality. We study the effect of changes in these subsidies on a worker's position in the wage distribution, by exploiting variation in the commuting deduction over time in Germany. Increases in the generosity of commuting subsidies induce longer commutes and workers to switch to higher-paying jobs. Although increases in commuting subsidies generally induce workers to switch to employers that pay higher wages, commuting subsidies also enhance positive assortativity in the labor market by better matching high-ability workers to higher-productivity plants. We thus show that greater assortativity induced by commuting subsidies corresponds to greater earnings inequality.

2.4 Commodity (Sales) Taxation

In studying tax competition, I have focused on sales taxes and have become an expert at sales tax related institutions. In doing so, this has led me to study place of taxation rules (such as nexus rules) and the tax treatment of Internet sales. Remote vendors were historically not required to remit sales taxes if they do not have a physical presence in the state that the consumer resides. However, remote vendors that have nexus are required to remit taxes to the consumer's destination locality and states recently switched to an economic definition of nexus. In addition, I have studied the economic and incidence effects of sales taxes and VAT in other settings, as well as excise taxes on new types of products.

The Internet as a Tax Haven?, *American Economic: Journal Economic Policy*. This paper empirically examines the effect of competition from the Internet on local sales tax rates, combining very detailed data on sales tax rates for towns, counties and states with information on local Internet penetration. The over-arching idea is that prior to the Internet, geographic tax competition led to unequal taxes across borders and by town size. The Internet is ubiquitous with respect to these competitive forces, which works to undo some of these prior imbalances—reducing taxes in previously high-tax places. At the same time, the Internet can also put upward pressure on tax rates where firms remit at destination given recent trends to collect sales taxes from online vendors. Empirically, I show that large towns experience downward (tax haven) pressure on tax rates, while smaller towns and towns in states where many online vendors have nexus experience upward pressure on tax rates following an increase in Internet penetration.

Online Shopping Can Redistribute Local Tax Revenue from Urban to Rural America (with Iuliia Shybalkina) *Journal of Public Economics*. Remittance rules are a critical part of tax systems. Using COVID-19 as a shock to online shopping and hand-collected high-frequency data on local sales tax revenue, we document an important shift in the state and local public finance landscape. As e-commerce increases, a destination basis for remote sales taxes results in higher growth in local sales tax collections in smaller, generally more rural jurisdictions. This increase comes at the expense of larger urban retail centers, which previously enjoyed an origin basis for sales tax collections. As households replace in-person commerce with online shopping, sales taxes no longer accrue to urban centers with large concentrations of retail establishments and instead expand the tax base of smaller jurisdictions. We conclude that remittance rules that enforce destination taxation also change the distribution of revenue across space.

Taxing Uber (with Weihua Zhao) *Journal of Public Economics*. Ride-hailing applications create new challenges for governments providing transit services, but also create new opportunities to raise tax revenue. To shed light on the effect of taxing or subsidizing ride-hailing services, we extend a pseudo-monocentric city model to include multiple endogenously chosen transportation modes, including ride-hailing applications and endogenous car ownership. We show that most tax and spending programs that cities have currently adopted mildly increase public transit usage. However, the model predicts more significant increases in public transit ridership when ride-hailing applications are subsidized as a "last-mile" provider. Our model indicates that whether ride-hailing services and public transit are substitutes or complements is a policy choice, as the cross-price elasticities are endogenous to the policy environment.

The Effects of Adopting a Value Added Tax on Firms (with Laura Zimmermann) R&R *Review of Economics and Statistics*. While many countries have adopted a VAT in the last 30 years, they often adopt systems that deviate from textbook principles. The net effect on firms is therefore unclear. India's arcane commodity tax system is one such example. We digitize back to 2002, India's commodity tax rates, which features up to forty product-specific tax rates that differ across states in India. We construct a dataset of product- and state-specific tax rates before and after India switched from a sales tax to a VAT. The reform had two effects: it lowered effective tax rates by eliminating tax cascading and reduced compliance costs by reducing tax complexity. We empirically decompose the effects of these two channels on firm sales growth.

Tax Incidence in Multi-Product World: Theoretical Foundations and Empirical Implications (with William Hoyt) working paper. We show that with perfectly competitive markets, in the presence of multiple related products, the textbook partial equilibrium formula often substantially mismeasures the incidence on consumers. We study general equilibrium tax incidence in a perfectly competitive, multiproduct setting. If only one product is taxed, the general equilibrium incidence will always be greater on the consumer than suggested by the standard incidence formula. If the tax changes on multiple related commodities, overshifting is possible even when markets are perfectly competitive. Thus, pass-through greater than one-hundred percent is not sufficient to infer market structure. When empirically estimating pass-through, pass-through estimates capture the direct effect of the tax on the market, the indirect feedback effects resulting from price and tax changes in other markets and taxation of inputs to production.

3 Influence of Research

My research deals with issues that arise in a wide range of policy contexts, and I have engaged with interested scholars all over the world through involvement in conferences and with research collaborations. Economics is a thoroughly internationalized discipline, but at the same time, many researchers are often "domestically specialized." However, my research spans multiple countries and fiscal institutions, while at the same time my expertise in sales taxation and tax competition/coordination has been widely recognized globally including by scholars working on very different types of taxes and institutions. The underlying issues of regional mobility and tax policies in Spain, state and local sales taxes and e-commerce in the U.S., the Indian adoption of state-specific VATs, tax setting in France, and commuting in the United States are all related. Given increasing globalization and rapid declines in transportation costs, the general issues relating to tax competition and mobility of the tax base are ones that arise throughout the world regardless of the type of government or fiscal institution.