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Nathan M. Jensen
Washington University,
St. Louis
Department of Political Science

Rene Lindstadt
Trinity College Dublin

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Nathan M. Jensen & René Lindstädt[†]

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Abstract

There is an increased focus in comparative politics and international relations on how choices of national governments are dependent on choices made by governments in other countries. We argue that while the relationship between policy choices across countries is often labeled as either diffusion or competition, in many cases the theoretical mechanisms underpinning these labels are unclear. In this paper we build a model of social learning with a specific application to the diffusion of corporate tax reductions. This model yields predictions that are differentiable from existing models of tax competition. Specifically, we argue that social learning is most likely to take place in the wake of tax policy cuts by left governments. We test this model using an existing data set of corporate tax rate changes and an author-created data set of changes in tax legislation, covering twenty OECD countries from 1980-1998.

Leaning Right and Learning from the Left: Diffusion of Corporate Tax Policy in the OECD

There is an increased focus in comparative politics and international relations on how (policy) choices of governments are interdependent. Countries' trade policy decisions are often conditional on the tariff rates and subsidy levels other countries. Scholars of monetary policy have often lamented periods of "beggar-thy-neighbor" policies where countries use currency devaluations to gain advantages over their trading partners. Neo-liberal economic reforms, including privatization and pension reform, spread across countries in waves.

In this paper, we address the growing literature on policy competition in the area of corporate taxation. Both domestically and internationally, corporate tax policy has emerged as a contentious issue. Domestically, traditional supporters of corporate tax policy reductions on the right have, in many cases, been joined by the left in pushing for corporate tax reduction as a mechanism for job creation. In some cases, this is directly in response to corporate tax policy elsewhere in the world, for example, when corporate tax reductions in the U.S. under President Reagan seemingly triggered major tax reductions around the world.

We argue that while the relationship between policy choices across countries is often labeled as either diffusion or competition, in many cases the theoretical mechanisms underpinning these labels are unclear. In the context of corporate tax policy, numerous scholars label the temporal clusters of tax policy cuts as evidence for tax policy competition. Yet, we believe that a number of potential theoretical mechanisms could explain this relationship. Empirically, we argue that the predictions generated by studies of corporate tax policy competition are in many cases observationally equivalent to models of social learning.

In this paper, we build a model of social learning and contrast it with existing models of corporate tax competition. The model provides us with comparative statics that allow us to empirically differentiate our explanation for clustered tax policy cuts from existing models of tax policy competition. Specifically, while models of tax policy competition focus on the role of large countries or competitors for investment as triggers of tax policy diffusion, we focus on the potential for learning, when a government with long-held preferences for higher corporate taxes (left governments) legislates corporate tax reductions. As a result, our social learning model yields empirical predic-

tions that are clearly distinguishable from existing models of tax competition. We stress that it is possible that multiple channels of diffusion can affect corporate tax decisions, where social learning is not mutually exclusive from these other forms of diffusion. Yet our goal is to construct a social learning model and a set of empirical tests that allow us to differentiate social learning from existing scholarship on corporate tax competition.

We test the model using an existing data set of tax policy rates from Basinger and Hallerberg (2004) and a unique, author-created data set on the timing of tax policy cuts in twenty OECD countries from 1980-1998. Our empirical results point to the importance of social learning in the diffusion of corporate tax policy. Specifically, we find that tax cuts by left governments lead to changes in the tax policies of other governments.

This project makes two major contributions to political science scholarship. First, it directly addresses the determinants of corporate tax policy cuts in the OECD. Contrary to existing studies that mostly link corporate tax reductions to tax competition, we find evidence consistent with social learning. Second, this paper makes a broader contribution to literatures in international relations and comparative politics. We outline a number of important substantive debates in international political economy and comparative politics that could apply and empirically test theories of learning, emulation and innovation, which traditionally have been under-utilized in political science.

1   Diffusion, Learning and Competition in the Global Economy

There is a growing recognition that the actions of one actor affect the actions of other actors, whether these are sub-national actors (e.g., states, provinces, etc.), groups within a society (e.g., political parties, insurgent military groups, etc.) or nation-states.[1] Specifically, studies of how policy and preferences diffuse across borders have become an important part of the scholarship in political science (for a review, see Simmons, Dobbin and Garrett, 2006). As pointed out by Elkins and Simmons, "since 1950, fifteen to twenty titles with diffusion appear each decade until the 1990s, when the number spikes to thirty-seven" (Elkins and Simmons, 2005, p. 36). While

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[1]See Knill (2005) for a review of policy convergence in the European Union, Gilardi (2005) on the diffusion of independent regulatory agencies and Meseguer (2005) for an excellent discussion of diffusion and rational learning in regulatory policies.

numerous research projects across different subfields have studied diffusion, we focus on reviewing the literature in international and comparative political economy, with a specific focus on corporate tax policy making in the OECD.

Terms such as diffusion, learning, competition and imitation are often used in political science, yet often the exact meaning of these concepts is either not defined or consistent with a number of different concepts. Recent contributions have made progress in refining these concepts, such as Simmons, Dobbin and Garrett (2006), who differentiate between coercion, competitive pressures from market forces, policy learning and social emulation.[2] Quinn and Toyoda (2007) examine how domestic and international factors affect changes in international capital account regulation. Volden, Ting and Carpenter (2008) build theoretical models that allow us to differentiate between situations in which governments learn from their own experiences and those where governments learn from the experiences of other governments. Drawing on a sociological approach, Lee and Strang (2006) argue that "interpretive frames" help explain the diffusion of public sector downsizing.[3] We argue that even with the advances in the diffusion literature, there is considerable room for both refinement and theory building, in order to improve on empirically differentiating between different forms of diffusion.

To give one example, research on the spread of neo-liberal reforms across countries, including the privatization of state-run enterprises, has considered diffusion as an important component of these policy reforms (see Meseguer, 2004).[4] If one examines the data on privatization, there is a clear pattern of temporally clustered privatization across countries, with waves of Eastern European and Latin American countries engaging in privatization at the same time. One argument is that these

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[2]Elkins and Simmons (2005) mention six mechanisms by which diffusion can take place: learning, imitation, bandwagoning, emulation, mimicry and competition.

[3]This argument on interpretative frames is broadly related to our social learning approach, yet with important differences. Our learning model focuses on how the partisanship of governments facilitates learning, while Lee and Strang argue that specific countries, sometimes referred to as pioneers, serve as leaders in policy change.

[4]See also Henisz, Zelner and Guillén (2005) for a discussion of different theories on the diffusion of infrastructure reforms.

countries could all be subject to common external shocks, such as budget crises or the collapse of the Soviet Union. Yet, while international factors obviously affect these privatization decisions, a direct relationship between, say, Hungary and Poland's decision to privatize could be absent.

Unfortunately, this pattern of diffusion is also consistent with a number of other theories. First, many countries were subject to structural adjustment programs or attempting to gain membership to international institutions (e.g., WTO, EU, etc.).[5] These patterns of privatization may be closer to coercion than diffusion (for an example, see Drezner, 2005). Second, there have been major shifts in economists' views on the proper way of economic regulation, so that these similar policy changes across countries could be the result of Chicago-trained economists and the Washington Consensus (see Kuczynski and Williamson, 2003).

Another example is the interdependence of exchange rate policies. While there is a large literature on the domestic factors that affect exchange rates, there is evidence that competitive dynamics influence exchange rate policies.[6] One argument is that exchange rates affect trade flows, in that countries' devaluations affect the prices of imports and exports. In periods of "beggar-thy-neighbor" exchange rate cuts, countries engage in exchange rate devaluation in response to other countries' devaluations (see Eichengreen, 1996).

Yet, there are also changes in exchange rate choices that seem to be independent of this competitive dynamic and, instead, based on learning from other countries. Some examples include the spread of independent central banks, fixed exchange rates or currency boards.[7] Without going into the details of these arrangements, there is considerable evidence that these major policy changes

[5]See Vreeland (2003) for a nuanced view on IMF conditionality. See Brune, Garrett and Kogut (2004) for an examination of how IMF conditionality influences the prices investors are willing to pay for privatized assets and Nooruddin and Simmons (2006) on the constraining impact of IMF programs on domestic spending choices.

[6]For selected studies on the political economy of exchange rates and monetary policy, see Simmons (1994), Bernhard and Leblang (1999), Bernhard and Leblang (2006), Bernhard, Broz and Clark (2002), Frieden (1991), Frieden (2002) and Bearce (2007).

[7]See Frieden and Stein (2001) for a review of exchange rate policy in Latin America.

were spread through the diffusion of knowledge across countries.[8]

More generally, we can say that in many areas of international and comparative political economy research has shown temporally or spatially clustered policy changes, yet this empirical regularity is consistent with models of learning, competition or diffusion. While we know that "international" factors influence the decisions of policy makers, we are still left with considerable gaps in our understanding of the exact mechanisms underpinning this diffusion. Does globalization "force" governments into policy change or does it allow governments to learn best practices from other governments, resulting in better domestic policy decisions?[9]

In this paper we address an important substantive question on the setting of corporate tax rates. Some scholars have argued for a "race to the bottom" in corporate tax rates (see Andrews, 1994; Cerny, 1990; Kurzer, 1993). A race to the bottom could lead to social tension, as citizens demand higher levels of social protection at a time when the government is the most fiscally constrained to provide these protections (see Rodrik, 1997). Recent scholarship has provided a much more nuanced view of tax "competition" across countries. Three prominent studies are worth mentioning.

First, Swank and Steimo (2002) identify major adjustments in the levels of statutory corporate tax rates, where numerous countries slashed corporate tax rates in the wake of major tax cuts in the United States in 1986 (see also Swank, 2006). According to Swank and Steimo, despite the fact that these tax cuts were the result of competition over mobile capital with the U.S., most countries, while lowering tax rates, also eliminated numerous industry and firm specific tax exemptions. Thus, while corporate tax rates fell, more firms were subject to corporate taxes. As a result, rate reductions had little impact on the revenues generated through corporate taxation. Although the statutory tax rates have decreased, there has been a "remarkable stability in the levels and distribution of tax burdens" (Swank and Steimo, 2002, p. 642).

Hays (2003) examines the convergence of corporate tax rates in the OECD. He builds a theoretical model of corporate tax rate decisions in which competition for capital can lead to tax

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[8]There is also a rich literature on the diffusion of financial crises (e.g. Kaminsky and Reinhart, 2000).

[9]These questions are quite similar to debates on the relationship between federalism and governance (Oates, 1999).

convergence. Yet, the simplistic view of tax policy as a race to the bottom is misguided. Hays finds that the majoritarian, liberal democracies are the countries most affected by the competition for international capital. Hays's work provides an excellent theoretical exploration of how domestic political institutions mitigate the effects of tax competition.

Finally, Basinger and Hallerberg (2004) present an influential article on corporate tax competition. They develop a tournament model of competition in which countries bid against other countries for investment. They argue that the tax rate determinants are greatly influenced by domestic politics, including levels of partisanship and veto players, which can limit tax policy cuts. Empirically, they find strong evidence for corporate tax competition, yet domestic political factors still heavily influence policy choices.

While we believe that these studies all provide important insights into tax policy competition, important elements remain unexplored. In this project we make a number of explicit assumptions that allow us to differentiate learning from these models of corporate tax competition. The first of these assumptions is rather uncontroversial and one that is common in the literature. We assume that it is more politically costly for left governments to cut corporate taxes (see for example Basinger and Hallerberg, 2004). *Ceteris paribus*, we would be more likely to observe tax cuts by right governments than governments of the left.

A second assumption, less common in the literature, is that governments are operating in an environment of imperfect information with regard to the elasticity of capital to taxes.[10] In other words, politicians have imperfect information on how investment will fluctuate with changes in corporate taxation. We argue that while governments may know that reductions in taxation will increase capital flows, there is uncertainty on the exact magnitude of these responses. We believe that this is a realistic assumption, which is supported by both theoretical and empirical studies of investment responses to taxation. In the following paragraph we briefly review this literature.

Theoretically, while many scholars make the assumption that investors simply respond to after tax rates of return, the literature on the determinants of multinational investment decisions (for-

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[10]While the elasticity of capital to taxation is negative, in our discussion of the models we refer to the elasticity of capital to tax reductions. Thus we expect a positive elasticity between tax reductions and capital inflows.

eign direct investment or FDI) is much more complicated. These multinational investors behave quite differently from other forms of capital (Hymer, 1976), in that this type of investment is a response to market failures, different industry level factors or firm-specific reasons for making investments.[11] Providing another level of complication, non-economic factors can also greatly affect foreign investment decisions. A recent article by Kiymaz and Taylor makes an explicit assumption of uncertainty, according to which "hosts cannot be sure of how much to offer the firm to locate in its borders, largely because it cannot precisely estimate the political, social, and cultural costs that the firm would face in foreign production" (Kiymaz and Taylor, 2000, p. 55). Consequently, the simple assumption of capital flowing to the countries with the highest after tax rate of return is not supported by the theoretical literature on foreign direct investment.

Equally problematic for the assumption of perfect information on the elasticity of capital are the complex findings of the empirical literature linking taxation and foreign direct investment (see Jensen, 2006). Numerous scholars in the economics and management literatures have found that corporate tax rates can impact certain types of investment decisions (e.g. in manufacturing). In a comprehensive review of the literature, Hines (1999) explores the time-series and cross-sectional analyses of the importance of tax rates for U.S. FDI outflows and foreign flows of FDI into the U.S. While several studies reviewed by Hines find that taxes are not significant determinants of FDI inflows or outflows, a number of other studies find that national tax rates do have a substantial influence on FDI inflows, with elasticities ranging from -0.6 to -2.8.[12] Devereux and Griffith (1998) find that average effective tax rates are an important determinant of FDI decisions. Devereux, Lockwood and Redoano (2008) build a sophisticated model of corporate tax policy setting, taking into account both the statutory tax rate and the effective marginal tax rate. This results in "two-dimensional tax competition" where statutory rates affect the location of profits and effective

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[11]Many of the models based on market imperfections find that tax rates are a minor determinant of FDI inflows (Markusen, 1995).

[12]Altshuler, Grubert and Newton (2001) estimate the effect of tax rates on U.S. manufacturing investment in 1984 and 1992. They find that tax rates have a significant effect on multinational investments, and that this relationship has grown stronger over time (with an elasticity of 1.5 in 1984 and an elasticity of 3.0 in 1992).

marginal rates the location of production. In one of the more recent and most comprehensive studies, Mutti (2003) finds that corporate tax rates have a strong influence on the decisions of manufacturing multinationals. According to his findings, a 1% decrease in the cost of capital leads to a 3% increase in MNE production. The catch is, as Mutti states it, that "such a high response does not apply if the output is destined for local markets, or if the country has high per capita income" (Mutti, 2003, p. 5). Thus, there remains considerable disagreement on the impact of taxes on foreign direct investment (see De Mooij and Ederveen, 2003).

Theoretically, this uncertainty could lead governments to "experiment" with tax reductions, cutting corporate taxes and then examining how FDI responds to tax cuts. Alternatively, governments could learn from the tax experiences of others by observing how FDI responds to tax reductions in other countries (see Volden, Ting and Carpenter, 2008; Baturo and Gray, 2009). Unfortunately for governments, the volatility of FDI flows makes a simple before and after tax cut comparison of FDI problematic even for well-trained scholars. As highlighted above, there is considerable disagreement on the relationship between taxes and FDI in the academic community. As a result, there is limited ability for "learning by doing" or simply observing the tax policy reforms and FDI responses in other countries. Our model focuses on learning from the tax policy decisions of other countries, allowing governments to observe policy changes by other governments before making their own tax policy decisions.

It is important to note that our social learning model does not negate the possibility of other forms of diffusion. To give an example from academia, Ph.D. programs may make changes to their graduate curriculum due to competition with other programs, learning from doing, and emulating best practices of other programs. It is plausible that all of these mechanisms are present and are mutually reinforcing. Our goal in this paper is not to argue against other forms of diffusion, rather our focus is to build a social learning model that explains corporate tax setting. Our empirical identification strategy is to differentiate our model of social learning from alternative diffusion mechanisms. While these other mechanisms certainly may influence corporate tax setting, we argue that our hypothesized patterns of statutory corporate tax reductions is consistent with our social learning model and is inconsistent with arguments on common shocks or tax competition.

In the following section we outline a model of social learning from the tax policy choices of other governments, not the response of FDI to taxation. Assuming imperfect information, we construct

a learning model that is distinguishable from existing models of tax competition. We believe that our model further contributes to our understanding of tax policy diffusion and has numerous other applications outside of political science.

2   Biased Learning and Globalization

In this paper we focus on the diffusion of tax policy across OECD countries. Diffusion theory has experienced a revival in recent years in political science, as evidenced by a growing number of articles, and has been usefully employed in a number of different contexts to understand the process by which ideas, practices and policies make their way across local, state and national boundaries (e.g. Berry and Baybeck, 1990, 2005; Boehmke and Witmer, 2004; Quinn and Toyoda, 2007; Elkins and Simmons, 2005; Shipan and Volden, 2006; Simmons, Dobbin and Garrett, 2006; Volden, 2006; Volden, Ting and Carpenter, 2008). Here, we combine two until now separate approaches to suggest a new mechanism by which diffusion can occur. The first part of our theoretical approach is rooted in the social learning strand of diffusion theory. The second part is taken from the theoretical work on the usefulness of biased advice (Calvert, 1985). From the combination of these two approaches emerges an innovative theory of diffusion that yields interesting new and plausible predictions, which we test with cross-national data on corporate tax cuts.

We begin by discussing the two components of our theoretical approach and then explain how these two approaches can be combined to further our understanding of national (tax) policymaking. The first approach goes under various names, but social learning is probably the most widely used and most descriptive among them. Common to all social learning approaches is the idea of "pure informational externalities" (Gale, 1996). This means that individuals can learn from each other's behavior, but their payoffs are not affected by the actions of the other individuals. In our context, tax policy changes in one country may not directly influence the level of FDI inflows into another country, but they can provide information on the relationship between taxes and FDI inflows.

We note that our theoretical model explicitly assumes that competitive dynamics (i.e. payoff externalities) are absent. A comprehensive theoretical model from which both competition and learning can emerge is beyond the scope of this paper. Here we merely suggest an alternative to the many models of competition in order to derive predictions about the circumstances and

observable implications of learning.[13] In our empirical analysis, we test the predictions of our learning model against those of the competition models. While, as a result, we have a competing theories setup, we point out that our argument is not to be understood as an attempt to refute the existence of competitive dynamics. Rather, it is meant as an existence proof, aimed at showing that even in environments and circumstances commonly perceived to be purely competitive, there is room for learning.

Here, we focus on a particular class of social learning models that has been referred to as cascade or herding models (hereafter, simply referred to as cascade models). In the typical cascade model, individuals receive a private signal, for instance, on the viability of corporate tax cuts, and then are presented with a binary choice, i.e. to cut the corporate tax rate or not (e.g. Banerjee, 1992; Bikhchandani, Hirshleifer and Welch, 1992, 1998). In the most basic version of the model, individuals choose sequentially, with the order determined exogenously. The model generates two key findings. First, individuals take into consideration the actions of earlier individuals. Second, the use of information tends to be inefficient. The first point is rather obvious. The second point, however, requires additional elaboration.

Why would the use of information be inefficient? The reason is that very early on in the sequence, individuals will start disregarding their personal information in favor of the information conveyed by the actions of individuals earlier in the sequence. Simply stated - for the tax policy case - assume government D has observed several other governments, call them A, B and C, cutting their corporate tax rates. Moreover, assume that government D has private information indicating

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[13]As we reviewed earlier, Hays (2003) and Basinger and Hallerberg (2004) are two prominent political science contributions that construct formal models of tax competition and also include domestic politics. There is also a rich literature in economics on tax policy competition. Wilson and Wildasin (2004) reviews this literature and explores the normative implications of tax competition. As cited earlier, one of the most sophisticated contributions is Devereux, Lockwood and Redoano (2008), where the authors not only model the location decisions of firms, but also the ability of firms to shift profits via transfer pricing. Thus governments are in competition for both investment and tax revenues. Recent contributions have also focused on firm-specific taxes (or subsidies). See King, McAfee and Welling (1993) and Han and Leach (2008).

that cutting the corporate tax rate might not be the best policy but feels pressured by the other governments' tax cuts to follow suit. Then government E, who is still waiting to make a decision, is in the same position as government D, having learned nothing new from the action of government D. This theoretical approach can be used to explain market bubbles and even provide insights into fashion fads.

We apply the general idea of cascade models to the question of how national governments make tax policy decisions in a globalized world. We believe that the basic dynamic of cascade models applies to national governments' tax decisions, but with additional twists, some of which have been discussed in the existing literature and one of which, to the best of our knowledge, has not yet been considered in the context of cascade models. As a starting point, take the social learning model due to Lohmann (1994). She applies a variation of the cascade model to the study of the East German revolution in 1989.

What sets Lohmann's approach apart from earlier cascade models is her focus on the ideology of the demonstrators. She suggests that the Leipzig demonstrations were actually successful at disseminating information about the East German regime, and that this success, in great part, has to be attributed to the turnout of ideological moderates (those who were neither particularly critical nor particularly sympathetic to the communist regime). The logic underlying this conclusion is that the participation of moderates in the demonstrations sent a signal to potential future participants that the demonstrations were not just a gathering of the ideological fringes, but rather a legitimate form of protest against an ill-behaving regime. Lohmann goes beyond previous cascade models by saying that it is not just important how many people show up, but also who shows up.[14]

We argue that this notion of ideology is crucial for understanding national governments' tax policy decisions. However, we depart from Lohmann's model in one important respect: We argue that it is not so-called moderates, as in the context of social movements, but "opposing extremists"

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[14]In a sense, including the notion of ideology in the model allows for what Banerjee (1992) has referred to as invertibility, which means that individuals later in the sequence can, at least partially, infer the signals received by early movers. While Banerjee claims that invertibility eliminates herd externalities, we would argue that they would only be completely eliminated if invertibility were perfect, which in Lohmann's story as well as in our story is not the case.

that are crucial to social learning in international politics. This is where the second part of our theoretical approach comes into play - the theory of biased advisors (Calvert, 1985). Calvert formally models a situation where a decision maker is seeking advice from an expert. Using a straightforward expected utility model, he shows that if a decision maker is strongly favoring a particular policy, then he is better off seeking advice from a biased advisor that has the same predisposition than seeking advice from an objective advisor (not to speak of an adviser biased in the opposite direction). The logic underlying this initially counterintuitive result is that the objective advisor is less likely to make the decision maker change his mind (because of the decision maker's previous predisposition), while advice from a biased advisor can have an impact: The biased advisor, who has the same ideological predisposition as the decision maker, would only suggest a policy contrary to that predisposition, if he thought that it was superior to the alternative(s).

While Calvert's model is about the relationship between a policy maker and an advisor, we are concerned with policy diffusion across governments. However, Calvert's model still has clear implications for diffusion in international politics.[15] We show that one national government can, at least under certain circumstances, infer information about another government's domestic policy-making process and use that information to devise its own policy. Take the example of a left government that adopts a conservative policy. Other governments, both left and right, who observe the first government, can infer from this that the left government must have obtained new and credible information. Why else would the left government have changed its policy stance? Of course, the same story could be told about a right government adopting a liberal policy.

In sum, we argue that Calvert's biased adviser model has implications for international politics,

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[15]We should note that while there are important similarities between our model and that of Calvert, the reader should know that Calvert's model focuses on how individuals process information given their own biases and the information biases of their advisors. Our model, while similar in intuition, focuses on actors with diverging partisan preferences for tax policy cuts. We believe that the implications of using either information biases (say towards tax cuts) or preferences (for tax cuts) would be similar. However, we prefer to focus on diverging preferences over tax policy, as it seems more realistic in our context and better fits into the existing work on the political economy of corporate taxation.

in that governments who reverse long-held policy positions facilitate social learning and diffusion across countries. In the cascade literature, such governments would be referred to as fashion leaders. What is interesting about this model is that by adding an international level to Calvert's biased advisor story, Calvert's result is expanded (assuming that his logic applies to the domestic level).

Combining the cascade model with the biased advisor model (in relation to domestic policy-making) and applying the modified theory to our question about national governments' tax policy positions yields the following story line. When it comes to cutting taxes in general and corporate taxes in particular, right governments are predisposed to a policy of lowering taxes, while left governments are predisposed to maintaining or even increasing existing tax levels. Given the uncertain role of corporate taxes in attracting foreign direct investment (FDI), both right and left governments would like to learn from the behavior of other governments about the feasibility of cutting corporate taxes in attracting FDI, i.e. about the elasticity of FDI to corporate taxes. While very little is learned about capital elasticity from tax cuts by right governments, tax cuts by left governments provide a credible signal that capital responds to tax policy cuts.[16] This conclusion stems from the following facts: Tax cuts are very costly for left governments, whose core constituencies oppose them, and politically advantageous for right governments, whose core constituencies are in support of tax cuts and smaller government. In the following paragraphs, we discuss the merits of this argument about partisan objective functions.

The existing literature on tax competition uses a number of different models, yet many of them share a core set of assumptions. The goal of our project is to explain the diffusion of tax policy changes across countries, contrasting learning with existing models of competition. At the core of our model is a simple assumption that is grounded in the political economy literature on tax policy: We assume that left governments have preferences for higher levels of corporate taxation. We justify this assumption below.

The numerous works in the public finance literature assume that politicians represent the interest of the representative household, where governments provide public goods through taxation. In

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[16]On the issue of credibility in cascade models, see Bikhchandani, Hirshleifer and Welch (1998). See also the discussion of the legitimation concept from sociological organization theory in Lieberman and Asaba (2006).

most of these models all residents are identical and thus have identical preferences over tax policy (or levels of public goods). One potential extension of these models is to assume at least two types of households, those endowed with capital and those endowed with labor. We can then derive their preferences on the level of taxation, and allow political parties to represent these different factors.

We favor a more direct approach, one that is exhibited in the work of Basinger and Hallerberg (2004). They model competition for capital, assuming that governments benefit from attracting mobile capital, but with different governments incurring different costs of enacting tax policy reforms. Right governments have lower costs of cutting corporate taxes and are more likely to enact corporate tax cuts, *ceteris paribus*, than left governments (Basinger and Hallerberg, 2004, Proposition 1, p. 264). This assumption is central to our theory. The fact that right and left governments have different preferences on taxation is often the very definition of right and left government.[17] Building on this simple assumption and an imperfect information environment, we show how partisanship can facilitate learning. Specifically, tax cuts by left governments reveal more information about the state of the world than tax cuts by right governments.

We note that our model is consistent with a number of variations of politicians' objective functions. For example, Garrett (1998) argues that left governments have strong preferences for redistribution, which leads to higher levels of capital taxation. Becker (1983) and Hays (2003) argue that the left and right governments have different constituencies, i.e. shareholders or wage earners, leading the left (representing wage earners) to have preferences for higher levels of taxation.[18] Swank suggests that right-of-center governments' electoral success can facilitate reform, where "extended right-party government will bolster mass and elite support for liberalization and market-orientated policies generally and produce incremental (if not dramatic) enactments of a variety of neoliberal economic and social policy reforms that lay the groundwork for a shift in the tax policy paradigm" (Swank, 2006, p. 857). While we focus on the higher costs to left governments of tax reform, our model is generalizable to cases where left governments are less likely to enact tax cuts than right

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[17]For example, Laver and Hunt (1992) use questions on a party's stance on tax policy as one of the questions to place parties on a left-right continuum.

[18]The direct mechanism for influencing politics in both models are the political expenditures of interest groups.

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governments, whether this is due to voters, interest groups, or other forms of costs.[19] In sum, governments attempt to attract capital through costly actions (tax reductions) but the costs for these actions are higher for left governments.

This assumption on left governments being less likely to enact tax cuts also illustrates how common exogenous shocks affect tax policy. For example, in (Basinger and Hallerberg, 2004) model an increase in the number of right governments in the world (an exogenous shock) increases the "effort" exerted by governments in cutting taxes. Yet their model still predicts that right governments are more likely to reduce corporate taxes than left governments.[20] This is an important point for both our model and empirical analysis. Common shocks, such as a change in the mobility of capital, can lead many or even all countries to cut corporate taxes. Yet we argue that a specific pattern of partisan learning can be differentiated from both standard models of tax competition and responses to common shocks.

This assumption also allows us to clearly differentiate our model from other models of corporate tax competition. For example, (Basinger and Hallerberg, 2004) model and empirical analysis focus on how competitive dynamics and domestic factors influence tax policy decisions. While partisanship affects the incentive to cut taxes, there is no theoretical argument or empirical test of how the partisanship of other governments affects tax diffusion. Competitive models focus on how tax cuts by large countries, common competitors, or major senders of capital affect a country's incentives to cut tax policy. The partisanship of a country cutting taxes should have no influence on tax competition. Yet our theory illustrates how tax cuts by left governments can reveal information about the

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[19]Adding another dimension of political competition complicates this argument. Romer (1998) finds that the left will moderate redistributive policies in the presence of a second (religious) dimension.

[20]Swank also argues that past control by right parties can affect future tax reform, suggesting that, "frequent government control by right-of-center parties in years preceding the proposal of market-conforming tax policy reforms should facilitate adoption of those reforms" (Swank, 2006, p. 857). Yet Swank also argues that government responses to the 1986 corporate tax reforms in the U.S. are predicted to be partisan. Countries with right-leaning electorates and elites are more likely to respond to this shock by enacting corporate tax reform.

state of the world that leads other states to cut corporate taxes. This pattern of left governments cutting taxes followed by other governments (left or right) is inconsistent with common exogenous shocks or existing models of tax competition.

The somewhat counterintuitive conclusion here is that left governments lead the way on tax cuts. Moreover, this model yields the following important empirical prediction: In line with the standard logic of cascade/herding models, the larger the number of left governments cutting taxes, the stronger the herding effects, in that the dynamic is more difficult to reverse (even if herding is based on incorrect information). The underlying logic of this key empirical prediction will be further developed in the following paragraphs where we outline the mathematical model.

The inefficient use of information clearly is still an issue in this context. But in our two-level social learning model in which domestic governments rely on biased advice, this seems to be far less of a problem, since presumably the accuracy of the left government's signal is higher than for the average right government (the same logic applies to the Lohmann (1994) model).[21] The combination of the biased advisor story and the social learning model yields some interesting dynamics that we are now going to explore in more detail.[22]

At the core of the model is the notion that governments are uncertain about the impact of corporate tax cuts on investment. Specifically, national governments have incomplete information about the elasticity of capital to taxes. If capital is inelastic to changes in the corporate tax rate, then national governments do not have an incentive to cut taxes and might even consider raising taxes. The reason for this type of scenario might be that investors are more concerned with existing infrastructure, secure property rights and easy access to neighboring markets rather than the tax rate. If, however, capital is highly elastic to taxes, then even small changes in the tax rate can lead investors to locate in or migrate from a particular country. While governments might have a general sense of the elasticity of capital to taxes, a substantial amount of uncertainty remains, not least because investors are likely to carefully guard the information about their sensitivity to tax

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[21]On signal accuracy, see Bikhchandani, Hirshleifer and Welch (1992).

[22]The social learning part of the model closely follows the standard cascade model developed in Chamley (2004). However, as we explain below, we add several assumptions to the basic model to make it conform to our theoretical story.

rate changes.

In the model, there are two types of governments, right and left governments, who have to decide whether to cut taxes or not, considering that capital elasticity to taxes is either higher or unchanged. When θ, the state of nature indicating capital elasticity, is equal to 1, then there has been an increase in capital elasticity. When $\theta = 0$, then capital elasticity is unchanged. Both types of governments, left and right, have the opportunity, when called upon, to take action, by either cuting the corporate tax rate, $x = 1$, or maintaining the current corporate tax rate, $x = 0$. The order in which governments set policy is determined exogenously, and governments are ordered by the periods in which they are called upon to act.[23] Therefore, government t gets to decide on a course of action in period t.

When governments are called upon to act, they receive a privately observed signal that provides probabilistic information on the elasticity of capital. The core of this model, as with any social learning model, concerns the evolution of beliefs about the state of nature. When it is an agent's turn to act, she/he combines, via Bayesian updating, the public knowledge about the probabililty of increased capital elasticity, i.e. $\theta = 1$, with her/his private knowledge, the source of which is the government's private signal. Specifically, in each period, the public belief is updated by the following formula. Since there are only two possible states of nature, we follow the convention in the literature and express the public belief, λ in Equation 1, as the loglikelihood ratio of the two possible states of nature.

$$\lambda_{t+1} = \lambda_t + \nu_t \text{ with } \nu_t = \log\left(\frac{P(x_t|\theta = 1)}{P(x_t|\theta = 0)}\right) \tag{1}$$

In words, this formula states that the public belief about capital elasticity at time $t+1$ is derived by combining the public belief at time t and the information conveyed by the action of government t in time period t. The updating of the public belief is one crucial place where we diverge from the

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[23]In future iterations, we will allow for the possibility of strategic delay (e.g. Bikhchandani, Hirshleifer and Welch, 1998; Lohmann, 1994). Rather than having a pre-defined sequence according to which national governments act, that model would allow governments to strategically delay decisions on tax policy to wait for more accurate information to become available. However, for our current empirical analysis a more refined model is not necessary.

standard model in the literature. While the literature that we are familiar with would distinguish governments only by their actions, i.e. tax cut or no tax cut, we introduce the idea that it might matter what type of government - left or right - it was that took the action.[24]

It is important to stress that this process of learning is central to our story. As evidenced by Equation 1, we model the updating of the public belief by observing the actions (i.e. tax policy) of other actors (i.e. governments). The ratio ν_t is to be interpreted as the information conveyed by the actions, specifically in terms of the probability of a particular state of nature given the observed action. We show at the end of this section that, under some general conditions, tax cuts by left governments lead to more favorable public beliefs about increases in capital elasticity than is the case for tax cuts by right governments. It directly follows that the larger the number of left governments cutting taxes, the stronger the public belief that capital elasticity has increased. The simple intuition is that for public beliefs to change, i.e. learning to take place, left governments have to reverse their traditional policy positions. There is little public information gained when a right government, already predisposed to cutting taxes, enacts a tax cut. Yet, tax cuts by left governments, who are normally loath to cut taxes, provide new information. The insight from Equation 1 informs much of the rest of the paper and leads to testable implications that we address in our empirical analysis.[25]

To illustrate the predictions of the formal model, we generate a set of simple simulations that show the trajectory of public beliefs under different scenarios. In the following paragraphs, we discuss the process by which we generated the simulations and the corresponding output. The

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[24]The only exception we know of is the Lohmann (1994) model discussed above. However, as pointed out earlier, her understanding of the importance of type is quite different.

[25]At this point, we assume away that actions are costly, and we avoid answering the question of why governments decide to cut taxes or not. We invite the reader to consider the possibility that arcane exogenous shocks trigger government action initially. With these simplifying assumptions, our model, by way of Equation 1 and the assumptions introduced below, shows that clustered tax cuts by left governments propel the public belief about increased capital elasticity more quickly above an arbitrary threshold than clustered tax cuts by right governments. We further elaborate on this finding in subsequent paragraphs.

simulations are based on a model with ten governments, five of which are left governments and the other five right governments (in the following paragraphs right governments are denoted by R and left governments by L). In a first step, we randomly generated the following sequence of those ten governments.

$$(L_1, R_1, L_2, L_3, L_4, R_2, R_3, R_4, L_5, R_5)$$

We then set the loglikelihood ratio of the initial public belief, λ_0, equal to zero, which corresponds to a starting public belief of $\mu_0 = 0.5$. Stated differently, we assume that initially governments are completely uncertain about the effect of taxes on capital investment. We also assume the following updating probabilities: $p_L = 0.4$, $p'_L = 0.8$, $p_C = 0.49$ and $p'_C = 0.51$. Here p_L refers to the probability that a tax cut by a left government accurately reflects increased capital elasticity, p'_L that a left tax cut does not accurately reflect changes in capital elastitcy, p_C that a right government's tax cut happens in an environment of increasing capital elasticity and p'_C that a right tax cut occurs despite unchanged capital elasticity. In words, we assume that (i) a left government that cuts taxes provides a fairly accurate signal that capital elasticity has increased and is unlikely to be associated with constant capital elasticity, and (ii) that the actions of right governments fail to provide accurate information about capital elasticity.

We then used Equation 1 to calculate the evolution of public beliefs under different scenarios. The lighter lines in the five panels of Figure 1 show the evolution of beliefs for the sequence (L_1, R_1, L_2, L_3, L_4, R_2, R_3, R_4, L_5, R_5). Specifically, in the first panel (lighter line), it is assumed that only R_1 cuts taxes (c on the x-axis), with all of the other governments, both left and right, opting not to cut taxes (n on the x-axis). In the second panel (again lighter line and going clockwise), R_1 and R_2 are the only governments to cut taxes. This pattern continues until, in the fifth panel, all right governments are assumed to cut taxes, but none of the left governments.

[FIGURE 1 ABOUT HERE.]

Next, we took the sequence (L_1, R_1, L_2, L_3, L_4, R_2, R_3, R_4, L_5, R_5) and replaced the right governments with left governments and vice versa to generate the following sequence, before increasing the number of left governments cutting taxes from one (first panel, dark line) to five (fifth panel, dark line).

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$$(R_1,\ L_1,\ R_2,\ R_3,\ R_4,\ L_2,\ L_3,\ L_4,\ R_5,\ L_5)$$

Comparing the dark and lighter lines, we can see that increasing the number of right governments cutting taxes (lighter lines) only minimally increases the public belief that capital is elastic (from 0.027 in the first panel to 0.037 in the last panel). However, increasing the number of left governments cutting taxes (dark lines) greatly increases the public belief that capital is elastic (from 0.13 in the first panel to 0.99 in the last panel). Given that the public belief is a crucial aspect of governmental policy-making in our model, these simulations provide clear evidence that the more left governments cut taxes, the more likely it is that other governments will be convinced to cut taxes themselves. While there is also an upward trend in the public beliefs as more right governments cut taxes, the effect is fairly limited and pales in comparison to the effect of tax cuts by left governments. Consequently, the key hypotheses that we are going to empirically test in subsequent sections are:

H1: The more left governments cut taxes, the more likely other governments, both left and right, are to cut their own tax rates.

H2: The number of right governments cutting taxes has no effect on tax policy decisions of other governments, both left and right.

There are some additional hypotheses that emerge from our model. While we do not empirically test those additional hypotheses, we briefly mention them here for the sake of completeness. First, no tax cuts by right governments, while not conveying a substantial amount of information about capital elasticity, lead to a slight decrease in the beliefs that tax cuts are conducive to attracting foreign capital. Second, just like left governments lead the way on tax cuts, right governments should lead the way on tax increases. Here, however, we are primarily concerned with the issue of tax cuts, not least because of the rare occurrence of tax increases. Finally, while tax cuts by left governments can, as shown, create momentum and trigger world-wide tax cuts, policy abandonment by left governments, i.e. when a left government breaks the chain - instead of following other left governments in cutting taxes, it stays put, choosing to maintain the current rate - can halt the momentum. To what extent policy abandonment changes the momentum depends both on the number of previous left governments that have cut taxes and the number of governments abandoning tax cuts subsequently.

One limitation of most existing empirical studies on learning and competition is that the presence of common shocks can complicate statistical identification. In the context of corporate tax policy, countries may cut taxes at the same time, suggesting competition or learning, when, in fact, tax cuts could be driven by a common exogenous shock. For example, a decrease in the world supply of foreign direct investment (i.e. a recession in the countries with the most outbound FDI) could lead all governments to change tax policy. These decisions could be entirely determined by the changing supply of FDI, yet the resulting pattern of simultaneous tax changes would be difficult to differentiate from competition or emulation.

Our model and empirical analysis can address this issue of common shocks. First, our theory directly models public beliefs about taxation and explores changes in these public beliefs. An exogenous change that is common knowledge to all countries would directly affect the public beliefs. Yet, our key assumption, a prominent one in much of the political economy literature, is that right governments are more likely to reduce corporate taxes than left governments. Common shocks would not produce a pattern of left governments leading the way in tax cuts, followed by all other governments. Thus our two hypotheses are inconsistent with arguments about common shocks driving tax policy. We also directly address this issue of common shocks in our empirical analysis within a hierarchical (or multi-level) modeling framework.

In the next section, we empirically test our theoretical learning model. We also consider various hypotheses associated with models of tax competition, in an attempt to isolate learning effects from competitive dynamics.

3   Learning or Competition: Data and Methods

Following Hypothesis 1 and 2, we explicitly test for partisan differences in learning by introducing measures of tax cuts by both left and right governments. Thus, our interest is in exploring whether tax cuts by right or left governments trigger tax cuts by other governments. We hypothesize, in accordance with the predictions generated at the end of Section 2, that learning takes place when left governments cut taxes. We stress that this pattern of diffusion is inconsistent with existing arguments about tax policy competition.

Our research design strategy is to focus on corporate tax policy cuts in the OECD to test our

theory.[26] Although we control for a number of domestic-level factors that affect corporate tax policy, our focus is on exploring how tax policy cuts in other OECD countries influence a country's tax policy decisions.

In our theoretical model, we argue that a process of learning within an environment of imperfect information can lead to temporally clustered tax policy cuts. Those patterns, however, are also consistent with models of tax policy competition. Yet, there are observable implications of our model that are distinct from the conventional wisdom of tax competition. Whereas models of tax competition, such as Basinger and Hallerberg (2004), argue that governments should be especially sensitive to tax policy cuts in competitor countries, we argue that learning can only take place under a limited set of conditions.

For example, we argue that major corporate tax cuts in the United States and Britain under Reagan and Thatcher could affect worldwide patterns of FDI inflows. Yet, the partisanship of these governments, both predisposed to lower corporate and personal income taxes, provides little information on the relationship between FDI and tax policy. However, when a left government, such as the Australian Labour government in 1987, implements considerable tax cuts, this provides meaningful information to other governments (by way of the biased advisor assumption).

We use two data sets to test our theoretical model. The first is the data set used by Basinger and Hallerberg (2004) who take corporate tax rate changes as the dependent variable. While we believe that these *rate* changes are important to multinationals making investment decisions, the focus of most of the social science literature is on the tax *policy* reforms of governments. Despite the fact that rate changes and policy reforms may seem equivalent, tax policy reforms are made when the legislature passes a corresponding law, while rates changes occur when these rates are applied to corporate taxes.[27]

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[26]The OECD countries are Portugal, Spain, Sweden, United Kingdom, United States, Italy, Japan, Netherlands, New Zealand, Norway, Finland, France, Germany, Greece, Ireland, Australia, Austria, Belgium, Canada and Denmark.

[27]In terms of rate changes (Basinger and Hallerberg (2004) data) there are 39 tax cuts by right governments and 14 by left governments during the study period. In terms of law changes (our own data), there are 29 right cuts and 11 left cuts.

Using a number of data sources, we searched for announced tax policy reforms in our sample of OECD countries from 1980-2000.[28] We provide details on the data coding in a supplemental appendix and include the data and replication materials on our websites. We coded major tax policy cuts as announced cuts to the maximum statutory marginal corporate tax rate. While this may miss a number of other potential tax policy cuts, such as changes in depreciation schedules, most of the major tax policy reforms in the OECD have been coupled with reductions in the statutory tax rate. We argue that the actual reforms are the signals that other countries observe. Thus, we differentiate between the yearly change in the tax rate and policy change.

Are we splitting hairs? A number of contemporary examples of tax policy cuts help to motivate this new data set. In many cases, governments pass a single law that affects corporate tax rates, yet the year that it is applied varies. Austria's 2004 tax reform proposed lowering corporate tax rates from 34% to 25%, taking effect in 2005. Thus, the policy reform was enacted in 2004, and the rate change became effective in 2005. In contrast, Ireland passed a corporate tax reform in December of 1997 that increased corporate tax rates from 10% to 12.5%, yet the change did not go into effect until 2003. Other countries, such as Canada, have recently (and historically) passed tax policy reforms where rate changes are phased in over a period of years. Perhaps the largest corporate tax reform in Canada's history was introduced in 2000, phasing in corporate tax rate reductions over five years. Thus, a single tax policy reform is associated with five tax rate changes. In these cases, if one assumed that tax reforms were passed the year before a tax rate change came into effect (a rate change in say 1985 is assumed to have been passed through a tax reform in 1984), this would lead to a correct classification of the Austrian cut, an incorrect coding of the Irish tax reform (coding the reform as having occurred in 2002 when, in fact, the law was passed in 1997) and multiple incorrect codings of the Canadian tax cut (rather than one law change in 2000, one would code five legislative changes). Thus there are major differences between when a tax rate comes into effect and when a tax policy reform is passed.

In Table 1 we present the descriptive data on the timing of tax policy cuts that we coded and observed rate changes from the Basinger and Hallerberg (2004) data set. We compare years in

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[28]These include Lexis-Nexis searches of major English language newspapers and data from Pechman (1988), Boskin and McLure, Jr. (1990), Haufler (2001) and OECD (2004).

which there is a change in the rate of corporate taxation (coded as 1 if there is a reduction in the central tax rate, 0 otherwise) using data from Basinger and Hallerberg and years of statutory corporate tax reform (coded as 1 if a law was passed to reduce statutory rates and 0 otherwise) as coded by the authors.[29] To be clear, if a country has a rate change from say 45% in year t to 40% in year $t+1$ in the Basinger and Hallerberg data, we code this as a tax rate change in year $t+1$. For our own data, we code tax policy cuts when major pieces of tax legislation are passed (as explained above). For example, Finland's decision in May 1988 for a package of corporate tax reductions over a series of years is coded as a tax policy cut in 1988.

[Table 1 about here.]

Of the 360 total cases in the data set, there are a total of 295 agreements in coding and 65 cases of disagreement. This error rate of 18% is not only high by most data coding standards, but it is striking in that the cases of agreement are mostly due to the rarity of tax policy cuts. In 284 cases, both data sets find no evidence of tax policy cuts. Although less extreme than war or democratization, tax policy cuts are pretty rare events. In all three cases, coding a data set of all zeros would yield fairly low overall error rates. In our case, a data set of all zeros (no policy change) would be more accurate than the policy changes implied by the Basinger and Hallerberg (2004) rate changes (89% vs. 83% accuracy).

Comparing our data on observed tax policy cuts and tax rate changes, there are only 14 cases of agreement (3.9% of the cases). We find 39 cases of Type I error, where the rate change data indicates tax policy cuts, yet we find no evidence of an actual tax law being enacted. We also find 26 cases of Type II error, where our data indicates a major tax policy reform, yet there is no rate change in the Basinger and Hallerberg (2004) data set. Put another way, in the Basinger and Hallerberg data, roughly 15% of the observations are tax policy cuts. In our data we find evidence of tax cuts in only 11% of the observations, with little overlap with their data.

Within this sea of numbers on the coding accuracy, we believe that one set of descriptive statistics tells most of the story. Of the 53 tax rate changes in the Basinger and Hallerberg (2004) data, 73% of the cases are not associated with an actual tax policy reform. One may quibble that these errors could be associated with assuming that a tax rate cut in year t, say 1990, should be

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[29]We find similar results using the general as opposed to the central tax rate.

associated with a tax policy cut in year t (also 1990). But what if we assumed that a rate change in t (1990) was associated with a tax policy cut in $t-1$ (1989)? Using rate changes in year t and assuming that these were caused by legislative change in year $t-1$, we still find very high error rates of over 16% and only 16 cases of correctly coded tax policy reform. To put it bluntly, no matter what lag structure one uses, if one assumed that a single tax rate change was associated with a single tax policy reform, one would be wrong 70% of the time!

It is important to stress that we do not dispute the quality of the underlying tax data used by Basinger and Hallerberg (2004). Theirs is high-quality data that has been used by numerous scholars, and it provides important information on the rates of corporate taxation faced by firms operating in a particular country in a given year.[30] In our empirical analysis we use both sets of data, yet we stress that if one is seeking to explain tax policy choice by governments, changes in corporate tax rates are not only rough estimates of when policy is enacted, but these estimates will tend to be wrong. In models of learning and competition that make arguments about temporal patterns, we believe that identifying the date of the change is necessary to assure accuracy of the empirical analysis.

In our empirical analysis we rely on two types of models. In the first set of models we estimate the determinants of tax *rate* changes. We replicate the work of Basinger and Hallerberg (2004), using a standard OLS model with panel-corrected standard errors. Our dependent variable is the change in the corporate tax rate (*Change in Central Tax Rate*). Our key independent variable is our constructed measure of corporate tax policy cuts in the $n-1$ other countries (*World Tax*

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[30]One other important distinction is that we are focusing on the maximum statutory marginal corporate tax rate. We argue that this rate serves as a clear signal of tax policy changes and is easily observed by other governments. Of course, other forms of national income, sales and value-added taxation, along with subnational taxation (at the state and local level), can affect firms' investment decisions. Basinger and Hallerberg (2004), for example, study tax competition using three different types of taxation that affect investment decisions. Again, we believe their data is an excellent source for exploring the tax burden and investment decisions of firms. However, since our focus is on tax policy learning across governments, the maximum statutory marginal corporate tax rate, being the most visible tax policy instrument, is the most appropriate measure in this context.

Law Changes).[31] We believe these models provide an excellent comparison to existing work on the political economy of corporate tax policy. The model takes the following form.

$$\Delta_{(t,t-1)}\text{centralrate}_{ij} \;\; = \;\; \mathbf{X}_{ij}\beta + \mathbf{Z}_j\zeta + \epsilon_{ij}, \;\; \text{for } i = 1,\ldots,299 \;\; \text{and } j = 1,\ldots,20$$

In the second set of models we focus solely on our data collected on tax policy cuts and do not use data on tax rates. We estimate the probability of tax law changes in two standard time-series cross-sectional logit models of the following form.

$$Pr(\text{taxlawcut}_i) \;\; = \;\; \text{logit}^{-1}(\mathbf{X}_i\beta), \;\; \text{for } i = 1,\ldots,299$$

We also estimate a hierarchical model (also referred to as multi-level or mixed-effect model), in which we allow the intercept to randomly vary across countries. We believe that a hierarchical model is the most appropriate one in this context, given (i) the hierarchical structure of our data and (ii) the built-in ability of this model to test for rather than assume the degree of country-level variance beyond that accounted for by the fixed effects.

$$Pr(\text{taxlawcut}_i) \;\; = \;\; \text{logit}^{-1}(\alpha_{j[i]} + \mathbf{X}_i\beta), \;\; \text{for } i = 1,\ldots,299$$

$$\alpha_j \;\; \sim \;\; N(\mu_\alpha, \sigma^2_{\text{country}}), \;\; \text{for } j = 1,\ldots,20$$

The key independent variables are the government's partisanship (*Partisanship*) as measured by Laver and Hunt (1992) and coded by Tsebelis and the ideological distance between veto players (*Ideological Distance*).[32] Partisanship is coded on a 0-1 continuum, where left governments (coded as 0) are more likely to resist corporate tax cuts due to the higher domestic costs associated with this policy change. Ideological Distance is the distance between veto players, where governments

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[31]Basinger and Hallerberg (2004) estimated the impact of tax competition on three different tax rates (effective, general and central). Since our paper focuses on statutory corporate tax policy reforms that are enacted by the central government, we use the central rate for the empirical analysis.

[32]http://sitemaker.umich.edu/tsebelis/veto_players_data.

with large ideological distances between veto players will have difficulty passing tax policy reforms. Basinger and Hallerberg (2004) also include the past corporate tax rate [*Tax Rate* $(t-1)$], where countries with higher rates are more likely to respond to tax policy competition. They also use a number of other control variables, including *Capital Controls*, *Inflation Rate* and economic *Growth Rate*, all of which are lagged by one year. We provide details on these variables in the Table 2.

[TABLE 2 ABOUT HERE.]

Basinger and Hallerberg (2004) also use a number of weights to generate variables representing the international environment. These include averages for the rest of the world of capital controls, ideological distance and changes in capital taxation in competitor countries. In this replication we take the simple weight of the $n-1$ countries in the world, where for a country (say Germany) *Capital Controls (World)*, *Ideological Distance (World)*, and *Competitor Taxation Change* are the mean values of the other 19 OECD countries.[33] *Competitor Taxation Change* is the key variable measuring competition.

Our empirical analysis only examines the impact of observing tax cuts in other countries, and not the size of the tax cuts. Incorporating the size of the tax cuts into our empirical analysis would require additional assumptions, such as how to code tax cuts that are phased in over a series of years. More importantly, our current theoretical model neither provides predictions on how the size of tax cuts affects learning nor how the size of tax cuts is related to partisanship (e.g., how large tax cuts by right governments affect learning relative to smaller tax cuts by left governments). In order to minimize the number of assumptions required for our data coding and to conduct the most direct test of our theoretical model, we do not examine how the size of tax cuts affects learning.

4 Learning from the Left: Empirical Evidence

We present the empirical results from the replication of Basinger and Hallerberg (2004) in Model 1 of Table 3.[34] We also test Basinger and Hallerberg's model of tax rate change by substituting their

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[33]In their paper, Basinger and Hallerberg (2004) estimate a number of weights on these variables, including weighting by GDP and levels of capital flows.

[34]The OLS models with panel-corrected standard errors were estimated using `xtpcse` command in Stata. We thank Mark Hallerberg and Scott Basinger for sharing their Stata do files with us.

variable for tax competition, Competitor Taxation Change, with our own measure of tax policy cuts. Our measure, *World Tax Law Changes*, is the number of tax policy cuts in the other $n-1$ countries in year $t-1$. The intuition for both models is that countries are responding to tax policy cuts in other countries.[35] We expect the coefficient on World Tax Law, Right Tax Law and Left Tax Law Changes to be positive since tax policy cuts are coded as 1 and no tax policy cuts are coded as 0. In both models tax rate changes and tax policy cuts are associated with tax cuts.

Our control variables are in line with conventional work on the determinants of tax policy cuts. We are more likely to observe tax cuts in years when other countries have low levels of restrictions on flows of international capital. Also, high tax countries and countries with high levels of inflation are more likely to reform corporate taxes. Model 1 in Table 3 replicates the work of Basinger and Hallerberg (2004), using the average corporate tax rate reduction of the $n-1$ other countries (Competitor Taxation Change) as the independent variable, and Model 2 uses our variable counting the number of tax policy reforms in the $n-1$ other countries (World Tax Law Changes). Both models show that tax changes, whether measured as rate reductions or tax policy cuts, are associated with rate reductions in other countries.

[TABLE 3 ABOUT HERE.]

In Model 3 we differentiate between tax policy cuts by left governments and right governments. Similar to Model 2, we include counts of the number of tax policy cuts by right governments, *Right Tax Law Changes*, and the number of tax policy cuts by left governments, *Left Tax Law Changes*.[36] The results from this model indicate that tax policy cuts are driven by the tax policy cuts of left governments. The negative coefficient on Left Tax Law Changes indicates that a tax policy cut by a left government leads to a reduction in the corporate tax rates of the $n-1$ other countries. Our

For the regular logit model, the hierarchical logit model and the post-estimation results presented in Figure 2 we used the `Zelig` package (Bailey and Alimadhi, 2007; Imai, King and Lau, 2007*a,b*, 2008) in `R` (R Development Core Team, 2009).

[35]The coefficient of *Competitor Taxation Change* is positive since tax policy cuts in other countries are coded as negative changes (a reduction from 40% to 30% is coded as -10%).

[36]We code governments ≤ 0.5 on the partisanship measure as left and > 0.5 as right.

results are robust to changes in the lag structure. Finally, when we do not separate left and right governments using a dichotomous classification and instead weight the tax law changes by the level of partisanship we find strong evidence that tax law changes by left governments (the change in the tax rate weighted by partisanship) lead to tax reductions, while we do not find evidence that large policy changes by right governments lead to tax cuts in other countries.[37] We interpret these results as providing strong support for both Hypothesis 1 and Hypothesis 2.

One potential criticism of our empirical analysis is that "left governments" cutting taxes may be significantly different from "right governments" choosing to cut taxes. For example, while most left governments are loath to cut corporate taxes, a small set of left governments may see themselves as very competitive in attracting FDI. Thus, our coding of left tax policy cuts could be proxying for effectiveness in attracting international capital.

We explored if there were significant differences between country-years when left governments enact tax reforms and (i) the rest of the country-years in the sample, and (ii) and right governments that cut taxes. We examined if there were statistically significant differences in the amount of capital attracted by these governments (foreign direct investment as a percentage of GDP), the size of the domestic market (log of GDP) and the country's level of development (log of GDP per capita).[38] All of these factors are associated with being a more attractive investment environment. We found no statistically significant differences between left governments cutting taxes and the rest of the governments in the sample, or between left governments cutting taxes and right governments cutting taxes. We are confident that our variable counting the number of left governments cutting taxes is not proxying for competitive governments cutting taxes.

[TABLE 4 ABOUT HERE.]

In Table 4 we present the results of two logit models using the passage of a tax policy cuts as the dependent variable. In Models 4 and 5 we present a logit of tax policy cuts with country

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[37]The level of partisanship is a continuous variable from 0 (left) to 1 (right). We weight left tax cuts by the formula ((1-partisanship) × tax law change) and right tax cuts by (partisanship × tax law change).

[38]All data is from the World Bank (2004).

dummy variables.[39] Note that the coefficient on Left Tax Law Changes were negative in Table 4 (cuts by left governments lead to reductions in tax rates) while in this set of regressions we expect a positive coefficient. We expect corporate tax policy cuts in left countries to positively affect other countries' propensity to enact tax policy cuts.

The first model controls for the country-level factors from Table 3. As in Models 2 and 3, we include a count of tax policy cuts in the $n-1$ other countries (World Tax Law Changes, Model 4) and the number of tax policy laws passed by both left and right governments (Left Tax Law Changes and Right Tax Law Changes, Model 5). While these regressions use the same set of control variables as the previous OLS regressions, many of the control variables are no longer statistically significant. We believe that one reason for this is that the limited amount of real tax policy reforms (11% of the observations) makes estimation difficult. Yet, we note that our key empirical results on social learning from left governments is robust to different empirical specifications.[40] As in Table 3, we find that while World Tax Law Changes has a positive and statistically significant effect on the tax policy decisions of governments, these results are entirely driven by the tax policy decisions of left governments.

We have examined the robustness of these results under a number of alternative specifications. One important concern is the issue of temporal dependence where observations of tax cuts at time t may not be independent of tax cuts made in pervious years. Beck, Katz and Tucker (1998) provide a methodology to deal with these issues of duration dependence in panel models with binary dependent variables. Following Beck, Katz and Tucker, we estimate Models 4 and 5 by including a count of the years since the last tax cut and three smoothing splines.[41] Our results on the relationship between left tax cuts and learning are robust and our results indicate that duration

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[39]The empirical results without the country dummies are similar.

[40]Given the large number of zeros in the dependent variable we also estimated rare events logit models (see King and Zeng, 1999*a,b*). Software used to calculate the rare events logistic regression is from Tomz, King and Zeng (1999). Our empirical results are similar. We will make the results available upon request.

[41]We use the `btscs` ado file made available Beck, Katz and Tucker. Results are available from the authors.

dependence is not an issue in our data.[42]

A second set of robustness tests examines if our results are driven by omitted variable bias. Our empirical analysis is built upon the specification of Basinger and Hallerberg (2004). Other influential articles cited in this paper, including Hays (2003), Swank and Steimo (2002) and Swank (2006), include additional control variables. We test the robustness of Models 4 and 5 by including measures of unemployment, levels of trade, the level of foreign direct investment and the government budget balance.[43] Our core empirical results are unchanged.

A third robustness test builds on the work of Hays (2003) and Devereux, Lockwood and Redoano (2008). Both argue that the existence of capital controls mediate tax competition. According to these models of tax competition, a government is likely to respond to tax cuts by other governments when capital controls are present. We test the interactive effect of capital controls and both the overall number of tax cuts and the number of tax cuts by right and left governments. We find that capital controls have no independent or mediating effect on responding to other countries' tax cuts. Thus, we are even more confident that our empirical results are capturing learned effects and not those of tax competition.

Finally, we estimate a hierarchical logit model, in which we regress tax policy cuts on the independent variables described earlier. The hierarchical model does not include country dummies. Rather, country-level variance is accounted for by including a random intercept.[44] The results are given in Table 4, Model 6.

The results confirm our theoretical predictions. Left Tax Law Changes is positive and statistically significant, while Right Tax Law Changes is not statistically significant. The lagged tax rate, Tax Rate $(t-1)$, is again positive and marginally statistically significant, indicating that countries with higher tax rates are more likely to cut taxes than countries with already low tax

[42]Neither the splines nor the count of years since the last tax cut are statistically significant. In our data we have cases of countries that never enact legislation that reduces corporate taxes and some cases of countries that engage in back-to-back tax law changes.

[43]All data is from World Bank (2004). Results available from the authors.

[44]In mixed-effects models, all of the variables except for the random effects are referred to as fixed effects.

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rates. The standard deviation of the country-level errors (SD RE Error in Table 4) is very small, indicating that there is very little variation across countries beyond what is accounted for by the fixed effects.[45] This indicates that there is quite a large degree of pooling, suggesting that it is not necessary to include country fixed effects.[46]

One potential criticism of our empirical analysis is that common shocks can cause tax policy changes that are observationally equivalent to competition or learning. One empirical solution is to include year dummy variables, thus accounting for factors that make it more likely to observe tax cuts in specific years. Unfortunately this solution is both atheoretical and also does not allow for a differentiation between common shocks, learning, or competition the very purpose of this project. Scholars have identified that certain years are associated with more tax cuts than others. The key question is which theoretical mechanism accounts for this diffusion. While we argue that our observed pattern of left governments cutting taxes and other governments following is inconsistent with common shocks, we also include one final robustness test to deal with the alternative explanation that common shocks account for temporally clustered tax policy changes.

Common shocks come in a number of different forms, from natural disasters to global recessions. Yet the key mechanism linking shocks to economic policy reform in general, and to domestic tax policy change in particular, is their effect on domestic economic outcomes. For example, global recessions become politically salient when these recessions lead to reductions in trade flows or increasing levels of unemployment. To paraphrase Rodden and Rose-Ackerman (1997), politicians only respond to market pressures when these market pressures translate into electoral pressures. Thus, accounting for common shocks does not require controlling for every possible type of shock.

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[45]By dividing the standard deviation of the country-level errors by 4, one gets $\pm$ the percent by which countries differ on the probability scale beyond the differences explained by the fixed effects (Gelman and Hill, 2007, p. 304). In the Model 6, that number is $\approx \pm 0\%$. This supports the argument that, given strong globalization effects, countries, aside from differences in their formal political processes, tend to be very similar in the area of tax policy making.

[46]We also estimated a generalized linear mixed model using maximum likelihood (`Zelig` uses penalized quasi-likelihood). The substantive results are the same across the models. We will make the results available upon request.

It only requires us to examine the channels through which these shocks affect politicians' tax policy calculus. Consequently, we use first differences of the full battery of economic control variables - changes in economic growth, inflation, unemployment, trade, foreign direct investment and budget deficits.[47] Even with this battery of economic controls, we find that tax cuts by left governments lead to other countries cutting corporate taxes.

The substantive impact of tax policy cuts by left governments is quite large. In Figure 2, we present post-estimation results generated with the R package Zelig. Specifically, Figure 2 shows the impact a tax policy cut by a left government has on countries' probabilities to institute tax policy cuts. For the simulations, on which the results in Figure 2 are based, we set all of the variables, except for Right Tax Law Changes and Left Tax Law Changes, at their means. The solid line in Figure 2 represents a situation in which neither a left nor a right government changes its tax laws.

[FIGURE 2 ABOUT HERE.]

In our sample of OECD tax policy cuts, only 11% of the country-year observations are tax policy cuts. From our simulations, we find that the impact of this one tax law change by a left government is quite substantial. During years when there were no tax law changes in the previous year, the expected probability of a tax law change is 8%. When a single left government chooses to cut tax policy in year t, the probability of each individual country implementing a tax policy cut in year $t+1$ jumps to 14%, an increase of 75%. While major tax policy cuts are still relatively uncommon, we find considerable evidence of learning consistent with our theory.

5   The Importance of Learning from Others

Taxation constitutes one of the most important areas of government decision making and is also one of the most hotly contested issues in domestic political debate. Yet, despite its prominance in domestic political debate, there still seems to be a lot of confusion surrounding the politics of taxation. Scholars have shown that much of the conventional wisdom on the politics of taxation is misleading. For example, while election campaigns around the world are still fought on the basis of

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[47]We test different specifications of how one-year shocks to these economic variables affect tax policy reform. The results are available from the authors.

"tax and spend" versus "small government," campaign rhetoric - maybe unsurprisingly - does not accurately reflect the complexities of fiscal policy making in a globalized world. The idea that left governments always look to raise taxes and right governments to cut taxes is a gross simplification.

At the other extreme is the view that global competition for capital has lead to a race to the bottom, especially with respect to corporate tax rates. Empirical evidence, however, has consistently shown that a race to the bottom is not taking place, questioning the alleged zero-sum nature of corporate tax policy making. Moreover, research has highlighted the importance of national circumstances and domestic political influences, further contradicting the pure competitive dynamics suggested by the race to the bottom story. Yet, a pure domestic politics view of taxation is equally misleading. Frequently, this approach treats domestic politics as a dam that holds back the forces of globalization, with domestic politics trumping global market forces. In this paper, we offer a very different account of the politics of taxation. In fact, we argue that domestic politics might be the driving force behind international diffusion of tax policies, which suggests that domestic politics and common global trends are not incompatible but integral and coexistent parts of international diffusion.

Our main contribution is to show how (domestic) partisan politics and globalization can be reinforcing, where government biases can provide opportunities for learning. For corporate tax policy in particular, this means that corporate tax cuts by left governments provide important signals to governments around the world about the viability of tax cuts. The underlying argument is based purely on dynamics of learning. Since left governments tend to be the most resistant to tax cuts, policy shifts by those governments toward lower taxation conveys important information to other governments. The result is diffusion of tax policy changes, not through coercion or competition, but through learning.

Our theoretical insights and research design strategy have applications beyond corporate taxation. Within the international political economy literature, scholars have identified waves of policy changes, such as shifts away from state owned firms, declines in the use of import substitution policies and a rise of facilitating exports as an economic development strategy. These changes are not necessarily permanent. While the expropriation of foreign direct investment was thought to have ended in the 1980s, it has reared its ugly head again in recent years. Explaining these waves of policy choices constitutes one of the most important challenges in political science. We hope

that our work can help push towards theory building and empirical analysis that explores these dynamics.

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	No Change in Policy	Change in Policy	Total
No Rate Change	281	26	307
Rate Change	39	14	53
Total	320	40	360

Table 1: *Comparison of Tax Policy Cuts and Changes in Tax Rates.*
Notes: Columns represent classification according to our coding of tax policy cuts. Rows represent coding based on Basinger and Hallerberg (2004).

Variable	Mean	SD	Min	Max	Description
Change in Central Tax Rate	−0.644	3.263	−25	20	Change in the central statutory corporate tax rate
Partisanship	0.554	0.152	0.211	0.86	Partisanship, where 0 represents left, 1 represents right
Capital Controls	0.105	0.157	0	0.75	0 represents full capital mobility
Ideological Distance	0.178	0.170	0	0.62	Ideological distance between veto players
Competitor Tax Rate Change	−0.621	0.996	−2.89	1.24	Average of the $(n-1)$ other countries' corporate tax rate changes
Tax Rate $(t-1)$	39.06	8.100	19	56	Lagged central statutory corporate tax rate
Growth $(t-1)$	2.296	2.074	−7.1	10.7	Lagged rate of economic growth
Inflation $(t-1)$	6.348	13.492	−0.8	215.7	Lagged rate of inflation

Table 2: *Basinger and Hallerberg (2004) Data.*

Variable	Model 1	Model 2	Model 3
Partisanship	$-3.021^{\dagger}$	-2.504	$-2.896^{\dagger}$
	(1.703)	(1.651)	(1.705)
Partisanship	0.136	8.145	1.535
(World)	(7.339)	(8.878)	(8.308)
Capital Controls	0.143	0.169	0.282
	(1.729)	(1.683)	(1.734)
Capital Controls	14.403**	13.843**	13.927**
(World)	(3.860)	(3.949)	(3.982)
Ideological Distance	0.095	0.498	0.385
	(1.489)	(1.508)	(1.491)
Ideological Distance	-7.591	-1.310	-0.625
(World)	(6.844)	(8.469)	(8.661)
Tax Rate $(t-1)$	-0.265^{**}	-0.264^{**}	-0.257^{**}
	(0.064)	(0.063)	(0.064)
Growth Rate $(t-1)$	-0.103	-0.090	-0.132
	(0.084)	(0.086)	(0.083)
Inflation Rate $(t-1)$	-0.081^{**}	-0.084^{**}	-0.083^{**}
	(0.007)	(0.007)	(0.007)
Competitor Taxation	0.438**		
Change	(0.146)		
World Tax Law		-0.256^{**}	
Changes		(0.075)	
Right Tax Law			0.005
Changes			(0.143)
Left Tax Law			-0.706^{**}
Changes			(0.224)
Constant	11.115*	5.572	$8.918^{\dagger}$
	(4.772)	(5.734)	(5.592)
Country Dummies	Yes	Yes	Yes
N	299	299	299
R^2	0.28	0.29	0.28

Table 3: *OLS Models of Tax Rates Changes.*
Notes: Panel-corrected standard errors in parentheses.
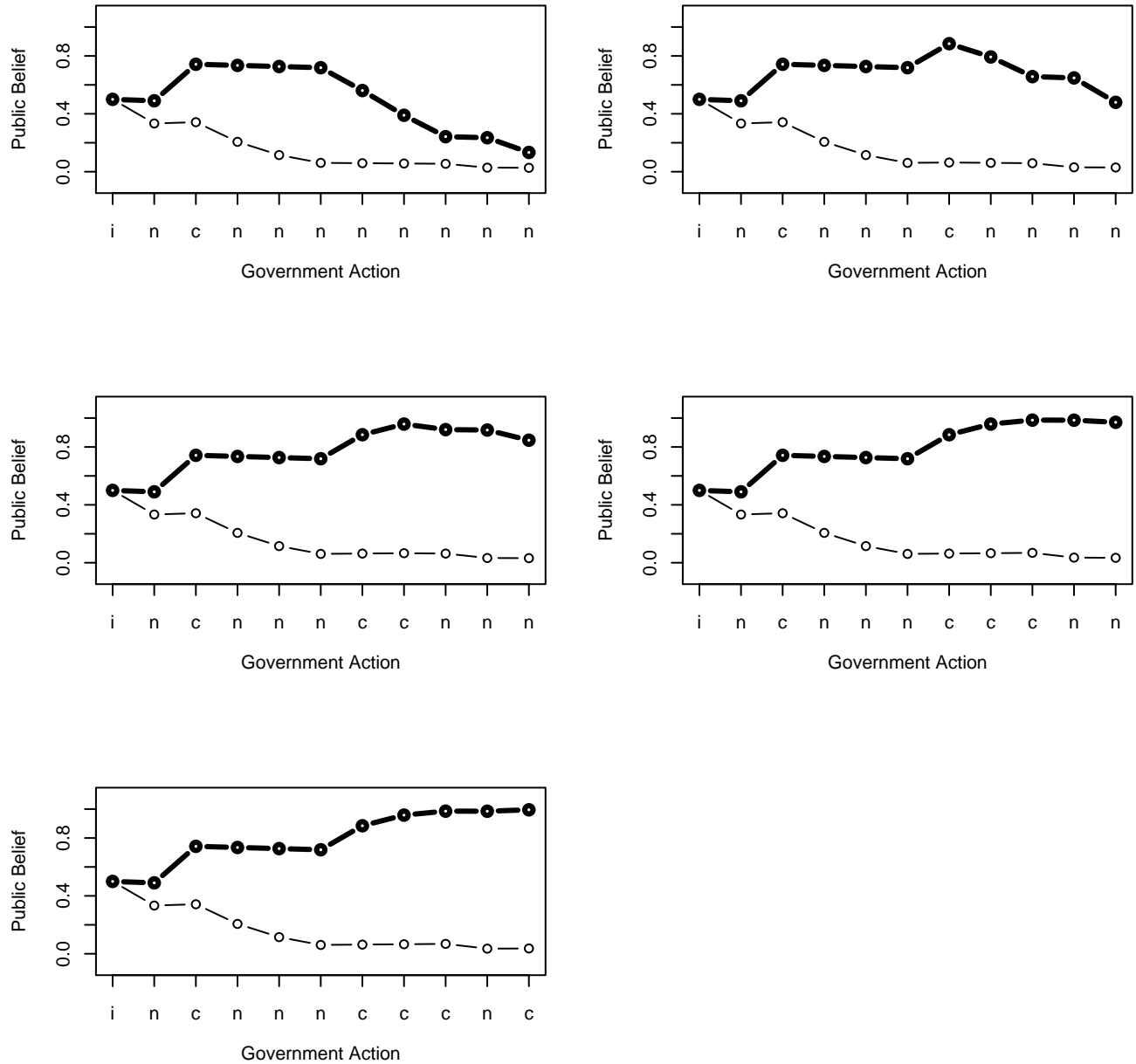Significance levels: $\dagger : 10\%$ $* : 5\%$ $** : 1\%$.

Figure 1: *Evolution of Public Beliefs.*
Note: Dark lines represent the evolution of public beliefs for left tax cuts, lighter lines represent public beliefs for right tax cuts. i represents the starting value of the public belief (0.5), n are cases of no tax cuts, c are cases of tax cuts.
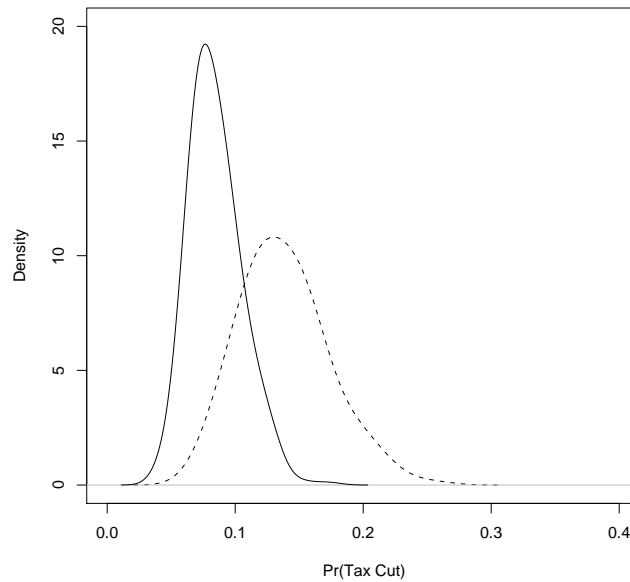
Figure 2: *Marginal Impact of Left Tax Policy Cuts on the Probability of Tax Policy Cuts.*

Note: The figure is based on simulations done in the R package Zelig. The curves present Gaussian density estimates, smoothed at twice the default level. For the solid line, all of the variables are set at their means and Left Tax Law Changes and Right Tax Law Changes are set at zero. For the dotted line, the Left Tax Law Changes variable was increased to 1, while all of the remaining variables maintained their values.

Variable	Model 4	Model 5	Model 6
Partisanship	2.304	2.386	1.081
	(2.096)	(2.141)	(1.432)
Partisanship	−3.620	1.539	3.897
(World)	(11.796)	(11.157)	(10.380)
Capital Controls	0.802	0.919	−1.430
	(2.632)	(2.667)	(1.656)
Capital Controls	−1.085	−0.871	−1.654
(World)	(4.609)	(4.674)	(4.130)
Ideological Distance	−2.652	−2.716	−2.082
	(1.986)	(2.028)	(1.304)
Ideological Distance	−11.103	−15.371	−14.380
(World)	(10.216)	(10.572)	(9.909)
Tax Rate $(t-1)$	0.024	0.016	$0.048^\dagger$
	(0.043)	(0.044)	(0.029)
Growth Rate $(t-1)$	−0.002	0.022	−0.011
	(0.109)	(0.108)	(0.100)
Inflation Rate $(t-1)$	0.025	0.025	0.015
	(0.030)	(0.030)	(0.015)
World Tax Law	$0.151^\dagger$		–
Changes	(0.087)		–
Right Tax Law		−0.231	−0.157
Changes		(0.189)	(0.171)
Left Tax Law		0.735*	0.558*
Changes		(0.307)	(0.274)
Constant	−-2.791	−4.657	−3.935
	(7.626)	(7.275)	(6.808)
Country-Level SD (ML)			≈ 0
Country Dummies	Yes	Yes	No
N	299	299	299
AIC	227.3	226.4	218.0

Table 4: *Logit Models of Tax Law Change.*
Notes: Standard errors in parentheses. Country-Level SD refers to the standard deviation of the country-level error in the hierarchical model. AIC stands for the Akaike Information Criterion. Loosely speaking, the lower the AIC the better the model fit.
Significance levels: $\dagger : 10\%$ $* : 5\%$ $** : 1\%$.