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PANDEMICS AND POLITICAL DEVELOPMENT
The Electoral Legacy of the Black Death in Germany

By DANIEL W. GINGERICH and JAN P. VOGLER

ABSTRACT

Do pandemics have lasting consequences for political behavior? The authors address this question by examining the consequences of the deadliest pandemic of the last millennium: the Black Death (1347–1351). They claim that pandemics can influence politics in the long run if the loss of life is high enough to increase the price of labor relative to other factors of production. When this occurs, labor-repressive regimes, such as serfdom, become untenable, which ultimately leads to the development of proto-democratic institutions and associated political cultures that shape modalities of political engagement for generations. The authors test their theory by tracing the consequences of the Black Death in German-speaking Central Europe. They find that areas hit hardest by that pandemic were more likely to adopt inclusive political institutions and equitable land ownership patterns, to exhibit electoral behavior indicating independence from landed elite influence during the transition to mass politics, and to have significantly lower vote shares for Hitler's National Socialist Party in the Weimar Republic's fateful 1930 and July 1932 elections.

I. Introduction

PANDEMICS have shaped the course of human history, felling tottering empires, altering colonization patterns, and endowing populations with competitive advantages. Depending on the circumstances, they can also restructure labor markets, with potentially far-reaching consequences for inequality and social organization.[1] Indeed, if the demographic shock imposed by a pandemic is sufficiently profound, it may fundamentally reconfigure the relative bargaining power of labor versus capital. This raises the possibility that pandemics hold implications for the substance and conduct of politics in the long run.

This article examines the long-term political impact of pandemic disease shocks by examining the localized consequences of the dead-

[1] Scheidel 2017.

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liest pandemic of the last millennium: the Black Death (1347–1351).[2] An outbreak of bubonic plague, the Black Death devastated Europe, causing a loss of life estimated at 30 to 60 percent of the total population. Figure 1 shows recorded outbreaks at the town level across the continent, based on data assembled by Remi Jedwab, Noel Johnson, and Mark Koyama.[3]

Among its many consequences, the Black Death radically altered relative factor prices. It left land and capital assets intact but culled the labor force, thus transforming labor from an abundant resource to a scarce one. The economic impact was immediate and long-lasting.[4] For Western Europe, the pandemic ushered in an era of higher real wages—lasting approximately two hundred and fifty years—and scaled back the obligations imposed on peasants in the manorial economy.[5]

For years, scholars have studied the macrolevel implications of the Black Death for economic development. Economic historians have argued that the Black Death brought an end to the Middle Age's so-called Malthusian trap, generating a shift from subsistence agriculture to economic production characterized by greater urbanization, increased manufacturing capacity, technological development, and sustained growth.[6] These changes made possible the fiscal infrastructure needed to support standing armies and to create nation-states.[7] Given its epochal importance for economic organization, the Black Death is widely considered to have produced one of the most important critical junctures in recorded human history. Indeed, it is thought to be the starting point for what would become large divergences in development between Western and Eastern Europe and between Western Europe and China.[8]

Recently, due to the pioneering data-collection efforts of George Christakos and colleagues, the Black Death's local-level consequences have also become a subject of scholarly inquiry.[9] Researchers have traced the long-term consequences of the Black Death for city growth,[10] the timing of demographic transition,[11] and the persecution of religious

[2]The exact timeline of the Black Death in Europe is debated among historians. Further outbreaks may have occurred in 1352 and 1353 in the eastern parts of the continent, but these had a much lower death toll.

[3]Jedwab, Johnson, and Koyama 2019a.

[4]The depth of the economic shock imparted by the Black Death may be unparalleled. Lead readings taken from an ice core in the Swiss-Italian Alps indicate that metal production during the Black Death outbreak was lower than at any other point in the last two thousand years; More et al. 2017.

[5]Pamuk 2007.

[6]Postan 1966; Herlihy 1997; Voigtländer and Voth 2013.

[7]North and Thomas 1973.

[8]Acemoglu and Robinson 2012; Voigtländer and Voth 2013.

[9]Christakos et al. 2005.

[10]Jedwab, Johnson, and Koyama 2019b.

[11]Siuda and Sunde 2021.

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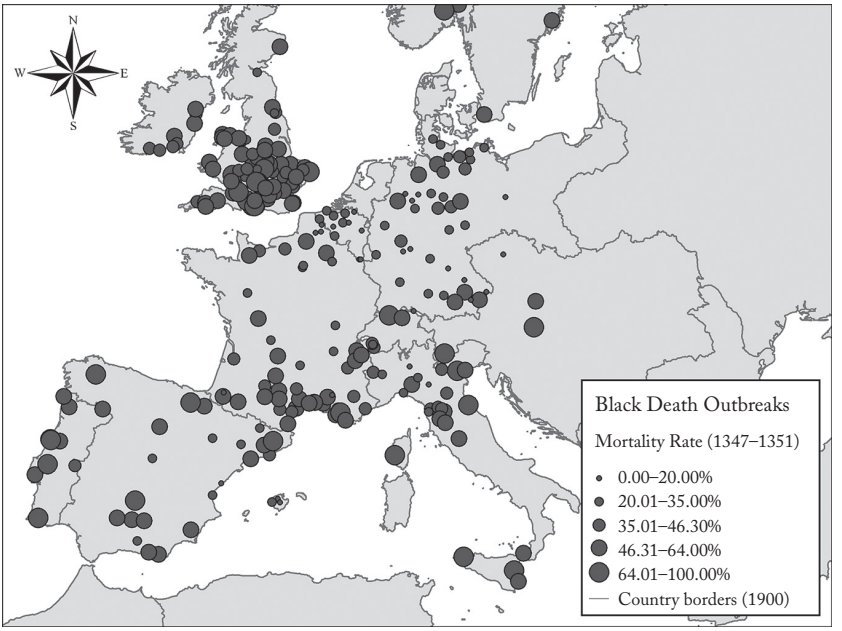

FIGURE 1
RECORDED BLACK DEATH OUTBREAKS AND MORTALITY RATES ACROSS EUROPE

minorities.[12] Other scholars have examined the more general impact of plague shocks on public goods institutions that shape the accumulation of human capital.[13] Despite these important advances, the Black Death's local-level consequences for political organization and behavior have yet to receive systematic social scientific scrutiny.

This inattention to the political legacy of the Black Death reflects a general pattern of neglect within the discipline of political science. Although the Black Death is prominent in accounts of long-term economic development, it has received remarkably short shrift in treatments of the development of political representation and mass political behavior. For instance, Barrington Moore Jr.'s canonical investigation into the social origins of political regimes offers only a single passing reference to the Black Death (for the case of England).[14] Stein Rokkan's foundational study of the origins of party politics in Europe ignores it entirely.[15] The classic political histories of European state formation similarly neglect the Black Death: Joseph Strayer and Charles Tilly

[12] Finley and Koyama 2018; Jedwab, Johnson, and Koyama 2019a.
[13] Dittmar and Meisenzahl 2020.
[14] Moore 1966, p. 5.
[15] Rokkan 1970.

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only give it offhand mentions in their general discussions of war, city growth, and threats to political stability.[16] There are exceptions, such as Margaret Peters's study of the consequences of credit market access for patterns of labor coercion in the aftermath of the Black Death.[17] But as with earlier scholarship,[18] her work treats the Black Death as a uniform shock and concentrates its analyses on differences in initial conditions rather than on the variegated impact of the disease.

We part ways with the existing scholarship by focusing systematically on the political implications of geographical variation in the loss of life caused by the Black Death. Our research uses geocoded data on Black Death mortality rates to examine the long-term socioeconomic and political consequences of localized variation in Black Death exposure. The core of our study focuses on the legacies of the Black Death for electoral behavior and land tenure patterns in Imperial Germany during the dawn of mass politics at the end of the nineteenth century. We complement these findings with analyses that assess the effects of the Black Death in earlier and later periods of history. For the pre-Reformation (pre-1517) period, we study the link between exposure to the Black Death and the emergence of early forms of participative institutions. For the period of full-fledged mass democracy (1919–1933), we identify the lingering effects of the democratic cultures bequeathed by the Black Death on geographic patterns of voting behavior in the Weimar Republic.

The historical experience of German-speaking central Europe is especially apt for evaluating the Black Death's long-term political consequences. Because this area exhibited significant regional variation in the mortality caused by the Black Death, one can identify distinct outcome patterns associated with differing levels of exposure to the outbreak. Equally important, there was no single, absolute ruler or other centralized political regime governing the German-speaking territories at that time. Rather, from the medieval period to the nineteenth century, the German-speaking parts of Europe were made up of a decentralized patchwork of principalities, duchies, free cities, and other administrative units. This high level of decentralization gave local political cultures, borne from the initial reactions to demographic collapse, space to implant themselves and become more distinctive over time.

Our central contention is that the long-lived regional political cultures attributable to the Black Death significantly shaped patterns of political participation up until the early days of the German Empire's

[16] Strayer 1970, p. 58; Tilly 1990, p. 146.
[17] Peters 2018.
[18] Blum 1957; Brenner 1976.

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foundation, and held a weaker but still perceptible influence in the decades that followed. There are three steps in our argument.

First, differences in Black Death mortality led to differences in the persistence and depth of labor coercion during the early modern period (mid-fourteenth century to the late eighteenth century). In areas where the Black Death hit hard, elites were forced to abandon serfdom for an incipient free labor regime. By contrast, in areas where the Black Death's toll was relatively mild, customary labor obligations were maintained (or even amplified).

Second, regional differences in the use of labor coercion led to a divergence in socioeconomic and political organization. In areas where serfdom receded, the new freedoms granted to laborers encouraged the development of institutions for (limited) local self-government, produced more employment outside of agriculture, and led to greater equality in landholding. In areas where serfdom was maintained or became more onerous, the development of participative institutions for local self-government was inhibited, the agricultural economy remained dominant, and high levels of inequality in landholding persisted.

Third, with the advent of mass electoral politics in the late nineteenth century, the societal conditions generated by the distinct legacies of labor coercion shaped voters' electoral decisions. In the areas characterized by participatory institutions and relative equality, voters were inclined to reject the guidance of traditional elites, leading to weak support for conservative parties and to stronger support for liberal parties. Contrariwise, in the areas characterized by less inclusive institutions and high inequality, voters were more inclined to defer to the directives of traditional elites, leading to strong support for conservative parties and weaker support for liberal parties. To put it succinctly, strong Black Death shocks favored abbreviated experiences with serfdom, more self-government, and ultimately, receptiveness to horizontally oriented and inclusive political parties. Weak Black Death shocks favored prolonged experiences with serfdom, less self-government, and eventually, receptiveness to parties with a hierarchical and illiberal orientation.

Our empirical findings match these expectations. Using district-level electoral data from the 1871 legislative elections of Imperial Germany, we find that geographical variation in exposure to the Black Death is decisively and negatively related to the percentage of the vote won by the Conservative Party—a party that was strongly antidemocratic in its means and ends. Moreover, our research shows that areas least affected by the Black Death were characterized by societal conditions in which the Conservative Party was likely to thrive. In particular, we find that

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landholding inequality in the late nineteenth century was significantly greater in areas with mild exposure to the Black Death than in areas where the disease had a profound impact.[19]

Our complementary analyses support the mechanisms and the implications of our argument. The analysis of the pre-Reformation period provides evidence for our claim that the intensity of Black Death exposure was positively associated with subsequent changes in key aspects of political development. Specifically, we demonstrate that the hardest hit areas were more likely to adopt local participative elections in the period from 1300 (pre–Black Death) to 1500 (post–Black Death) than areas that were not similarly affected. This gives us confidence that the Black Death encouraged the development of distinctive regional political traditions that shaped political behavior in the long run.

The analysis of the Weimar Republic, in turn, provides evidence that the link between Black Death exposure and support for illiberal parties is not an artifact of the political idiosyncrasies of early Imperial Germany. Examining spatial variation in the vote share of the Nazi party (Nationalsozialistische Deutsche Arbeiterpartei, NSDAP) in the 1930 and July 1932 German federal parliamentary elections, we find that areas that had experienced high levels of exposure to the Black Death showed significantly lower levels of electoral support for the Nazis than did areas with low levels of exposure. This gives us confidence that the regional political traditions we attribute to the pandemic were robust and played a crucial role in German electoral politics during pivotal moments in the nation's history.

The rest of this article is organized as follows: First, we outline our contribution relative to existing studies of labor coercion and the long-term consequences of infectious diseases. Second, we offer a theory of how the Black Death affected relative factor prices and the feasibility of labor coercion. Third, we introduce the empirical case and highlight the dimensions most relevant to our study. Fourth, we outline the framework of our empirical test. After discussing the results, we conclude and consider the possible lessons of our study.

II. Pandemics, Factor Prices, and Labor Coercion

Pandemics impose death, often on a massive scale. Whenever a pandemic causes a major demographic collapse, it can also change relative factor prices: the economic returns to *labor* versus *land* or *capital*. This

[19] Major regions with a mild impact were those that were farthest away from the center of the pandemic. Although there was often intraregional variation in the pandemic's local intensity (even for regions that were not strongly exposed), the average intensity of exposure within a region decreased as one moved farther away from the pandemic's geographic center.

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may lead to substantial changes in economic and political organization. It is widely acknowledged that differences in factor prices shape economic inequality,[20] which, in turn, affects both the incidence of democracy[21] and the quality of democratic representation.[22]

Even though factor prices are axes of social organization, it can be a challenge to pinpoint empirically how they shape political life. As relative factor prices delimit the bargaining power of social groups, they shape and are shaped by public policies.[23] The same can be said for political institutions, which structure how public policies are made.[24]

Because the causal arrow relating factor prices to policies and institutions goes in both directions, isolating the influence of the former requires one to identify an appropriate exogenous shock. The Black Death offers a good historical example of such a shock. The plague is caused by the bacterium *Yersinia pestis*. During the Black Death outbreak that is at the center of this study, it was transmitted to humans by infected fleas carried by rats (and later via human-to-human contact in its pneumonic strain). But its etiology was completely unknown to medicine at that time,[25] so its timing and intensity did not appear to depend on differences in rudimentary public health procedures or on preexisting levels of economic development.[26] Proximity to trade routes was clearly important, but *conditional on trade exposure,* plague mortality was nearly random.[27] Unlike contemporary pandemics, the Black Death did not overtly discriminate by social status: it cut down wealthy and poor alike, claiming the lives of the King of Castile, large swathes of the clergy, and countless peasants. At the same time, the intensity of the disease varied greatly across geographic areas.[28] These special features make it possible to discern the long-term influence of Black Death mortality, and ipso facto, changes in relative factor prices, by employing a standard suite of econometric tools.

Our central claim is that by increasing the price of labor relative to land, Black Death mortality shaped patterns of labor coercion and the long-term development of local political cultures. Extant studies offer two competing approaches for considering the starting point of this argument: the effect of changes in factor prices on labor coercion.

[20] Piketty and Saez 2014; Piketty 2014.
[21] Boix 2003; Acemoglu and Robinson 2006; Ansell and Samuels 2014.
[22] Bartels 2008; Gilens 2012; Uslaner 2008.
[23] Rogowski 1989; Hall and Soskice 2001; Beramendi and Anderson 2008.
[24] Acemoglu 2010.
[25] Snowden 2019, pp. 52–53, 69.
[26] Cf. Gottfried 1983; Christakos et al. 2005.
[27] Yue, Lee, and Wu 2017.
[28] The German cities of Bremen and Nuremberg illustrate this fact, as the former lost between one-half to two-thirds of its population, whereas the latter lost only 10 percent; Gottfried 1983, p. 68.

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The standard account can be classified as the theory of Malthusian Exit. According to this view, shocks that generate a high level of labor scarcity (thus increasing labor's shadow price) catalyze a series of economic and social changes that move a society away from a subsistence economy based on labor coercion and toward an economy with manufacturing potential based on free labor.[29] Specifically, the scarcity of labor improves the outside options of workers and forces elites to reduce coercive practices, which in turn creates greater and more variegated forms of consumption. As demand for manufactured goods increases, new technologies develop, urban areas expand, and the power of landed elites begins to wane. This theory is often invoked to explain Western Europe's development in the wake of the Black Death.

An alternative account can be classified as the theory of Elite Reaction, according to which elites respond to an increase in labor scarcity by doubling down on coercion.[30] In particular, elites use more coercion to repress the wage increases and improved living standards that would otherwise follow a reduction in labor force size. Work obligations and the policing of labor only become more burdensome. The agrarian economy remains supreme, technological innovation is suppressed, and the power of landed elites remains uncontested. This theory is often invoked to explain the recrudescence of serfdom and economic underdevelopment in Eastern Europe after the Black Death.[31]

Empirical studies that address each theory's relative purchase are limited and offer contradictory findings.[32] In truth, much of the existing empirical work provides little guidance for understanding the consequences of a labor market shock like that generated by the Black Death. This is because previous contributions largely seek to assess the consequences of variation in relative factor prices along the intensive margin—that is, for small amounts of change within the respective society. The Black Death, by contrast, generated change along the *extensive* margin. Indeed, at an aggregate level it was one of the largest—and possibly *the* largest—labor market shocks in recorded human history. As we argue in the next section, the depth of labor scarcity is important for understanding the elite reaction to a labor supply shock. Reactions to minor shocks will differ from reactions to large ones.

[29] Postan 1966; North and Thomas 1973; Voigtländer and Voth 2013. For a detailed historical account of related economic trends in the late medieval period, see also Aberth 2021, chap. 10.

[30] Domar 1970. See also Blum 1957; Brenner 1976.

[31] For a theoretical contribution that integrates the mechanisms underlying both accounts, see Acemoglu and Wolitzky 2011.

[32] For instance, the findings of Naidu and Yuchtman 2013 and Klein and Ogilvie 2017 are largely consistent with Elite Reaction theory, whereas those of Dippel, Greif, and Trefler 2016 are consistent with the logic of Malthusian Exit theory.

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The empirical findings of this article about the long-term legacy of the Black Death contribute to a prominent literature on the economic and political consequences of infectious diseases. The incidence of infectious diseases has been tied to low levels of labor productivity and investment, and ultimately to the emergence of poverty traps in tropical areas.[33] In the case of colonial Mexico, disease-driven demographic collapse has been linked to long-term changes in land tenure patterns.[34] Diseases may also determine the composition of the ruling elite and the prospects for good governance. According to Jared Diamond, Europeans gained immunological advantages by living in proximity to livestock (and suffering through repeated disease waves), and this partially explains the ease with which they were able to conquer the Americas.[35] Most directly related to our article, Daron Acemoglu, Simon Johnson, and James Robinson show that the disease environment at the time of colonization shaped the institutions that colonizers implanted in different territories, thereby influencing the quality of government and prospects for economic development.[36] Our study provides a natural complement to this finding. Whereas Acemoglu and colleagues demonstrate that diseases can affect political development via the external imposition of institutions, we demonstrate that diseases can also catalyze processes of institutional change that are internal to societies.

In examining how demographic change reshapes social and political organization in agrarian societies, this article also contributes to the study of landed elite power and its implications for democracy. Historical investigations of political change have long emphasized that the economic and political power of landed elites tends to delay or preclude the transition to democracy.[37] And for countries that have already made the transition, the presence of a powerful landed elite fundamentally shapes the character of electoral politics.

Practices like clientelism and vote brokerage are considered especially effective in contexts where landed elites employ a large segment of the labor force.[38] Consequently, in agrarian settings with dominant landowners, voters are often induced to vote for candidates preferred by the elites—typically, conservative politicians inclined to defend the extant property-rights regime.[39] Our contribution to this literature is to

[33] Sachs and Warner 1997; Bonds et al. 2010.
[34] Sellars and Alix-Garcia 2018.
[35] Diamond 1997.
[36] Acemoglu, Johnson, and Robinson 2001.
[37] Moore 1966; Rueschemeyer, Stephens, and Stephens 1992; Ziblatt 2008. For a related argument, see Paniagua and Vogler 2021.
[38] Stokes et al. 2013; Anderson, Francois, and Kotwal 2015.
[39] Baland and Robinson 2008; Gingerich and Medeiros 2020; Gingerich 2020; Mares 2015.

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endogenize the sources of landed elite power in a long-term historical perspective. Specifically, we show how shocks to the labor supply can undermine the landed elite's political influence. In the process, we offer a novel account of the historical genesis of programmatic versus clientelistic linkages between citizens and politicians.[40]

This article also contributes to the literature on how patterns of labor coercion shape political development in the long run. Influential treatments of the subject have long held that traditions of servile labor inhibit state building or dampen the prospects for democracy.[41] Following in these footsteps, a recent wave of empirical scholarship explores how legacies of labor coercion shape norms and political behavior[42] as well as patterns of economic activity.[43] Our work follows this scholarly agenda, in that it seeks to deepen understanding of the political consequences of the erosion of serfdom by tracing out the repercussions of a plausibly exogenous shock to this institution: mortality due to the Black Death.

III. The Long-Term Implications of Labor Supply Shocks for Electoral Behavior

In this section, we explicate the theoretical mechanisms tying labor supply shocks to long-term electoral behavior. We start with the premise that the magnitude of the initial shock is crucial. If a labor supply shock is sufficiently profound, it creates a new institutional equilibrium that recasts the relationship between lord and peasant, producing more inclusive modes of political engagement that in the long run structure mass political behavior. Weaker labor supply shocks lead to a retrenchment of socioeconomic hierarchies and obligations, producing exclusionary modes of political engagement that also structure mass political behavior, albeit in a very different way.

Consider the relationship between labor supply shocks and labor coercion. A demographic collapse that radically reduces the labor supply brings two immediate consequences. First, the shadow price of a coerced worker's labor skyrockets. The economic returns for work outside the manor to which the laborer is bound become much greater, making employment elsewhere significantly more attractive and increasing the laborer's willingness to accept the risk of punishment that results

[40] Cf. Kitschelt and Wilkinson 2007.
[41] Anderson 1974; Kurtz 2013; Mahoney 2001.
[42] Nunn and Wantchekon 2011; Lowes and Montero 2017; Acharya, Blackwell, and Sen 2018.
[43] Dell 2010; Markevich and Zhuravskaya 2018; Buggle and Nafziger 2021.

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from fleeing the manor. For the elites, keeping what remains of the labor force in place requires either an increase in wages (and a reduction in customary obligations) or a greater investment in the monitoring and punishment of laborers. Given the existence of economies of scale in policing labor, the per-laborer cost of dissuading exit through coercion will be exorbitant. Therefore, unless the shock causes labor productivity to increase immensely, the elites will consider adopting an incipient free-wage regime to be the least detrimental option.

The second consequence of a negative labor supply shock concerns the prospects for coordination among agrarian elites. Given the reality of a decimated labor force, the competition among elites for laborers will be quite intense: success or failure in poaching the labor of neighboring manors may mean the difference between bringing a crop to harvest or watching it rot in the fields. So, to keep wages low and laborers on their estates, elites must expend significant effort to create and police an antipoaching cartel among themselves. But the larger the shock, the greater the returns for each member of the elite who defects from the cartel. Thus, for a sufficiently large shock, maintaining the antipoaching cartel will be next to impossible. An incipient free wage regime emerges by default.

If the shock to the labor supply is fairly minor, the dynamics will differ. With only a moderate reduction in the labor force, the returns to laborers from fleeing their manors will be smaller, and the per-laborer cost of dissuading exit through coercion will be much more manageable for elites. And given the smaller returns to elites from poaching the laborers of their peers, it will be feasible to sustain a cartel. Consequently, whereas large labor supply shocks will prompt an early exit from labor coercion, smaller shocks will be associated with its persistence or reinforcement.

In turn, the abandonment or persistence of labor coercion has implications for economic, social, and political organization. In settings where labor coercion has diminished, the freedom of movement for laborers contributes to greater urbanization as well as to a restructuring of relationships in the countryside. Greater urbanization and higher living standards spur the development of new technologies that jumpstart new forms of manufacturing, such as textile production and book printing with movable type. Overall, the weight of agriculture in the economy diminishes. Agricultural production itself shifts away from the classic manorial model in which land and property rights are vested solely in elites, to one in which land rights are more widely shared. The roots of a system of small farming are established, and formerly gaping

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inequalities in landownership become more modest.[44] The improved employment opportunities and diversification of property rights naturally lead to a more heterogenous social structure and more diverse preferences among the populace. The new social groups, in turn, demand channels for the representation of their interests. At the local level, this leads to the development of such institutions as the election of mayors and town councils, providing at least a limited form of self-government. Even if traditional elites initially hold veto power over the decisions of these institutions, their very existence encourages nonelite coordination and demand-making.[45] Thus, the seeds for autonomous political participation are sown.

In settings where labor coercion persists unabated over a long period of time, these occurrences do not come to pass. Peasants remain tied to the land, and urban areas remain small and scarce. The adoption of technological innovations, to the extent that these emerge from elsewhere, is actively discouraged by the traditional elites. Political power remains vested in the landed aristocracy, which perpetuates its status through the use of enforcers deployed to police labor. The economy gravitates around agriculture, which is dominated by a small number of large landholdings. Institutions designed to channel the demands of nonelite actors are unlikely to emerge—and if they do, they perish quickly. The great mass of the citizenry gains little or no experience in advocating for their own interests, and most certainly not in a way that might conflict with the desires of the agrarian elite. In this context, the prospects for autonomous political participation are dim.

The divergent paths of labor coercion that emerge in the wake of labor supply shocks create very different environments for electoral politics once the era of mass politics begins. Areas where labor coercion was dismantled early differ in four crucial ways from those areas where it persisted over time. First, early reforming areas have more differentiated economies, giving more voters viable employment opportunities outside their current jobs. As a consequence, voters are not so easily intimidated by employers who wish to sway their votes.[46] Second, the opportunities afforded to laborers in early reforming areas encourage greater human capital development, especially higher levels of education. As a result, voters are more likely to be politically engaged

[44] See Alfani, Gierok, and Schaff 2020 for direct evidence on the reduction in wealth inequality in German-speaking Europe following the Black Death. Similar evidence is provided by Alfani 2015 and Alfani and Ammannati 2017 for the Piedmont and Tuscany regions of Italy, respectively. See Aberth 2021, pp. 226–31, for an overview of land redistribution patterns after the Black Death.

[45] Cf. Giuliano and Nunn 2013.

[46] Cf. Frye, Reuter, and Szakonyi 2014; Mares 2015.

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and more aware of their political options, with a keener sense of how the contenders represent their interests.[47] Third, because of the legacies of labor coercion for urbanization, voters in early reforming areas are likely to live in more densely populated communities than voters in late reforming areas. Greater population density makes it harder for traditional elites to monitor and profit from clientelistic exchanges, thereby limiting the influence of material inducements on voting patterns.[48] Fourth, and arguably most importantly, the erosion of traditional socioeconomic hierarchies in early reforming areas means that voters in these areas are less likely to adhere to norms dictating deference to elites. Among such norms are shared understandings of reciprocity, which facilitate the ability of local elites to guide voters' electoral choices.[49] Seen more broadly, deference norms reflect political cultures in which citizens view themselves as the subjects of political and economic elites—a state of affairs conducive to the growth of illiberal and antidemocratic political movements.[50]

To summarize, the societal context bequeathed by the early erosion of labor coercion is one where in the long run, voters (1) have a clear sense of which candidates they would prefer to vote for, and (2) enjoy the economic and cultural autonomy to vote as they wish. In contrast, the societal context bequeathed by the late or incomplete erosion of labor coercion is one where voters ultimately have no strong preferences over contending political forces, and lack the wherewithal to resist the voting instructions of traditional elites. Figure 2 summarizes the theory.[51]

IV. Background on the Case of Germany

The subject of our empirical analysis is German-speaking Central Europe, an area that was largely contained within the Holy Roman Empire and that remained politically fragmented for most of the time period under consideration. Because the Holy Roman Empire was a confederation—as opposed to a centralized nation-state—this area should be understood as a cultural entity, united primarily by a common language and shared customs.

[47] Milligan, Moretti, and Oreopoulos 2004; Sondheimer and Green 2010.
[48] Brusco, Nazareno, and Stokes 2004; Gingerich and Medina 2013.
[49] Finan and Schechter 2012; Lawson and Greene 2014.
[50] Lewin 1943; Almond and Verba 1963.
[51] For readers interested in additional detail, the supplementary material applies our framework to an extended historical discussion of Black Death severity, the evolution of serfdom, and the development of distinctive political traditions across specific principalities in German-speaking Central Europe; Gingerich and Vogler 2021b, sec. A.26.

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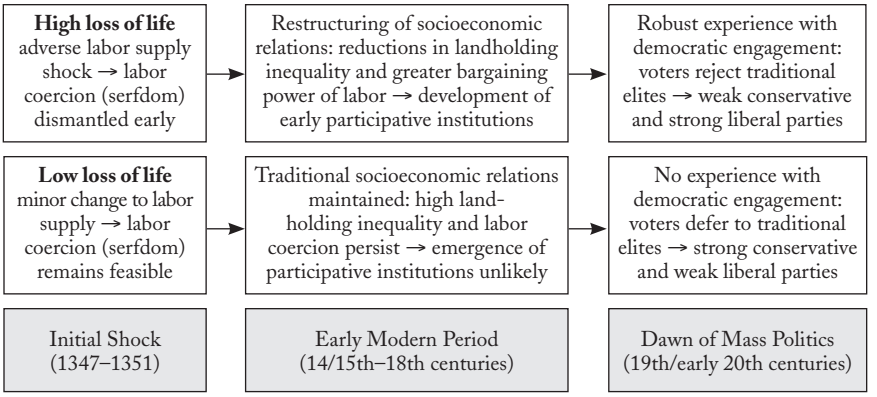

FIGURE 2
LONG-TERM CONSEQUENCES OF THE BLACK DEATH

RATIONALE FOR CASE SELECTION

We focus on this particular area for two reasons. The first is the significant regional variation in the Black Death's intensity. Much of Germany's west, and southwest, and parts of the north suffered devastating outbreaks, while many towns and settlements in the eastern parts were relatively unaffected.[52]

The second reason is Germany's historically high level of political decentralization, which allowed local traditions to persist over extensive periods.[53] Germany was long composed of hundreds of principalities, city-states, kingdoms, and other administrative units. In other settings, a central state was able to supplant local institutions, but in Germany distinct local political traditions had ample space to survive until at least the nineteenth century. This combination makes Germany the ideal case for studying the pandemic's long-term effects.

IMPERIAL GERMANY: SOCIOECONOMIC CONDITIONS AND POLITICAL OUTCOMES

In 1871, Prussia united most of the German cultural region under a single political system known as Imperial Germany or the German Empire. Based on our theory about the social transformation brought by the Black Death, we use this case to investigate long-term variation in fundamental socioeconomic structures and local political behavior.

[52] This is largely due to the timing of the Black Death's geographic spread: it hit the western and southern parts of German-speaking Europe early and hard, but arrived late and with much lower intensity in the eastern parts of Central Europe. Regarding the Black Death's absence in eastern Central Europe, see Myśliwski 2012, pp. 261–65.

[53] Frost 2012; Wilson [1998] 2003, esp. p. 1. See also Blanning 2012.

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In terms of socioeconomic structures, we focus on landholding inequality. Where land inequality is high, a small number of landholders own a disproportionate share of property in the agricultural sector, indicating that it is more elite-dominated. This elite domination of rural property rights is often associated with elite domination of politics.[54]

In terms of political behavior, we consider electoral outcomes in elections of the Imperial Diet (the Reichstag), the lower chamber of the Empire's legislature. Importantly, the formal conditions (electoral rules, voting age, and suffrage restrictions) were homogeneous across Germany, making these elections suitable for cross-sectional analysis. We concentrate on two outcomes: (1) the vote share received by the Conservative Party in 1871, and (2) the number of electoral disputes between 1871 and 1912, indicating violations of electoral rules (typically by elites). Such disputes arise when formal democratic procedures are undermined in some way, indicating a violation of democratic principles.[55]

We focus on the Conservative Party of the early 1870s because it was elitist in both means and ends. Its stated goal was to defend traditional social structures—that is, the privileged position of the landed elites. It rejected popular democracy, resisted the socioeconomic changes caused by industrialization, and railed against national unification (which was perceived to threaten the aristocracy).[56] Although the Conservative Party ran in formally democratic elections, the landed elites used intimidation, clientelism, and worker coercion to improve their chances of victory.[57]

Such tactics demonstrate that while formal electoral regulations were the same across Germany, socioeconomic conditions and political norms varied significantly.[58] This diversity also led to variation in the parties that ran across different districts.[59] The electoral viability of the Conservative Party depended on the socioeconomic and political structures associated with an agriculturally centered economy and high landholding inequality.[60] In places where these conditions did not exist, the party had little chance of success in open electoral competition, so party organization was scarce.[61] There was another conservatively ori-

[54] Ziblatt 2008; Ziblatt 2009.

[55] This subject has been studied extensively in Ziblatt 2009 and Mares and Zhu 2015.

[56] Anderson 2000, chap. 6; Berdahl 1972, esp. pp. 3–4, 18; Eley 1986, esp. p. 245; Berdahl 1988, pp. 13–14; Retallack 1988.

[57] Anderson 1993; Anderson 2000, chap. 6; Mares 2015, chap. 3–5; Nipperdey 1961, chap. 5.

[58] Eley 1986, p. 245.

[59] Sperber 1997, pp. 26, 114.

[60] Anderson 1993; Anderson 2000, chap. 6; Lepsius 1966; Ziblatt 2008; Ziblatt 2009.

[61] Across Imperial Germany, the Conservative Party had at least one candidate in forty-six out of sixty-seven government districts (Regierungsbezirk, units that encompass multiple electoral districts). Yet in only twenty-seven government districts did it receive an average of more than 10 percent of the vote.

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ented party: the Free Conservative Party, whose leadership, unlike that of the Conservative Party, included industrialists who did not defend an estate society. Moreover, besides several smaller parties that competed only in geographically limited areas, four other major moderate/liberal parties were present across large areas of Imperial Germany in the early 1870s: the National Liberal Party, the German Center Party, the Liberal Reich Party, and the German Progress Party.

Our historical perspective on the social bases of parties' electoral support aligns with previous scholarly work. Most importantly, Rainer Lepsius argues that parties in nineteenth-century Germany reflected "sociomoral milieus"[62] based on such deeply rooted factors as culture, socioeconomic conditions, and political norms.[63] Note that the variation in these dimensions predated the Empire's political system.[64]

We focus initially on electoral outcomes in 1871 because, with national unification just beginning, local political traditions were not likely to have been much affected by national-level trends. But in the following section we consider the Weimar Republic's crucial 1930 and July 1932 elections, exploring whether the political-economic equilibria created by differential Black Death exposure persisted into interwar Germany. Moreover, in the supplementary material we consider the results of the 1874 election.[65]

Weimar Germany: Persistence of Local Political Cultures and Votes for the National Socialist Party

Given our contention that different levels of exposure to the Black Death bequeathed distinctive and enduring political traditions that contributed to the electoral viability of illiberal parties, it is worth investigating whether the divergence caused by the outbreak can still be seen in later elections, especially the fateful German parliamentary elections of 1930 and July 1932. Because these elections gave rise to National Socialism as a major force in German politics, their relevance for the course of world history is unquestionable.

Specifically, in 1930, Hitler's NSDAP expanded its vote share from 2.6 percent to 18.3 percent, increasing its number of seats almost ten-fold, from 12 to 107. This is considered to have been the party's

[62] Lepsius 1966.

[63] Sperber 1997, pp. 3–4. Such variation in local culture and norms can persist over long time periods and shape political-economic outcomes; Alesina and Giuliano 2015; Acharya, Blackwell, and Sen 2018; Putnam, Leonardi, and Nanetti 1994; Vogler 2019.

[64] Sperber 1997, pp. 4–5.

[65] Gingerich and Vogler 2021b, sec. A.13.

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"breakthrough election."[66] And in July 1932, the NSDAP became the parliament's largest party, with slightly more than 37 percent of the vote.[67]

At first glance, a number of factors cast doubt on the proposition that the Black Death's legacy would still persist in the Weimar Republic. For one, politics in Germany became more nationalized after the 1870s, leading to the development of a national democratic culture.[68] This may have entailed a move away from the fragmented initial conditions. And after 1871, Germany's second wave of industrialization took off, followed by comprehensive social transformation.[69] Among the consequences were changes in electoral politics and a realignment of the party system.[70]

The combination of national trends and World War I likely decreased the influence of regional political traditions that derived from experiences with the Black Death. Yet if the political cultures shaped by differences in the pandemic's intensity had survived for more than five hundred years, their remnants might still be visible in the Weimar period (1919–1933).[71]

Indeed, several studies suggest that Weimar Germany retained a geographically fragmented electoral landscape, where outcomes were often influenced by local socioeconomic configurations, culture, and traditions.[72] If conditions differed greatly across geographic areas, it is likely that the Nazis' potential for electoral success varied accordingly.[73]

Thus, despite the aforementioned trends, regional political traditions generated by differential Black Death exposure may still have affected electoral outcomes in the Weimar Republic. Specifically, John O'Loughlin suggests the following interpretation of spatial differences in the Nazi party's success:

> Weimar Germany was simply a complex mosaic of culturally identifiable microregions, a product of a history of local principalities, weak central authority, and intense political-confessional competition.[74]

[66] O'Loughlin 2002, pp. 220–24.
[67] O'Loughlin 2002, pp. 220–21.
[68] Anderson 2000; Anderson 1993; Berman 2001, esp. p. 445.
[69] Hahn [1998] 2011; Sperber 1997, p. 5.
[70] Berman 2001, esp. pp. 441–42, 445–46; Sperber 1997, esp. pp. 7, 19; Eley 1986, esp. pp. 239–40
[71] Lepsius 1966.
[72] Ault and Brustein 1998; O'Loughlin 2002; O'Loughlin, Flint, and Anselin 1994; Flint 1998.
[73] For instance, Satyanath, Voigtländer, and Voth 2017 show that differences in social capital across towns predict entry into the Nazi party. Additionally, Brustein 1996 argues that economic conditions and incentives (which varied widely across Germany) played an important role in shaping voting behavior.
[74] O'Loughlin 2002, p. 232.

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Like the Conservative Party of the early 1870s, the Nazi party promoted a political platform that was hostile to democracy and fundamentally illiberal at its core. Although the two parties certainly had crucial differences in terms of their socioeconomic policies, they were similarly explicit in their disdain for competitive elections and a plural social order.[75] Accordingly, it is plausible that the same Black Death–driven spatial variation in social hierarchy and prior democratic experience could also have influenced the NSDAP's electoral success.

V. Empirical Design

Measuring the Intensity of the Plague: The Black Death Exposure Intensity Score

Since the Black Death's impact varied widely across Central Europe and its intensity represents our key explanatory variable, we must construct an appropriate measure of Black Death intensity. To this end, we use data compiled by Jedwab, Johnson, and Koyama on recorded outbreaks in European towns,[76] primarily based on Christakos and colleagues,[77] to compute a measure of Black Death exposure intensity (BDEI score).

Although we have data on mortality rates for many individual medieval towns, our score is not simply a reflection of the intensity of the outbreak just in the nearest town. Instead, it is a composite measurement accounting for how much the area around any specific location was affected. We compute the score this way to account for the fact that labor is a highly mobile factor of production. If the Black Death has only a minor impact, or only hits a few locations in an area, the labor supply can return to its old equilibrium due to regional market forces.[78] But if many locations in an area are hit severely at the same time, it is much harder to return to a previous equilibrium. Accordingly, we assign a higher BDEI score to any location of interest (that is, any geographic unit of analysis) if there are many outbreaks around it and if these outbreaks are severe. Thus, our score can also be understood as conceptualizing how close any given location was to the pandemic's center.

Mathematically, the BDEI score represents the sum of recorded outbreak intensities inversely weighted by the distance to any specific lo-

[75] For an important qualification regarding the comparability of the Nazi party with previous German right-wing political forces, see Eley 1986.

[76] Jedwab, Johnson, and Koyama 2019a.

[77] Christakos et al. 2005.

[78] Cf. Hilton 1969, p. 32.

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cation. The weighting is inverse (and exponentially decreasing) because outbreaks in the closest vicinity are the most relevant.

Imperial Germany: Outcome Variables

Our analysis of outcomes in Imperial Germany is at the level of the electoral district. We consider three main outcome variables that reflect distinct political-economic equilibria:

SOCIOECONOMIC CONDITIONS

—1. Landholding inequality (Gini coefficient): Measures of landholding inequality, provided by Daniel Ziblatt, are bounded between 0 (absolute equality) and 1 (absolute inequality).[79] Especially in societies with large agrarian sectors, high levels of landholding inequality indicate socioeconomic power imbalances, which we expect to be a long-term result of the equilibrium associated with low Black Death mortality.

POLITICAL OUTCOMES

—2. Conservative Party vote share 1871: Data on electoral outcomes are provided by Jonathan Sperber.[80] These data denote the Conservative Party's vote share in the 1871 elections. As that party promoted extremely hierarchical social structures and opposed democratization, its vote share directly reflects the equilibrium associated with low Black Death mortality.

—3. Net electoral disputes 1871–1912: Data on electoral disputes are provided by Robert Arsenschek and Ziblatt.[81] These data reflect the cumulative number of disputes that occurred in all peacetime elections.[82] Since electoral disputes reflect the subversion of formal democratic regulations, they are more likely to occur in areas without strong democratic traditions, which we attribute to low Black Death mortality.

Imperial Germany: Control Variables

It is crucial to control for factors that could affect both Black Death intensity and subsequent long-term political-economic outcomes. Our geographic controls in particular reflect the importance of trade in disease transmission: the Black Death spread through rat fleas, which are often transported by merchants and commercial ships.[83]

[79] Ziblatt 2009.

[80] Sperber 1997.

[81] Arsenschek and Ziblatt 2010. Note that Ziblatt 2009 considers landholding inequality to be the key explanatory factor when it comes to electoral disputes. By contrast, we view both outcomes as aspects of long-term political-economic equilibria that resulted from differential Black Death exposure.

[82] Since disputes in a given year are uncommon, we use cumulative disputes across multiple elections to prevent zero inflation.

[83] Geographic measures were computed in ArcGIS (in the cases of distances to geographic features) or in R using data from GeoNames 2020 (in the case of land elevation).

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Specifically, our control variables are as follows:

—1. Urban density 1300: Historical levels of urban density could influence both Black Death intensity and long-term political-economic outcomes. We use data by Fabian Wahl to compute a historical urban density score for each electoral district.[84]

—2. Distance to the nearest major port: Besides the fact that the Black Death spread through trade, proximity to major ports could also influence commerce and economic activity in the long run.[85]

—3. Distance to the nearest medieval trade city: This variable is included for the same reasons as (2).[86]

—4. Distance to the ocean: Although major ports were the primary centers of sea trade, there may have been a number of minor ports. Therefore, we include distance to the ocean (North Sea or Baltic Sea) as a proxy.

—5. Distance to the nearest large river: Much trade took place on navigable rivers, likely spreading the plague.[87]

—6. Elevation: Land elevation could affect the accessibility of population centers to outsiders and animals carrying the plague,[88] influencing both plague intensity and long-term political-economic outcomes.

Weimar Germany: Persistence of Local Political Cultures and Votes for the National Socialist Party

Extending our empirical analysis, we consider the spatial association between Black Death exposure intensities and the NSDAP's vote share in the elections of Weimar Germany.

Specifically, we consider two primary outcome variables:

—1. NSDAP vote share 1930: For this election, data on electoral outcomes at the level of the town/city are provided by Jürgen Falter and Dirk Hänisch.[89] As the NSDAP was extremely illiberal and antidemocratic, its high vote shares are indicative of the equilibrium associated with low Black Death intensities.

—2. NSDAP vote share July 1932: Data on the outcomes of this election at the county level are also provided by Falter and Hänisch.[90]

We use the same set of control variables as in our main analysis. Peter Selb and Simon Munzert provide the geographic data used to compute them.[91]

[84] Wahl 2019. Similar to the BDEI score's construction, this measure reflects the sum of towns' population sizes (log) inversely weighted by their distance from the electoral district (or other geographic unit) under consideration.
[85] Benedictow 2004, p. 186.
[86] Hribar 2016.
[87] Benedictow 2004, p. 202. Data on rivers are from European Environment Agency 2020.
[88] Bossak and Welford 2015, p. 72.
[89] Falter and Hänisch 1990.
[90] Falter and Hänisch 1990. Unfortunately, town-level data are not available for this specific election.
[91] Selb and Munzert 2018.

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Mechanisms, Part I: Pre-Reformation Germany—Introduction of Participative Elections 1300–1500

In addition to our primary analysis, we add a secondary set of empirical tests focused on changes in participative institutions at the town level (1300–1500). These analyses are meant to evaluate empirical support for the suggested transmission mechanisms.

Here, we focus on a binary dependent variable based on data compiled by Wahl: *introduction of participative elections 1300–1500*.[92] This variable is equal to 1 for towns that newly adopted local participative elections during the 1300–1500 period; 0 otherwise.[93] Note that participative elections in medieval Germany did not mean a participatory democracy with full voting rights for all adults. Instead, such elections consisted of contests for the mayor, town council, or other local offices, usually with participation limited to adult male property owners. That said, even these forms of restricted participation indicate important changes in political institutions and norms.[94]

Because our unit of analysis here is the town—an organizational unit that existed long before and long after the time period we investigate—additional covariate data are available. Thus, we account for several factors that could have had an impact on early democratic development.

Specifically, we include variables for (1) *land elevation*, (2) *distance to the nearest river*, (3) *Roman road in the vicinity*, (4) *agricultural suitability*, (5) *population in the year 1300 (log)*, (6) *land ruggedness*, (7) *urban potential 1300*, (8) *trade city 1300*, and (9) *proto-industrial city 1300*. We draw these variables from Wahl, who provides detail on coding procedures.[95]

Mechanisms, Part II: Early Nineteenth-Century Prussia—The Black Death and Footprints of Serfdom

In addition to the pre-1500 analysis focused on changes in political institutions, we assess whether the proposed mechanisms are consistent with differences in socioeconomic structures across German-speaking Central Europe. According to our theoretical framework, serfdom as a socioeconomic institution should have waned in areas severely affected by the Black Death whereas it should have grown in areas largely spared by the outbreak. We provide qualitative evidence in favor of this prop-

[92] Wahl 2016.

[93] No towns with participative elections in 1300 discontinued these in 1500. Regardless of whether we include these towns, our substantive findings do not change.

[94] Further details on the underlying data and coding are provided by Wahl 2016.

[95] Wahl 2019.

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osition in the supplementary material.[96] To complement our discussion of the link between the Black Death and changes in labor coercion, we also empirically evaluate the degree to which variation in mortality is associated with two footprints of serfdom seen in early nineteenth-century Prussia: the dominance of large estates in agriculture and the prevalence of agricultural servants. The underlying measures were originally compiled by the Prussian state as part of the first available standardized and comparable data set of socioeconomic characteristics across large parts of German-speaking Europe.

Specifically, we analyze the spatial association between Black Death intensity and the following two outcome variables:

—1. Large estates as a proportion of all agricultural properties 1816: Data on the number of different types of farms are provided by Sascha Becker and colleagues.[97] We compute the proportion of farms in the largest category recorded by the Prussian census, which is "over 300 Prussian morgen" (approximately 189 acres). The coercive imposition of onerous labor obligations in the German-speaking lands went hand-in-hand with the consolidation of large, export-oriented estates.[98] Thus, we expect Black Death intensity to be negatively associated with this measure.

—2. Agricultural servants as a proportion of the overall population 1816/1819: These data provide a direct measure of the legacy of serfdom. Although agricultural servants and serfs are not one and the same (since serfdom was formally abolished in Prussia in 1807), in practice most freed serfs continued to work their lords' lands as renters and wage laborers. Thus, the number of agricultural servants represents a good proxy for the former population of serfs. Due to limitations on available data, the number of servants is from the year 1819 and the population numbers are from 1816. As above, we expect Black Death intensity to be negatively associated with this measure.

We use the same set of control variables as in our main analysis. Geographic data on the location of Prussian counties were provided by the ifo Institute for Economic Research (ifo Zentrum für Bildungsökonomik).[99]

Empirical Specifications

We use a range of outcome variables with different properties and adjust our models accordingly. With respect to *land inequality* and *Con-*

[96] Gingerich and Vogler 2021b, sec. A.26.

[97] Becker et al. 2014.

[98] This is described in more detail in the supplementary material; Gingerich and Vogler 2021b, sec. A.26.

[99] Because our data on the geographic locations of Prussian counties are from a different year (1871), we merge data according to the merging keys provided by Becker et al. 2014. As a result of the associated data aggregation processes, which only allow for the computation of approximate geographic locations, our geographic measures in this part of the analysis are slightly less fine-grained than if we had exact geographic data for the historical counties of 1816/1819.

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servative Party vote share, we primarily use OLS regression with clustered standard errors.[100] We also use OLS regression when analyzing a number of variables in our extensions and mechanism sections.[101] For all truncated outcome variables, in the supplementary material we discuss an alternative set of results using Tobit models.

The format of our OLS regressions is as follows:

$$y_i = \beta_0 + \beta_1\, BDEI\ Score_i + \boldsymbol{x_i'\beta} + \varepsilon_i, \quad (1)$$

where y_i is the respective outcome and $\boldsymbol{x_i}$ represents a vector of covariates at the electoral district level (i).[102] β_1 represents the coefficient of the BDEI score.

We depart from OLS when it is called for, based on the properties of our outcome variables. When considering net electoral disputes, which is a count variable, we use quasi-Poisson models. And we use logistic regression when analyzing the binary variable *introduction of participative elections 1300–1500*.

The BDEI score is computed in the following way:

$$Raw\ BDEI\ Score_i = \sum_{j=1}^{n} LMR_j * (1 - DIST_{ij})^k, \quad (2)$$

where $LMR_j \in (0,1]$ is the local mortality rate at outbreak site j, and $DIST_{ij} \in [0,1]$ is the distance between i and j, which is used as the weight (with locations farther away from i being weighted down). The parameter $k \in \{3, 6, 9, 12, 15\}$ for versions 1 through 5 of the BDEI score, respectively, represents the distance discount factor. We compute different versions of the BDEI score to show that results are not dependent on any single value of k. The farther an outbreak site is from the location under consideration i, the more it is exponentially discounted. To make the different versions of the *raw BDEI score* more comparable and our results easier to interpret, we standardize them to have a mean of $\mu = 0$ and a standard deviation of $\sigma = 1$.

VI. Results

Imperial Germany: Socioeconomic Conditions and Political Outcomes

The results of our empirical analysis reveal a strong relationship between the historical intensity of the Black Death and long-term polit-

[100] Errors are clustered at the level of the government district (Regierungsbezirk) (67 units).

[101] In our major extension regarding NSDAP vote shares in Weimar Germany, we cluster errors at the level of the electoral district (Wahlkreis) (35 units).

[102] In our primary analysis, the unit of analysis is the electoral district. In additional empirical tests that focus on towns or cities, the covariates are provided for these other units of analysis.

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ical and socioeconomic outcomes in Imperial Germany. We begin by considering a graphic overview of *landholding inequality* across Germany's electoral districts, as shown in Figure 3.[103] Levels of landholding inequality in a district are indicated by that district's shade of gray. Additionally, towns with recorded outbreaks are displayed as circles, and the intensity of the outbreaks is also shown by each circle's shade of gray. The northeastern districts exhibit especially high levels of landholding inequality. And almost all electoral districts in the easternmost parts, where the plague was least severe, have relatively high levels of landholding inequality.

As discussed, we also expect a long-term impact of variation in Black Death intensity on *Conservative Party vote share*, with high vote shares indicating the political-economic equilibrium linked to low historical Black Death intensities. This is clearly reflected in Figure 4. The party's vote share is consistently higher in areas with fewer and less intense recorded outbreaks. Similarly, as shown in Figure 5, the total number of electoral disputes between 1871 and 1912 is also higher in the northeast than in many parts of the west and south.

Next, we turn to our regression analysis. Table 1 shows our findings with respect to *landholding inequality*. In addition to a first set of models (1–5) that are based on our key independent variable only, we provide a second set (6–10) that include the previously discussed controls. Across all specifications, the BDEI score has a significant negative impact on landholding inequality, indicating the persistent influence of the Black Death. Specifically, a one standard deviation increase in the BDEI score results in a decrease in the value of landholding inequality (Gini) that ranges from 0.042 to 0.061 (0.350 to 0.508 standard deviations). Figure 6 shows the predicted values for different magnitudes of BDEI score v1.

Table 2 shows the results with respect to *Conservative Party vote share*. As with our previous analyses, we also provide models without (1–5) and with (6–10) control variables. In line with our theory, the Conservative Party is weaker in areas that had more severe outbreaks, indicated by a high BDEI score. Specifically, a one standard deviation increase in the BDEI score leads to a reduction in the party's vote share ranging from 0.106 (10.6 percentage points) to 0.141 (14.1 percentage points) (0.426 to 0.566 standard deviations). The results again highlight the pandemic's long-term influence. Figure 7 shows the predicted values for different magnitudes of the BDEI score v1.

Table 3 shows the results of quasi-Poisson regressions on electoral

[103] These maps are based on data by Nüssli and Nüssli 2008b; Jedwab, Johnson, and Koyama 2019a; Sperber 1997; and Ziblatt 2009.

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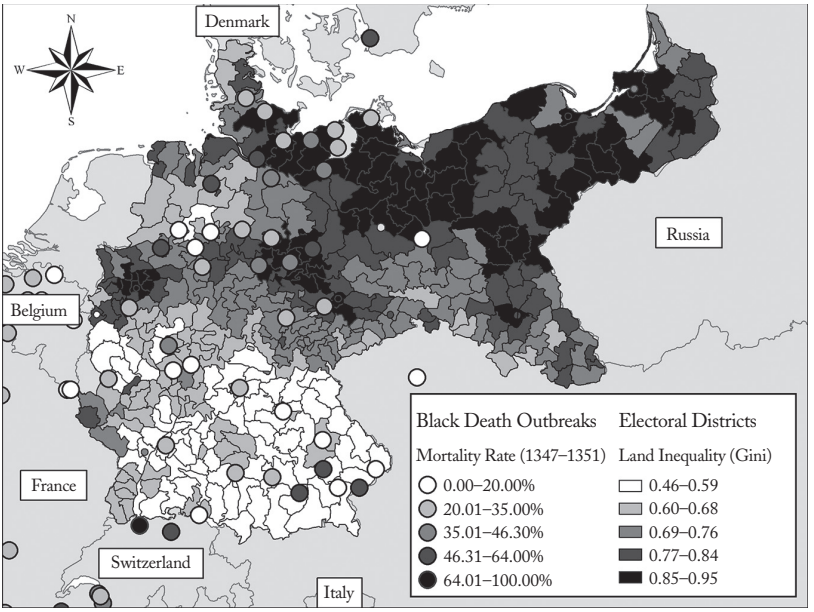

FIGURE 3
LANDHOLDING INEQUALITY BY ELECTORAL DISTRICT

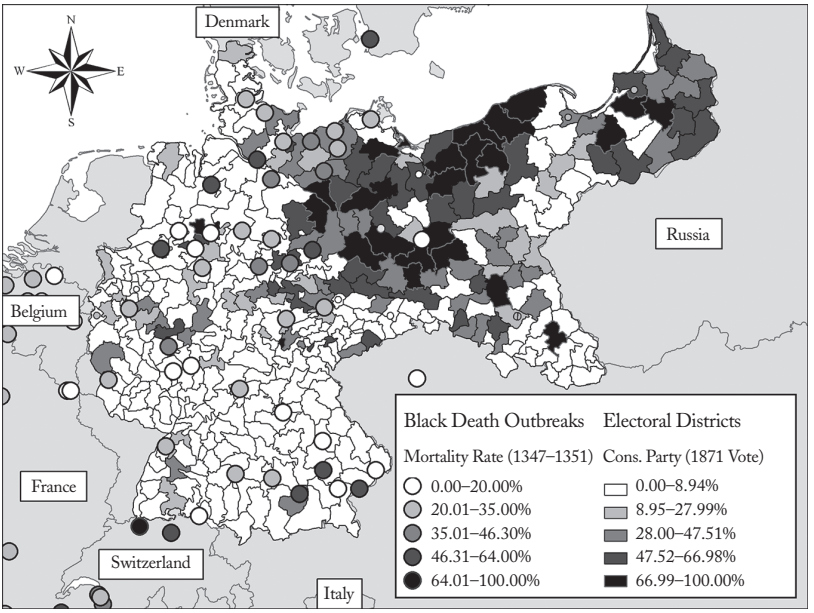

FIGURE 4
CONSERVATIVE PARTY VOTE SHARE BY ELECTORAL DISTRICT (1871)

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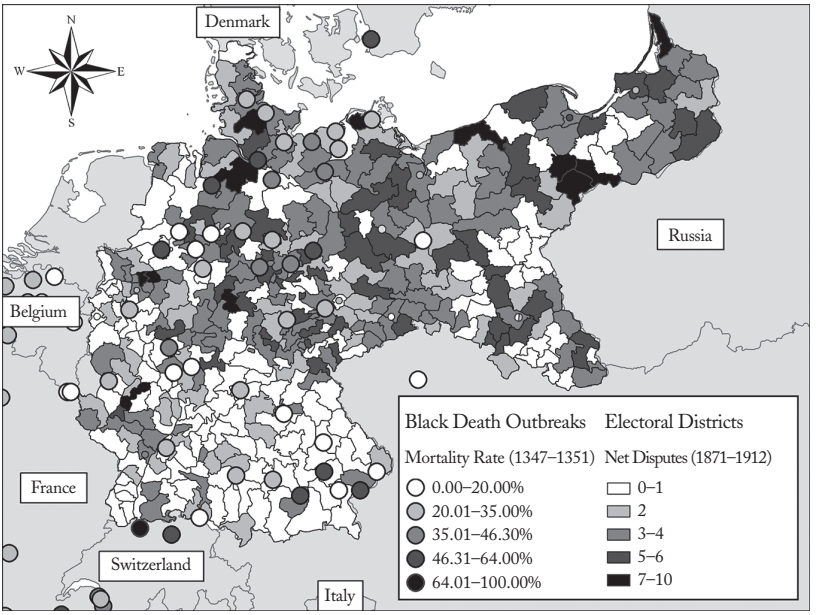

FIGURE 5
NET ELECTORAL DISPUTES BY ELECTORAL DISTRICT (1871–1902)

disputes. Here, we also confirm our theoretical expectations: places with more intense outbreaks have significantly fewer electoral disputes. Specifically, a one standard deviation increase in the BDEI score leads to a change in the logs of expected counts ranging from −0.172 to −0.313.

In sum, we find comprehensive evidence that the Black Death shaped socioeconomic structures and political behavior in the long run. In terms of both landholding inequality and the Conservative Party's electoral viability, we find that regional variation in plague outbreaks in the fourteenth century has strong predictive power for a number of outcomes in the nineteenth century. These results indicate that this biological shock fundamentally reshaped society in areas where it hit hardest while reinforcing socioeconomic and political hierarchies in other regions, leading to distinct political-economic equilibria that persisted for generations.

IMPERIAL GERMANY: EXTENSIONS OF THE EMPIRICAL ANALYSIS

We present multiple extensions in the supplementary material.[104] In the first extension, we add covariates for *population size* and *Prussia*. In the second extension, we consider a variable that reflects variation

[104] Gingerich and Vogler 2021b, secs. A.3–A.16.

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TABLE 1
LANDHOLDING INEQUALITY (GINI COEFFICIENT) (OLS) [a]

	Dependent Variable: Landholding Inequality (Gini Coefficient)									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI	−0.061***					−0.053***				
score v1	(0.011)					(0.015)				
BDEI		−0.061***					−0.049***			
score v2		(0.011)					(0.014)			
BDEI			−0.059***					−0.048***		
score v3			(0.011)					(0.014)		
BDEI				−0.057***					−0.046***	
score v4				(0.011)					(0.013)	
BDEI					−0.053***					−0.042***
score v5					(0.011)					(0.013)
Constant	0.726***	0.726***	0.726***	0.726***	0.726***	0.844***	0.844***	0.843***	0.843***	0.842***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.026)	(0.025)	(0.025)	(0.025)	(0.024)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	397	397	397	397	397	397	397	397	397	397
R^2	0.260	0.255	0.243	0.223	0.193	0.641	0.641	0.638	0.632	0.623
Adjusted R^2	0.259	0.253	0.242	0.221	0.191	0.634	0.635	0.632	0.626	0.616

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$; clustered standard errors

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: electoral district of Imperial Germany) was exposed to the pandemic.

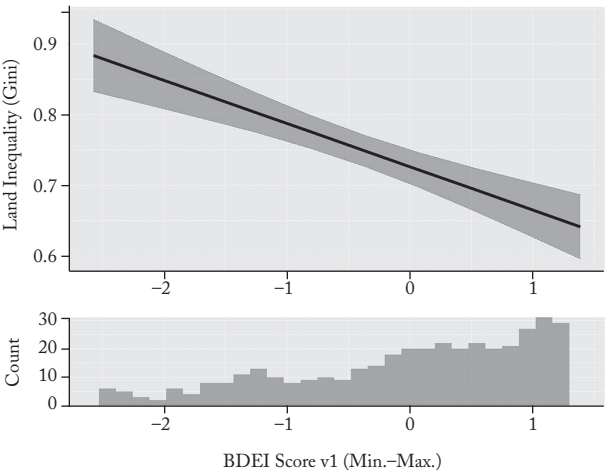

FIGURE 6
PREDICTED VALUES PLOT: BDEI SCORE V1 AND LANDHOLDING INEQUALITY (GINI)

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TABLE 2
CONSERVATIVE PARTY VOTE SHARE (OLS) [a]

	Dependent Variable: Conservative Party Vote Share									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI score v1	−0.116*** (0.021)					−0.141*** (0.035)				
BDEI score v2		−0.115*** (0.022)					−0.132*** (0.032)			
BDEI score v3			−0.113*** (0.023)					−0.130*** (0.031)		
BDEI score v4				−0.110*** (0.023)					−0.133*** (0.033)	
BDEI score v5					−0.106*** (0.024)					−0.136*** (0.035)
Constant	0.155*** (0.023)	0.154*** (0.023)	0.155*** (0.023)	0.155*** (0.023)	0.156*** (0.024)	0.208*** (0.065)	0.206*** (0.064)	0.207*** (0.063)	0.211*** (0.062)	0.216*** (0.060)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	382	382	382	382	382	382	382	382	382	382
R^2	0.212	0.208	0.202	0.193	0.180	0.318	0.319	0.318	0.318	0.315
Adjusted R^2	0.210	0.206	0.200	0.191	0.178	0.305	0.306	0.306	0.305	0.302

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$; clustered standard errors

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: electoral district of Imperial Germany) was exposed to the pandemic.

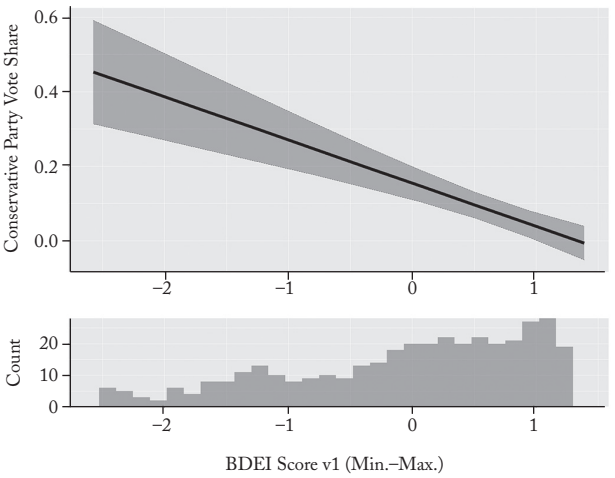

FIGURE 7
PREDICTED VALUES PLOT: BDEI SCORE V1 AND CONSERVATIVE PARTY VOTE SHARE 1871

TABLE 3
NET ELECTORAL DISPUTES (QUASI-POISSON) [a]

	Dependent Variable: Net Electoral Disputes									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI score v1	−0.200*** (0.051)					−0.313*** (0.135)				
BDEI score v2		−0.200*** (0.055)					−0.287*** (0.125)			
BDEI score v3			−0.196*** (0.056)					−0.284*** (0.123)		
BDEI score v4				−0.186*** (0.057)					−0.291*** (0.125)	
BDEI score v5					−0.172*** (0.058)					−0.294*** (0.128)
Constant	0.850*** (0.065)	0.850*** (0.065)	0.851*** (0.065)	0.853*** (0.066)	0.855*** (0.066)	1.122*** (0.154)	1.114*** (0.152)	1.118*** (0.153)	1.133*** (0.159)	1.150*** (0.168)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	397	397	397	397	397	397	397	397	397	397

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$; quasi-Poisson; clustered standard errors

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: electoral district of Imperial Germany) was exposed to the pandemic.

in the Reformation's long-term impact: a district's *share of Catholics*. In the third extension, we calculate the BDEI score based on an alternative set of outbreak observations. In the fourth extension, we condition our analysis of *landholding inequality* on the relevance of agriculture in the district.[105] In the fifth extension, we use the *timing of outbreaks* in a two-stage least squares setup to isolate exogeneous variation in mortality rates.[106] In the sixth extension, we replace our distance measures to geographic features with dummy variables. In the seventh extension, we control for variability in agricultural (caloric) potential to account for historical information asymmetries.[107] In the eighth extension, we include quasi-random spatial fixed effects to address suggestions made by Thomas Pepinsky, Sara Wallace Goodman, and Conrad Ziller.[108] In

[105] Mares 2015, pp. 23–24, chap. 4.

[106] This strategy is based on observations that the Black Death was most severe in the spring and summer and that its intensity waned over time; Aberth 2021, p. 26; Benedictow 2004; Gottfried 1983; Campbell 2016.

[107] Ahmed and Stasavage 2020.

[108] Regarding the use of spatial fixed effects in legacy studies, see the contributions to this debate by Pepinsky, Goodman, and Ziller 2020; Homola, Pereira, and Tavits 2020a; Homola, Pereira, and Tavits 2020b.

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the ninth extension, we use two alternative data sets to compute the BDEI score.[109] In the tenth extension, we use data by Christos Nüssli and Marc-Antoine Nüssli to introduce fixed effects based on pretreatment administrative borders.[110] In the eleventh extension, we consider three alternative outcome measures: (1) *the combined vote share of all conservative parties in 1871*, (2) *the combined vote share of all major liberal and moderate parties in 1871*, and (3) *the Conservative Party's vote share in 1874*. In the twelfth extension, we account for city population sizes when computing the BDEI score. In the thirteenth extension, we manually limit the regions used to construct the BDEI score to neighboring ones. And in the fourteenth and last extension, we account for pre-1500 *caloric potential*.[111] All told, our key results are robust across a large set of alternative approaches to measurement and statistical analysis.

Weimar Germany: Persistence of Local Political Cultures and Votes for the National Socialist Party

Besides the extensions discussed above, the substantively most important addition to our empirical test is an analysis of Weimar Germany's 1930 and July 1932 elections. As shown in figures 8 and 9, the electoral strength of the NSDAP in both elections is highly correlated with the Black Death's historical intensity as measured by BDEI score v1.

Tables 4 and 5 provide further details with respect to these results, underscoring the persistent negative association between historical *Black Death exposure intensity* and the vote share of antidemocratic parties. In the 1930 election, a one standard deviation increase in the BDEI score leads to a reduction in the expected vote share of the NSDAP ranging from 0.017 (1.7 percentage points) to 0.028 (2.8 percentage points) (0.160 to 0.264 standard deviations). In the election of July 1932, a one standard deviation increase in the BDEI score leads to a reduction in the expected vote share of the NSDAP ranging from 0.034 (3.4 percentage points) to 0.088 (8.8 percentage points) (0.233 to 0.603 standard deviations). These results indicate that aspects of the spatial divergence in political cultures created by the Black Death persisted into the Weimar Republic despite the socioeconomic and geographic dislocations ushered in by industrialization and WWI.[112]

[109] Büntgen et al. 2012; Schmid et al. 2015.
[110] Nüssli and Nüssli 2008a.
[111] Galor and Özak 2016.
[112] In the supplementary material, we show that our theoretical predictions also hold when analyzing the combined vote shares of the NSDAP and the German National People's Party (DNVP); Gingerich and Vogler 2021b, sec. A.19.

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TABLE 4
NSDAP VOTE SHARE 1930 (OLS) [a]

	Dependent Variable: NSDAP Vote Share 1930									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI score v1	−0.019** (0.008)					−0.028** (0.012)				
BDEI score v2		−0.020** (0.008)					−0.028** (0.012)			
BDEI score v3			−0.020** (0.008)					−0.028** (0.012)		
BDEI score v4				−0.019** (0.009)					−0.028** (0.012)	
BDEI score v5					−0.017* (0.009)					−0.026** (0.013)
Constant	0.184*** (0.009)	0.184*** (0.009)	0.184*** (0.009)	0.184*** (0.009)	0.184*** (0.009)	0.205*** (0.030)	0.206*** (0.031)	0.206*** (0.031)	0.206*** (0.032)	0.204*** (0.032)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	3,347	3,347	3,347	3,347	3,347	3,346	3,346	3,346	3,346	3,346
R^2	0.031	0.032	0.032	0.029	0.023	0.076	0.078	0.079	0.078	0.074
Adjusted R^2	0.031	0.032	0.032	0.029	0.023	0.074	0.076	0.077	0.076	0.072

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$; clustered standard errors

[a]The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: town/city in Weimar Germany) was exposed to the pandemic.

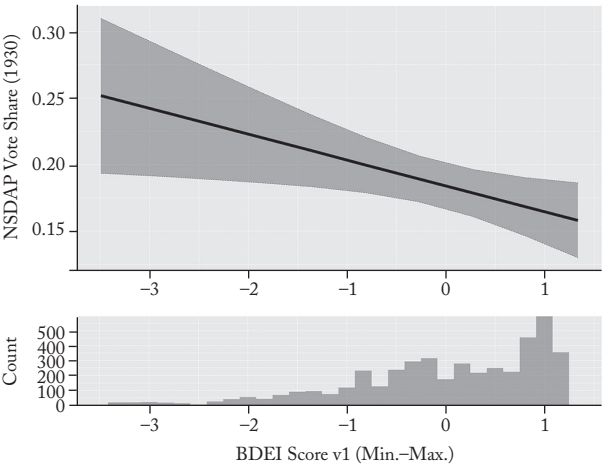

FIGURE 8
PREDICTED VALUES PLOT: BDEI SCORE v1 AND NSDAP VOTE SHARE 1930

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TABLE 5
NSDAP VOTE SHARE JULY 1932 (OLS) [a]

	Dependent Variable: NSDAP Vote Share July 1932									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI score v1	−0.037*** (0.010)					−0.085*** (0.019)				
BDEI score v2		−0.038*** (0.011)					−0.082*** (0.018)			
BDEI score v3			−0.039*** (0.011)					−0.084*** (0.017)		
BDEI score v4				−0.037*** (0.011)					−0.087*** (0.017)	
BDEI score v5					-0.034*** (0.011)					−0.088*** (0.017)
Constant	0.387*** (0.017)	0.387*** (0.017)	0.387*** (0.017)	0.387*** (0.017)	0.388*** (0.017)	0.488*** (0.028)	0.487*** (0.028)	0.489*** (0.028)	0.494*** (0.029)	0.498*** (0.031)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	1,037	1,037	1,037	1,037	1,037	1,036	1,036	1,036	1,036	1,036
R^2	0.069	0.071	0.072	0.068	0.059	0.227	0.230	0.236	0.241	0.239
Adjusted R^2	0.068	0.070	0.071	0.067	0.058	0.222	0.225	0.231	0.236	0.234

*p < 0.1, **p < 0.05, ***p < 0.01; clustered standard errors

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: county in Weimar Germany) was exposed to the pandemic.

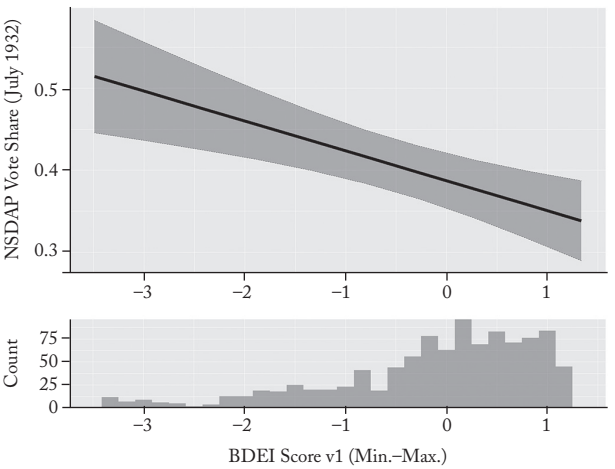

FIGURE 9
PREDICTED VALUES PLOT: BDEI SCORE V1 AND NSDAP VOTE SHARE JULY 1932

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Mechanisms, Part I: Pre-Reformation Germany—Introduction of Participative Elections

Next, we focus on the underlying mechanisms by which we postulate that the Black Death exerted a long-term effect on political outcomes in Germany. We begin with a set of analyses that examine pre-Reformation Germany. We study outcomes prior to the Protestant Reformation, which began in 1517, to rule out the possibility that the Reformation could be responsible for the observed outcomes. By showing that the Black Death is associated with key changes in proto-democratic institutions by the year 1500 (when compared to 1300), we demonstrate that some of the mechanisms discussed can be observed many years *before* the Reformation affected Germany's political landscape.

Table 6 shows the results for *introduction of participative elections 1300–1500* for 325 towns. The results indicate that towns more strongly exposed to the Black Death were significantly more likely to adopt participative institutions by 1500.

In Table 7, we add a variety of control variables, including geographic factors. While the results are at or below the threshold of statistical significance in two specifications, the direction of the effect remains the same. Indeed, the lower level of significance is likely due to the much smaller number of cases for which covariate data are available. Overall, the evidence suggests that demographic collapse from the Black Death set in motion institutional changes that are consistent with patterns of political behavior observed in the nineteenth century.

Mechanisms, Part II: Early Nineteenth-Century Prussia—The Black Death and Footprints of Serfdom

In the final set of analyses, we consider socioeconomic outcomes in early nineteenth-century Prussia. These analyses evaluate whether geographical variation in Black Death intensity is associated with proxy measures of the strength of serfdom long before 1871.

Our results indicate that both *proportion of large estates 1816* and *proportion of agricultural servants 1816/1819* are associated with the Black Death's historical intensity. Specifically, Table 8 shows a persistent negative relationship between the BDEI score and the proportion of large estates, indicating that the areas hit hardest by the Black Death had the smallest relative number of large estates in 1816. Table 9 shows a similar pattern when it comes to agricultural servants as a proportion of the overall population. In accordance with our mechanisms, the results indicate that areas hit hardest by the Black Death had a significantly smaller number of agricultural servants, indicating an economy that was less hierarchical and less agriculturally centered.

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TABLE 6
INTRODUCTION OF PARTICIPATIVE ELECTIONS 1300–1500 (LOGIT)[a]

	Dependent Variable: Introduction of Participative Elections 1300–1500				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
BDEI score v1	0.572***				
	(0.184)				
BDEI score v2		0.527***			
		(0.174)			
BDEI score v3			0.466***		
			(0.166)		
BDEI score v4				0.397**	
				(0.161)	
BDEI score v5					0.322**
					(0.159)
Constant	−1.836***	−1.821***	−1.802***	−1.782***	−1.764***
	(0.171)	(0.168)	(0.165)	(0.162)	(0.160)
Observations	325	325	325	325	325
Log likelihood	−132.288	−132.751	−133.617	−134.660	−135.714
Akaike Inf. Crit.	268.575	269.501	271.235	273.319	275.428

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: town in pre-Reformation Germany) was exposed to the pandemic.

TABLE 7
INTRODUCTION OF PARTICIPATIVE ELECTIONS 1300–1500 (WITH CONTROLS) (LOGIT)[a]

	Dependent Variable: Introduction of Participative Elections 1300–1500				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
BDEI score v1	2.203**				
	(1.030)				
BDEI score v2		2.022**			
		(0.965)			
BDEI score v3			1.751**		
			(0.890)		
BDEI score v4				1.326*	
				(0.777)	
BDEI score v5					0.861
					(0.646)
Constant	9.264	8.204	6.583	4.502	2.593
	(5.827)	(5.522)	(5.118)	(4.661)	(4.279)
Control variables	yes	yes	yes	yes	yes
Observations	86	86	86	86	86
Log likelihood	−28.884	−29.010	−29.306	−29.854	−30.468
Akaike Inf. Crit.	81.769	82.021	82.612	83.707	84.937

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: town in pre-Reformation Germany) was exposed to the pandemic.

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TABLE 8
PROPORTION OF LARGE ESTATES 1816 (OLS)[a]

	Dependent Variable: Proportion of Large Estates 1816									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI score v1	−0.010***					−0.012***				
	(0.001)					(0.002)				
BDEI score v2		−0.010***					−0.012***			
		(0.001)					(0.002)			
BDEI score v3			−0.010***					−0.013***		
			(0.001)					(0.002)		
BDEI score v4				−0.009***					−0.013***	
				(0.001)					(0.002)	
BDEI score v5					−0.009***					−0.014***
					(0.001)					(0.003)
Constant	0.017***	0.017***	0.017***	0.017***	0.017***	0.023***	0.025***	0.026***	0.027***	0.027***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	267	267	267	267	267	266	266	266	266	266
R^2	0.213	0.215	0.209	0.196	0.179	0.413	0.426	0.431	0.432	0.430
Adjusted R^2	0.210	0.212	0.206	0.193	0.176	0.397	0.411	0.416	0.417	0.414

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: geographic area in early nineteenth-century Prussia) was exposed to the pandemic.

TABLE 9
PROPORTION OF AGRICULTURAL SERVANTS (OF TOTAL POPULATION) 1816/1819 (OLS)[a]

	Dependent Variable: Proportion of Agricultural Servants (of Total Population) 1816/1819									
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
BDEI score v1	−0.012***					−0.018***				
	(0.002)					(0.005)				
BDEI score v2		−0.012***					−0.018***			
		(0.002)					(0.004)			
BDEI score v3			−0.012***					−0.018***		
			(0.002)					(0.004)		
BDEI score v4				−0.012***					−0.019***	
				(0.002)					(0.005)	
BDEI score v5					−0.012***					−0.020***
					(0.002)					(0.005)
Constant	0.092***	0.092***	0.092***	0.092***	0.092***	0.160***	0.161***	0.161***	0.162***	0.162***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Control variables	no	no	no	no	no	yes	yes	yes	yes	yes
Observations	280	280	280	280	280	279	279	279	279	279
R^2	0.103	0.101	0.100	0.098	0.095	0.296	0.299	0.300	0.300	0.298
Adjusted R^2	0.100	0.098	0.096	0.095	0.092	0.278	0.281	0.282	0.282	0.280

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

[a] The BDEI score shows how strongly a unit of analysis was exposed to the Black Death (1347–1351). The different versions of this score (v1–v5) vary in the discount factor (3, 6, 9, 12, 15). A higher discount factor implies that historical Black Death outbreaks at a greater distance receive a smaller weight in calculating our measure of how strongly the unit of analysis (here: geographic area in early nineteenth-century Prussia) was exposed to the pandemic.

VII. Conclusion

Contemporary social science emphasizes the importance of actions taken during critical junctures to explain differences in the nature, scope, and quality of government across societies.[113] As moments in time, critical junctures are defined by significant upheaval and fluidity:[114] institutional structures and social arrangements long taken for granted are suddenly amenable to changes that would have been inconceivable under normal circumstances. Such windows for change do not open easily. The antecedent to a critical juncture may be a shock that profoundly reorders economic circumstances or the de facto balance of power in a society.[115] Compared to the various types of shocks that may produce such an alteration in circumstances, the demographic collapse caused by a pandemic certainly numbers among the most consequential.

Our study examines the long-term legacy of one of the most profound demographic shocks in European history: the loss of life due to the Black Death in the mid-fourteenth century. Concentrating on the historical experience of the German-speaking areas of Europe from the arrival of the Black Death until the onset of the German Empire in 1871 and beyond, the study explicitly lays out all four stages of analysis needed to establish the importance of a critical juncture:[116] (1) characterization of the shock (the intensity of exposure to the Black Death); (2) the critical juncture itself (the decision to roll back or augment labor coercion); (3) the mechanisms of production of the legacy (changes in economic arrangements and political institutions resulting from changes in labor coercion); and (4) the legacy (electoral behavior in the late nineteenth century and in the Weimar period).

Empirically, our article shows that areas more intensely affected by the Black Death developed more inclusive political institutions at the local level and more equitable ownership of land, both reflecting a fundamentally changed political-economic equilibrium. Contrariwise, those areas less affected by the Black Death maintained political institutions and land ownership patterns that concentrated political and economic power in a small elite. In the first set of areas, voters in the late nineteenth century would come to reject the Conservative Party at the ballot box, an outcome indicative of voters' autonomy from the directives of the landed nobility. In the second set of areas, voters overwhelm-

[113] Cf. Collier and Collier 1991; Mahoney 2001.
[114] Capoccia 2015.
[115] Tarrow 2017.
[116] Collier and Munck 2017.

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ingly cast their ballots in favor of the Conservative Party, indicative not only of an antidemocratic political culture, but also of the ability of the landed elite to guide decisions at the ballot box. By restructuring political institutions and social organization at the local level, the Black Death had significant consequences for how citizens would come to engage in mass politics.

Importantly, the remarkable spatial divergence in political cultures created by the Black Death launched a political conflict between conservative and progressive forces that persisted well into the Weimar Republic. That conflict is evident in the clear association between historical Black Death exposure and votes for the National Socialist Party. The NSDAP's extremely antidemocratic and illiberal political views found fertile ground in the parts of Germany that had limited historical experience with democratic participation at the local level. Thus, the Black Death did not just shape institutional development in Central Europe during the early modern period and electoral outcomes during the nineteenth century. Its echoes may still be found in the party politics of the Weimar Republic's doomed experiment with mass democracy—an era of instability that led to the darkest episode in German history.

The experience of the German-speaking lands in the wake of the Black Death makes it clear that abrupt and dramatic shifts in relative factor prices may have significant consequences for long-term institutional development. Of course, pandemics are not alone in their ability to shift prices in this way: major wars can produce similar effects, as can large-scale migration and periods of revolutionary technological change. But pandemics are especially significant for social scientists because they offer distinctive opportunities for inference. Since pandemics are not products of human choice (like war and large-scale migration, for example), they may—in certain circumstances—unsettle relative factor prices in a manner more akin to that of a random shock. Thus, while pandemics are not necessarily uniquely influential for institutional development, they can be especially revealing when it comes to the way institutional development responds to changes in the relative power of labor versus capital and land.

What specific lessons does the Black Death offer about the potentially transformative role of a pandemic? One important lesson is that the depth of the shock matters. As the Black Death made its way through Europe, it imposed incalculable physical and emotional suffering and profoundly darkened the tenor of literature, music, and the visual arts. But despite the death and suffering, the world inherited by survivors and their descendants in areas ravaged by the Black Death was

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in many ways preferable to the world in which their ancestors had long toiled. Massive demographic collapse improved the bargaining power of labor, leading to major changes in social organization and political institutions. These developments would upgrade living standards and provide opportunities for meaningful political engagement. In a dark twist of irony, the experience of the Black Death demonstrates that the long-term political independence of labor may have blossomed from the graves of workers.

As a general matter, however, one should not expect all pandemics to have these types of consequences. To radically restructure labor relations—the catalyst for the social and political changes wrought by the Black Death—a disease shock must be very large, must affect individuals in their prime working age, and cannot be easily reversible. Pandemics that infect great numbers of individuals but have relatively low mortality rates, such as the Spanish Flu of 1918 and the global Covid-19 outbreak that started in 2019–2020, do not change the labor supply to the extent needed to fundamentally alter factor prices. The same is true for pandemics that have a high mortality rate but limited contagiousness, as was the case for HIV/AIDS before the widespread use of antiretroviral drugs. Diseases that primarily afflict children, such as measles and polio, also do not reconfigure relative factor prices—at least not in the long run—as reproductive strategies may compensate for heightened child mortality.[117]

To produce a labor market shock that generates dynamics like those initiated by the Black Death, a pandemic would have to combine high contagiousness with high mortality for working-age adults. The Ebola virus seemed to have this potential, but the recent development of a vaccine has reduced Ebola's threat to human life. Although no obvious alternative threat lies on the horizon, the present combination of high population density and unprecedented global interconnectedness will surely make the next great pandemic all the more destructive when it does arise. In the end, the Black Death offers this important reminder: when the next wave of destruction emerges, contemporary labor-repressive institutions may well be washed away in its wake.

Supplementary Material

Supplementary material for this article can be found at https://doi.org/10.1017/S0043887121000034.

[117] Cf. Hossain, Phillips, and LeGrand 2007.

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Data

Replication data for this article can be found at https://doi.org/10.7910/DVN/M0PKZE.

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Key Words

antidemocratic parties, aristocracy, Black Death, bubonic plague, Central Europe, conservatism, conservative parties, culture and institutions, democracy, democratization, disease, elections, elite politics, epidemics, factor prices, fourteenth century, German Empire, Germany, illiberal politics, Imperial Germany, inclusive political institutions, institutional persistence, labor coercion, labor repression, land-labor ratio, landed elites, landholding inequality, legacies, liberal parties, liberalism, local political participation, long nineteenth century, National Socialism, Nazi party, NSDAP, pandemics, path dependence, plague, political elites, political culture, political history, proto-democratic institutions, Prussia, right-wing parties, serfdom, transition to mass politics, twentieth century, Weimar Republic

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THE IMPACT OF POLITICAL APOLOGIES ON PUBLIC OPINION

By RISA KITAGAWA and JONATHAN A. CHU

ABSTRACT

Apology diplomacy promises to assuage historical grievances held by foreign publics, yet in practice appears to ignite domestic backlash, raising questions about its efficacy. This article develops a theory of how political apologies affect public approval of an apologizing government across domestic and foreign contexts. The authors test its implications using large-scale survey experiments in Japan and the United States. In the surveys, the authors present vignettes about World War II grievances and randomize the nature of a government apology. They find that apology-making, both as statements acknowledging wrongdoing and as expressions of remorse, boosts approval in the recipient state. But in the apologizing state, backlash is likely among individuals with strong hierarchical group dispositions—manifested as nationalism, social-dominance orientation, and conservatism—and among those who do not consider the recipient a strategically important partner. This microlevel evidence reveals how leaders face a crucial trade-off between improving support abroad and risking backlash at home, with implications for the study of diplomatic communication and transitional justice.

TO maximize their soft power, governments have an interest in maintaining good relations with foreign publics.[1] Their ability to achieve this goal depends in part on effective diplomatic communication and, more generally, engaging in successful public diplomacy.[2] This article examines one facet of this larger phenomenon of public diplomacy: the use of political apologies. To what extent do they help to garner public approval, and why?

Leaders have long used apologies as part of their arsenal of public diplomatic communication.[3] In the East Asian context, "apology diplomacy" over wartime legacies is a salient feature of contemporary interstate relations.[4] Prime Minister Junichiro Koizumi observed the sixtieth

1 See, for example, Chiozza 2015; Goldsmith and Horiuchi 2012; Nye 2004; Pape 2005.

2 Agadjanian and Horiuchi 2020; Chiozza and Choi 2003; Goldsmith and Horiuchi 2009; Goldsmith, Horiuchi, and Matush 2020; Mor 2006; Wang 2008; Wilson 2008.

3 Contemporary high-profile apologies include Bill Clinton's to Rwanda in 1998 and to Guatemala in 1999 for the United States' implicit role in the countries' civil wars (Gibney and Warner 2000), the UK's Tony Blair expressing "deep sorrow" for his country's involvement in the trans-Atlantic slave trade (National Archives, UK 2006) and in the Iraq War (Independent 2016), and King Willem-Alexander of the Netherlands apologizing to Indonesia for massacres committed during Dutch colonial rule (Jatmiko and Karmini 2020).

4 Dudden 2008; Lind 2010.

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anniversary of Japan's World War II surrender by issuing an apology for Japan's past militarism in the region, with the aim of placating China and South Korea.[5] And in 2016, President Barack Obama's announcement of his plan to visit Hiroshima revived public debates over apologizing for deploying atomic weapons in Hiroshima and Nagasaki.[6]

Although broad agreement exists about the rise in the use of apologies in the 1990s—dubbed by scholars the "age of apology"[7]—the effectiveness of apologies in winning public goodwill across different audiences remains unclear. Conventional scholarly accounts tout the political apology's ability, or at least its potential, to mend interstate or intergroup relations by signaling peaceful policy intentions or a commitment to international norms.[8] Yet the same apologies that are hailed as critical for improving foreign relations can sometimes alienate domestic groups. For instance, Japanese apologies over World War II, issued in the 1990s, were meant to mend relations with South Korea but incensed Japanese citizens.[9] Similarly, a 2019 UK proposal to apologize to India for the darkest chapters of British colonial history became a flashpoint in the House of Lords while simultaneously raising hopes among those in India who had long pressed for an official British acknowledgment.[10]

We contend that this mixed evidence stems from two main gaps in the literature. First, few studies holistically consider both the domestic and international repercussions of an interstate apology. The asymmetric effects of apologies across various audiences remain an underappreciated and undertheorized aspect of apology diplomacy, although more general scholarship in international relations addresses how audience costs constrain leaders.[11] Second, the apologies scholarship often addresses reconciliation as a broad outcome, yet few studies directly identify the effect of apologies on the political dimensions of this concept. Existing studies instead tend to conceptualize and operationalize "reconciliation" in a way that conflates political approval with broad social repair, forgiveness, and psychological healing.[12] Although these are important outcomes, the objective of apology diplomacy, in particular, is

[5] Onishi 2005.
[6] Hu and Domonoske 2016.
[7] Brooks 1999. See also Barkan 2000; Gibney et al. 2008; Govier and Verwoerd 2002a.
[8] See, for example, Barkan 2000; Barkan and Karn 2006; Bilder 2008; Nobles 2008.
[9] Lind 2009a; Lind 2008; Wakamiya 1995.
[10] Wagner 2019; Schultz 2019.
[11] Kertzer and Brutger 2016; Quek 2017; Tomz 2007.
[12] Reconciliation is defined in various ways in apologies scholarship. See, for example, Blatz, Day, and Schryer 2014; Blatz and Philpot 2010; Govier and Verwoerd 2002b; Marrus 2007; Minow 2002; Nobles 2008; Nobles 2014; Verdeja 2010; Weyeneth 2001.

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to improve relations between polities, which may include winning political approval without obtaining the deep, long-term psychological outcome of healing and forgiveness.

To address these gaps, we develop and test a theory of interstate apology-making as a form of strategic communication between states and audiences at home and abroad. We use the term "apology-making" to refer to either political apologies or expressions of remorse, where a political apology is an official public speech act or statement issued by a government (the apologizer) to a foreign country (the recipient) that acknowledges responsibility for a past political offense committed by the apologizer state against the recipient state or its members. In addition, we examine the related role played by an expression of remorse that signals regret from the perspective of the apologizer.[13]

We argue that the effects of apology-making on public approval of a government are asymmetric across audiences in apologizing and recipient states and that this asymmetry can be understood through two sets of attributes that shape individuals' responses: (1) hierarchical group dispositions—that is, individuals' tendencies to view social groups in terms of hierarchies and their group's place within them; and (2) the perceived value of relations between the two states involved. On the one hand, in the recipient nation, we expect the public to be generally receptive, viewing apology-making as addressing grievances plaguing intergroup relationships or as preserving the benefits of existing relations with the apologizing nation. On the other hand, these two sets of factors yield mixed predictions about how different audiences within the apologizing nation will react. Specifically, any positive effect of apology-making on public approval of the apologizing government will be significantly reduced among citizens who exhibit strong hierarchical group dispositions—nationalism, social-dominance orientation, or political conservatism—compared to those with weak such dispositions. The benefits will also diminish among those who see little advantage in

[13] A much thicker concept of apologies in Tavuchis's (1991) widely cited sociological study of interpersonal apologies includes the explicit aim of reconciling two parties. We use a relatively minimal conception because we view reconciliation as one of many possible outcomes of a political apology, rather than as a definitional feature of it. Our conception also differs from sociological and psychological research that suggests a genuine apology could contain as many as a dozen elements (Blatz, Schumann, and Ross 2009; James 2008; Lazare 2004; Tavuchis 1991), including an acknowledgment of victim suffering, a promise of nonrepetition, or an offer of reparations. There is substantial theoretical disagreement over which elements must be present to constitute an "authentic" apology (Jeffery 2011). But because government apologies, in practice, rarely contain all or even many of them (Blatz, Schumann, and Ross 2009), we consider apology-making in its basic form: a formal apology implying the acknowledgment of responsibility (which may or may not express remorse) and a show of remorse (which may or may not be contained in the same statement as the formal apology). See also Inamasu et al. 2020 on apologies as a multidimensional form of communication.

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conceding to a recipient state that is not a strategically important ally. These individual-level factors therefore explain the divergent effects of apology-making across the two states and reveal its potential to polarize audiences within the state seeking to acknowledge a historic wrong.

We tested our argument using large-scale survey experiments in Japan and the United States that manipulated the level and nature of apology-making in vignettes (hypothetical news articles) invoking World War II events in Japan and South Korea. This methodological approach is appropriate for testing our theoretical claims about individual-level, rather than state- or group-level, variation in the effects of apology-making and has the additional advantage of overcoming inferential issues arising from governments' strategic decisions to apologize in some cases but not in others.[14] In line with our theory, our experimental evidence demonstrates the sometimes-countervailing costs and benefits of apology-making. Apologies and expressions of remorse can garner favor with audiences in the recipient state. But they are significantly less successful at winning citizens' approval of their government in the apologizing state, sometimes even provoking a backlash. We show that this backlash is explained by individuals' views regarding an implicit hierarchy of social groups and their beliefs about the value of bilateral relations.

These findings advance our theoretical and empirical understanding of apology diplomacy in several ways. In contrast to the majority of studies, which primarily focus on emotional outcomes of apologies,[15] our analytical focus on public approval of a government provides a potential missing link between political apologies and broader interstate cooperation. Importantly, the ability of apology-making to improve mass public approval hinges on individual-level attributes, which existing scholarship has largely overlooked in favor of evaluating context-specific features of the apologies themselves.[16] Through theory and evidence on the heterogeneity across individuals, this article challenges the prevalent view of political apologies as predominantly positive tools for mending interstate relations and highlights their multifaceted effects across different populations. The evidence has implications for our understanding of when leaders offer—and withhold—apologies for

[14] Methodological advances in survey experimental research have allowed scholars to tackle nonrandom political communication in other areas of international relations, such as the domestic audience costs of backing down from threats (Kertzer and Brutger 2016; Tomz 2007), but scholars have only begun to apply experimental techniques to the area of apology-making (see, for example, Inamasu et al. 2020; Mifune et al. 2019).

[15] Allan et al. 2006; Brown, Wohl, and Exline 2008; Philpot and Hornsey 2011.

[16] See, for example, Blatz, Schumann, and Ross 2009; James 2008.

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historical grievances, which are often viewed as obstacles to international cooperation.[17]

Methodologically, this is the first experimental test of how an interstate apology can simultaneously affect domestic and foreign public opinion. This approach complements existing scholarship that uses in-depth qualitative cases, which provide rich historical depth but are less suited to testing causal hypotheses related to variation among individual-level attributes.[18] Indeed, our findings underscore the need to more fully bring microfoundations—especially the role of individuals' psychological dispositions and beliefs—into existing scholarship on apology diplomacy. In this, we join a broader literature on the microfoundations of political communication in foreign affairs.[19] The conclusion further discusses these contributions, as well as implications for the study of leader behavior in public diplomacy.

I. A Theory of Interstate Apology-Making

The study of apologies has traditionally focused on descriptive or normative features of apologies[20] in relation to outcomes like forgiveness or a sense of justice among victims.[21] We investigate instead the role of apology-making as a political tool: a form of strategic communication by governments seeking to win mass public approval. Further, we focus on interstate political apologies rather than on interpersonal or intergroup apologies. Below, we build on relevant scholarship across political science, history, sociology, and social psychology to theorize and generate hypotheses regarding the effects of apologies on domestic and foreign public opinion. We illustrate the theoretical intuitions through examples from scholarly and journalistic accounts, although doing so is not meant as a formal test of our argument.

Why Do Apologies and Expressions of Remorse Win Approval in the Recipient Country?

Scholars argue that apologies for past injustice can resolve tensions between the offender and the victimized by offering a "a symbolic defrock-

[17] Hwang, Cho, and Wiegand 2018.

[18] See, for example, Barkan 2000; Brooks 1999; Espindola 2013; Lind 2009a; Lind 2009b; Lind 2008. There are also rich qualitative studies on intrastate apologies, such as those by Canada (Blatz, Schumann, and Ross 2009) and Australia (Nobles 2014) to historically marginalized groups, and by Brazil (Schneider 2014) and Chile (Verdeja 2010) over political violence committed by prior regimes.

[19] See, for example, Goldsmith and Horiuchi 2009; Lin-Greenberg 2019; Chu, Ko, and Liu, 2021.

[20] Gill 2000; Govier and Verwoerd 2002a; Lazare 2004; Smith 2008; Tavuchis 1991; Verdeja 2010; Weyeneth 2001.

[21] Allan et al. 2006; Blatz and Philpot 2010; Brown, Wohl, and Exline 2008; Espindola 2013; Nobles 2008; Philpot and Hornsey 2011; Weyeneth 2001.

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ing"[22] and signaling new, peaceful policy intentions, and thereby reducing the perceived threat among victims.[23] In democratizing states, the act of apologizing for past violence is often central to broader transitional justice efforts aimed at achieving political and social reconciliation, as occurred when South Africa emerged from apartheid.[24] In the case of interstate apologies, historians and social scientists often credit Germany's public contrition for World War II atrocities with promoting reconciliation among European nations.[25] Others argue that Japan, in contrast to Germany and France, failed to undergo a deep reckoning over wartime atrocities, raising suspicions about Japan's foreign policy intentions and undermining prospects for reconciliation with its neighbors.[26] Consistent with this view, a survey study of Australian, Malaysian, and Filipino participants found that those who believed, correctly, that Japan had formally apologized for military aggression were more willing than apology-deniers to forgive the country.[27] More generally, even as explicit refusals to apologize are rare, governments and leaders are often criticized for staying silent or not responding to a call for an apology.[28]

Thus, from the standpoint of the recipient, apologies are primarily a positive act. For members of victimized groups, apologies can powerfully symbolize recognition of a past injustice.[29] Apologies are a step toward mending a past harm.[30] From a broader political perspective, apologies offer a show of goodwill between countries and help to alleviate suspicions about the apologizer's intentions toward the recipient state. We therefore expect the following:

> —H1. Political apologies increase public approval of the apologizer government in the recipient country.

Another key insight of past studies, however, is that not all apologies are created equal. Although on the one hand, the acknowledgment of responsibility for a past harm is a minimal requirement for apologies

[22] Teitel 2006, p. 104.
[23] Lind 2008.
[24] de Greiff 2008; Rotberg 2006.
[25] Barkan 2000, pp. 60–64; Jeffery 2011; Kydd 1997; Lebow 2006.
[26] Christensen 1999; Kydd 1997; Lind 2008.
[27] Philpot and Hornsey 2011.
[28] Examples include media coverage of Boris Yeltsin's silence on the Soviets' 1940 massacre of fifteen thousand Polish officers in Katyn (Scislowska 1995), Belgium's reticence regarding a United Nations report urging the country to apologize for its colonial practices in the Congo (*BBC News* 2019), and calls for Australia's Prime Minister Paul Keating to apologize to Malaysia over a diplomatic gaffe (Hellaby and Brown 1993).
[29] Nobles 2008; O'Neill 2001, pp. 177–92.
[30] Recipient state members may also like the idea that another country is apologizing to theirs for status reasons, or "the management of face and honor"; O'Neill 2001, p. 192.

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in general, scholarly and popular accounts suggest that the most effective apologies further convey remorse or deep regret.[31] An apology that is perceived to be lacking this quality, on the other hand, is unlikely to satisfy victim groups.[32] Bill Clinton's offer of condolences for unarmed Korean refugees whom American soldiers shot in the early stages of the Korean War, for example, fell short. Korean survivors argued for "a more sincere apology, not a vague statement of regret, from the U.S. government."[33] Similarly, Asian women forced into sexual slavery by the Japanese army during World War II have repeatedly rejected compensation by private foundations in favor of a heartfelt apology.[34]

Indeed, a formal apology and an expression of remorse can each exist without the other. Japanese official statements regarding World War II atrocities are typically labeled "quasi-apologies" for failing to adequately invoke the moral vocabulary of remorse. But some Japanese apologies have also been criticized for omitting an acknowledgment. When Prime Minister Shinzo Abe on the seventieth anniversary of Japan's defeat publicly addressed Japanese soldiers' brutal treatment of prisoners of war and the mass rape of Chinese women at Nanking, his speech expressed remorse—"I bow my head deeply before the souls of all those who perished both at home and abroad. … I express my feelings of profound grief and my eternal, sincere condolences"—but pointedly omitted an acknowledgment of Japanese responsibility.[35] The United States has engaged in a similar diplomatic strategy regarding its use of atomic bombs in Japan. In his visit to Hiroshima, Obama delivered a sympathetic and emotional speech but sought to avoid signaling that the visit amounted to an apology.[36]

The above cases imply that an apology may be more effective when it is accompanied by a clear expression of remorse, which may be implicit in some apologies, but not all. To disentangle the effects of apologies as such and of expressions of remorse, we therefore test two additional hypotheses:

[31] Blatz, Schumann, and Ross 2009; Govier and Verwoerd 2002a; James 2008; O'Neill 2001, pp. 185–88; Tavuchis 1991, p. 16.

[32] Gibney and Roxtrom 2001; Minow 2002; Nobles 2008.

[33] Cited in Becker 2001.

[34] Osiel 1995, pp. 677–78.

[35] Groll 2015.

[36] Hu and Domonoske 2016. In an additional example, a 2001 US public statement to China over a military clash in the South China Sea specifically expressed regret, but did not acknowledge responsibility for the incident (Lakshmanan 2001). Conversely, Tony Blair's qualified apology over UK involvement in the Iraq War acknowledged "mistakes [and] failures for which I repeat I take full responsibility and apologize," but maintained that the war's outcomes ultimately left the world "better off" (*Independent* 2016).

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—H2. Expressions of remorse will increase public approval of the apologizer government in the recipient country.

—H3. The positive effect of an apology on the recipient country's public approval will be greater when it is accompanied by an expression of remorse.

In hypotheses 1–3, we do not predict whether an expression of remorse serves as a substitute for an official apology, but we explore this possibility in the empirical analysis.

Saying "Sorry" and the Potential for Domestic Backlash

Domestic audiences in the apologizing state, like those in the recipient country, may value building goodwill through apology-making. But historical and journalistic accounts provide numerous examples of apologies backfiring at home and requiring an explanation. Tony Blair's 1997 apology to Ireland for the UK's role in the nineteenth-century potato famine was widely criticized by historians and the media as opening the door for Ireland, as the *Daily Telegraph* wrote, to "place the blame for all the country's ills at the door of the Brits, ultimately justifying terrorism."[37] Similar fears about an apology bringing "ruin" drove political groups across Europe that mounted stiff opposition against attempts to confront past collaboration with the Nazis.[38] Concerns about offending World War II veterans dissuaded Obama from issuing an apology over the use of atomic bombs in Japan, particularly in light of criticism during his 2012 reelection campaign for having gone on an "apology tour" in 2009 that seemed to acknowledge missteps in US foreign policy.[39]

These accounts point to an implicit but undertheorized pattern. Apology-making can alienate certain domestic constituencies even while boosting public approval abroad. But which domestic constituencies? We argue that considerations that diminish or even reverse an apology's upsides are most likely among two kinds of citizens in the apologizer state: those with strong hierarchical group dispositions and those who see little value in bilateral relations between apologizer and recipient.

Hierarchical Group Dispositions

A government apology can be a potent symbol, invoking the moral, ideological, and distributive claims of different groups.[40] As such, an apology can amplify a sense of us-versus-them, creating skepticism among

[37] *Daily Telegraph* (UK), cited in Holland 1997.
[38] Lind 2009b, p. 142.
[39] Borchers 2016; Fisher 2016.
[40] Nobles 2008; O'Neill 2001.

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those who perceive their group's values to be under attack. Although individuals can identify with many different groups at any given time, we argue that three such dispositions are especially relevant for interstate apology-making. First is identification with the nation. Nationalistic sentiment is a key source of contention over the way a country's history of conflict is reflected in school textbooks,[41] judicial proceedings,[42] and political discourse.[43] For individuals with strong nationalist sentiments who view their country as superior and dominant,[44] apology-making may pose a direct challenge to their positive perceptions of their nation's identity and values. Further, these nationalists may believe that recognition of injustice to nonnationals weighs less, on balance, than the priorities of their own nation.[45]

Second, social and political psychology research demonstrates that those who exhibit greater social-dominance orientation—that is, those who consider a group identity to demarcate and justify social hierarchies—think, behave, and support policies in ways that benefit and protect such hierarchies.[46] Those exhibiting greater social-dominance orientation, then, may be less inclined to accept an official apology that is offered to another nation, a clear out-group. For example, in a 2019 survey study of Japanese participants, preferences for group-based hierarchies were correlated with weaker support for government apologies to foreign countries on issues like the ecological consequences of the 2011 Fukushima nuclear disaster.[47]

Third, political conservatism provides another source of skepticism toward apology-making to another nation. Unlike in liberalism, an important strand in conservative thinking privileges the idea of an individual being rooted in a communal sense of identity.[48] In a similar vein, research in moral psychology shows that conservatives are more likely than liberals to draw from in-group loyalty as a fundamental moral value.[49] Given the special importance in popular conservative discourse of

[41] Buckley-Zistel 2009; Schneider 2008.

[42] Milanović 2016.

[43] Barahona De Brito, Gonzaléz-Enríquez, and Aguilar 2001; Löytömäki 2013.

[44] Kosterman and Feshbach 1989.

[45] As summarized by Miller 1995, p. 49: "In acknowledging a national identity, I am also acknowledging that I owe special obligations to fellow members of my nation which I do not owe to other human beings."

[46] Pratto et al. 2013; Pratto et al. 1994; Sidanius and Pratto 1999; Spears, Doosje, and Ellemers 1997; Tajfel and Turner 1986.

[47] Mifune et al. 2019.

[48] For psychological research see, for example, Jost et al. 2003; Karasawa 2002. See also a rich debate in contemporary political theory around the politics of recognition and difference: Coulthard 2014; Kymlicka 1995; Laborde 2008; Taylor 1994.

[49] Graham, Haidt, and Nosek 2009.

a nation's history and its representation, an interstate political apology that corrects the dominant historical narrative of the apologizer nation may be taken as pernicious.[50] Conservative groups in the United States,[51] the UK,[52] and Mexico,[53] among other countries, have recently protested attacks on their understanding of their nation's history.

In sum, what unites nationalism, social-dominance orientation, and conservatism is a core belief in intergroup distinction and hierarchy. Nationalists tend to view their nation as superior to others; social-dominance oriented individuals wish to preserve their group's superior hierarchical position; conservatives, although valuing authority and tradition, draw on special responsibilities to the in-group as an anchoring moral value. The three traits all therefore provide foundations for why individuals may perceive apology-making as an affront to their deeply held group values, making them more likely to disapprove of or even to reject their government's apology-making to a foreign nation.

BELIEFS ABOUT THE STRATEGIC VALUE OF BILATERAL RELATIONS

Interstate apology-making could also provoke concerns about national security and interstate politics more generally. In contrast to hierarchical group dispositions, which tend to be deeply held beliefs rooted in individual psychology and values, these concerns stem from people's pragmatic perceptions of strategic relations at the state level.

Specifically, we contend that citizens will be more supportive of a political apology or an expression of remorse if they believe that it is being issued to a country of political importance. They may think such measures prudent to repair relations with a formal ally or a key strategic partner. For example, Japanese citizens have long had a favorable opinion of the United States and, in a 2016 poll, a striking 95 percent said that the future development of US-Japan relations was "important" for the region.[54] The public's recognition of Japan's vital interest in maintaining and enhancing cooperation with the United States may have provided the receptive domestic audience needed for Abe to express "deep repentance" to the American people over Japan's role in World War II.[55]

[50] This conservative objection is summed up by the historian Sander Philipse on Dutch popular opposition to revisiting the country's colonial history in Indonesia: "We did it, it was a long time ago, everybody else was doing it . . . there's nothing to apologize for." Cited in Henley, Oltermann, and Boffey 2020. See also Bar-Tal, Oren, and Nets-Zehngut 2014 on how such collective narratives can sustain support for intergroup conflict.

[51] Dawson and Popoff 2004.

[52] Cunningham 2008.

[53] Minder and Malkin 2019.

[54] Japanese government data, cited in Kafura 2017.

[55] *BBC News* 2015.

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A long theoretical tradition analyzes how states behave to maximize their security interests;[56] more recent research shows that individual citizens adopt, to some extent, instrumental foreign policy preferences as well. For example, Daniel Drezner's analysis of observational and experimental survey data reveals that a surprisingly large part of the public embraces realpolitik regarding international affairs.[57] Appealing to strategic interests can therefore help leaders to convince the public to support costly alliance policies, persuading citizens by invoking "the logic of consequences."[58] We thus hypothesize that citizens are generally more permissive of their government apologizing or displaying remorse over a past harm to a strategically valuable ally than to a rival or even a neutral nation.

Some might wonder about the relationship between the hierarchical group dispositions and strategic-relations factors. People exhibiting strong social-dominance orientation may be less likely to think that they are getting something out of a bilateral alliance because they are more disposed to seeing relationships as hierarchical rather than as interdependent. Nevertheless, there are strong conceptual and empirical reasons to believe that these two attributes function in distinct ways. The dispositional indicators—nationalism, social-dominance orientation, and conservatism—tap into individuals' deeply held convictions, often with a moral or value-based foundation, regarding the world and their group's place within it. Such dispositions are relatively sticky,[59] whereas people's beliefs about a relationship's strategic value are more readily influenced by short-term circumstances, including geopolitical and economic events.[60] Consider, for example, US perceptions of the need to strengthen ties with Japan to "offset China's power"; the proportion of people holding this view increased by 11 percentage points in just a decade, from 2008 to 2018.[61]

Our survey data also show a high correlation among nationalism, social-dominance orientation, and conservatism, but not between these factors and individuals' beliefs about the strategic value of the relationship between apologizer and recipient states (see the supplementary material).[62] Further, as we discuss, our evidence for H4 and H5 below is robust to accounting for the correlation between the two sets of variables through multivariate regression analysis. Thus, although people's

[56] See, for example, Morgenthau [1948] 1985; Waltz 1979.
[57] Drezner 2008.
[58] Chu, Ko, and Liu, 2021; Krebs 2015.
[59] See, for example, Herrmann, Tetlock, and Visser 1999; Wittkopf 1990.
[60] See, for example, Margalit 2013.
[61] Friedhoff and Kafura 2018, p. 5.
[62] Kitagawa and Chu 2021b.

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hierarchical group dispositions may overlap to some extent with their perceptions about the strategic benefits of interstate relations, our conceptualization and evidence provide a basis for treating them as distinct moderators.

We therefore test two additional hypotheses:

> —H4. The effect of apologizing/expressing remorse will be smaller among members of the apologizing state who exhibit strong hierarchical group dispositions (higher levels of nationalism, social-dominance orientation, and conservatism).
>
> —H5. The effect of apologizing/expressing remorse will be larger among those who see a higher strategic value in the relationship between apologizer and recipient.

Before moving to the research design, we state two caveats about H4 and H5. First, we do not claim these two sets of factors explain all the variation in the effect of apology-making, but we focus on them for the theoretical foundations we described above that suggest that they are especially germane to interstate apology diplomacy. They also apply across diverse regions and time, in contrast to narrower factors, including context-specific histories, that are no doubt important but are less amenable to generalizable theory. Second, our theory does not make a prediction about how the hierarchical group disposition and perceived strategic value variables might moderate the effect of public approval in the recipient country. Although nationalists, for example, may be averse to their state apologizing to another, there is little a priori reason to expect that they would be similarly averse to receiving another country's apology; the same goes for individuals who are highly social-dominance oriented or who are conservative. Similarly, citizens of a state that has committed a wrong may support an apology to keep the favor of a valuable ally, but this strategic calculation does not symmetrically apply to citizens of a wronged state. For these reasons we do not establish symmetric hypotheses on public approval in the recipient state, although in the supplementary material we show such analyses for completion and transparency.[63]

II. Research Design and Data

A key challenge of identifying the effects of political apologies is that leaders strategically decide whether to issue an apology while consider-

[63] Kitagawa and Chu 2021b. We find that the various moderators in H4 and H5 do not consistently interact with the effects of apologizing in these cases, in line with the theory's claims that these individual-level attributes matter primarily in the apologizer state.

ing the potential for domestic and foreign public approval and backlash. We took an experimental approach to mitigate this problem of endogeneity between the occurrence of an apology and public opinion. We conducted a pair of large-scale survey experiments in Japan and in the United States that manipulated the nature of apology-making in hypothetical news articles. The surveys were designed to test the effects of apology-making from the perspective of the apologizer's and recipient's domestic audiences. To our knowledge, this is the first experimental test of the effects of political apologies on both foreign and domestic public opinion. By considering both types of audiences simultaneously, we can identify the potentially uneven or dual effects of apology-making, speaking to the trade-offs leaders face when acknowledging past injustices.

The vignettes in our survey experiments deal with two scenarios—a US apology to Japan and a Japanese apology to South Korea—described below. We take the US-Japan scenario as a starting point due to the countries' relatively friendly relations over the years, which serve as a hard test for any potential domestic backlash to apology-making. Although the US-Japan context is itself important in terms of both theory testing and policy, we examine the generalizability of the results in the Japan survey by exposing participants to an additional scenario involving Japan–South Korea relations.

Scenario 1: Japanese and US Reactions to a US Apology to Japan

Japanese and US respondents completed scenario 1, which involves the United States apologizing (or not) to Japan for using nuclear weapons during World War II. In this scenario, we measured the public reaction in the recipient country, Japan, and the apologizing country, the United States. The Japan sample consists of 775 adults, drawn using quotas to be nationally representative in terms of gender, age, and political affiliation.[64] The sample was collected through an online survey programmed by the authors and fielded by Qualtrics in March 2020. The US sample includes 758 adults, drawn from a diverse convenience-sample. The authors fielded this survey online over Amazon Mechanical Turk, also in March 2020. Because the typical Amazon Mechanical Turk sample is slightly younger, more educated, and more liberal than the general

[64]The Japan sample was part of an omnibus survey of 1,567 respondents, of whom 775 received scenario 1, regarding Japan-US relations. As described below, all 1,567 respondents received scenario 2, involving Japan and South Korea.

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population,[65] we applied statistical weights to adjust for these demographic differences using the procedures that Jens Hainmueller describes.[66]

Japanese and US respondents completed a survey with the same structure and text in their respective national languages. The main parts of the survey were (1) a set of pretreatment moderator questions; (2) a vignette about a potential apology by the United States to Japan over World War II; (3) posttreatment questions asking respondents to evaluate how the United States handled the situation, along with a manipulation check; and (4) some final demographic questions. We used the set of pretreatment moderators to test the conditional effects hypotheses about hierarchical group dispositions and perceived benefits of the bilateral relationship; we describe the procedures on the moderators in detail in our discussion of the results. The supplementary material contains a breakdown of the respondents' demographics, along with the questionnaire and other auxiliary descriptive statistics.[67]

Japanese and US respondents read a hypothetical news story in which a US delegation visit to Hiroshima prompts calls for the United States to address its use of nuclear weapons during World War II. In the news story, we randomized the US government's reaction using a 2 x 2 design (absence or occurrence of apology x absence or occurrence of remorse). This yielded four conditions: the United States (1) stays silent; (2) apologizes but does not express remorse; (3) expresses remorse but does not apologize; or (4) apologizes and expresses remorse.[68] The staying-silent response, which reflected how the absence of apology-making is typically covered in the press,[69] served as the baseline. Because some respondents may perceive remorse to be implicit in an apology, and vice versa, we explicitly noted whether the government response contained one or both elements. Table 1 shows the full vignettes.[70]

[65] Berinsky, Huber, and Lenz 2012.

[66] Hainmueller 2012. We created weights to match demographic targets on the following variables: age, gender, race, household income, education, party affiliation, and political ideology. A more detailed description, including the results without weights, is described in the supplementary material; Kitagawa and Chu 2021b. Substantive results do not change when excluding the weights.

[67] Kitagawa and Chu 2021b.

[68] To reduce variance, we use a block-randomized design, blocking on the respondent's beliefs about the benefit of a US-Japan alliance. Early in the survey and before the vignettes, respondents scored on a one to seven scale how much they believed that their own country benefited from this alliance and how much they believed the other country benefited. Subjects were randomly assigned to one of the four conditions within each level of this scale.

[69] See, for example, Hellaby and Brown 1993; Pearlman 2011; Schultz 2019.

[70] Our diagnostic analyses show that the randomization achieved balance. Further, a high level of respondents, roughly equal across all treatment groups, passed the manipulation check: 73.4 percent in the Japan sample and 83.3 percent in the US sample. Balance tests and manipulation checks are described in the supplementary material.

TABLE 1
VIGNETTES FOR JAPAN-US EXPERIMENT (ENGLISH VERSION)[a]

[Opening text] August 1 – A US delegation of government officials visited Hiroshima City, Japan. The visit took place just days before August 6th, the date the US dropped an atomic bomb on the city during World War II. In reaction to the visit, many have called upon the US government to issue an official apology.

	Apology	*No Apology*
Remorse	**US apologizes, expresses remorse for World War II atomic bomb use** After considering its options, the US government issued a statement apologizing and expressing deep remorse for using nuclear weapons during WWII.	**US expresses remorse for World War II atomic bomb use** After considering its options, the US government issued a statement expressing deep remorse for using nuclear weapons during WWII. Observers, however, noted that the statement did not include an apology.
No Remorse	**US apologizes for World War II atomic bomb use** After considering its options, the US government issued a statement apologizing for using nuclear weapons during WWII. Observers, however, noted that the statement did not express deep remorse.	**US stays silent on World War II atomic bomb use** After considering its options, the US government did not respond to the request for an apology.

[a] Each group read a different headline, depending on the treatment condition. The opening text in the hypothetical article was identical for all groups and followed the headline. Table cells show the headlines (in bold) and the varying US government responses that follow the opening text.

After viewing the news story, respondents received a question that captures our study's main dependent variable, approval of the US government response, measured on a seven-point approve–disapprove scale. In the analysis, for ease of interpretation, we collapse this seven-point scale into a binary approve or disapprove measure, allowing the effects to be read in terms of percentage points.[71]

SCENARIO 2: JAPANESE REACTIONS TO A JAPANESE APOLOGY TO SOUTH KOREA

We take our analysis further by exploring how the results might differ in another diplomatic context, allowing us to examine whether the ef-

[71] Strongly approve, somewhat approve, and slightly approve are coded 1 for approve, and the rest are coded 0. The results are robust to, and generally even more pronounced, using the full seven-point scale, as it captures a greater degree of meaningful variance.

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fects of apology-making generalize beyond the US-Japan dyad. In our survey of Japanese participants, we included an additional scenario relating to Japan–South Korea relations. The scenario, which 1,567 Japanese respondents evaluated, provides a second case of how domestic audiences of an apologizing country (Japan) may react to their government issuing a political apology (in this case, to South Korea).

To be clear, our main hypotheses do not make predictions about whether and why effects would differ across country cases. One can think of dozens of reasons why Japan and the United States' relationship is not comparable with Japan and South Korea's. Instead, analyzing a starkly different case allows for a more robust evaluation of our hypotheses and helps to identify potential scope conditions. Just as important, the second case allows us to test whether our key moderators—hierarchical group dispositions and perceived value of the bilateral relationship—generalize. Nevertheless, in the discussion of the results we reflect on potential reasons for similarities and differences across cases.

Scenario 2 follows the same survey structure as scenario 1. Japanese survey-takers (1) answered pretreatment moderator questions, (2) read a vignette about Japan making an apology (or not) to South Korea over World War II, (3) evaluated the Japanese government's response (this part of the survey also included a manipulation check), and (4) answered post-outcome demographic questions. The vignettes this time involved wartime atrocities by Japan in South Korea during World War II, including the military institution of *ianfu*, or "comfort women," the Japanese euphemism referring to an estimated two hundred thousand Asian women forced into sexual slavery.[72] This topic provided realism to the vignettes, considering how Japan's often frosty relations with South Korea are rooted in ongoing disputes over this history.[73]

Respondents read a hypothetical news story about a dispute over harm done by Japan during World War II; Japan was now the potential apologizer state. Here, we used a 2 x 2 x 2 design. The first two factors were the same as those in scenario 1 (apology x remorse). We added an additional independent factor that randomized whether the potential apology was about forced wartime labor or explicitly about "comfort women." This additional level of randomization helped us to evaluate whether the results would be sensitive to certain triggering phrases. We find, however, that the effects of apologizing and showing remorse are not significantly affected by the issue difference, and so we focus on the

[72] For background, see, for example, Soh 1996; Yoshimi 1995.
[73] See, for example, Denyer 2019; Kim 2019; Sala 2017.

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results in the aggregate in our analysis below. The vignette texts closely mirror scenario 1 (full vignettes are in the supplementary material).[74] To maximize the realism and external validity of the vignette, the hypothetical scenarios were modeled after actual news articles.[75]

As with scenario 1, after reading a vignette, the Japanese survey respondents expressed their approval or disapproval for how the Japanese government handled the situation. Again, the outcome was recorded using a seven-point scale, but we present it below using a binary measure for ease of interpretation.

III. Results

Do Political Apologies Affect Domestic and Foreign Opinion?

We begin by examining whether apology-making can win the favor of citizens in the recipient state. According to the responses to the first scenario, they do.[76] As Figure 1 reveals, Japanese citizens express far greater approval when the US government apologizes or expresses remorse compared to when it stays silent. Furthermore, they approve of a US apology with remorse more than they do of either an apology or a show of remorse alone. The differences are positive and statistically significant at the 0.05 level.

Now we turn to the effect of apology-making on the citizens of the apologizer. Overall, the results tell a less optimistic story about the ability of apologies to garner public approval. In the United States, as Figure 2 shows, apologies without an expression of remorse do not significantly raise domestic public approval compared to staying silent. Expressions of remorse have a modest positive effect (about ten points), but nowhere near the forty-point effect seen in the recipient public sample in Figure 1. Similarly, a statement of apology coupled with an expression of remorse has a positive, but relatively modest, effect.

The results thus far support a sanguine narrative about the ability of apologies to bring two nations together, although the benefits of apologizing are primarily on the recipient rather than apologizing side. As we turn to scenario 2, we further see how domestic backlash can manifest in the apologizer's public. When Japanese survey-takers read that their government apologized to South Korea for Japanese acts during

[74] Kitagawa and Chu 2021b.

[75] See, for example, Rich 2018; Suzuki 2019.

[76] For this US-Japan scenario, the baseline approval ratings for staying silent were 42.3 percent in the US sample and 16.7 percent in the Japan sample.

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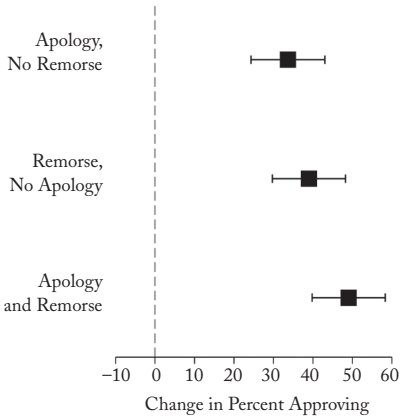

FIGURE 1
US GOVERNMENT APOLOGIES BOOST JAPANESE APPROVAL
(SCENARIO 1: US–JAPAN)[a]

[a] Figure presents the estimates of changes in Japanese approval of the US government from difference in means tests between different kinds of US apologies/shows of remorse versus staying silent (baseline). N = 775; 95 percent confidence intervals are displayed.

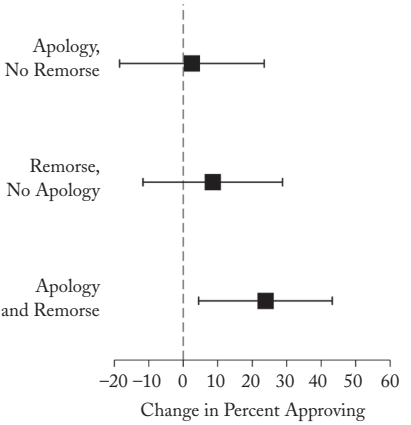

FIGURE 2
TEPID APPROVAL AMONG AMERICANS FOR OFFICIAL US APOLOGY
(SCENARIO 1: US-JAPAN)[a]

[a] Figure presents the estimates of changes in US approval of the US government from difference in means tests between different kinds of US apologies/shows of remorse versus staying silent (baseline). N = 758; 95 percent confidence intervals are displayed.

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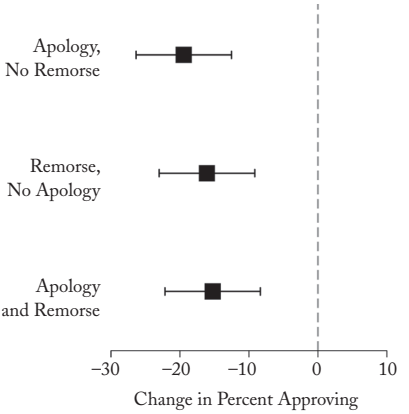

FIGURE 3
JAPANESE DISAPPROVE OF THEIR GOVERNMENT APOLOGIZING TO SOUTH KOREA (SCENARIO 2: JAPAN–SOUTH KOREA)[a]

[a] Figure presents the estimates of changes in Japanese approval of the Japanese government from difference in means tests between different kinds of Japanese apologies/shows of remorse versus staying silent (baseline). N = 1,567; 95 percent confidence intervals are displayed.

World War II, they balked. As shown in Figure 3, Japanese apology-making of any form decreased domestic approval by ten to twenty percentage points.[77]

In sum, we find support for H1–H3. Apologies and expressions of remorse significantly boost approval in the recipient state, and their combination has a greater effect than either component alone. Yet, as the theory suggests, apology-making has an indeterminant effect on the domestic audiences of the apologizer; cross-cutting factors could generate gains but also backlash. The next section on moderators of the apology-making effect delves into this phenomenon.

HIERARCHICAL GROUP DISPOSITION AND DOMESTIC BACKLASH TO APOLOGIZING

Recall our argument that individuals' hierarchical group dispositions and perceptions about their country's relationship with another provide distinct sets of reasons why domestic audiences might not reward or might even disapprove of their government for issuing an apology.[78] We

[77] The baseline approval rating for staying silent was 59.9 percent.

[78] Here, we examine these two sets of moderators separately, but as shown in the supplementary material, the analysis is robust to statistical models that control for the presence of the other set of factors (for example, when assessing the interaction between hierarchical group disposition and apologizing, we control for people's beliefs about the bilateral relationship's benefits).

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first test our hypothesis on how hierarchical group dispositions moderate the impact of apology-making. Specifically, we expect nationalism, social-dominance orientation, and conservativism—variables that map onto hierarchical group dispositions—to diminish the positive effect of apology-making on domestic public approval.

We created trichotomous scales for each moderating variable for the analysis. To measure nationalism, we split into tertials the average of three nationalism measures. Respondents were asked if they agreed or disagreed with the following three statements: (1) Japanese/Americans are not perfect, but Japanese/American culture is better than other cultures; (2) I would rather be a citizen of Japan/the United States than any other country in the world; and (3) the world would be a better place if people from other countries were more like those in Japan/the United States. These measures draw from the conceptualization of nationalism that Rick Kosterman and Seymour Feshbach outline, which distinguishes nationalism (the view that one's country is superior and should be dominant) from patriotism (feelings of attachment to one's country).[79] In this way, the measures home in on respondents' us-versus-them sense of national group identity.

Similarly, to measure social-dominance orientation, we split into tertials the average of two indicators. Respondents were asked whether they supported or opposed the following general statements about groups in the world: (1) in setting priorities, we must consider all groups; and (2) we should not push for group equality. We took these measures from Felicia Pratto and coauthors.[80] The nationalism and social-dominance orientation indicators are standard measures that have been validated in cross-national contexts, allowing us to include them in both the Japan and US surveys.

To measure political ideology, we asked standard left-right ideology questions and created trichotomous scales with the values of left (liberal), center (moderate), and right (conservative).

From these variables, we estimated the conditional average treatment effect of apologizing and showing remorse at each value of the three moderating variables. For the three values of each moderator, we collapse the 2 x 2 (apology x remorse) into the average treatment effect of apologizing and the average treatment effect of showing remorse, as opposed to breaking out all four conditions as we did in the previous

[79] Kosterman and Feshbach 1989.

[80] Pratto et al. 2013 test which indicators from an earlier widely used work (Pratto et al. 1994) are robust to different cultural contexts. We use the two most robust indicators of social-dominance orientation identified by Pratto et al. 2013.

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analysis. Doing so allows us to clearly show the interaction between the moderating variables and either apologizing or showing remorse.

The results tell a coherent story. As Figure 4 illustrates, individuals who are highly nationalistic, highly social-dominance oriented, or conservative are less likely than others to reward their government for apologizing to another state. In some cases, these groups may even react negatively. Conservatives and those who rank high on social-dominance orientation cut their approval by eight to nine percentage points when the United States issues an apology versus when it stays silent.[81]

Figure 5, showing results for the Japan sample, is similar. All three moderators negatively interact with both the apology and remorse treatments, although only the interactions between nationalism and apology, social-dominance orientation and remorse, and conservativism and apology are statistically significant at the 0.05 level. Across the two scenarios, however, we find a negative effect for all twelve interactions, and a majority are significant at the 0.05 level, lending strong confidence to the argument that people holding intense hierarchical group dispositions are less approving of political apologies than others (H4).

Beliefs about Bilateral Relations and the Impact of Apologizing

Next we explore how the perceived value of bilateral relations between apologizer and recipient moderates the effects of apology-making at home. If citizens in the apologizing state do not see the benefits of maintaining good relations with the recipient country, they are less likely to reward and may outright disapprove of their leaders for apologizing or expressing remorse.

To assess this claim, we asked survey-takers in the apologizer state to rate their country's relationship with the recipient nation and, using their responses, created a trichotomous variable that codes whether they thought the relationship brought a small, medium, or large political benefit. In the US-Japan scenario, Americans expressed whether they thought the two countries' alliance was beneficial to the United States. In the Japan–South Korea scenario, Japanese survey-takers were asked if they believed that the Japan–South Korea intelligence-sharing agreement was beneficial to Japan.

Figure 6 summarizes the results, which lend support to H5. The impact of an apology is greater among citizens of the apologizer who be-

[81]The negative interaction term is significant at the 0.10 level for nationalism, 0.05 for social-dominance orientation, and 0.05 for conservatism (conservative*apology only, not remorse). They are all significant at the 0.05 level when using the full seven-point-scale dependent variable.

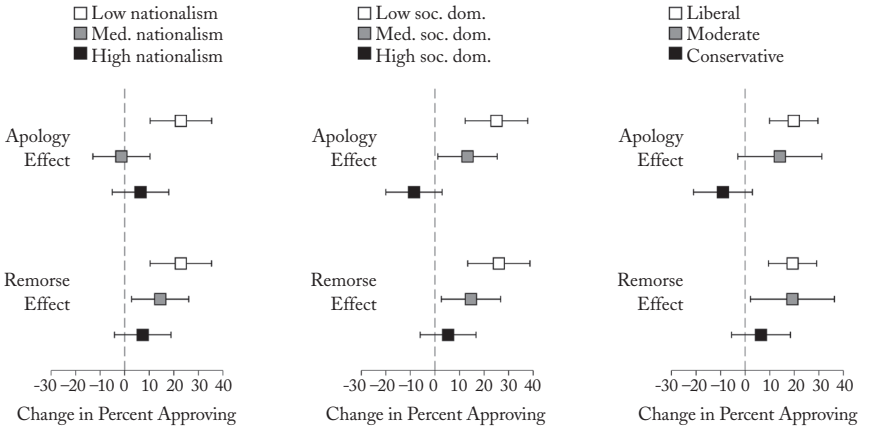

FIGURE 4
STRONG HIERARCHICAL GROUP DISPOSITIONS SUPPRESS THE BENEFITS OF APOLOGIZING (AMERICAN OPINION ON A US APOLOGY)[a]

[a] Figure presents, for different subgroups of Americans, the effect of apologizing or showing remorse on their approval of the US government. N = 758; 95 percent confidence intervals are displayed.

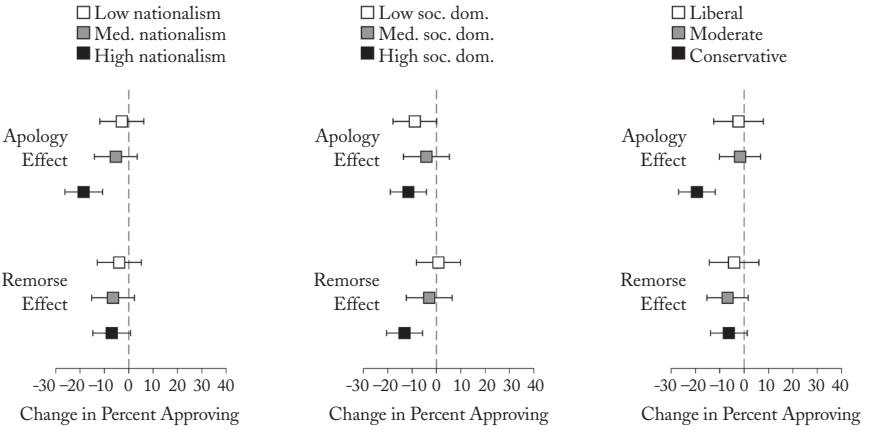

FIGURE 5
STRONG HIERARCHICAL GROUP DISPOSITIONS SUPPRESS THE BENEFITS OF APOLOGIZING (JAPANESE OPINION ON A JAPANESE APOLOGY)[a]

[a] Figure presents, for different subgroups of Japanese, the effect of apologizing or showing remorse on their approval of the Japanese government. N = 1,567; 95 percent confidence intervals are displayed.

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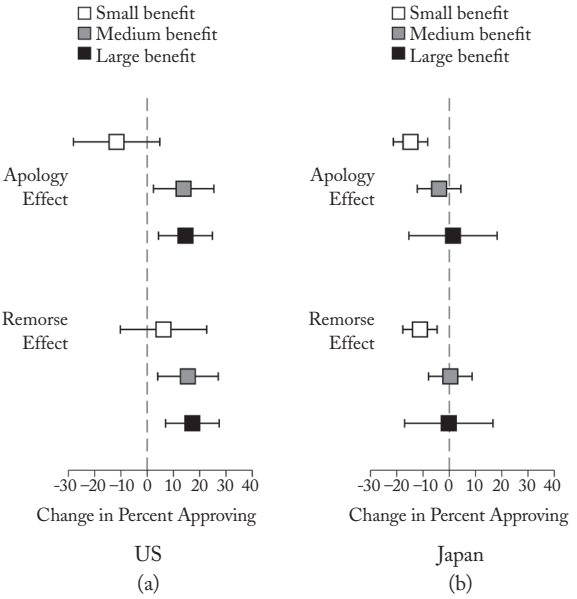

FIGURE 6
THE GREATER THE PERCEIVED VALUE OF THE RELATIONSHIP, THE GREATER THE APPROVAL FOR APOLOGIZING[a]

[a] Figure presents, for different subgroups of Japanese/Americans, the effect of apologizing or showing remorse on their approval of their own government. N = 1,567 for Japan; N = 758 for the United States; 95 percent confidence intervals are displayed.

lieve that their country benefits from its political relationship with the recipient, compared to those who see little value in the relationship. The greatest difference in the apology effect exists between those who believe that the political relationship brings their country a small benefit versus those who believe it brings a medium benefit. The apology effect is not consistently greater among those who believe the relationship brings a large benefit versus those who believe it brings a medium one. But overall, there is a positive and statistically significant interaction between the benefit measure and apology/remorse treatments.

IV. DISCUSSION

The experimental results provide broad support for our hypotheses, as summarized in Table 2. Our first key finding is that in the recipient state, either a political apology or a show of remorse can vastly improve public opinion of the apologizer. In the Japanese sample, a US apology

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TABLE 2
SUMMARY OF OUTCOMES[a]

	Theoretical Expectations	*Support for Hypothesis*
In the recipient state:		
H1	An apology will increase public approval for the apologizer government.	✓
H2	Remorse will increase public approval for the apologizer government.	✓
H3	The positive effect of an apology on public approval will be greater when it is accompanied by a show of remorse.	✓
In the apologizer state:		
H4	The effect of an apology/show of remorse will be smaller among members of the public with higher levels of nationalism, social-dominance orientation, and conservatism.	✓[b]
H5	The effect of an apology/show of remorse will be larger among those who see a higher strategic value in the relationship between the apologizer and the recipient.	✓

[a] An apology or expression of remorse can drive favorable opinion abroad, but the effects on a domestic audience depend on individuals' disposition toward intergroup hierarchy and beliefs about the strategic value of the relationship between the apologizer and recipient.

[b] H4 is supported in nine of the twelve statistical models tested; the remaining three produce coefficients in the correct direction but are not significant at the conventional 0.05 level.

combined with remorse improved approval more than either an apology or a show of remorse alone, although the substantive size of this effect was not large. These results suggest that an explicit expression of remorse can have a similar function as a formal apology.

This set of results supports the sanguine view of interstate apologies' effects on recipients' opinion of the apologizer, but the story from the perspective of the apologizing nation is more nuanced. Here, the same apology has an uneven effect on public approval. Domestic backlash is highly contingent on the strength of hierarchical group dispositions, supporting H4. Among US and Japanese respondents alike, individuals exhibiting high levels of nationalism, social-dominance orientation, or conservatism were less likely to approve of their government's conciliatory gestures when compared to those with moderate or weak dispositions along these dimensions.

Further, individuals who saw little strategic value in the bilateral relationship with the recipient were either unaffected or responded neg-

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atively to their government's apology-making. This pattern, which supports H5, was consistent across the US-Japan and Japan–South Korea scenarios, indicating that the benefits of acknowledging a past harm are greatest and the risk of backlash lowest in an audience that sees at least some value in a cooperative relationship with the other state. Taken together, these results challenge the widespread view of interstate political apologies as generally effective tools for reconciliation. They underscore the need to pay greater attention, in terms of both theory and empirics, to social and political heterogeneity within a domestic audience to understand the nuanced consequences of political apologies.

Japanese and US Citizens' Different Reactions to Their Governments' Apologies

In Japan and the United States, domestic audiences reacted to their government's apology to another nation with little enthusiasm and, in the case of Japan, with overt backlash (see figures 2 and 3). Although theorizing about cross-national differences in the effects of apology-making is not the primary purpose of this article, we reflect on the three factors that could explain the differences between the two countries. We show how some of these differences reinforce support for H4 and H5 on hierarchical group dispositions and perceived strategic benefits.

First, Japan's especially negative domestic reaction to apologizing may be rooted in historical differences. In contrast to the relatively friendly relations between the United States and Japan in the postwar period (bolstered by economic and security cooperation), yearly public opinion polls show consistently low levels of affinity between South Korean and Japanese citizens. A 2019 poll found that half the Japanese respondents had a negative image of South Korea, the top reason cited being "South Korea's continued criticism against Japan on historical issues." Half of the South Korean participants likewise had a negative image of Japan, with over three quarters of this group citing "no remorse over Japan's past wartime aggression" as the top reason.[82] In contrast, public demand in Japan for a US apology regarding the Hiroshima and Nagasaki bombings has been more nuanced.[83]

Second, how respondents perceive the identity of the apologizing

[82] Genron NPO and East Asia Institute 2019.

[83] For example, ahead of Obama's 2016 Hiroshima visit, the *Hidankyō* (Japan Confederation of A- and H-Bomb Sufferers Organization), an influential civil society voice, called on Japanese citizens to exercise "perseverance" instead of demanding a full apology, suggesting the trade-off was worthwhile if it would bring about a US commitment to the abolition of nuclear weapons (Sadakuni 2016). Also see Renteln 2008 on how the meaning of apologies might be culturally bounded.

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government might explain some of the differences between the United States and Japan, although we find this less likely. When reading the vignette, survey-takers may have had in mind the Donald Trump administration—not known for being apologetic—and therefore reacted more strongly to a US apology. Yet, several reasons suggest that the results were not driven by perceptions about a specific administration. To begin, the survey vignette avoided naming Trump and explicitly told survey-takers that the news story was general and not tied to current events. Next, Abe, the Japanese prime minister at the time, was typically portrayed in both Western and Japanese media as a hawkish and unapologetic leader on issue areas like foreign policy toward East Asian neighbors, the revision of the Japanese constitution, and World War II grievances.[84] In this respect, the credibility of a Trump apology and an Abe apology should be roughly comparable. That is, any apologizer identity bias would run in the same direction and could not be the source of cross-country differences. In addition, government reputations often persist beyond leadership transitions,[85] adding confidence that the cross-country differences are not driven by Trump or Abe alone.

Third and most important for our argument, we find that Japan's comparatively negative reactions can in part be explained by individuals' hierarchical group dispositions and their beliefs about the strategic value of apologizer-recipient relations. If the theory behind H4 and H5 is generalizable, these factors should be present regardless of differences in histories or leaders across the two dyads. As Figure 7 shows, the Japan sample is indeed more nationalistic, social-dominance oriented, and conservative than the US sample. Japanese survey-takers also value their state's relationship with South Korea less than US survey-takers value their country's relationship with Japan. As we have argued, these factors sour the domestic reaction to apology-making. The fact that Japanese citizens differ significantly from Americans on all of these dimensions is therefore consistent with their relatively stronger distaste toward their government apologizing to another country.

Ultimately, it is not possible to pinpoint the exact cause or causes that led to cross-national variation here, but that is not the main objective of this study. Instead, across two different dyads, one with a relatively stable history and one with a relatively antagonistic one, we show that the same moderators relating to hierarchical group dispositions

[84] For media coverage examples, see Kajimoto and Sieg 2018; Rich 2018; Sakurai 2016; Sieg 2013; Yoshikawa 2020.

[85] Weisiger and Yarhi-Milo 2015.

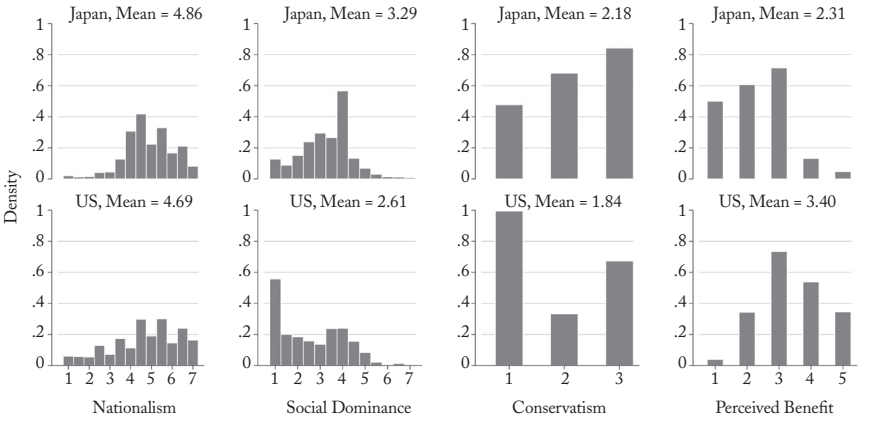

FIGURE 7
DIFFERENCES IN MODERATORS ACROSS COUNTRIES[a]

[a] Histograms use the full-scale measures for nationalism and social-dominance orientation (seven-point scale) and perceived strategic benefits (five-point scale). Conservatism is standardized to the three-point scale used in the main analyses, since the raw measure of ideology ranged from 1 to 10 in Japan and 1 to 7 in the United States.

and perceptions about interstate relations are associated with similar differences in the effect of apology-making. Thus, we demonstrate how our theory and empirics regarding apology-making's impact on public opinion produce generalizable insights.

V. IMPLICATIONS

Apology diplomacy promises to assuage historical grievances, which are often viewed as impediments to international cooperation.[86] This article complicates this conventional understanding of apology-making in international affairs. Beyond addressing whether apologies can heal historical grievances held by foreign audiences, our theory and analysis of how they affect both sides of the apologizer-recipient relationship help to clarify when they might be most successful. Whereas recipient audiences generally reward foreign governments for apology-making, reactions back home are mixed. Individuals who are highly nationalistic, social-dominance oriented, and conservative are significantly less receptive (or even opposed) to their government issuing a political apology or expressing remorse. Citizens who see little value in the political

[86] Barkan and Karn 2006; Hwang, Cho, and Wiegand 2018.

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relationship between their country and the recipient of the apology are also less supportive.

This evidence has implications for our understanding of when apologies might be offered or withheld. Leaders should have the most to gain from apology-making under two conditions: first, when their domestic constituency is sufficiently interested in maintaining a cooperative bilateral relationship with the recipient state, and second, when the need to pay heed to nationalistic or conservative constituents is outweighed by the need to foster goodwill in the recipient state (for instance, to obtain cooperation on the economy and national security). For example, postwar West Germany prioritized revitalizing the economy in concert with other European nations,[87] which created incentives for a deep reckoning. Conversely, leaders would have the most to lose from apology-making when the value of bilateral relationships with the recipient state is contested and when domestic constituents with strong hierarchical group dispositions are a critical support base for the leader. This explains why, for instance, French President Jacques Chirac's 1995 apology over the Vichy regime, a stark departure from prevailing official attitudes, came only as extreme right-wing groups and the Gaullist myth of France as a nation of resisters were in decline.[88]

A broader contribution of the article is to reveal the importance of individual-level characteristics as drivers of public opinion on apology diplomacy, factors that have thus far been largely neglected in the literature. The rationalist literature on strategic foreign policy interactions has traditionally dealt with individual-level variation among the public as unmeaningful noise;[89] similarly, the mostly qualitative and historical scholarship on political apologies has privileged macro-, group-, or state-level factors. Instead, we have argued and demonstrated that variation in individuals' attitudes and beliefs moderates the impact of interstate apologies. This variation also helps to explain the curious instances when apologies do *not* occur. Consider Japan's "failure to reckon with difficult history" even when that failure unleashed demonstrations and a boycott of Japanese products in South Korea, threatening trade.[90] Although not an all-important political constituency within Japan, relatively hawkish and conservative populations have traditionally been a critical base for the ruling Liberal Democratic Party—in power for all but four years since World War II. These populations likely de-

[87] Eichengreen 2007.

[88] Fette 2008.

[89] Yarhi-Milo, Kertzer, and Renshon 2018, p. 2172. For a critical discussion, see also Brutger and Kertzer 2018; Kertzer and Brutger 2016; Rathbun et al. 2016.

[90] Branzinsky 2019.

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terred various administrations from fully responding to South Korean demands. A geopolitical shift that requires stronger cooperation with South Korea, such as the rising threat of China or North Korea, could tip the scale in the other direction.

Although we do not claim that the specific moderating variables we tested explain all the variation in the effect of apology-making, our findings make clear the need to bring microfoundations, especially the role of individual-level attributes and beliefs, more fully into theories of political apologies and public diplomatic communication. Changing global norms about historical reckoning, for instance, may shift the underlying dispositions of those who would otherwise have resisted an apology. The 2020 killing of George Floyd in Minneapolis and subsequent mass protests inspired Algeria to demand an apology from France for its colonial past,[91] in turn prompting an introspective moment within France on how to achieve "reconciliation between the French and Algerian peoples."[92] Shared ethnicity or race across apologizer and recipient may also influence societal acceptance or rejection of apology-making; after all, ethnic bias in diverse societies can shape a host of attitudes and behaviors, including political responsiveness[93] and altruism.[94] Thus, although we have demonstrated that hierarchical group dispositions and beliefs about bilateral relations are critical to the success of political apologies in a variety of contexts, the roles of other moderating factors rooted in specific histories or other individual-level attributes are important questions for future work.

This article also provides a point of departure for new empirical questions about leader behavior in public diplomacy. Our study suggests that leaders can preemptively express remorse together with issuing apologies to win over particularly difficult foreign audiences, highlighting the need for governments to consider a broader repertoire of rhetoric when engaging in public diplomacy. Indeed, research on soft power and diplomacy demonstrates that impressions of sympathy and

[91] *Al Jazeera* 2020.
[92] *Le Monde* 2020.
[93] McClendon 2016.
[94] Charnysh, Lucas, and Singh 2015; Mironova and Whitt 2014. At the same time, experimental research demonstrates how national or transnational identity can be more powerful than group interest defined by ethnicity or race (Prather 2020; Robinson 2016). Our finding that Japanese backlash against an apology to South Korea, despite shared race across the two countries, was stronger than US resistance toward an apology to Japan accords with this claim. This may suggest that at least for interstate apologies, nation trumps other sources of social dispositions, such as race, which is arguably more context specific. Gender is another plausibly relevant attribute determining the acceptance of apologies (Allan et al. 2006), but again, the gender gap in attitudes toward foreign policy is strongly context specific (Brooks and Valentino 2011).

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sincerity in a leader can shape strategic interactions between states.[95] Relatedly, recent experimental research finds that voters are more confident in conciliatory policy gestures when they are initiated by hawkish leaders rather than by doves, regardless of the policy's substantive success.[96] On the one hand, an apology's risk of domestic backlash may be amplified for leaders perceived as dovish; the Obama administration's mulling of an apology in Hiroshima provoked accusations of another apology tour. On the other hand, the risk may be mitigated for hawks; had Abe renewed a formal apology to Japan's East Asian neighbors, he might have suffered less domestic blowback than Junichiro Koizumi did when he apologized in 2005. Questions about leaders' rhetoric and their perceived qualities are therefore important avenues for future research on apology diplomacy. Studies have found public opinion to be consequential not only for soft power but also for "hard" policy outcomes,[97] and discourse around historical injustices, a key feature of transitional justice, is increasingly prominent in contemporary diplomatic relations. The stakes are high, given that governments both speak to and for their citizens.

Supplementary Material

Supplementary material for this article can be found at https://doi.org/10.1017/S0043887121000083.

Data

Replication files for this article can be found at https://doi.org/10.7910/DVN/PGMX3H.

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[95] Hall and Yarhi-Milo 2012. Whether apologies substitute physical gestures that signal sincerity is another important question that we leave for future research. West German Chancellor Willy Brandt's famous gesture of kneeling before a monument at the Warsaw Ghetto had an arresting effect on German and foreign public opinion (Renner 2016). Similarly, although Obama's 2016 Hiroshima visit did not include an apology, the emotional embrace he exchanged with a bomb survivor drew widespread support within Japan and abroad (Soble 2016; Takeda 2016).

[96] Mattes and Weeks 2019.

[97] Goldsmith and Horiuchi 2012.

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Key Words

diplomacy, East Asia, foreign policy, public opinion, survey experiments, transitional justice

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ECONOMIC RISK WITHIN THE HOUSEHOLD AND VOTING FOR THE RADICAL RIGHT

By TARIK ABOU-CHADI AND THOMAS KURER

ABSTRACT

This article investigates how unemployment risk within households affects voting for the radical right. The authors contribute to recent advances in the literature that have highlighted the role of economic threat for understanding the support of radical-right parties. In contrast to existing work, the authors do not treat voters as atomistic individuals; they instead investigate households as a crucial site of preference formation. Combining large-scale labor market data with comparative survey data, they confirm the expectations of their theoretical framework by demonstrating that the effect of occupational unemployment risk on radical-right support is strongly conditioned by household-risk constellations. Voting for the radical right is a function not only of a voter's own risk, but also of his or her partner's risk. The article provides additional evidence on the extent to which these effects are gendered and on the mechanisms that link household risk and party choice. The results imply that much of the existing literature on individual risk exposure potentially underestimates its effect on political behavior due to the neglect of multiplier effects within households.

Introduction

THE current success of populist radical-right parties has led to a wave of public attention as well as renewed academic interest in this development. The literature on the driving forces behind the vote for radical-right parties has long been dominated by noneconomic explanations based on anti-immigration attitudes and racial resentment. But widespread political dissatisfaction in the aftermath of the Great Recession, with its adverse impact on labor markets aggravated by additional economic pressure from international trade and automation, has put the spotlight back on the economic roots of right-wing populism.

In contrast to pioneering studies with a narrow focus on individuals' immediate material circumstances, more recent work has recognized the need for a more nuanced understanding of economic anxiety. We advance this burgeoning literature by systematically integrating two important conceptual extensions into a comprehensive analysis of

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the structural economic roots of radical-right support. The first extension follows from the realization that common indicators of objective hardship leave us well short of understanding the main motivation behind political dissatisfaction and its manifestation in the electoral arena. Economic shocks resulting from job loss or substantial income drops are understood to have predictable but transient influence on political attitudes and even more limited effects on voting behavior in general[1] and populist support in particular.[2] Instead, somewhat richer conceptualizations of latent economic threat may be more promising to explain support for the radical right.[3] The second crucial extension builds on the intuition that an individualistic perspective on voters' economic circumstances may be misleading. Building on long-standing insights of social psychology research, various recent studies in different subfields of the social sciences have adopted the understanding that perceptions and political preferences depend on the context conditions in which individuals form opinions and against which they juxtapose their own economic situation.[4]

Our approach systematically integrates these theoretical and empirical insights into a comprehensive framework to examine the economic roots behind radical-right support. On the one hand, we take latent threats seriously by studying uncertainty about economic conditions rather than focusing on socioeconomic endowment, such as income, or materialized hardship, such as unemployment. More specifically, adding to recent studies that have begun to look into various forms of economic threat or social decline, we examine whether occupational unemployment risk is systematically related to supporting radical-right parties. On the other hand, we take context seriously by including individuals' family and household situations, thereby integrating a key premise of the work/family role system[5] into the typically individualistic study of electoral behavior. Most voters do not live on their own but cohabit with a partner or a family. And since most contemporary households no longer fit the traditional image of a single (male) breadwinner responsible for a family's standard of living, an individualistic perspective is in danger of missing important aspects of the societal consequences of economic risk and household mobility.[6] The household may be an important site of preference formation because individ-

[1] Margalit 2019a.
[2] Margalit 2019b.
[3] Rovny and Rovny 2017; Cohen 2018; Gidron and Hall 2017; Mutz 2018; Kurer 2020.
[4] Incantalupo 2011; Western et al. 2012; Aytaç 2017; Rooduijn and Burgoon 2018.
[5] E.g., Pleck 1977; Shelton and John 1996; Western et al. 2012.
[6] DiPrete and McManus 2000.

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uals cognitively pool economic resources and hence, build their political preferences based on household risk rather than on personal risk alone.[7]

To test our theoretical expectations, we calculate economic risks for disaggregated occupational groups on the basis of large-scale labor survey data (European Union Statistics on Income and Living Conditions or EU-SILC) in eleven West European countries.[8] We combine this indicator of labor market vulnerability with the European Social Survey (ESS). In contrast to most other comparative social science surveys, the ESS provides detailed information not only on respondents' own occupational situation, but also on the occupational situation of other household members. This allows us to merge the indicators of unemployment risk on respondents as well their spouses, which yields the crucial information on within-household constellations of economic vulnerability.

Our analysis provides strong evidence for the relevance of the household-insecurity framework. We first provide consistent evidence for a positive link between individual economic risk and vote choice. Occupational unemployment risk is systematically related to supporting radical-right parties (while current unemployment status is not). This link is then put into perspective by taking into account different household constellations. We find significant household effects that substantially improve our understanding of the link between economic conditions and party choice. We provide evidence that support for the radical right is a function not only of individual economic risk, but also of household risk more generally: voters incorporate their partner's economic conditions in their vote calculus and adjust their own political behavior accordingly. Importantly, our findings indicate that voters do not pool economic risks in a way that a low-risk spouse can compensate for a high-risk partner. Instead, we find that one high-risk individual per household is sufficient to significantly increase the probability of supporting the radical right among all household members. Finally, we also assess gender-asymmetric effects and find—in line with previous sociological work on household income dynamics[9]—that individual risk plays a more important role for men than women.

Our findings have far-reaching implications. They provide a comprehensive analysis of economic risk as a determinant of electoral behavior. We show that—adequately conceptualized—economic circumstances

[7] Becker 1974; Becker 1991.

[8] Austria, Germany, Denmark, Finland, France, Great Britain, Greece, Netherlands, Norway, Sweden and Switzerland.

[9] E.g., DiPrete and McManus 2000.

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need to be taken seriously for understanding patterns of radical-right support.[10] Importantly, political parties may channel such anxieties in a programmatic direction that resonates with their electorate, as radical-right parties have done in successfully mobilizing a sense of collective status threat among national ethnic majority groups.[11] The key implication is that fundamentally economic shocks may result in noneconomic (or not purely economic) political manifestations.[12] In addition, our findings demonstrate that household composition, often ignored in research on electoral behavior, plays a substantial role in individual preference formation. Crucially, ignoring material and non-material spillover effects within households may result in considerable underestimation of the role that economic risk plays in voting for the radical right and for political behavior more generally.

Socioeconomic Conditions and the Radical Right

The Role of Latent Economic Threat

Traditional approaches to explaining right-wing populism based on economic grounds exist in two flavors. The first is concerned with increasingly insecure labor market prospects in times of globalization and focuses on economic nationalism as an appealing offer for those who feel threatened by cheap foreign labor.[13] The second channel through which economic concerns could translate into support is the welfare state. Rather than competition on labor markets, voters might fear distributional conflicts between natives and immigrants when it comes to public spending.[14] But many studies that rely on these traditional economic approaches and investigate the political implications of economic hardship in absolute terms do not find a relationship between unemployment, for example, and radical-right voting.[15]

In contrast, our focus is on economic risk—uncertainty related to a latent threat of adverse economic shocks in the future rather than on currently materialized economic conditions. Risk-based approaches have attracted a lot of interest, especially in the welfare literature, and have proved their explanatory power with respect to social policy pref-

[10] C.f., Margalit 2019b.
[11] Bonikowski 2017.
[12] Rodrik 2018; Pardos-Prado and Xena 2019.
[13] E.g., Mughan, Bean, and McAllister 2003; Colantone and Stanig 2018; Scheve and Slaughter 2004.
[14] Lefkofridi and Michel 2014; Cavaille and Ferwerda 2019.
[15] Norris 2005; Ivarsflaten 2007.

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erences.[16] They have much more rarely been used to explain political behavior. The scarcity of evidence results in an ongoing scholarly debate about the role of labor market risk in shaping vote choice in general and support for radical-right parties in particular. The few existing studies that argue for a link between labor market risk and radical-right voting[17] were challenged in a recent symposium on the political repercussions of labor market inequality.[18] Essentially, "labor market outsiders," who are particularly prevalent in the service sector, should not be mistaken for the working-class supporters of right-wing populist parties typically found in routine and manufacturing occupations.[19]

Against the backdrop of this unresolved debate, we first discuss the theoretical channels that may connect economic risk to voters' propensity to support the radical right. The traditional insurance logic in the political economy literature suggests that voters react similarly to risk exposure and to the experience of absolute economic hardship. As insurance against potential future job or income loss, voters demand policies that guarantee social protection. Such demands could either result in support for left parties that are the most credible providers of a generous welfare state or in support for radical-right parties that promise authoritarian solutions to reduce competition by immigrants regarding both labor markets and welfare states.[20]

A recent strand in the literature has brought up another explanation that suggests a somewhat different mechanism. Various studies have examined the role of nostalgia,[21] societal pessimism,[22] recognition gaps,[23] or status threat and fear of societal regression[24] as important drivers behind radical-right voting. These contributions share the understanding that populist radical-right parties thrive on a program that emphasizes an idealized past rather than attracting voters with concrete policy remedies against perceived disadvantages. Economic risk would thus lead to support for the radical right as a form of protest against the vagaries of economic modernization and mainstream parties' continued support for the politics of liberal and globally integrated advanced capitalist societies.

[16] Moene and Wallerstein 2001; Iversen and Soskice 2001; Cusack, Iversen, and Rehm 2006; Rehm 2009; Burgoon and Dekker 2010; Häusermann, Kurer, and Schwander 2015; Rehm 2016.
[17] Rovny and Rovny 2017; Cohen 2018.
[18] Häusermann, Kemmerling, and Rueda 2020.
[19] Häusermann 2020.
[20] Rovny and Rovny 2017; Pardos-Prado and Xena 2019; Cavaille and Ferwerda 2019.
[21] Gest, Reny, and Mayer 2017.
[22] Steenvoorden and Harteveld 2018.
[23] Lamont 2018.
[24] Gidron and Hall 2017; Kurer 2020.

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The Role of Context: Household Constellation

We argue that the inclusion of the household is necessary to arrive at a more encompassing understanding of the relationship between economic risk and support for the radical right. Although the overwhelming majority of social science research studies political attitudes as those of atomistic individuals, there is strong reason to expect that voters do not form preferences in isolation but rather depend on a multitude of context conditions and reference points.[25] In particular, people who share a household budget and interact frequently will influence each other's political preferences.[26] Additionally, structural economic pressure is not only experienced directly, but also often in mediated form, which manifests itself as concern for one's social group and results in grievances that are at least as much sociotropic as they are individual.[27] Of all social units, such influence is most likely to characterize households and, especially, partner relationships because of their simple structure and their economic interdependence.[28]

Beyond the widespread expectation that people within social units tend to align political preferences over time, existing sociological work on household and couple effects primarily assesses the mutual impact of income, education, and class position on household members' political behavior.[29] We propose that labor market risks follow a comparable spillover logic within the household. Hence, our first expectation is that individual vote choice not only depends on voters' own vulnerability, but also reacts sensitively to labor market risks affecting other members within their intimate social network.

Going beyond this baseline expectation of mutually interdependent preference formation, we contend that exactly how individual risks interact within households is less obvious. Scrutinizing the different ways in which partners affect voting patterns is important because the precise channel of influence may provide valuable insights about underlying mechanisms. We derive observable implications of competing theoretical expectations about how individuals adjust (or do not adjust) party preferences given their own and their partner's economic risk.

[25] Incantalupo 2011; Western et al. 2012; Aytaç 2017; Rooduijn and Burgoon 2018; Kurer et al. 2019; Burgoon et al. 2019.

[26] Ahlquist, Hamman, and Jones 2015; Häusermann, Kurer, and Schwander 2016; Foos and de Rooij 2017; Daenekindt, Koster, and van der Waal 2020.

[27] Bonikowski 2017.

[28] Becker 1974; Becker 1991; Zuckerman and Kotler-Berkowitz 1998; Zuckerman 2005; Iversen and Rosenbluth 2006.

[29] De Graaf and Heath 1992; Kan and Heath 2006; Strøm 2014; Daenekindt, Koster, and van der Waal 2020.

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Traditional bargaining models of the family focus on the distribution of economic resources and the division of labor between spouses.[30] Even though we are concerned with a different core concept, namely labor market vulnerability, this literature is insightful for our purpose because one may think of risk exposure as uncertainty about future income.[31] In such a relatively narrow economic interpretation of unemployment risk, traditional resource pooling, as proposed in Gary Becker's seminal framework, appears as a rational household strategy.[32] Both spouses' levels of risk have similar weight and reinforce each other's political preferences, resulting in what may be seen as averaging of attitudes within households. The economic safety of one spouse can help to remedy the risk of the other.

Conversely, we can also think of a situation in which one spouse's economic circumstances dominate the joint household preference formation. Rather than averaging out heterogeneous risk exposure, a dominance framework suggests that household members align preferences around a particular influential actor within the social network. For example, Robert Erikson highlights the difficulty of ascribing a single class position to modern dual-earner families and proposes to derive the family's class position from the family member who carries the economic responsibility of the household, irrespective of gender.[33] We can think of a similar logic of dominance regarding the link between economic risk and radical-right voting, although most likely with a reversed logic: given that we do not study the distribution of economic gains but a situation of potential income loss, we have good reasons to expect that, if anything, a high-risk spouse will dominate the household's preference formation. Experimental research in social psychology and behavioral economics provides abundant evidence that losses and disadvantages have greater impact on preferences than gains and advantages.[34] Hence, instead of pooling economic risks, household preferences may converge based on the predominant risk situation. In this scenario, spouses primarily respond to their worse-off partner so that their own (lower) risk becomes relatively less important. The vulnerable position of one household member could thus be sufficient to shape household voting behavior independent of the risk of the other.

We provide stylized visualizations of these expectations in Figure 1. The main explanatory variable is an individual's economic risk (x-axis)

[30] Becker 1974; Becker 1991; Lundberg and Pollak 1996; Iversen and Rosenbluth 2006.
[31] Rehm 2009.
[32] Becker 1974; Becker 1991.
[33] Erikson 1984.
[34] Kahneman and Tversky 1979; Tversky and Kahneman 1991.

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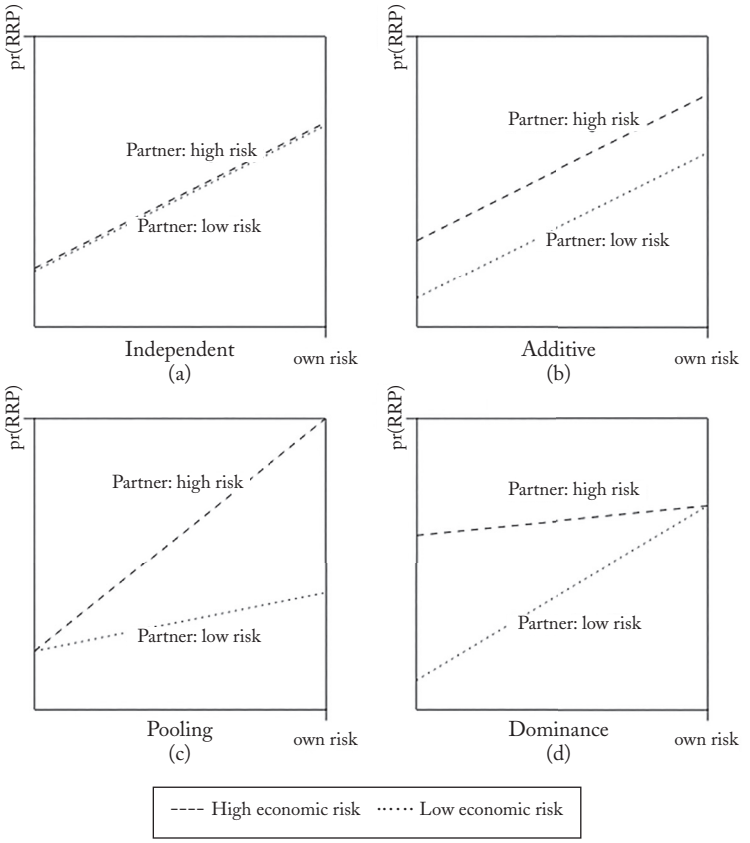

FIGURE 1
STYLIZED EFFECTS OF HOUSEHOLD RISK COMPOSITION

and the dependent variable is the probability of this individual supporting a populist radical-right party (y-axis). In line with the arguments discussed above, we expect a positive relationship between these two variables. We are interested in how household effects, or more precisely, how the economic situation of the individual's partner affects the respondent's own party choice. Thus, each panel in Figure 1 displays the relationship between risk and support for a radical-right party for a situation in which the individual has a partner with low economic risk and for a situation in which the individual's partner suffers from high economic risk.

To make the model as complete as possible, we also illustrate two different kinds of null hypotheses, that is, expected patterns in the absence of preference alignment within households in which a partner's

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risk either has no effect on an individual's voting propensity or is simply added to the individual's own risk perception (panel [a] and [b]). Panels (c) and (d) illustrate conditional effects of economic risks within households that indicate one of the two discussed scenarios. Panel (c) shows how the partner's lower risk can reduce the effect of an individual's own risk on voting for the radical right. When partners can provide a safety net, demand for the radical right decreases. Panel (d) shows a scenario in which one high-risk person in a household is sufficient to increase the probability of radical-right voting.

A priori, we consider these expectations similarly plausible, which is why we treat the pattern of the interaction of economic risks within households as an empirical question. Beyond their explicit effects, these empirical patterns likely suggest different underlying mechanisms connecting unemployment risk and radical-right support. Risk pooling follows a strongly economic logic in which the combined (or averaged) level of vulnerability determines household members' vote choice. Such an averaging of risk suggests that household members rationally calculate their joint need for insurance against potential future job loss and accordingly adjust their demand for policy remedies to help achieve this goal. Indeed, previous work has provided evidence for household risk pooling when it comes to social policy preferences.[35] A less vulnerable partner serves as a kind of private safety net and reduces the demand for social protection for both spouses. Although left parties are commonly considered the most credible supplier of such polices, radical-right parties have offered economic nationalism, immigration control, and welfare chauvinism as their alternative response to perceived labor market vulnerability.

In contrast, the empirical pattern related to a dominance scenario suggests a less strictly policy-based explanation. The overly dominant impact of one vulnerable actor within an otherwise relatively well-off household does not square well with a calculated demand for concrete policy remedy. Rather, this pattern seems to pick up a more general sense of disillusionment,[36] and perhaps anger,[37] at the workings of the current system and the political actors behind it. In this scenario, support for radical-right parties does not follow a clear bread-and-butter logic, but entails stronger elements of protesting against a political system that is not perceived as responsive toward latent threats of economic vulnerability. By implication, although a fundamentally eco-

[35] Häusermann, Kurer, and Schwander 2016.
[36] Kriesi 2014.
[37] Rico, Guinjoan, and Anduiza 2017; Magni 2017.

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nomic challenge (unemployment risk) fuels radical-right support, its ultimate appearance in the political arena (dissatisfaction with the political status quo) might not manifest itself in purely economic terms.

In addition, any discussion of household effects on political preferences would remain incomplete without addressing potentially asymmetric effects between men and women. Even though the economic position and "outside options" of women have improved over time,[38] and female students now largely outperform male students at all levels of school,[39] structural differences in labor market opportunities of men and women remain. In line with most existing research that takes into account potentially asymmetric household effects,[40] preference alignment within the household is likely to be more pronounced among women than among men. By implication, we would expect that male respondents' own risk is relatively more important in determining voting for the radical right compared to female voters, resulting in a stronger correlation between risk and radical-right support in the context of a low-risk partner (see Figure 1).[41]

Empirical Approach

To test our argument, we need an empirical measure of individual economic risk exposure. We focus on the risk of job loss, which is certainly one of the most consequential threats in terms of both its material and psychological implications.[42] Following Philipp Rehm's influential work,[43] we propose that an individual's probability of losing his or her job is a reasonable objective proxy for risk exposure. The probability of job loss is approximated by objective occupational unemployment rates, that is, the share of unemployed workers in a respondent's occupational

[38] Iversen and Rosenbluth 2006.

[39] DiPrete and Buchmann 2013.

[40] De Graaf and Heath 1992; DiPrete and McManus 2000; Kan and Heath 2006; Strøm 2014; Häusermann, Kurer, and Schwander 2016.

[41] Note that our analysis neglects the role of divorce, which has featured prominently in bargaining models of the family. Although the divorce option is especially relevant with regard to the division of labor (Iversen and Rosenbluth 2006), its role is more contested when it comes to the structuration of political preferences (Finseraas, Jakobsson, and Kotsadam 2012). We have decided not to prominently engage with the divorce question for two reasons. First, our sample consists of "double-occupation households," that is, of (female) respondents who have already been incentivized by paid work and hence, have made use of the outside options provided by labor markets. A second more pragmatic reason is data availability. The individual risk of divorce is typically operationalized on the basis of a direct question asking respondents whether they have considered ending their present relationship, or more indirect questions about the experience of serious problems in their relationship over the last years. Unfortunately, our primary data source, the European Social Survey, does not provide these items.

[42] Jahoda 1979.

[43] Rehm 2009; Rehm 2016.

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environment. Measuring risk exposure at the group level makes sense since risk—the probability of a bad event—cannot meaningfully be derived without a reference group.[44] An objectively calculated measure of risk is desirable because it is arguably exogenous to political attitudes and electoral preferences. That said, we would certainly want our objective measure of risk to predict subjective assessments of risk perceptions reasonably well. Previous research has indeed empirically demonstrated this correlation.[45]

As a first step, we rely on large-scale labor market data provided by the EU-SILC to obtain reliable estimates of the group-specific prevalence of job loss. To do so, we calculate unemployment rates within occupational groups as defined by the International Labor Organization, that is, according to the International Standard Classification of Occupations (ISCO). Closely following Rehm's work on occupational unemployment and redistribution preferences,[46] the main models rely on the prevalence of unemployment within major occupational groups (ISCO one digit). In the robustness section below, we show that our results also hold when we calculate unemployment risk based on a more fine-grained disaggregation of occupations into sub-major groups (ISCO two digit).

In a second step, we combine this objective group-specific indicator of risk exposure with individual-level survey data from the ESS. The ESS contains the necessary dependent variables on political behavior as well as detailed information on occupation and other sociodemographics. Most important, it also contains the same information for other household members. This exceptionally rich data set thus allows us to create occupational groups identical to those in the EU-SILC for ESS respondents as well as their partners, which makes merging the two data sources a straightforward task.

Our final sample consists of respondents who are (1) in a relationship, (2) have an occupational code assigned, and (3) have a partner who also has an occupational code. It is important to emphasize that the universe of cases we examine in our analysis reaches far beyond double-income households with two partners in the active labor market. The ESS asks respondents about their current *or previous* occupation ("What is/was the name or title of your main job?"). The attribution of structural unemployment risks is therefore not contingent on current employment status ("main activity during the last 7 days," see Table A2

[44] Rehm 2016, 40.
[45] Rehm 2016; Kurer et al. 2019.
[46] Rehm 2009.

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in the supplementary material).[47] Even if respondents or, similarly important, their partners have not been occupied with paid work most recently, their economic vulnerability can be estimated based on their last job. Our sample thus includes household members who are at the moment not doing paid work (for example, students or homemakers) but who have at their disposal a set of occupational skills from a previous employment spell. Since most workers remain in a similar job environment, experience in previous occupations provide a natural approximation of their economic vulnerability once they decide to reenter the labor market. We limit our sample to the working-age population (between 18 and 65 years old), and our analyses are necessarily limited to people in households. We restrict any inference from our analysis to this population.

The main dependent variable—support of radical-right parties—is based on country-specific ESS items asking respondents about the party they voted for in the last general election. We group support into party families and classify populist radical-right parties on Cas Mudde's conceptual foundation (see Table A4 in the supplementary materials for details).[48] Our main dependent variable is a dummy capturing voting for populist radical-right parties (one) versus all other parties in the zero category. All our findings hold if we use a variable for radical right (one) versus the mainstream left and mainstream right parties in a country that make the zero category more homogenous. We show our main findings for this in the supplementary material.[49] Note that to ensure a close connection between risk exposure and electoral behavior, we match the labor market risk information based on the year the election took place rather than on the year the ESS round was released.

We analyze our data set with country and wave fixed effect logit regression models and standard errors clustered by country wave to correct for nonindependent observations.[50] All our findings are robust against excluding any single country from the analysis. We control for

[47] Abou-Chadi and Kurer 2021b.

[48] Mudde 2007; Abou-Chadi and Kurer 2021b.

[49] Abou-Chadi and Kurer 2021b, Table A10.

[50] Some debate exists around the use of fixed effects in logit models. The main issue for estimation stems from the fact that group-mean centering is not a solution for nonlinear models and thus, potentially, many different parameters have to be estimated. This is, however, less of a problem in our case because we do not employ actual unit fixed effects, such as individual respondents in true panel data or countries in time-series cross-sectional (TSCS) data), but rather use group-specific intercepts. Simply put, our fixed effects represent countries (and waves) and not individual respondents who represent the unit of analysis. As a consequence, the number of parameters that needs to be estimated for our fixed-effect model does not increase with N. Hence, in our case, we do not face the incidental parameters problem that is often associated with the application of fixed effects in logit specifications. For a detailed discussion of this, see Beck 2020.

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age, education, gender, children, and income. We also include controls for unemployment status and partner's unemployment. A table with summary statistics can be found in the supplementary material. We refrain from including more specific attitudinal variables because they are clearly posttreatment to our structural variables and would bring with them the risk of posttreatment bias. Our approach employing country fixed effects leads to an exclusion of all countries that do not have a radical-right party successful enough to meaningfully show up in survey responses. The problem of potentially inducing selection bias has been widely discussed in the literature on radical-right voting. Therefore, we additionally show that our findings do not change if we use a linear probability model that does not exclude these cases. We also show our main findings for a multilevel model with random effects at the country-wave level.

Descriptives

Figure 2 provides an overview of average risk exposure by occupational group and gender, pooled over time and space. Recall that risk exposure is proxied with an individual's occupational unemployment risk, which is calculated as a group-specific analogue of the national unemployment rate. There is considerable variation between the nine major occupational groups. Workers in low-skilled elementary occupations, such as cleaning, construction, and food preparation, suffer from the highest risk levels (15.2 percent on average within a large cross-sectional bandwidth). Craft and related trade workers, plant and machine operators/assemblers, and workers in services and sales are exposed to medium levels of risk (around 10 percent), followed by clerical workers with slightly lower risk exposure (6.8 percent on average). More high-skilled managerial, professional, and technical jobs are characterized by a lower prevalence of unemployment. Unemployment in the classical sense is also less frequent in the agricultural sector. One important observation (confirmed below) is that unemployment risk is less strongly gendered than one might expect and is certainly less gendered than broader concepts of labor market vulnerability, such as "outsiderness," that also include (involuntary) part-time employment.[51] Although female workers face higher unemployment risks than their male counterparts in craft and manufacturing occupations in which they represent a clear numerical minority, this is not the case in other occupations. To the contrary, male workers face higher risks in clerical, sales, and elementary occupations. However, due to compositional effects, that is, a

[51] Häusermann, Kurer, and Schwander 2016.

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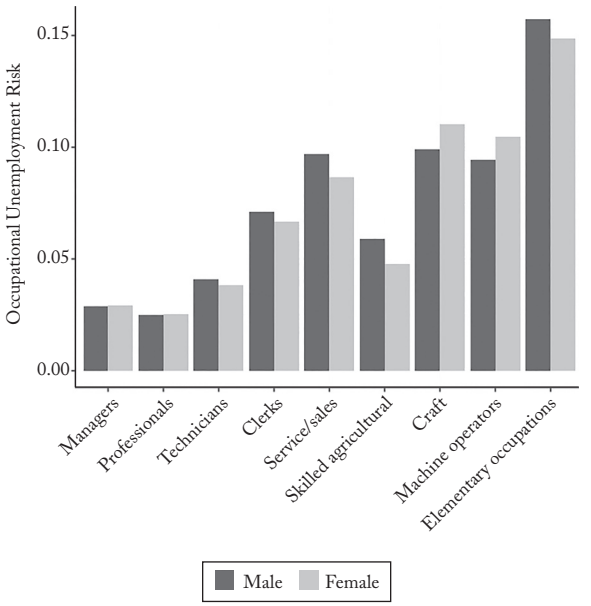

FIGURE 2
UNEMPLOYMENT RISK BY OCCUPATIONAL GROUP AND GENDER

higher proportion of female workers in high-risk occupations (for example, 60 percent female in elementary occupations versus 32 percent female in managerial jobs), the average risk of female respondents is slightly higher than that of male respondents in our sample.

Our data on spouse's occupation allows us to go one step further and examine within-household constellations of unemployment risk. To facilitate a concise illustration, we have aggregated individual risk exposure into country-specific deciles and then calculated risk-decile combinations for individual households (see Figure 3). The heat map's density is highest around the diagonal, where respondent and partner risk are similar, but the plots also demonstrate that there is enough variation of risk distribution within households to examine the political implications of heterogeneous patterns of risk exposure. More specifically, we can look at the nine cells (3 × 3) in the upper left and lower right corners of Figure 3. The share of our respondents that are located within these corners is 12.1 percent across the full sample, ranging from 9.6 percent in Germany to 15.7 percent in Switzerland and the Netherlands (see Table A3 in the supplementary material). We consider this a sizable share of our sample that justifies closer scrutiny of not only household effects within homogamous relationships, but also of those with more unequal risk distribution.

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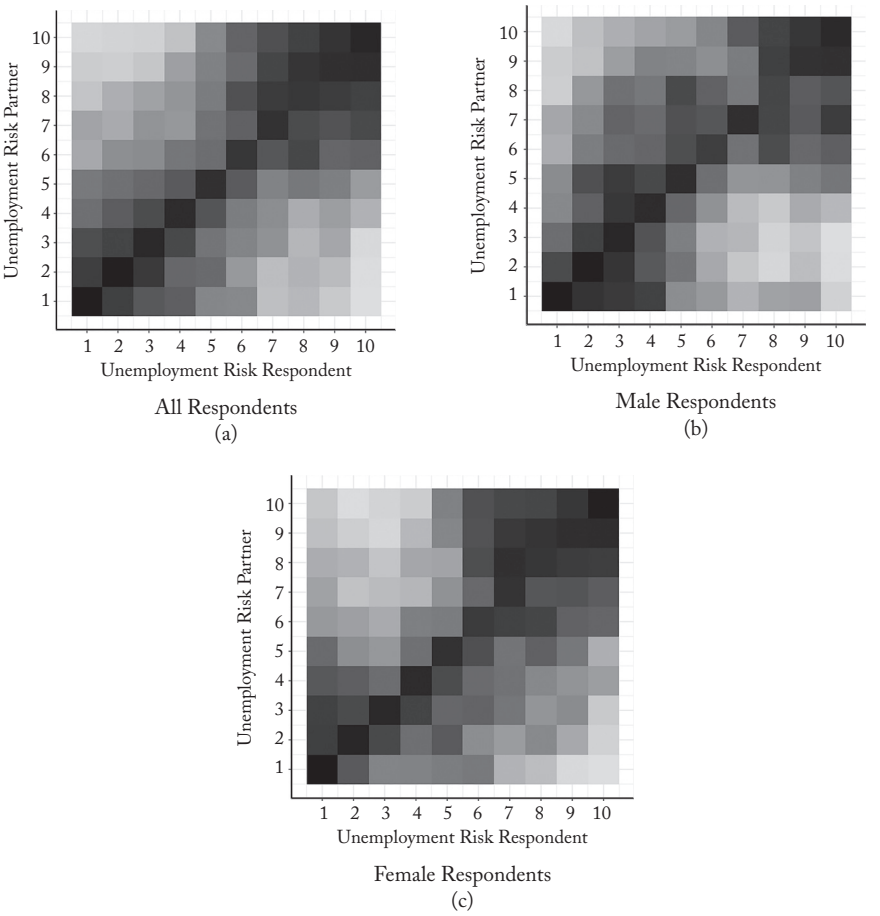

FIGURE 3
HOUSEHOLD RISK CONSTELLATIONS[a]

[a] Distribution of unemployment risks within households in deciles. Darker colors represent higher density.

Figure 3 (b) and (c) display the patterns for male and female respondents separately and demonstrate that a somewhat gendered pattern lies below the apparent symmetry of the overall sample. As one would expect, male respondents are on average in a slightly more secure position than their female partners, illustrated by darker shading above the diagonal (and vice versa for female respondents). Note that in line with the evidence discussed above, the distribution of unemployment risk is not extremely unbalanced between male and female respondents.

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Results

Table 1 shows our findings for the direct effect of unemployment risk on voting for the radical right. For comparable samples, all models are limited to people who cohabit with a partner. Model 1 includes the effects of individuals' own risk; model 2 adds partner's risk to the model. The first model provides some interesting information. First, unemployment risk is a strong and significantly positive predictor of support for radical-right parties. Second, we do not find any significant effect for individual unemployment status or partner's unemployment status. This confirms the general idea within the growing literature on economic effects on radical-right voting that it is not material hardship per se but latent economic threat that constitutes a driver behind voting for the radical right.

Model 2 adds unemployment risk of the partner, which has an independent effect of comparable magnitude to the respondent's own economic risk and is also statistically significant. This first set of results thus provides strong evidence for our presumption that the household is an important site of preference formation that affects the political preferences of household members net of their own socioeconomic conditions.

What about the magnitude of these effects? Figure 4 shows the predicted probabilities of voting for a radical-right party conditional on the individual's and the partner's risk based on model 2. (All other variables are held at their observed values.) We see substantively meaningful effects for both variables. Although individuals with a low risk of unemployment have a predicted probability of about six percent for voting for the radical right, for higher levels of risk this increases to over 17 percent. Considering the baseline probability of voting for a radical-right party, it is a substantial increase. Similarly, for partners' unemployment risk, we find an increase from six percent to about 15 percent. Figure 4 demonstrates that unemployment risk significantly affects the probability of voting for the radical right. It's important to emphasize that this is the effect of a partner's unemployment risk controlling for the respondent's own risk. Contagion effects exist within the household and the economic risks of other household members do indeed influence respondents' voting behavior.

Model 3 interacts respondent and partner risk to scrutinize exactly how economic vulnerabilities within households interdependently affect voting for the radical right. Because we are dealing with a nonlinear logit model, we cannot directly interpret the coefficient of the interac-

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TABLE 1
UNEMPLOYMENT RISK AND RADICIAL-RIGHT VOTING

	Model 1	*Model 2*	*Model 3*
Unemployment risk	7.957**	6.467**	9.423**
	(1.194)	(1.075)	(1.995)
Unemployment risk – Partner		5.101**	8.214**
		(1.069)	(1.737)
Unemployment risk × Unemployment risk – Partner			–38.743*
			(17.754)
Unemployed	0.148	0.137	0.131
	(0.134)	(0.134)	(0.133)
Partner unemployed	–0.006	–0.058	–0.078
	(0.353)	(0.353)	(0.349)
Income	–0.004	0.003	0.003
	(0.017)	(0.017)	(0.018)
No children	0.100	0.096	0.096
	(0.052)	(0.052)	(0.052)
Education	–0.539**	–0.530**	–0.520**
	(0.033)	(0.033)	(0.035)
Age	–0.020**	–0.020**	–0.020**
	(0.003)	(0.003)	(0.003)
Female	–0.358**	–0.349**	–0.349**
	(0.051)	(0.052)	(0.052)
Constant	–0.331	–0.622	–0.846
	(0.395)	(0.411)	(0.452)
Observations	31312	31312	31312
Pseudo R^2	0.134	0.136	0.136

*$p < 0.05$, **$p < 0.01$; clustered standard errors in parentheses; country and year fixed effects included

tion term.[52] Therefore, we illustrate the interaction effects in the form of conditional predicted probabilities. Figure 5 shows how the effect of an individual's unemployment risk is conditional on the partner's risk. We display the predicted probability of voting for the radical right for increasing values of unemployment risk conditional on low (first decile) and high (ninth decile) risk of their partners.

The simulations provide a clear picture of how the distribution of unemployment risk within households affects radical-right voting. First, the figure demonstrates that respondents' own risk and their partners' risks interact. Second, we see that the probability of voting for the radical right strongly increases with higher levels of risk for individuals whose partners have a very low risk of unemployment. This

[52] Ai and Norton 2003.

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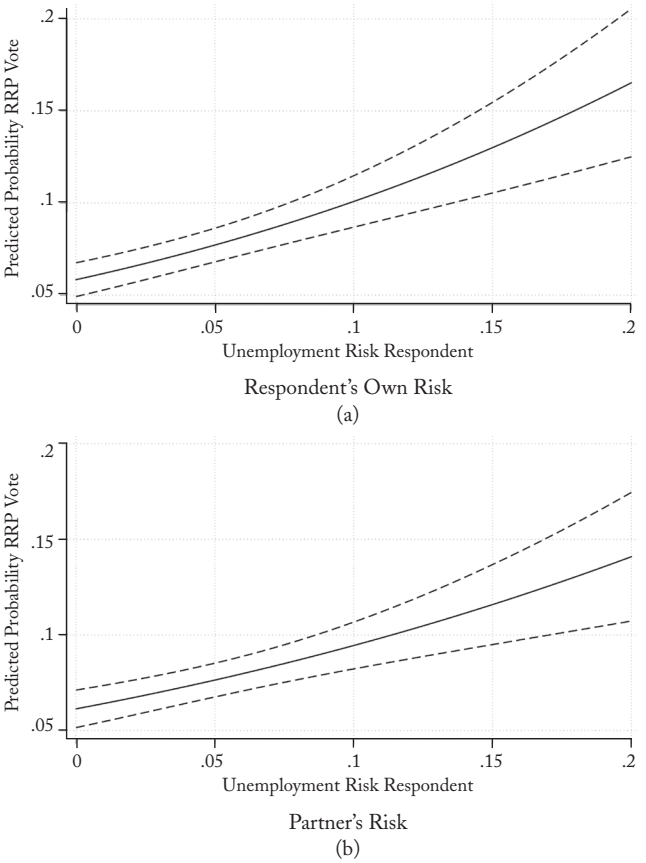

FIGURE 4
DIRECT EFFECT OF UNEMPLOYMENT RISK[a]

[a] Predicted probabilities of voting for the radical right conditional on unemployment risk and partner's unemployment risk. Dashed lines represent 95 percent confidence intervals.

speaks against a logic in which partners provide a household safety net that mitigates or averages out the effect of risk on radical-right support through resource pooling. If partners' low risk could compensate for individuals' own risk, we should see a nearly flat line when partner risk is low. This is clearly not the case. Similarly, Figure 5 shows a clear effect of a partner's unemployment risk even when individuals have a low risk themselves; at an individual's unemployment risk of nearly zero, the individual's probability of voting for the radical right is more than twice as high when the partner has high rather than low risk of unemployment.

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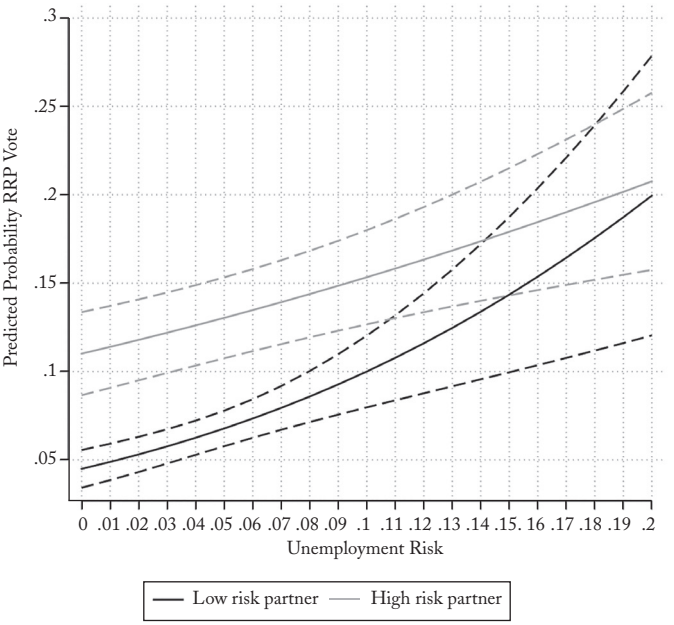

FIGURE 5
PREDICTED PROBABILITIES: OWN RISK AND PARTNER RISK[a]

[a] Predicted probabilities of voting for the radical right conditional on unemployment risk and partner's unemployment risk. Dashed lines represent 95 percent confidence intervals.

Third, we see that a partner's unemployment risk has a higher effect on voting for the radical right when a person's own unemployment risk is low than when it is high. Again, from a logic of risk pooling we should expect the opposite effect: if a respondent's unemployment risk is low, the partner's risk should matter less. These findings do not only underline the importance of economic risk and its distribution within households for explaining the success of the radical right, they also point to a potential factor for why studies of individual economic determinants of radical-right voting have only found unstable and often weak effects. If one individual at risk of losing his or her job is enough to substantially increase the household's probability to vote for the radical right, then looking only at individuals and not taking their context situation into account could significantly underestimate the overall effect of economic risk on radical-right support.

With respect to the different channels linking risk and radical-right support discussed above, the empirical pattern lends support to the

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dominance mechanism, that is, the idea that voters' preferences within households converge toward the highest level of risk exposure. Partners do not seem to be pooling risks in a way that the low risk of one partner can work as a remedy to the risk of the other. Instead, a high risk of one person in the household is enough to substantially increase radical-right voting. In contrast to social policy preferences,[53] support for radical-right parties does not follow a simple bread-and-butter logic. The absence of obvious policy demand in response to household risk may suggest that affected voters are more strongly motivated by a desire to protest against the latent threat of economic vulnerability.

Gender-Specific Household Effects

We next investigate the possibility that unemployment risk within the household affects men and women differently. We thus estimate our models for a split sample of men and women. For these analyses, we exclude same-sex couples. We show these results in Figure 6; the regression table can be found in the supplementary material

Figure 6 shows the effect of unemployment risk on voting for the radical right for men and women. We see that men and women show the same general pattern of dominance. In both cases, for individuals with a low unemployment risk, the partner's unemployment risk increases the probability of voting for the radical right. The figure also demonstrates some pronounced differences between men and women, most clearly visible for individuals whose partners have a low risk of unemployment. For men, we see a strong increase in the likelihood of voting for a radical-right party with increasing level of risk. This increase is only moderate for women. Nevertheless, we do not see a safety-net effect. Overall, individual risk seems to have a stronger effect for men than for women. In addition, although at lower levels of unemployment risk we do not see a difference between men and women in the likelihood of voting for the radical right, the difference becomes apparent and more pronounced as unemployment risk increases.

In sum, our findings show that especially for individuals with low unemployment risk, if household situation is not taken into account, then there's potential to misinterpret their political leanings. Our findings indicate that for constellations in which both partners have a similar level of unemployment risk, predictions based on one of them should be pretty accurate. But for constellations in which there is a bigger difference (the off-diagonal in Figure 3), partner risk should have a

[53] Häusermann, Kurer, and Schwander 2016.

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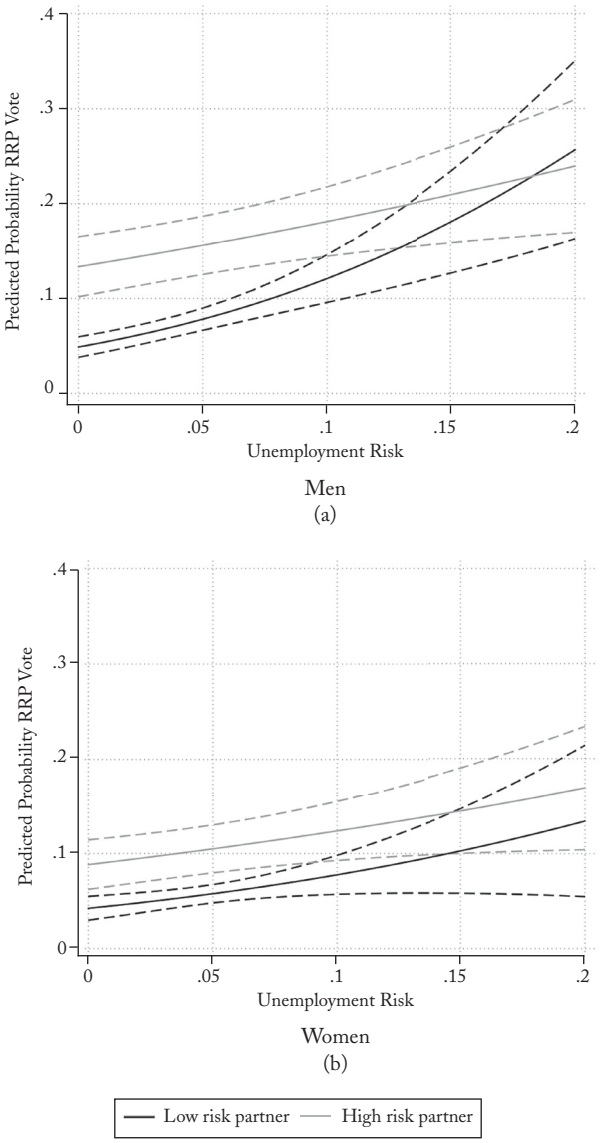

FIGURE 6
EFFECT OF UNEMPLOYMENT RISK BY GENDER[a]

[a] Predicted probabilities of voting for the radical right conditional on unemployment risk and partner's unemployment risk. Dashed lines represent 95 percent confidence intervals.

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strong, potentially unobserved effect with low-risk individuals. The specific magnitude of this effect will vary by country and will depend on the number of households that include partners with strongly differing risks.

We illustrate the magnitude of this effect with an example based on the calculations above. Based on the distribution of partner's unemployment risk for men with very low own unemployment risk (0.001), we can estimate the prevalence of a dominance effect. For the third quartile of a partner's unemployment risk, we see an increase from 5 percent to 7.5 percent in the predicted probability of voting for a radical-right party. This means that for 25 percent of the cases for men with low unemployment risk, their predicted probability of voting for the radical right is 50 percent higher than when estimated based on only their own unemployment risk. As can be seen in Figure 6, this difference becomes smaller as an individual's own unemployment risk increases. Overall, this means that neglecting partner risk can lead to substantial bias among a rather small, but non-negligible share of the population—those households in which someone with low risk cohabits with a high-risk partner (see Table A3 in the supplementary material for country-specific shares).

Robustness

We run additional analyses to demonstrate the robustness of our findings to alternative specifications and measures and to address issues of causality. Table A6 of the supplementary material summarizes the findings. First, we replicate our main analysis using a measure of unemployment risk based on two-digit ISCO codes. We thus use more fine-grained occupational class groups to estimate an individual's risk of becoming unemployed. We again find that an individual's unemployment risk as well his or her partner's unemployment risk has a significant positive effect on voting for a radical-right party. We also establish the same pattern of interaction between an individual's risk and his or her partner's risk in determining the propensity to support the radical right.

Our original models do not include attitudinal variables because they may introduce posttreatment bias. In supplementary material Table A6, models 3 and 4, we show that our main findings remain unaffected by the inclusion of variables controlling for attitudes generally associated with voting behavior in a postindustrial political space (left-right self-placement, redistribution, and immigration). Interestingly, including these variables does not reduce the effect size of individual's unemploy-

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ment risk and partner's risk. While including them does not constitute a comprehensive mediation analysis, which is beyond the scope of this article, it is another indication in line with our tentative interpretation of pooling versus the dominance channel, that the effect of unemployment risk may not run through policy attitudes. If individuals instrumentally use their vote for the radical right as a potential policy remedy against their economic risk, we should see that reflected in a mechanism that goes through their policy attitudes.

In our observational set up, we cannot fully rule out that people select into couples based on similar socioeconomic context conditions, which would result in potential problems based on selection and endogeneity. To strengthen our claim for a causal direction, we additionally run our analysis including class fixed effects for respondents and partners. We construct these occupational class groups following Daniel Oesch.[54] His class scheme has been explicitly developed to describe contemporary postindustrial societies.[55] We thus limit our analysis to variation in unemployment risk within occupational class groups. This means that to a large degree, we only exploit over time variation in these models.[56] Although it is certainly possible that people select into relationships based on membership in a specific class group, we assume that it is highly unlikely that people select into relationships based on fine-grained variation in unemployment risks. By including these class fixed effects and leveraging within-class variation, we corroborate our results that both individual unemployment risk and partner's risk significantly affect voting for the radical right. They do so in a pattern very similar to the one outlined in our main analysis.

Conclusion

In this article, we examine the economic roots of the populist radical right. We show that economic pressure might well result in not purely economic reactions in the electoral arena. We suggest that the relatively weak explanatory power of economic variables in previous empirical analyses is due to the neglect of two key insights of a literature that has recently taken a decidedly relational perspective to political be-

[54] Oesch 2006.

[55] The collapsed Oesch scheme differentiates between eight different occupational classes: self-employed professionals and large employers, small business owners, (associate) managers and administrators, office clerks, technical professionals and technicians, production workers, sociocultural (semi-) professionals, and service workers.

[56] We do not include year fixed effects in these models because they would absorb almost all of the remaining variation left in this approach.

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havior. First, radical-right support might be motivated much more by latent economic threats than by current material conditions.[57] Second, the study of economic insecurity should not only focus on individuals, but should also integrate household constellations to adequately capture overall risks to economic well-being.[58]

Our analysis systematically incorporates these two aspects into a comprehensive assessment of the relationship between economic risk and radical-right support. Based on large-scale labor market data and cross-national survey data, we demonstrate that households are important sites of preference formation that shape the electoral effects of economic risk. In contrast to the idea of risk pooling, households do not seem to provide private safety nets when it comes to voting for the radical right. Rather, respondents react to the vagaries of economic modernization affecting anyone in the household. In fact, one high-risk person in a household may be a sufficient condition to significantly increase the probability of all other household members voting for the radical right.

Although we have focused on arguably the most important contextual condition with regard to human interactions, our results are likely to travel beyond voters' homes. The dominance mechanism suggested by our analysis implies that interactions with other family members, friends, or colleagues who are adversely affected by latent labor market risks might also increase support for the radical right among voters who are less exposed themselves but who empathetically react to the well-being of relevant peers. Granted that such interactions might happen on a lower level of intensity compared to households: multiplier effects might be somewhat weaker, but we have no reason to expect fundamentally different patterns of preference alignment within voters' broader personal networks. More generally, further research should investigate how latent economic threats to people's in-groups affect their support for the radical right. Although our analysis has mostly focused on economic threats to social status, it should not indicate that no other such threats exist. In addition, future research may also dive deeper into the dynamics that play out in partnerships or within households. The fact alone that people live with or without a partner should affect their risk perceptions as well as their propensity to support the radical right. Combined with traditional gender roles, differences in risk, income, or education within households might affect perceptions of social status and could in turn determine voting for the radical right.

[57] Gidron and Hall 2017; Kurer 2020.
[58] Western et al. 2012.

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Our findings have important implications for empirical studies of radical-right support in all social science disciplines. As we demonstrate the crucial role that households play in moderating the effect of economic risks, our study points to the high risk of omitted variable bias when not taking contextual effects seriously. More precisely, studies that estimate the effects of individuals' economic risk on voting for the radical right might underestimate these effects because one risk-exposed individual within someone's close personal network might be sufficient to increase support for the radical right—even among less vulnerable voters. While our study clearly documents that individual economic risk is an important driver of radical-right voting, the strength of this potential bias will be determined by the share of people that live in households with mixed levels of economic risk.

In line with other recent studies, the findings we present point to the important role that socioeconomic transformations play for the success of the radical right. Changes in economic risks are mainly the result of big social, economic, and demographic transformations. Since these insecurities have become politically associated with support for a group of parties that successfully channels this dissatisfaction, it is unlikely that the recent success of the radical right is short-lived. Although there is ongoing scholarly and public debate about how party positions and policy solutions concerning the issue of immigration may dampen the support for the radical right, our findings indicate that determinants of radical-right support might be more deeply rooted in the socioeconomic transformations of our time. This casts doubt on the idea that governments can successfully counteract the recent surge of the radical right through simple economic and social policy changes.

Supplementary Material

Supplementary material for this article can be found at https://doi.org/10.1017/S0043887121000046.

Data

Replication files for this article can be found at https://doi.org/10.7910/DVN/IVKRZY.

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Key Words

economic risk, electoral competition, radical right

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SOCIAL DEMOCRATIC PARTY EXCEPTIONALISM AND TRANSNATIONAL POLICY LINKAGES

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ABSTRACT

Political parties learn from foreign incumbents, that is, parties abroad that won office. But does the scope of this cross-national policy diffusion vary with the party family that generates those incumbents? The authors argue that party family conditions transnational policy learning when it makes information on the positions of sister parties more readily available and relevant. Both conditions apply to social democratic parties. Unlike other party families, social democrats have faced major competitive challenges since the 1970s and they exhibit exceptionally strong transnational organizations—factors, the authors contend, that uniquely facilitate cross-national policy learning from successful parties within the family. The authors analyze parties' policy positions using spatial methods and find that social democratic parties are indeed exceptional because they emulate one another across borders more than do Christian democratic and conservative parties. These findings have important implications for our understanding of political representation and of social democratic parties' election strategies over the past forty years.

> [W]e are all united in the effort to create democratic systems in which not determination from outside or from above but responsible self-determination is to be the dominating social principle […]. We are not a closed society but an association of independent parties whose representatives feel they can learn from each other and can by joint effort achieve something useful […].
>
> —*Willy Brandt, speech to the Socialist International Congress, Vancouver*[1]

> The debate today is no longer about whether we modernise, but how and how fast. My case is straightforward. The left and centre-left has to stay true to its values but rediscover fundamental radicalism in applying those values to the modern world and jettison outdated doctrine and dogma that stands in our way.
>
> —*Tony Blair, address to the 1999 Socialist International Congress*[2]

[1] Quoted in Seidelmann 1998, p. 3.
[2] Quoted by *BBC News* at http://news.bbc.co.uk/1/hi/uk_politics/508882.stm.

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Introduction

ANALYSES of the Socialist International,[3] Social Democratic party cooperation at the European level,[4] and social democracy's reorientation toward Third Way policies during the 1990s[5] suggest strong policy linkages within the Social Democratic party family. But studies of cross-national policy linkages between parties highlight *success*, rather than party family, as the mechanism driving transnational policy diffusion.[6] According to these studies, political parties seek to construct a winning electoral strategy at home by taking cues from foreign incumbents in general, that is, successful political parties abroad[7] and not necessarily only those in the same party family. In this article, we revisit the role of party family in the policy diffusion process and argue that due to their ideology, extensive transnational linkages, and unique challenges, successful Social Democratic parties transmit policies more strongly within their party family than do successful parties in other families.

When politicians and party strategists make programmatic choices to position their party for electoral success, they face considerable uncertainty. Previous research emphasizes that political parties respond to such uncertainty by employing the heuristic[8] of learning from and emulating other successful parties' positions. This learning and emulation occurs not only in their domestic sphere,[9] but also in the wider world by looking at successful parties abroad.[10] The expectation is that success, operationalized as incumbency, drives policy diffusion for all political parties; that is, political parties emulate and learn from foreign incumbents.

Markedly absent from our understanding of cross-border policy diffusion between parties is the role of party family.[11] Successful incumbents who lead governments are overwhelmingly Social Democrats, Christian Democrats, or Conservatives. These parties cluster in *familles spirituelles*, defined by their origins in the great ideological movements of the nineteenth and early twentieth centuries, history, and transna-

[3] Imlay 2018. The Socialist International is the worldwide organization of social democratic, socialist, and labor parties. It aims to strengthen and develop social democratic policies in the world.

[4] Hix 1996; Ladrech 1993.

[5] Giddens 1998. Third Way policies formed a moderate economic position that generally accepted free markets and sought to regulate their effects with center-left social positions.

[6] Böhmelt et al. 2016; Böhmelt et al. 2017.

[7] Ezrow et al. 2019.

[8] For example, Kahneman, Slovic and Tversky 1982.

[9] For example, Adams and Somer-Topcu 2009; Williams 2015; Williams and Whitten 2015.

[10] For example, Böhmelt et al. 2016; Böhmelt et al. 2017.

[11] See Senninger, Bishof, and Ezrow 2020, who examine the role of the European Parliament in influencing national parties' policy positions. A party family effect is not reported, though.

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tional linkages.[12] We examine whether party family matters for international policy diffusion by combining the literature on party families, and specifically Social Democratic parties,[13] with research on party policy diffusion.[14]

We expect party family to influence international policy diffusion from successful, incumbent parties for two reasons. First, the shared ideological ambitions and cross-border linkages within party families affect what information is available to party strategists through the organizational channels that exist to transmit policy ideas. These channels vary across party families. Second, the unique cross-national challenges faced by a party family condition the relevance that party strategists attach to the success of foreign sister parties in their own search for a winning electoral strategy. Both mechanisms, we contend, make the Social Democratic party family an exception to the otherwise limited role of party families in cross-border policy diffusion. Defined by the shared internationalist goal of building more egalitarian capitalist democracies, social democracy developed exceptionally strong transnational organizational channels to facilitate policy exchange.[15] These channels made information on the platforms of successful sister parties readily available to party strategists. Moreover, the unique challenges that social democracy has been facing since the 1970s, including the decline of the industrial working class, globalization, the fall of communism, and the rise of green parties,[16] made the platforms of successful sister parties within the family the most relevant precedent for leaders searching for winning platforms. Our theoretical and empirical arguments suggest that by contrast, transnational organizations have not remained as strong for the other major party families that have generated most incumbents—the Christian Democrats and Conservatives[17]—nor were unique policy challenges as critical to them.[18]

[12] For example, see von Beyme 1985; Jacobs 1989; Gallagher, Laver, and Mair 2011; Ware 1996. Note that the concept of party family is evolving, especially as parties position themselves on new issues, such as European integration. But the conventional party family framework, which emphasizes traditional left-right ideological linkages, demonstrably retains analytical usefulness, which we rely on (Whitefield and Rohrschneider 2019).

[13] Benedetto, Hix, and Mastrorocco 2020; Kitschelt 1994; Pontusson 1995; Przeworski and Sprague 1986.

[14] Adams and Somer-Topcu 2009; Meguid 2005; Meguid 2008; Laver 2005; Williams 2015; Williams and Whitten 2015; Böhmelt et al. 2016; Böhmelt et al. 2017; Wolkenstein et al. 2020.

[15] Hix 1996; Ladrech 1993; Imlay 2018.

[16] Benedetto, Hix, and Mastrorocco 2020; Ladrech 1993; Pontusson 1995; Przeworski and Sprague 1986.

[17] In addition to the comparison to the Christian Democratic and Conservative party families on the right, we also examine programmatic policy diffusion among parties to the left of social democracy as an alternative reference point, see Table A9 of the supplementary material; Schleiter et al. 2021. (All tables and figures beginning with the prefix "A" can be found in the supplementary material).

[18] As we note below, there were also pressures for policy diffusion within these party families, for

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We test our expectations using quantitative data on twenty-six established democracies in Europe from 1977 to 2017. The results show that social democracy is exceptional and, unlike the Christian Democratic and Conservative party families, characterized by extensive cross-national emulation of left-right policy positions from Social Democrats abroad who were incumbents in the recent past.[19] We find that a party family is important and influences cross-national learning when it shares sufficiently strong transnational organizations and significant political challenges. This result has crucial implications for four important political science literatures: studies of programmatic policy learning, social democracy, party election strategies, and policy diffusion in general. We expand on these contributions in the conclusion.

Party Policy Diffusion, Heuristics, and Party Family

When parties seek to position themselves for electoral success in a changing environment, they face complex and uncertain choices.[20] Parties' strategies may, for instance, focus on taking or altering ideological positions,[21] picking issues to prime voters or to shift their attention,[22] and choosing broad or narrow appeals.[23] Complexity and uncertainty make the calculation of optimal electoral strategies challenging[24] and tax the decisional capacities of party strategists. Parties, therefore, use heuristics to identify relevant information in constructing winning strategies.[25] Heuristics are cognitive shortcuts—guides to rational action in conditions of uncertainty and complexity with a fair chance of success.[26] Two types of cognitive heuristics guide parties in their search for electorally successful strategies: the availability heuristic and the representativeness heuristic. Decision makers who use the availability heuristic estimate "frequency or probability by the ease with which instances or associations can be brought to mind."[27] Under the represen-

instance, with respect to labor market liberalization and centrist social policies, but the modes of policy diffusion were significantly weaker.

[19] Studies of social democracy frequently emphasize the importance of a two-dimensional political space in generating dilemmas in the competition for votes. Although our main analysis focuses on the one-dimensional left-right scale, we examine the robustness of our findings when accounting for multidimensionality of the issue space in the supplementary material; see tables A10 and A11.

[20] Budge 1994, p. 445; see also Somer-Topcu 2009; Somer-Topcu 2015.

[21] For example, Adams, Merrill, and Grofman 2005; Adams and Somer-Topcu 2009; Bawn and Somer-Topcu 2012.

[22] Aragonès, Castanheira, and Giani 2015.

[23] Somer-Topcu 2015.

[24] Laver and Sergenti 2012.

[25] See also Weyland 2005.

[26] Kahneman and Tversky 1979.

[27] Tversky and Kahneman 1982, p. 164.

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tativeness heuristic, "probabilities are evaluated by the degree to which A resembles B."[28] These heuristics have been shown to explain not only why parties learn from and emulate foreign policies, but also, crucially, whose policies are likely to be emulated. In particular, these are dominant governing parties that won office alone or that lead their coalitions because information on their policies is both readily available and a relevant precedent demonstrating how to win votes and how to dominate a government.[29]

Party families, or (perceived) ideological similarity, may also affect the availability of information and the relevance of precedents. Nevertheless, previous accounts of international policy diffusion downplay the role of party family and ideology[30] or do not find empirical support that party families matter for diffusion.[31] A reevaluation of party family is warranted, given that parties pursue not only electoral success, but also policy goals.[32] Clearly, the search for electoral victory can cause parties to assimilate some programmatic stances of successful parties from other ideological blocs,[33] as illustrated by the way some Social Democratic parties have adopted parts of the center-right's neoliberal economic program. But to remain competitive, parties must negotiate the tension between pursuing policy and electoral success.[34] In this respect, sister parties with similar goals that succeed in winning office abroad are likely to be particularly relevant precedents. Hence, learning from and emulating their policies may be an important heuristic. Likewise, at the domestic level, there is evidence that parties pay close attention to the peers within their own ideological bloc.[35]

Although it is plausible that ideological affinity matters for international policy diffusion, it is likely more influential for some party families than for others. Specifically, we contend that party strategists can be expected to privilege learning from successful sister parties abroad under two conditions. First, when transnational organizations within the famille spirituelle make information on sister parties abroad readily available and, second, when unique challenges faced by the family make the choices of sister parties the most relevant precedent. Under these circumstances, party family links condition the availability and repre-

[28] Tversky and Kahneman 1974, p. 1124.
[29] Böhmelt et al. 2016; Böhmelt et al. 2017.
[30] See Senninger, Bischof, and Ezrow 2020.
[31] Böhmelt et al. 2016; Böhmelt et al. 2017.
[32] Strøm 1990.
[33] Adams and Somer-Topcu 2009; Laver 2005; Williams 2015; Williams and Whitten 2015; Böhmelt et al. 2016; Böhmelt et al. 2017.
[34] Wittman 1983.
[35] Adams 2001; Adams and Merrill 2009; Adams and Somer-Topcu 2009; Williams 2015.

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sentativeness heuristics applied. Below, we discuss these two mechanisms and show that they apply to social democracy but not to the other party families, and in particular, not to the Christian Democratic and Conservative families that produced the majority of incumbents on the political right.[36] This makes the Social Democratic party family the exception to the otherwise muted role of party families in transnational policy diffusion.

Social Democratic Party Exceptionalism

Transnational Linkages and Learning from Available Precedents

Comparative research clusters parties into families because of their shared origins in the great ideological movements of the nineteenth and early twentieth centuries and because international linkages likely have consequences for their behavior.[37] Party families mobilizing to represent social groups in specific historical contexts developed organizational structures of varying strength to suit their goals. In cross-national policy diffusion, such family links may shape the information available to party strategists in their search for winning strategies, that is, they affect how the availability heuristic is applied.[38] Previous work assumes that information availability is driven by the media coverage that successful incumbents receive compared to opposition parties.[39] We argue that strong transnational organizations specific to party families are an additional channel that makes information about the programs of successful incumbent sister parties easily available within the family. Enhanced organizational and informational linkages increase the probability that party leaders and their advisers learn from and emulate foreign incumbents in the same party family.

Social democracy, unlike other party families, featured exceptionally strong cross-national links from its inception for two reasons. Ideologically, social democracy retained from its revolutionary origins the shared ideological goal of transforming capitalism[40] and subscribed to socialist internationalism—cross-national collaboration to develop shared pol-

[36] In Table A9, we also examine how party policy diffusion among Social Democrats contrasts with diffusion among parties to their left.

[37] von Beyme 1985; Jacobs 1989; Gallagher, Laver, and Mair 2011; Ware 1996.

[38] Tversky and Kahneman 1982.

[39] Even when controlling for the level of electoral support: Green-Pedersen, Mortensen, and Thesen 2017; Hopmann et al. 2011; Schoenbach, de Ridder, and Lauf 2001; Semetko 1996.

[40] Benedetto, Hix, and Mastrorocco 2020.

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icy approaches.[41] Organizationally, the party family developed transnational institutional links supporting this policy collaboration. The Socialist International channeled consultation between socialist parties on international issues.[42] Regionally, Social Democratic parties formed an effective and powerful party federation in the European Parliament (EP) and the Party of European Socialists (PES). Recent work shows that party groups in the EP are effective institutional channels of policy diffusion,[43] but the PES proved institutionally more powerful than others.[44] It has not only been coordinating European policies of national Social Democratic parties since the 1970s, but it has also grown increasingly influential with the 1992 Maastricht Treaty negotiations and a PES statute that provides "for majority decision making in all areas of EC policy where qualified majority is used in the Council of Ministers, and in certain areas decisions can be made which are binding on the national socialist parties."[45]

These transnational organizations were employed by successful leaders within the party family to disseminate policy ideas and influence sister parties abroad. Willy Brandt, for instance, made use of his presidency of the Socialist International (1976–1992) to promote the normalization of relations with the USSR, an extension of the objectives that he pursued through *Ostpolitik* as German Chancellor. Similarly, Tony Blair, addressing the Congress of the PES in Malmö in 1996, called on fellow European socialist leaders to "modernize or die," and to embrace Third Way reforms by holding "our values dear, then revolutionize our method of implementing them."[46]

Incumbents of the political right, by contrast, have traditionally been significantly less united ideologically and organizationally. Successful parties representing that part of the political spectrum since 1945 are drawn from the Christian Democratic and Conservative party families and display greater ideological heterogeneity than social democracy.[47] Key ideological fault lines among Christian Democrats include the centrality they accord to their Christian roots (for example, dividing the Dutch Christian Democratic Appeal from the German Christian Democratic Union/Christian Social Union), antisocialism (central for

[41] Imlay 2018.
[42] Imlay 2018.
[43] Senninger, Bischof, and Ezrow 2020.
[44] Senninger, Bischof, and Ezrow 2020 focus on the policy diffusion that occurs between parties belonging to the same EP party groups. We provide a theoretical account of cross-family variation.
[45] Hix 1996, p. 320.
[46] See https://bbc.in/3cmnHvR.
[47] Layton-Henry 1982; Kalyvas and van Kersbergen 2010.

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many of these parties, but for others, such as the Belgian, Dutch, and Italian parties, it contradicts their domestic Christian Democratic-Socialist alliances), and different welfare state models.[48] Moreover, while Christian Democrats embraced supranational cooperation and European integration, Conservatives did not necessarily do so. These differences hampered the creation of effective transnational organizations by these parties. Although the Conservatives formed the European Democratic Union, it remained weaker than other federations and eventually merged in the 1990s with the European People's Party (EPP) formed by the Christian Democrats.[49] Thus, although with the EPP the Christian Democratic parties had a strong transnational party organization, it was less effective as a channel for policy diffusion than the equivalent organizational ties among Social Democrats for two reasons: ideologically, Christian Democracy is more heterogeneous, and organizationally, it coalesced with another major party family at the European level since the 1990s.

In sum, the strength of transnational organizations within the Social Democratic party family is exceptional and instrumental in making information on the policy platforms adopted by successful sister parties abroad readily available to party strategists.

Shared Policy Challenges and Learning from Representative Precedents

In cross-national policy diffusion, the second type of cognitive shortcut applied by party strategists is the representativeness heuristic[50]—the degree to which the ambition and strategic choices open to a foreign party resemble those of the focal (domestic) party that is aiming to construct a winning platform. Existing research suggests that the representativeness heuristic leads party strategists aiming to position their party for electoral success to focus on foreign parties whose programmatic choices have won them office.[51] We claim that whether a winning foreign party's choices represent the dilemmas faced by the focal party can be mediated by party family. Specifically, when unique cross-national challenges are confronted by parties within a family, the choices of successful sister parties become a particularly relevant precedent.

Social Democratic parties have faced significant and unique competitive pressures since the mid-1970s. In the postwar years, they success-

[48] van Kersbergen and Manow 2009; Kalyvas and van Kersbergen 2010.
[49] Hix 1996.
[50] Tversky and Kahneman 1974.
[51] Dolowitz, Greenwold, and Marsh 1999; Dolowitz and Marsh 2002; see also Ezrow et al. 2019.

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fully adopted catchall strategies that broadened their electoral support beyond the working class.[52] This strategy saw their support peak in the 1960s–1970s[53] and their coalition options expand, and it propelled them into governments across Europe. But beginning in the 1970s, the catchall strategies of these parties came under pressure.[54] The challenges facing the party family in the 1970s and 1980s were economic, ideological, and political. Economic development precipitated a shift toward nonindustrial occupations,[55] which sent the industrial working class, traditionally the core electorate of Social Democratic parties, into secular decline. The oil crisis of the 1970s was accompanied by high levels of unemployment, stagnation, and inflation, which challenged the assumptions of Keynesian economics and led to the adoption of neoliberal approaches that opened up national economies to global trade.[56] The resulting pressures on Social Democratic parties were further compounded by the collapse of Communism and the introduction of the single European market.[57] Ideologically, these developments called into question the programmatic identity of social democracy and the effectiveness of policies that it had traditionally espoused to promote workers' rights and social justice. Politically, competition from the left for socially liberal voters from rising Green parties put further strain on the electoral coalition underpinning social democracy. The confluence of these factors required a renewal of social democracy.

In response to these challenges, leaders within the movement proposed the reorientation of Social Democratic parties toward Third Way politics that generally accepted free markets but also sought to regulate their effects. We argue that the rapid diffusion of many of these ideas within the party family, albeit with national differences,[58] was powerfully driven by the specificity of the challenges that social democracy faced. The strategists of Social Democratic parties across Europe learned from the programmatic choices of the first Social Democrats carried to power in the 1990s by the adoption of Third Way ideas, because those choices resolved dilemmas that closely resembled those of their own party. Hence, Social Democratic party family mediated policy diffusion because successful Social Democratic parties were most representative of the precedent that focal party strategists aimed to emulate.

[52] Przeworski and Sprague 1986.
[53] Benedetto, Hix, and Mastrorocco 2020.
[54] Przeworski and Sprague 1986.
[55] Pontusson 1995.
[56] Benedetto, Hix, and Mastrorocco 2020.
[57] Ladrech 1993; see also Benedetto, Hix, and Mastrorocco 2020.
[58] Keman 2011.

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Anecdotally, there is ample evidence of the diffusion of Third Way policies within the Social Democratic party family. As Anthony Giddens notes, "[w]hen New Labour first came into government, there was intense interest among Social Democratic parties in Continental Europe."[59] In April 1999, Bill Clinton sponsored a dialogue in Washington, D.C., on the Third Way that was attended by several European heads of government: Blair, Gerhard Schröder, Wim Kok, and Massimo D'Alema. Later that year, Blair and Schröder published a joint vision for a reformed social democracy in "The Third Way/Die Neue Mitte,"[60] drafted by their strategists Peter Mandelson and Bodo Hombach.[61] Through the mid- to late-1990s, the concomitant centrist policy shifts proved electorally successful: European Social Democratic parties dominated elections and entered governments either solely or in coalition. In 1998, the only exceptions in Europe were Ireland, Norway, and Spain.[62]

But this success proved transient, and social democracy continued to face severe challenges. Since 2000, the electoral support of these parties has sunk to historical lows with the continued decline of the industrial working class, the defection of socially conservative socialist voters to populist parties, and a loss of public-sector support in light of severe constraints on public spending following the Great Recession.[63] The uniqueness of these challenges to the Social Democratic party family can be expected to provide powerful incentives for party strategists to learn from and emulate the first successful responses, once they emerge, by sister parties abroad.

Although the same social, economic, and geopolitical changes also affected the competitive environment of Conservatives and Christian Democrats, the impact on these parties was neither as uniform nor as existentially threatening as it was for the Social Democrats. The decline of the industrial working class represented more opportunities than challenges for the Conservatives and Christian Democrats.[64] While economic globalization forced the political right to reform their welfare policies, individual parties were committed to different wel-

[59] Giddens 2000, p. 4.

[60] Blair and Schröder 1999.

[61] For example, the pamphlet calls on Social Democrats to "learn from each other and measure our own performance against best practice and experience in other countries. With this appeal, we invite other European Social Democratic governments who share our modernizing aims to join us in this enterprise"; Blair and Schröder 1999.

[62] Benedetto, Hix, and Mastrorocco 2020.

[63] Benedetto, Hix, and Mastrorocco 2020; Berman and Snegovaya 2019.

[64] Kalyvas and van Kersbergen 2010, p. 189.

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fare-state models,[65] which made the challenges they faced heterogeneous. Globalization, with the spread of neoliberalism and labor market liberalization, also represented a less fundamental threat to Conservatives and Christian Democrats because they held economic positions to the right of their Social Democratic counterparts.[66] And how the collapse of Communism and post-material value change, including the rise of secularism, influenced Conservatives and Christian Democrats differed based on whether antisocialism, traditionalism, or their confessional roots remained central to their identities.[67] Thus, the challenges that Conservatives and Christian Democrats faced were more varied and less existentially threatening than those faced by Social Democrats, which weakened incentives for cross-national family-specific learning.

In sum, party leaders and strategists focus on successful foreign parties as a useful heuristic to develop a model for their own success. We argue that party family mediates this strategy under two conditions: first, when the family features strong transnational organizational links (making information on successful programmatic choices within the family readily available to party strategists) and, second, when it faces significant and unique challenges to success (making successful responses by sister parties the most representative precedents). Among the party families that have generated significant numbers of incumbents throughout the postwar era, both conditions apply to Social Democrats from the 1970s onward, in contrast to Christian Democrats and Conservatives. Hence, we hypothesize that policy diffusion within the Social Democratic party family through learning from its successful foreign incumbents is the exception to the otherwise muted role of party family in mediating transnational policy diffusion.

> —H1. Social Democratic Party Family Hypothesis. Policy diffusion within the Social Democratic party family from its incumbents is exceptionally strong, compared to other party families.

Research Design

The unit of analysis in our data set is party-year, and we analyze 264 political parties in twenty-six European democracies over a forty-year period from 1977 to 2017. New parties enter the data set with the first election they compete in and parties leave the data once they no longer participate in national elections. To define parties and their entry and

[65] van Kersbergen and Manow 2009.
[66] Ward, Ezrow, and Dorussen 2011.
[67] Kalyvas and van Kersbergen 2010, p. 188.

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exit dates, we rely on the Comparative Manifesto Project (CMP).[68] All parties are included when data are available, including regional, agrarian, and other small, specialized party families coded by the CMP investigators. The total number of observations is 4,049 party-years. The two central components of our research design are the dependent variable, which captures left-right policy positions of Social Democratic parties, Christian Democrats, and Conservatives, and our empirical method, which tests whether policy diffusion occurs within the major party families (Social Democrats, Christian Democrats, and Conservatives). This research design maximizes parsimony and clarity, allowing for a direct test of our hypothesis by examining the contrast between diffusion in the three party families that have generated the overwhelming majority of incumbents.[69]

For the dependent variable in our models, the CMP provides a left-right measure on party positions.[70] In tables A10 and A11 of the supplementary material, we discuss additional analyses that account for the potential multidimensionality of the policy space.[71] The left-right dimension is the most important one for issue competition[72] and for political elites and voters, it is a common vocabulary relating to the salient issues of governments' role in the economy and the distribution of income.[73] The CMP's left-right measure is broadly consistent with those derived using other methods.[74] We rescale the original variable to an interval ranging from one (extreme left) to ten (extreme right) to make it consistent with our median voter scale (see below). Interpolation is required because parties' policy positions are measured only in election years. For this interpolation, we assume that party positions do not change until the next election year.[75]

Our main focus is on Social Democratic parties, but we also exam-

[68] Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2013.

[69] In the supplementary material, we examine further implications of the theory and its underlying mechanisms, including diffusion on a secondary policy dimension next to the general left-right scale, the impact of the unique challenges faced by Social Democratic parties on policy diffusion within this party family (via an interaction with economic globalization), and the exceptionality of policy diffusion in the PES compared to the groups formed by other party families in the EP (see tables A10 to A13).

[70] Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2013.

[71] Schleiter et al. 2021.

[72] Huber and Powell 1994; Powell 2000; see also McDonald and Budge 2005.

[73] Huber and Inglehart 1995; Warwick 2002. Ideological structuring underlying the left-right scale in Eastern Europe may differ from that in Western Europe (Evans and Whitefield 1993) as well as across countries and time (Evans and Whitefield 1998; Harbers, De Vries, and Steenbergen 2012; Linzer 2008; Markowski 1997). However, there are strong arguments for using the left-right dimension to understand party competition in post-Communist democracies (Marks et al. 2006, p. 169; Pop-Eleches and Tucker 2011; McAllister and White 2007).

[74] Hearl 2001; McDonald and Mendes 2001; Laver, Benoit, and Garry 2003.

[75] See also Böhmelt et al. 2016; Böhmelt et al. 2017.

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ine models concentrating on Christian Democrats and Conservatives.[76] We follow Giacomo Benedetto, Simon Hix, and Nicola Mastrorocco[77] and define Social Democratic parties as those that are "a member of the Socialist International or Party of European Socialists at a particular time." The terms *socialism* and *social democracy* are often used interchangeably, though Social Democrats are sometimes viewed as more centrist than other members of the Socialist International in a particular country. The CMP[78] provides detailed information on the type and family of each party coded. We use this information to initially create a binary variable capturing whether a party is Social Democratic (1) or not (0). Out of the 4,049 party-years in our data, 747 pertain to Social Democratic parties (18.45 percent of all observations). Table A1 of the supplementary material provides a detailed overview of the Social Democratic parties that are included in our data with entry and exit years. Note that some countries have more than one Social Democratic party at the same time. This phenomenon affects only a small number of cases: specifically, pairing each party in our data set with all others produces 431,780 cases and only 256 of those party-dyad years signify pairs of Social Democratic parties in the same country (0.0006 percent). The focus of our analysis is on international programmatic diffusion between Social Democratic parties, but domestic-level diffusion is controlled for in the supplementary material in Table A7, in which we account for the possibility that domestic rival parties influence one another.[79] To examine whether policy diffusion within the Social Democratic party family is indeed exceptional and different from diffusion within the Christian Democrat and Conservative party families, we draw on the party family information contained in the CMP data[80] and create binary variables that capture the latter groups of parties. In our data set, 588 cases (14.52 percent of all party-years) are coded as Christian Democrats and 472 (11.66 percent) are defined as Conservatives. Based on previous studies by Zeynep Somer-Topcu and by Tobias Böhmelt and colleagues,[81] we also aggregate these blocs of parties and examine Conservatives and Christian Democrats jointly (see Table A8).

We use spatiotemporal lag models[82] to capture party policy diffusion

[76] In an additional analysis, we focus on parties to the left of the Social Democrats as the reference point in examining the robustness of our argument that policy diffusion within the Social Democratic party family is exceptional (see Table A9 in the supplementary material).

[77] Benedetto, Hix, and Mastrorocco 2020.

[78] Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2013.

[79] Adams and Somer-Topcu 2009; see also Williams 2015.

[80] Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2015.

[81] Somer-Topcu 2009; Böhmelt et al. 2016.

[82] Franzese and Hays 2007; Franzese and Hays 2008.

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and the role of social democracy's exceptionalism. The models estimate a party's position as a function of foreign parties' positions. We achieve this via a weighting matrix, **W**, which specifies the relationship between parties (senders and receivers) and, thereby, the subset of foreign parties that potentially exert an influence. We multiply this connectivity matrix with a temporally lagged version of our dependent variable (y_{e-1}) to construct the spatial lags—the core components in our models ($\mathbf{W}y_{e-1}$)—which thus combines data on parties' policy positions with information on party-family membership. The temporal lag we use for the spatial lags ($_{e-1}$) pertains to the year before the last election in a sender country. That is, we focus on the positions of potentially influential parties in the year before their last election. To illustrate this design, consider estimating the influence of the German Social Democratic Party (SPD) on the British Labour Party's 2015 manifesto: the temporal lag will take on the German SPD's 2012 policy position. The last German election before 2015 was held in 2013 and the lag pertains to the year before the last election (2012). The rationale behind this design is based on the observation that developing party manifestos is a "time-consuming process […] which typically takes place over a two-three year period during which party-affiliated research departments and committees draft sections of this manuscript, which are then circulated for revisions and approval upward to party elites and downward to activists."[83] Considering this argument and following previous studies,[84] instantaneous diffusion effects are unlikely and therefore, we use parties' policy positions from the year before the last election in their country when constructing the spatial lags.

To allow for distinct effects among Social Democratic parties and Christian Democrats or Conservatives, we specify different weighting matrices. We multiply a first matrix with the temporally lagged dependent variable, where matrix entries are set to 1 only if both parties i (receiver party) and j (sender party) are Social Democratic according to the CMP[85] and they do not compete for office in the same country. This leads to the first spatial variable, $\mathbf{W}y^{\text{Social Democrats}}$, which captures the policy position of all Social Democratic parties abroad as a potential influence on Social Democrats "at home." The impact of non–Social Democratic parties is set to 0, and the matrix does not allow for a Social Democratic influence from abroad on non–Social Democrats at home (as the entries are set to 0 here, too). A second spatial variable captures

[83] Adams and Somer-Topcu 2009, p. 832.
[84] For example, Böhmelt et al. 2016; Böhmelt et al. 2017; Senninger, Bischof, and Ezrow 2020.
[85] Budge et al. 2001; Klingemann et al. 2006; Volkens et al. 2015.

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the influence of incumbent parties abroad in the context of party policy diffusion. Here, we modify the matrix so that its entries only receive a value of 1 if both parties, *i* and *j,* are Social Democratic parties, *j* is active in another country, and *j* was recently in government (either forming the government on its own or as a member of a coalition). Data for incumbency are taken from Holger Döring and Philip Manow.[86] We label this second spatial lag $\mathbf{W}y^{\text{Incumbent Social Democrats}}$. A last set of spatial variables follows the setup of the first two items, but we focus instead on Christian Democrats or Conservatives: $\mathbf{W}y^{\text{Christian Democrats}}$ and $\mathbf{W}y^{\text{Conservatives}}$ capture the policy positions of all Christian Democratic or Conservative parties abroad as a potential influence on Christian Democratic and Conservative parties at home; and $\mathbf{W}y^{\text{Incumbent Christian Democrats}}$ and $\mathbf{W}y^{\text{Incumbent Conservatives}}$ provide the information on whether the "sender" Christian Democratic or Conservative party abroad was recently in power.

We do not row standardize the spatial lags for theoretical reasons.[87] Row standardization implies that the number of (Social Democratic incumbent) parties abroad at a given time is not relevant. But rational strategists should only consider other parties' positions if they expect the marginal value of the information gathered to exceed the marginal cost of obtaining it, which is not consistent with the allocation of a fixed amount of effort. In other words, as the number of foreign parties increases, diffusion effects are likely to increase but at a rate that diminishes with each additional party. We use spatial OLS (S-OLS) regression, which is justifiable because our explanatory variables are temporally lagged.[88]

To credibly ensure that contagion "cannot be dismissed as a mere product of a clustering in similar [party or state] characteristics,"[89] we follow Robert Franzese and Jude Hays[90] by accounting for the common exposure of parties to similar economic (and other exogenous) factors.[91] We do so by including the (one-year) temporally lagged dependent variable, party fixed effects, and year fixed effects. We also include several additional control variables. Parties may respond to the positions of other domestic parties[92] and there are likely more general influences across borders than the Social Democratic ones we seek to

[86] Döring and Manow 2012.
[87] Böhmelt et al. 2016; see also Williams 2015; Williams, Seki, and Whitten 2016.
[88] Williams 2015; Williams and Whitten 2015; Böhmelt et al. 2016.
[89] Buhaug and Gleditsch 2008, p. 230; see also Plümper and Neumayer 2010, p. 427.
[90] Franzese and Hays 2008.
[91] Franzese and Hays 2007, p. 142.
[92] For example, Adams 2001; Adams and Merrill 2009; Adams and Somer-Topcu 2009; Williams 2015.

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examine.[93] To control for these effects, we define two additional spatial lags. First, in $\mathbf{W}y^{\text{Domestic}}$, matrix entries only receive a value of 1 if *i* and *j* are different parties competing in the same political system, 0 otherwise. Second, we specify $\mathbf{W}y^{\text{Foreign}}$, which is defined in a similar manner except that matrix cells contain 1 only if *i* and *j* are different parties not competing in the same system, 0 otherwise. Note that foreign Social Democratic, Christian Democratic, and Conservative parties are a subset of all parties abroad. Hence, although this last spatial variable addresses general cross-border diffusion effects not distinguishing between party families or incumbency status, including it in the models likely soaks up explanatory power of the main variables, making our estimations more conservative.[94] We further account for the position of the median voter using Eurobarometer data on respondents' left-right self-placement on a scale of one (left) to ten (right).[95] We lag this variable by one year to allow for delayed responses by parties. Finally, the effects of economic globalization are conditioned by the position of the median voter.[96] We thus control for the economic component of the KOF Globalization Index[97] and include the multiplicative interaction *lagged median voter * lagged economic globalization*.

Empirical Results

Hypothesis 1 expects policy diffusion within the Social Democratic party family (from its incumbents) to be stronger than diffusion within other party families. Table 1 presents the results for Social Democratic parties. Model 1 includes only the control variables, and we omit the core spatial variables. Model 2 adds only $\mathbf{W}y^{\text{Social Democrats}}$, and model 3 includes only $\mathbf{W}y^{\text{Incumbent Social Democrats}}$ (while omitting $\mathbf{W}y^{\text{Social Democrats}}$). Model 4 considers all control variables and both Social Democratic spatial variables simultaneously. We can directly interpret signs and statistical significance in this table. A spatial lag captures the weighted values of all neighboring units, in this case Social Democrats and Social Democratic incumbents. A coefficient estimate refers to the unit change in a focal party's position if, for example, all Social Democratic incumbents

[93] Böhmelt et al. 2016; Böhmelt et al. 2017.

[94] Excluding $\mathbf{W}y^{\text{Foreign}}$ from the analyses produces qualitatively similar results, although the main variables' effects increase in size as expected.

[95] Schmitt and Scholtz 2002.

[96] Ward, Ezrow, and Dorussen 2011; see also Williams 2015; Williams and Whitten 2015; Williams, Seki, and Whitten 2016.

[97] Dreher 2006. This variable is based on trade flows, portfolio and direct investment, tariff and invisible barriers to trade, and capital controls.

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TABLE 1
PARTY POLICY DIFFUSION: SOCIAL DEMOCRATIC FAMILY[a]

	Model 1	*Model 2*	*Model 3*	*Model 4*
Lagged party position	0.8240	0.8226	0.8216	0.8215
	(0.0106)***	(0.0107)***	(0.0107)***	(0.0107)***
Lagged median voter	0.2955	0.2955	0.3076	0.3048
	(0.1105)***	(0.1105)***	(0.1105)***	(0.1106)***
Lagged economic globalization	0.0184	0.0183	0.0191	0.0189
	(0.0076)**	(0.0076)**	(0.0076)**	(0.0076)**
Lagged median voter ×	−0.0039	−0.0039	−0.0040	−0.0040
Lagged economic globalization	(0.0015)***	(0.0015)***	(0.0015)***	(0.0015)***
$\mathbf{W}y^{\text{Domestic}}$	0.1480	0.1493	0.1492	0.1495
	(0.0105)***	(0.0105)***	(0.0105)***	(0.0105)***
$\mathbf{W}y^{\text{Foreign}}$	0.1439	0.1452	0.1451	0.1455
	(0.0104)***	(0.0104)***	(0.0104)***	(0.0104)***
$\mathbf{W}y^{\text{Social Democrats}}$		0.0015		0.0008
		(0.0007)**		(0.0008)
$\mathbf{W}y^{\text{Incumbent Social Democrats}}$			0.0033	0.0025
			(0.0012)***	(0.0014)*
Observations	4049	4049	4049	4049
Year and party FEs	yes	yes	yes	yes
R^2	0.884	0.884	0.884	0.884
RMSE	0.308	0.307	0.308	0.308

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

[a] Table entries are coefficients; standard errors in parentheses; constant as well as year and party fixed effects (FEs) are included in all models, but are omitted from presentation; the scale for party position (dependent variable) is recalibrated from the left-right estimates reported by the CMP to fit on the one to ten median voter scale; all explanatory variables are one-year lags; the spatial lags capture parties' policy positions of the year before the last election.

abroad ($\mathbf{W}y^{\text{Incumbent Social Democrats}}$) would increase their party position by one unit. But the interpretation is more complex because our weighting matrices are not standardized and there is a possibility of temporal as well as spatial spillover effects. Therefore, first, to assess short-term effects directly, the coefficients of the spatial lags are multiplied by the average number of neighbors.[98] Second, we also calculate the long-term (asymptotic) effects of the spatial lags following Thomas Plümper, Vera Troeger, and Philip Manow.[99] Asymptotic long-term and short-term effects of the core spatial variables in Table 1 are presented in Figure 1. Last, to fully account for spatial spillover effects, we calculate spatial long-term equilibrium effects for the core spatial lags, which allow us

[98] Plümper and Neumayer 2010, p. 430f; see also Ward and Gleditsch 2008, p. 39.
[99] Plümper, Troeger, and Manow 2005, p. 336; see also Plümper and Neumayer 2010, p. 425.

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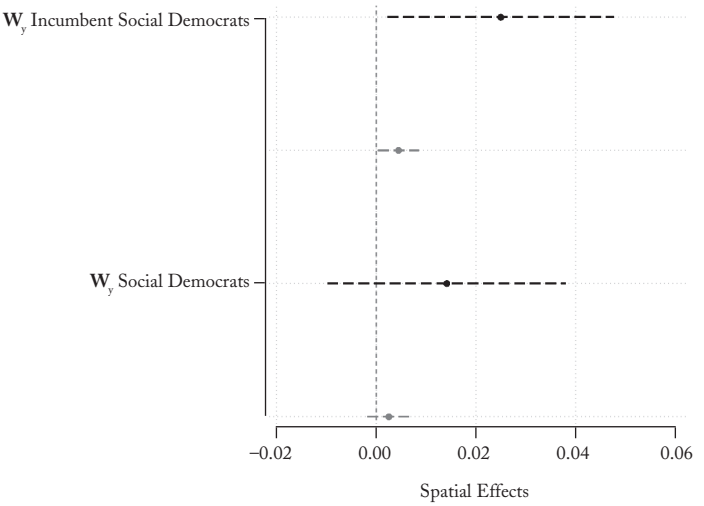

FIGURE 1
TEMPORAL SHORT-TERM AND ASYMPTOTIC LONG-TERM EFFECTS[a]

[a]The horizontal bars are 90 percent confidence intervals. Spatial effect of zero marked with dotted vertical line. Estimates are based on model 4. Short-term effects are reported in grey below asymptotic long-term effects (in black).

to estimate "responses of the dependent variable across all units."[100] Table 2 presents the spatial influence after diffusion has occurred and accounts for first-order, second-order, and feedback effects.[101]

The two spatial lags, $\mathbf{W}y^{\text{Social Democrats}}$ and $\mathbf{W}y^{\text{Incumbent Social Democrats}}$, are positively signed and statistically significant at conventional levels in Table 1, models 2 and 3, respectively. This suggests that party policy diffusion does occur between Social Democratic parties, and that Social Democratic incumbents are more influential than Social Democrats who are currently not in government. This is confirmed in model 4, in which $\mathbf{W}y^{\text{Social Democrats}}$ is no longer statistically significant, but $\mathbf{W}y^{\text{Incumbent Social Democrats}}$ remains significant at conventional levels and positively signed. This reemphasizes that Social Democrats learn from and emulate the policies of other Social Democratic parties, particularly if the latter were recently in power. As all foreign Social Democratic incumbents are also Social Democrats (and, as discussed above, they belong to the set of parties abroad), the inclusion of $\mathbf{W}y^{\text{Social Democrats}}$ next to $\mathbf{W}y^{\text{Incumbent Social Democrats}}$ naturally lowers the impact of the latter variable

[100] Hays, Kachi, and Franzese 2010, p. 409.
[101] Hays, Kachi, and Franzese 2010, p. 409.

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TABLE 2
SPATIAL LONG-TERM EQUILIBRIUM EFFECTS[a]: $\mathbf{W}_{\text{INCUMBENT SOCIAL DEMOCRATS}}$

Country	*Party*	*SPD*	*Labour*
Austria	Austrian Social Democratic Party	0.0664	0.0664
Belgium	Socialist Party Different	0.0664	0.0664
Belgium	Francophone Socialist Party	0.0664	0.0664
Bulgaria	Coalition for Bulgaria	0.0664	0.0664
Cyprus	Progressive Party of the Working People	0.0656	0.0656
Cyprus	United Democratic Union of Cyprus	0.0656	0.0656
Czech Republic	Czech Social Democratic Party	0.0672	0.0672
Denmark	Social Democratic Party	0.0672	0.0672
Estonia	Social Democratic Party	0.0672	0.0672
Finland	Finnish Social Democrats	0.0664	0.0664
France	Socialist Party	0.0672	0.0672
Germany	Social Democratic Party of Germany	4.5829	0.0664
Greece	Panhellenic Socialist Movement	0.0672	0.0672
Hungary	Hungarian Socialist Party	0.0664	0.0664
Hungary	Hungarian Social Democratic Party	0.0664	0.0664
Ireland	Labor Party	0.0672	0.0672
Luxembourg	Socialist Workers' Party of Luxembourg	0.0664	0.0664
Netherlands	Labor Party	0.0664	0.0664
Norway	Norwegian Labor Party	0.0664	0.0664
Portugal	Socialist Party	0.0664	0.0664
Slovakia	Direction-Social Democracy	0.0664	0.0664
Slovenia	Social Democratic Party	0.0672	0.0672
Spain	Spanish Socialist Workers' Party	0.0664	0.0664
Sweden	Social Democratic Labor Party	0.0672	0.0672
United Kingdom	Labour Party	0.0664	4.5829

[a] Table entries pertain to spatial long-term equilibrium effects when raising the party policy position of one of the parties highlighted in the last two columns by one. Entries are based on four decimal places and rounded accordingly. The table only captures a selection of parties and countries in 2010, and not the whole sample. Effects in the last two columns are calculated based on one-unit shifts to the right for the German Social Democratic Party (SPD) and the UK Labour Party.

in model 4 when compared to model 3. Therefore, model 4 controls for the influence of Social Democratic opposition parties abroad more directly than model 3 (which omits them from the estimation and treats them as noise). Substantively, focusing on model 4 and after spatial-lag coefficients are multiplied by the average number of neighbors, a Social Democratic party's left-right policy position would be 0.0025 points higher in the short run, if all foreign (neighboring) Social Democratic parties shift one unit to the right, compared to the year before.[102] But this estimate is not statistically significant. The effect of foreign Social

[102] Ward and Gleditsch 2008, p. 38.

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Democratic incumbent parties is calculated at 0.0045 in the short run. That is, a Social Democratic party's left-right policy position would be 0.0045 points higher (after the spatial-lag coefficient is multiplied by the average number of neighbors), if all foreign Social Democratic incumbents had shifted one unit to the right in the year before their last election. Hence, incumbency almost doubles the overall diffusion impact for Social Democrats, and this effect is significant. Asymptotically (Figure 1), the effect associated with $\mathbf{W}y^{\text{Social Democrats}}$ is estimated at 0.0141 (statistically significant) and the impact linked to $\mathbf{W}y^{\text{Incumbent Social Democrats}}$ is 0.0250 when a spatial lag is increased by one unit. These results are based on model 4, and adding or dropping specific variables does not alter the substantive findings.

For the long-term equilibrium effects of party policy diffusion among Social Democrats for cases in which the sender party was recently in power, we first assume that the spatial weights and all other variables remain at 2010 values. We then hypothetically increase some preselected Social Democratic parties' policy positions by one unit. This shock has direct (first-order) effects in the system via linkages among Social Democratic parties, but also has indirect (second-order) effects via longer chains of intermediaries and eventually feeds back to the source party. Since each party will have a different set of linkages to its neighbors, the impact of a hypothetical change in a party's policy position depends on which party's position is altered. We calculate the long-term effects on all parties as the shock reverberates through the system of spatial and temporal lags, that is, the effects presented in Table 2 comprise both direct and indirect influences.[103] Our calculations are based on model 3, which discards spatial variables other than $\mathbf{W}y^{\text{Incumbent Social Democrats}}$ for simplicity.

Table 2 summarizes the findings for the effect of a one-point increase in the positions of the German SPD and the UK's Labour Party. We report the median equilibrium impact that incorporates first-order, second-order, and feedback effects, which is based on one thousand random draws from the multivariate normal distribution of the spatial and temporal lags. The simulations suggest that a one-unit increase in the British Labour Party's policy position would positively affect all other Social Democratic parties in the system. The German SPD, for instance, would react by increasing its policy position by 0.0664 units to the right (accounting for all direct and indirect influences). If the British Labour Party had moved to the right by one unit, the Irish Labour

[103] Ward and Cao 2012, pp. 1092–94; Ward and Gleditsch 2008, p. 45.

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party would have emulated this move by adjusting its position 0.0672 units to the right of its initial left-right placement. Linking these findings to our theory, we find strong and robust support for H1.

We now turn to a comparison of incumbent political parties to the right of the political spectrum. The setup in Table 3 mirrors model 4 in Table 1, except in it we focus on the Christian Democratic and Conservative spatial variables. The Conservative spatial lags are negatively signed while the coefficient estimates for the Christian Democrat variables are all insignificant (with varying signs). This suggests that international party policy diffusion does not occur within Christian Democratic or Conservative parties, and that Christian Democratic and Conservative incumbents do not have a special influence, either. These findings support our theory: party family–specific cross-national diffusion from successful sister parties is only strong within the Social Democratic family, and it is not a characteristic of right-wing incumbent party families.

The results concerning the control variables mirror previous research.[104] First, the coefficients of the domestic-level spatial lag, $\mathbf{W}y^{\text{Domestic}}$, and of the foreign-level spatial lag, $\mathbf{W}y^{\text{Foreign}}$, have positive estimates, which emphasizes that parties learn from and emulate not only rival parties, but also other political parties in other countries. This replicates the findings of previous work.[105] Second, economic globalization conditions the effect of the median voter on parties' policy positions. The coefficient of the interaction between these two variables shows that the further to the left the median voter, the more globalization pushes parties' positions to the right.[106]

In Table A1 of the supplementary material, we give an overview of the parties that are coded as Social Democratic and we discuss a number of additional analyses. First, we take the size of a source (or sender) party's country into account because it may be plausible that parties, including Social Democratic ones, are more likely to learn from parties in larger states (Table A2). Second, we control for inflation and GDP growth as additional economic influences (Table A3). Third, we model thoroughly systemic changes in the international context, which may affect party policy positions, by accounting for Cold War developments and EU membership. We also examine whether diffusion within the Social Democratic party family changed over time, given its Third Way–turn discussed above, by restricting our analysis to the pre-2000 period

[104] For example, Adams and Somer-Topcu 2009; Williams 2015; Ward, Ezrow, and Dorussen 2011.
[105] Adams and Somer-Topcu 2009; Williams 2015; Böhmelt et al. 2016; Böhmelt et al. 2017.
[106] Ward, Ezrow, and Dorussen 2011.

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TABLE 3
CHRISTIAN DEMOCRATIC/CONSERVATIVE PARTY FAMILY[a]

	Model 5	*Model 6*
Lagged party position	0.8218	0.8235
	(0.0107)***	(0.0107)***
Lagged median voter	0.2715	0.2928
	(0.1105)**	(0.1106)***
Lagged economic globalization	0.0169	0.0181
	(0.0076)**	(0.0076)**
Lagged median voter ×	–0.0037	–0.0039
Lagged economic globalization	(0.0015)**	(0.0015)***
$\mathbf{W}y^{\text{Domestic}}$	0.1512	0.1479
	(0.0106)***	(0.0105)***
$\mathbf{W}y^{\text{Foreign}}$	0.1472	0.1439
	(0.0104)***	(0.0104)***
$\mathbf{W}y^{\text{Conservatives}}$	–0.0032	
	(0.0016)**	
$\mathbf{W}y^{\text{Incumbent Conservatives}}$	–0.0012	
	(0.0020)	
$\mathbf{W}y^{\text{Christian Democrats}}$		–0.0010
		(0.0010)
$\mathbf{W}y^{\text{Incumbent Christian Democrats}}$		0.0003
		(0.0015)
Observations	4049	4049
Year and party FEs	yes	yes

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

[a] Table entries are coefficients; standard errors in parentheses; constant as well as year and party fixed effects (FEs) are included, but are omitted from presentation; the scale for party position (dependent variable) is recalibrated from the left-right estimates reported by the CMP to fit on the one to ten median voter scale; all explanatory variables are one-year lags, the spatial lags capture parties' policy positions of the year before the last election.

(tables A4 and A5). Fourth, we test the robustness of our findings after adjusting for uncertainty around the estimates of party position (Table A6). Fifth, we control for the presence of more than one Social Democratic party in a focal country, we aggregate Christian Democrats and Conservatives into one party group (an ideological bloc), and we consider parties to the left of the Social Democrats (rather than to the right) as our reference point (tables A7 to A9). Sixth, we address the argument that Social Democratic parties compete in a two-dimensional political space. For instance, these parties' progressive positions on the cultural dimension of competition[107] may have "alienated the core con-

[107] Kitschelt 1994.

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stituency of social democracy, the working class."[108] Our main analyses focus on the left-right scale and thus, a one-dimensional issue space. But we account for the existence of a multidimensional issue space in two ways: we first omit and then control for countries that are likely characterized by only one dimension (Table A10).[109] Next, we examine the diffusion of party policy positions on an issue that the literature identifies as part of a second dimension (Table A11). Following recent work,[110] we analyze this second dimension using party positions on European integration. Both analyses confirm that Social Democratic party policy diffusion is exceptional—not just for the left-right policies but also for European integration. Last, we focus more closely on the relevance of the two diffusion pathways that our theory identifies (social democracy's institutional linkages and shared challenges), for the exceptional level of policy diffusion within this party family. We shed light on the centrality of strong transnational institutional links to the exceptional level of policy diffusion among Social Democrats by studying the impact of membership in the EP's PES group (Table A12). To model the effect of the unique cross-national challenges facing Social Democratic parties, we interact $\mathbf{W}\mathbf{y}^{\text{Incumbent Social Democrats}}$ with the globalization item and examine whether diffusion rates increase in the magnitude of the challenge, as measured by levels of globalization (Table A13 and Figure A1). The results of all these additional analyses support H1.

Conclusion

We theorize that party family becomes an important channel for policy learning from and emulation of successful sister parties abroad when it features strong transnational organizational ties and faces unique and powerful challenges. Both of these factors identify Social Democratic parties as exceptional compared to the other major party families, in particular Christian Democratic and Conservative parties. Our empirical findings provide strong and robust evidence for H1, the Social Democratic party family hypothesis, that cross-national policy diffusion is more likely to occur from successful incumbents within the Social Democratic family than within other party families. This result makes contributions to four important literatures in political science.

First, for work on programmatic policy diffusion, we clarify the conditions under which party families are (and are not) consequential for

[108] Abou-Chadi and Wagner 2020, p. 247.
[109] Based on Benoit and Laver 2006; Table A10 in the supplementary material.
[110] Abou-Chadi and Wagner 2020; Whitefield and Rohrschneider 2019.

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transnational policy emulation.[111] Second, to the study of social democracy, we add a systematic theoretical and empirical account of the exceptional amount of policy learning that has occurred across borders from successful parties within this family since the mid-1970s in contrast to other major party families. This analysis complements other prominent research that emphasizes the uniqueness of this party family.[112] Third, with respect to the literature on political parties' election strategies, we highlight that parties can be powerfully influenced by sister parties abroad. This adds an international dimension to a body of work that otherwise naturally gravitates toward domestic-level explanations.[113] Fourth, to the extent that Social Democratic parties account for a significant share of the incumbents that then influence governing policies, our research has broader implications for the literature on policy diffusion.[114] As we show, among Social Democrats, in contrast to Christian Democrats and Conservatives, party family is a channel that facilitates the emulation of and learning from policies adopted by foreign incumbents.

This article also raises several questions for future research. For example, our theory suggests that the continuing unique and existential challenges that have driven the decline of social democracy generate strong incentives within this family for cross-national emulation of future programmatic choices that prove capable of carrying Social Democrats back to power. It may also be interesting to conduct analyses of policy diffusion within party families on more narrowly defined issue dimensions than the left-right, such as immigration or the environment. The success of populist challengers, for instance, may be a by-product of cross-national policy transmission on the specific dimension of immigration within this bloc.

The role of party organization also deserves further attention. Gijs Schumacher, Catherine de Vries, and Barbara Vis[115] claim that the balance of power between party activists and party leaders affects parties' policy shifts.[116] Hierarchical parties may be more active in engaging in policy diffusion processes because leaders have more authority to adopt successful party strategies. Alternatively, internally democratic and less hierarchical parties could develop more channels for emulation

[111] Gallagher, Laver, and Mair 2011.
[112] Kitschelt 1994; Przeworski and Sprague 1986; see also Adams and Merrill III 2009.
[113] Abou-Chadi and Orlowski 2016; Adams and Merrill 2009; Meguid 2008; Spoon 2011; see also Erikson, MacKuen, and Stimson 2002.
[114] Elkins and Simmons 2005; Gilardi 2010; Gilardi 2013.
[115] Schumacher, de Vries, and Vis 2013.
[116] See also Lehrer 2012.

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through transnational ties between their supporters.[117] Depending on which intraparty mechanism is at work, there will be important consequences for our understanding of how party policy diffusion occurs. To generate a complete understanding of cross-border policy learning within party families, our quantitative study would also benefit from complementary qualitative and process-oriented comparisons to observe specific interactions (or the lack thereof) between party elites.

And while much of the established literature concentrates on the cross-border diffusion of policies from one government to another,[118] we add support to the claim that parties' policy positions also travel across countries. This finding is important because parties' manifesto rhetoric usually precedes legislative action.[119] That said, a more comprehensive analysis of how levels of diffusion interact is required, that is, how diffusion works across voters, parties, and governing policies. For example, it may be plausible that political parties react especially strongly to governing parties' concrete policy outputs (although arguably, these may be based on their manifesto pledges). The notion that governing parties' policy outputs could be influential is straightforward, and it is consistent with research showing that voters are more likely to update their perceptions of governing parties versus opposition parties.[120] If voters are more attentive to incumbents, this would also suggest that policy diffusion will occur more readily from successful political parties and the subsequent policy outputs they legislate.

We conclude that our findings open several avenues for future research and contribute to a more nuanced understanding of social democracy, party families, parties' election strategies, and policy diffusion. The Social Democratic party family is unique because incumbents have an exceptional level of influence on the policies of their sister parties abroad.

Supplementary Material

Supplementary material for this article can be found at https://doi.org/10.1017/S0043887121000022.

Data

Replication files for this article can be found at https://doi.org/10.7910/DVN/DYWBRH.

[117] Ceron 2012; Lehrer et al. 2017.
[118] See Gilardi 2010; Gilardi 2013.
[119] See also Böhmelt et al. 2016.
[120] Adams, Bernardi, and Wlezien 2020; Bernardi and Adams 2019; Soroka and Wlezien 2010.

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Key Words

diffusion, party policy decisions, political parties, political representation, social democracy

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TECHNOLOGICAL CHANGE AND THE INTERNATIONAL SYSTEM

By HELEN V. MILNER and SONDRE ULVUND SOLSTAD

ABSTRACT

Do world politics affect the adoption of new technology? States overwhelmingly rely on technology invented abroad, and their differential intensity of technology use accounts for many of their differences in economic development. Much of the literature on technology adoption focuses on domestic conditions. The authors argue instead that the structure of the international system is critical because it affects the level of competition among states, which in turn affects leaders' willingness to enact policies that speed technology adoption. Countries adopt new technology as they seek to avoid being vulnerable to attack or coercion by other countries. By systematically examining states' adoption of technology over the past two hundred years, the authors find that countries adopt new technologies faster when the international system is less concentrated, that changes in systemic concentration have a temporally causal effect on technology adoption, and that government policies to promote technology adoption are related to concerns about rising international competition. A competitive international system is an important incentive for technological change and may underlie global technology waves.

Introduction

DURING what are known as "technological revolutions" or "long waves," new technologies diffuse rapidly through the international system and economic growth surges. At other times, the adoption of technology is slow. As researchers studying these patterns stress, such global waves cannot be attributed to economic factors alone. "Any 'model' that limits itself to pure economic factors (such as R&D, capital investment or human capital) provides a much too narrow perspective . . . The transformation of capitalism involves interaction of the economic sphere with other domains, such as science and technology, and institutions."[1] Examining what facilitates the global spread of technology is therefore important for understanding countries' levels of economic development, their military capabilities, and their state capacity.

Figure 1 plots the yearly percentage increase in use of twenty of the most important technologies (including railroads, telephones, and ag-

[1] Fagerberg and Verspagen 2002, p. 1293.

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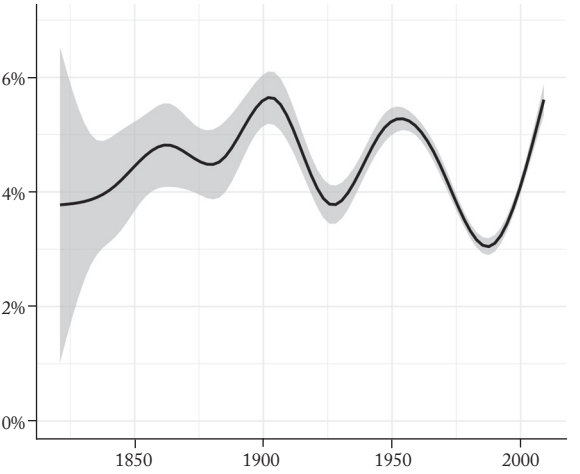

FIGURE 1
TRENDS IN (Δ LOG OF) TECHNOLOGY UNITS PER CAPITA OF TWENTY KEY TECHNOLOGIES FROM 1820–2008[a]

SOURCE: Comin, Dmitriev, and Rossi-Hansberg 2013.

[a] The plot summarizes more than ninety thousand observations of rates of technology adoption for twenty key technologies over the past two centuries. It shows unexplained yearly increase in the number of technology units per capita, after controlling for country and technology-specific heterogeneity. The grey area shows the 95 percent confidence interval of a loess regression.

ricultural tractors) over almost two hundred years (1820–2008).[2] These especially important technologies form the basis for our analysis. In the words of Olivier Blanchard, "Though technological progress is smooth, it is certainly not constant. There are clear technological waves."[3] We do not seek to explain why some technologies diffuse faster than others, or why some countries adopt technology at a higher pace. Rather, we explain the global waves of technology adoption: why there are periods when many technologies are adopted quickly in many countries at the same time.

[2] The referenced twenty technologies are: agricultural tractors, ATMs, aviation passenger-kilometers, aviation ton-kilometers, cars, cellphones, commercial trucks, communication radios, computers, electricity production, internet users, rail passenger-kilometers, rail ton-kilometers, ships, steel tons from blast oxygen, steel tons from electric arc, telegrams, telephones, transportation rail line km, and televisions. The twenty technologies were selected because they have been widely used by many countries and have been seen as crucial or have been the focus of prior studies of technology. The majority of remaining technology series in the CHAT data set capture the yearly number of medical procedures or are technologies related to textile production in a smaller number of countries.

[3] Blanchard 2009, p. 213.

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Scholars of international relations have suggested that international competition, especially competition short of violent conflict, may have important positive effects in addition to obvious costs. In particular, the prospect of competition for survival or predominance may force countries to change policies to increase their growth. As Kenneth Waltz, among many IR scholars, claims, the "evolutionary pressure" imposed by an anarchic international system forces states to constantly increase their productivity and military prowess to thrive and survive.[4] One important adjustment is the adoption of new technology. We provide a theory and systematic tests relating the structure of the international system to the speed of technological change.

Our theory argues (1) that external pressures to adopt are not constant over time, (2) that these systemic pressures are related to the distribution of capabilities in the international system, and consequently, (3) that systemic shifts can be linked to global technology waves, that is, cycles of slow or rapid technology adoption involving many technologies in many countries. We are not alone in arguing that external pressures induce changes in economic policy or that competition in the international system varies with the distribution of capabilities, but we combine the two ideas into a theory of global waves of technology adoption. Empirically, our contribution is to expand the most extensive data set on technology adoption at the country technology–year level (adding more than sixteen thousand observations), and to examine whether there are links between technology adoption and the structure of the international system across two centuries, all key technologies, and nearly one hundred seventy countries.

This article begins with a summary of the literature on technology adoption, differentiating adoption from innovation, highlighting the importance of technology sourced from abroad, and noting the key role governments play in affecting technology adoption. We then develop our systemic theory in more detail and present our hypotheses. The subsequent sections contain details on our data, empirical strategy, and results. We conclude with a discussion of these results. Our theory shows how the dispersion of power in the international system incentivizes leaders to change policies to make technology adoption more likely. Our data and case study corroborate this causal story, which is a novel, international system-based explanation of global technology waves.

[4] Waltz 1979, p. 128.

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Technological Change and Its Enemies

The empirical literature on technology adoption has established four key conclusions about technological change: (1) Most countries most of the time adopt new technologies from abroad; few countries ever innovate. (2) Adoption is costly and disruptive. (3) Because of (2), most vested interest groups and governments resist new technologies. (4) Governments and their policies are critical factors in slowing down or speeding up technology adoption. As these claims are crucial to our theory, we discuss them below and bring them together with scholarship on international relations.

Research and development efforts are concentrated in a relatively small number of highly developed countries, which means that most countries most of the time rely on adopting technology from abroad. For instance, in 1995, the seven largest industrialized countries accounted for about 84 percent of the world's R&D spending.[5] Foreign sources of technology are estimated to account for around 90 percent or more of technology-based productivity growth for most countries. For almost all countries almost all the time, the majority of new technology is developed in other countries.[6] The pattern of worldwide technological change is thus largely determined by the adoption of technology from abroad. Our focus is on adoption of new technology and not on innovation.

The adoption of technology is not costless, easy, or automatic. A range of empirical evidence indicates that international technology transfers carry significant resource costs.[7] Furthermore, it is known that the market for new technologies is inefficient due to incentives to misrepresent technologies' value.[8]

Importantly, adopting new technology disrupts existing economic arrangements and it has been resisted throughout history by self-interested status quo forces.[9] From railroads to ride-hailing services, for example, existing industries have lobbied their governments to block adoption. Additionally, consumers voice concerns about safety, voters voice concerns about distributive implications, and workers voice concerns about the loss of jobs. Those who bring new technology to a country must overcome this resistance, and often must do so from a

[5] Keller 2004.
[6] Keller 2010; see also Hall and Jones 1999; Easterly and Levine 2001; Keller 2004.
[7] Mansfield and Romeo 1980; Ramachandran 1993.
[8] Often, only the broad outlines of technological knowledge are or can be codified and easily shared. Other times, lack of necessary investment—in people or in infrastructure—slows adoption.
[9] Mokyr 1998.

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position of weakness. A new technology's benefits may be very uncertain, and newcomers usually face the realized capabilities of powerful vested interests.

This disruptive quality is important because governments are widely seen as key actors in fostering or deterring technology adoption. As Joel Mokyr writes, "[O]utright resistance is a widely observed historical phenomenon. Precisely because such resistance must work outside the market and the normal economic process, artificial distinctions between the 'economic sphere' and the 'political sphere' for this class of problems are doomed."[10]

Governments may facilitate or suppress technology adoption. The promotion of technologies may, like railroads, be undertaken as projects commissioned by national governments, or may, like air travel, necessitate government participation. Subsidies are another critical way in which government action can get a new technology off the ground. But more important may be what a government does not do, such as not erecting or enforcing barriers to technology adoption. Conversely, through policies like restrictions on trade or on imports of certain products, granting monopolies, setting prohibitive safety standards, erecting regulatory barriers, or granting existing industries avenues of legal action, governments have many means to limit the adoption of new technology. Scholars note that the regulatory power of states can have major effects on innovation and adoption.[11] Even when new technologies can't be kept out of a country entirely, such policies may significantly affect the intensity with which they are utilized.

Markets and firms are important actors in technological change, but governments are crucial. As firms have grown in size and capital requirements since the nineteenth century, government policy has become more important for facilitating or deterring investments in new technology. In Europe, economic development processes between countries differed considerably in "speed and character"[12] as a result of government policies. As Alexander Gerschenkron notes in his seminal essay, "The state, moved by its military interest, assumed the role of the primary agent propelling the economic progress in the country."[13]

Research attempting to pin down systematic differences in technological adoption rates tends to highlight the importance of domes-

[10] Mokyr 1998, p. 40.
[11] Farrell and Newman 2010; Newman and Posner 2011.
[12] Gerschenkron 1962, p. 7.
[13] Gerschenkron 1962, p. 17.

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tic politics.[14] In particular, Diego Comin and Bart Hobijn find that domestic institutional characteristics explain much of the variation in countries' adoption of technologies with competing predecessor technologies.[15] They argue that government barriers often hinder adoption of new technologies, and that such barriers are erected when lobbying efforts by vested interests outweigh the benefits of adoption. These effects are large. "[T]he estimated effect of lobbies on technology diffusion represents 50% of the observed variation in technology diffusion."[16]

Indeed, scholars of technological change frequently argue that the main barrier to it lies in entrenched domestic interests and the policies that governments adopt to protect those interests.[17] As Mokyr notes, "Technological change involves substantial losses sustained by those who own specific assets dedicated to the existing technology …. When the new techniques arrive, it is optimal for those groups that stand to lose from technological change to resist them. It is also obvious that they have to use non-market mechanisms to do so."[18] He shows that when these conservative groups capture government policy, they can slow or prevent technological change, which explains what has become known as Cardwell's Law: "No nation has been very creative for more than an historically short period. Fortunately, as each leader has flagged there has always been, up to now, a nation or nations that take over the torch."[19] As Mark Taylor summarizes, "Everyone agrees that progress in science and technology is routinely blocked by status quo interest groups."[20]

The second part of Cardwell's Law suggests a puzzle. How does

[14] Olson 1982, Mokyr 1994, and Parente and Prescott 2000 are three prominent examples.

[15] Comin and Hobijn 2004; see also Comin, Hobijn, and Rovito 2006.

[16] Comin and Hobijn 2004, p. 238. These findings join extant theoretical work wherein authors suggest that the degree to which elites feel their economic interest is under threat determines their responses to technological change (e.g., Acemoglu and Robinson 2000). Political scientists writing on technology adoption have typically focused on the political *consequences* of new technologies. One focus has been on the consequences of new military technologies for international relations, especially the impact of changes in perceptions of offensive or defensive advantage; Jervis 1978; Levy 1984. See also Christensen and Snyder 1990; Tang 2009; Acharya and Ramsay 2013. Other works consider the spread of nuclear weapons technology (for early works, see, e.g., Brodie et al. 1946 and Oppenheimer 1953; and on other military technology innovations, Horowitz 2010). Considerably less has been written about how international political structures influence technology adoption, although some consider this with regard to specific technological innovations, such as the Internet (Milner 2006), or the degree to which the innovation process can be held secret and gains internalized within nondemocratic regimes (Londregan 2015).

[17] Mokyr 1990; Mokyr 1994; Mokyr 1998; Mokyr 2002; Mokyr 2010; Landes 1990; Landes 2006; Taylor 2016; Jones 1988; Schmid and Huang 2017.

[18] Mokyr 1994, p. 564. As Mokyr 1998 notes, while new technology may make things better on average, it almost always makes things worse for someone.

[19] Cardwell 1972, p. 210.

[20] Taylor 2016.

technological change ever take place given these domestic vested interests? The answer for Mokyr and Taylor, alluded to in a general economic productivity context by Waltz[21] and others, is that international factors also matter. A threatening international environment provides a strong incentive for governments to not fall behind—and adopting new technology is one way to do so.

A Counter to Domestic Forces

International relations scholarship tends to assume that variation in economic policies—implicitly, policies affecting the adoption of new technology—responds in some fashion to threats from abroad. Important works, such as those by Charles Tilly,[22] Paul Kennedy,[23] and Waltz,[24] assume that international security competition forces new policies on governments. These scholars claim that military-strategic concerns or "evolutionary pressures"[25] in the struggle for survival in an anarchic system promote the adoption of new technologies that are militarily relevant (so-called "dual use"), and suggest that military procurement stimulates nascent industries. Other work argues that differential rates of economic growth (implicitly, the adoption of new technology) are a cause for larger global change and conflict.[26]

The importance of international competition is also emphasized in work on economic development more generally. "The remarkable development of Western Europe from relative backwardness in the 10th century to world economic hegemony by the 18th century is a story of a gradually evolving belief system in the context of competition among fragmented political/economic units producing economic institutions and political structure that produced modern economic growth."[27]

More recent research argues for a close link between external threats and new technology adoption. Based on studies of European economic history, Mokyr argues that international competition in fractured political environments can break the iron hand of domestic vested interests. And Taylor, although focused on technology innovation rather than its adoption, argues that "creative insecurity" generated by a situation in which threats from economic or military forces abroad are greater than

[21] Waltz 1979.
[22] Tilly 1992.
[23] Kennedy 1989.
[24] Waltz 1979.
[25] Waltz 1979.
[26] Gilpin 1981.
[27] North 1994, p. 365.

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the dangers from domestic forces, leads governments to change their policies and institutions in favor of new technologies.[28] He concludes, "Competition causes innovation, not [domestic] institutions or policies, and the most compelling form of competition is that which takes place between states in the international arena."[29]

Policymakers explicitly link the need for technology adoption to external pressures. As Joseph Stalin said in 1931, "We are 50 or 100 years behind the advanced countries. We must make good this distance in 10 years. Either we do it, or we shall go under."[30] Leaders seek to balance fierce domestic resistance to change with the pressures of their international context. They recognize that in a more competitive international environment, the risks generated by being technologically backward are greater. Falling behind other countries can endanger a nation's existence, its bargaining position, and its influence. Furthermore, the potential benefits of being more technologically advanced are significant, allowing the extraction of concessions and resources from other states. Political leaders thus have stronger incentives to push for, facilitate, or fund the adoption of new technologies when they perceive the international environment to be more competitive. In sum, as Taylor argues, "creative insecurity" drives states to innovate and to adopt new technologies. External threats and challenges to the government and country must be greater than the cost of overcoming domestic resistance to change.[31]

But which configuration of the international system promotes technology adoption has not been theorized in the literature, and no work explains global temporal variation in new technology adoption. We undertake these tasks in this article. We link the international system to global patterns of technology adoption and show how pressures from a more or less competitive configuration of capabilities can be linked to global technology waves.[32]

Our theory is consistent with the view that threats from abroad assert important pressure on governments to adopt policies that facilitate technology adoption. This pressure is necessary. Such policies are costly and are almost always resisted by the domestic interests favored by the status quo. But we don't focus on the external environments of particular countries, on how small states with strong neighbors adopt

[28] See also Acemoglu and Robinson 2006.
[29] Taylor 2016, p. 275.
[30] As quoted in Engerman 2004, p. 27.
[31] Taylor 2012; Taylor 2016.
[32] These are related to Kondratieff waves (also known as "K-waves") in the sense of being long-term wave-like economic phenomena.

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technology faster, or on the security implications of adopting specific technologies. Rather, using facts established by economists and ideas incipient in the IR literature, we bring together a systemic theory of global technology waves—ones that affect many countries at the same time.

Competition in the international system is always present. We focus on temporal variation in how vigorous that competition is. Our contribution is to theorize and show under what conditions the international system matters or more less, and in the process provide an explanation for global variation in technology use.[33]

We argue that a competitive configuration of the international system makes the costs of not adopting new technology greater for all countries. If the system is highly competitive, then states have to worry more about their position. When international competition is strong and leaders face threats to their regimes' or state's interests and even survival, they are more likely to facilitate technological dynamism. When the international system does not threaten leaders as much, their tendency may be to give in to domestic elite pressures for retarding technological change. When the international environment is very competitive, the costs of resisting technological change rise along with the benefits of adopting it, making governments more willing to enact policies that foster adoption. It is this temporal and systemic variation in international competition that underlies global technology waves.

Although our research does not seek to explain why certain countries innovate or adopt technology faster than others, it is an important question that many scholars have endeavored to address. Answers have focused on the nature of the domestic environment—its politics, economics, and social relations. The wealth of a country, its population size, military budget, internal and external conflicts, regime type, veto players, government policies toward technology and innovation, economic policies toward market failures, research and development spending, and educational policies are well-known factors.[34] As Taylor notes, most of these explanations do not hold across time and space because countries have followed and can follow very different policy paths to reach the technology frontier.[35] Nor do we seek to explain why some technologies diffuse faster than others. Our objective is instead to explain the waves of technology adoption over time across the globe.

[33] We also bring the first link between the international system and technology adoption using direct measures of technology use.

[34] Taylor 2016; Nelson 1993; Lundvall 2010; Acemoglu, Zilibotti, and Aghion 2006; Hall and Soskice 2001; North 1990; Breznitz 2007; Drezner 2001; Mokyr 1990; Rosenberg and Birdzell 1986; Comin and Hobijn 2004; Fagerberg and Srholec 2008; Comin, Dmitriev and Rossi-Hansberg 2013.

[35] Taylor 2016, p. 276.

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A large literature on diffusion helps us to understand how technologies spread. Economists have pointed to many aspects of the domestic environment that support fast diffusion of technologies.[36] In political science, an extensive literature has focused more on the diffusion of policy or political norms than on technology per se.[37] These models usually point to emulation, learning, coercion, and contagion as the primary mechanisms leading countries to adopt. With his book, *The Diffusion of Military Power*, Michael Horowitz is one of a few who focuses on technological diffusion in particular.[38] As the title makes clear, Horowitz's interest is military power capabilities, and he postulates that the way that these capabilities are adopted by militaries has a major effect on international politics. His adoption-capacity theory focuses on how the financial and organizational intensity of innovations shapes how they are adopted by states and their militaries, and on how they change national military might and strategy and thus, world politics. Unlike that study, our focus is not on how diffusion pressures operate, but rather on how competition in the international system provides an incentive to adopt new technology. Diffusion is usually seen as a process generated by neighbors or close competitors; for our theory, it is the overall system that matters. We argue that such systemic competition affects all countries in the system and the adoption of all types of technology.[39] Linking the international system structure to patterns of technology adoption is important not only because of its implications for material welfare, but also because of its theoretical importance in international relations.

Theory: International Competition Spurs Technology Adoption

We propose a formal model linking international competition to government choices to foster or hinder technology adoption. This abstract model combines domestic political interaction in which groups can reward or punish politicians for their policies with leaders' concerns about the international system. The model is not explicit about the domestic process of aggregating interests; such domestic political institutions are important, but they vary greatly across countries and can have

[36] Mansfield 1961; Rogers 2003; Comin and Hobijn 2009a.

[37] See, e.g., Finnemore and Sikkink 1998; Elkins and Simmons 2005; Simmons and Elkins 2004; Dobbin, Simmons and Garret 2007; Shipan and Volden 2008; Cao 2010; Solingen and Börzel 2014; Risse 2016.

[38] Horowitz 2010. Wan 2014 considers nuclear weapons diffusion.

[39] To show that the effect of the international system cannot be reduced to diffusion from nearby countries, we control for such diffusion explicitly and find that the pressure of the international system remains important.

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many different effects.[40] However, policies affecting the adoption of new technologies have implications beyond domestic politics. In particular, they make it more (or less) likely that the government can withstand a challenge from other countries. One contribution of the model is to show that the likelihood of such international challenges exerts a powerful influence on government policy. Another is to show that such challenges are more likely if capabilities are more evenly distributed in the international system.

The model posits a country controlled by a unified government (g), facing firms (f) and consumers (c). The government provides national defense because it values surviving international challenges and it values receiving contributions from these two domestic groups. Firms want the government to refrain from supporting a new technology and to provide national defense so they can survive and prosper. Consumers want the government to provide national defense and to support the new technology because so doing increases their welfare.[41] The stages of the model are:

> —1. Firms and consumers simultaneously announce contribution schedules $r_f(s)$,$r_c(s)$, which promise a certain level of contributions given to the government for each level of government support for technology adoption, $s \in [0,1]$.[42]
>
> —2. The government selects policies and thus s indicates the amount of support for the new technology. At low levels of support, the government actively blocks adoption of the technology.
>
> —3. Firms and consumers contribute the promised levels of contributions, $r_f(s)$,$r_c(s)$, as a function of s, the implemented level of support for technology adoption.
>
> —4. Technology adoption level Y is realized, a value strictly increasing in government support, s.[43]
>
> —5. The country faces an international system of possible adversaries. With probability $1 - p$ the game ends. With probability p, the country finds itself in disagreement with another country and the game enters a conflict subgame. This other country has capabilities λ, a draw from $U(-\gamma,\gamma)$, the distribution of capabilities in the international system.[44]
>
> —6. In the conflict subgame, the country and its adversary simultane-

[40] See, for example, a recent study by Simmons 2016.

[41] Proofs are provided in the supplementary material; Milner and Solstad 2021b.

[42] Contributions may be money, electoral support, endorsements, policy cooperation, or other benefits. We also create a more complex model in which contributions to different political factions are possible (thus incorporating the possibility of "negative" contributions from the government's perspective), which is available on request from the authors via email. We assume that firm and consumer contributions are bounded and positive; there is a limit to how large contributions from firms or consumers can be.

[43] As we detail in the two preceding sections, goverment policy (including what a government does not do), is enormously influential in countries' technology adoption. Comin 2004 estimates that such policies can account for 50 percent of the variation in technology adoption.

[44] See below for discussion of other distributions.

ously choose whether to back down (payoff = −1) or to escalate. If neither backs down, the disagreement becomes a conflict in which either side has a probability of winning related to its capabilities: $\pi = \Phi(s - \lambda)$, where Φ is a strictly increasing function between 0 and 1 and λ denotes the capabilities of the other country.[45] However, as James Fearon argues, a conflict entails a cost, here $0 < c < ½$.[46] The two sides will then only enter a conflict if both have a great enough chance at succeeding to offset its cost.[47]

—7. If the government loses the dispute, it, as well as consumers and firms in the country, incur a cost, normalized to 1.

We characterize a subgame perfect equilibrium by first solving for equilibrium in the conflict subgame (steps 5–7) and then using the equilibrium utility from this subgame to characterize equilibrium behavior in the technology adoption game (steps 1–4).

We model the process by which countries enter disputes explicitly. In doing so, we show how system concentration is linked to the likelihood of conflict and how, accounting for the fact that greater capabilities brought on by technology adoption can stave off conflict in the first place, lower system concentration is tied to greater support for technology adoption.

We first relate the balance of capabilities to countries' decisions about whether to escalate a disagreement. We define

$$\Delta \equiv \Phi^{-1}(1 - c).$$

PROPOSITION 1. If $|s - \lambda| < \Delta$, the unique equilibrium of the conflict subgame is for both countries to escalate. If $|s - \lambda| > \Delta$, the unique equilibrium is for the stronger country to escalate and the weaker to stand down.

The following corollary expresses the utility that the government, firms, and consumers realize in the conflict subgame.

COROLLARY 1. Equilibrium utility in the conflict subgame is given by

$$C^*(s, \lambda) = \begin{cases} 0 & \lambda < s - \Delta \\ \Phi(s - \lambda) - 1 - c & s - \Delta < \lambda < s + \Delta \\ -1 & \lambda > s + \Delta. \end{cases}$$

[45] We assume $\Phi(.)$ is invertible and twice continuously differentiable.

[46] Fearon 1995. We normalize cost of losing the conflict in this subgame to one, and assume countries that win receive zero. To guarantee a possibility of conflict, we assume that $c < ½$. We assume s, λ, and $c < ½$ are common knowledge.

[47] We are agnostic as to whether such a conflict between the two sides entails open warfare or a negotiated solution. Our assumption is only that the chance of succeeding in such a conflict is increasing in the difference between one's capabilities and those of the other side.

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We use corollary 1 to derive each domestic actor's expected utility (over adversary capability, λ) in the conflict subgame.[48] In the event that disagreement occurs, expected utility in the conflict subgame is given by

$$\mathbb{E}[C^*(s,\lambda)] = \int_{s-\Delta}^{s+\Delta} \frac{\Phi(s-\lambda)-1-c}{2\gamma} d\lambda - \left(1-\frac{s+\Delta+\gamma}{2\gamma}\right)$$

$$= \frac{1}{2\gamma}\left(\int_{s-\Delta}^{s+\Delta} \Phi(s-\lambda)d\lambda + s + \Delta(2c-1) - \gamma\right)$$

$$= \frac{a(s)+b}{2\gamma},$$

where $a(s) = \int_{s-\Delta}^{s+\Delta} \Phi(s-\lambda)d\lambda + s$ and $b = \Delta(2c-1)-\gamma$. We now introduce a new quantity, $\tau \equiv \frac{p}{\gamma}$, which measures the competitiveness of the international system. Because the country enters into a conflict with probability p, the expected conflict payoff from technology policy to each domestic actor can be expressed as

$$V(s;\tau) = \frac{\tau}{2}(a(s)+b).$$

Note that $a(s)$ is strictly positive and that b is strictly decreasing in γ. Therefore, $V(s;\tau)$ is strictly increasing in τ. It is straightforward to check that $V(s;\tau)$ is also strictly increasing in s:

$$\frac{d}{ds}V(s;\tau) = \frac{\tau}{2}\left(\frac{d}{ds}a(s)\right) = \frac{\tau}{2}\left(\frac{d}{ds}\left(\int_{s-\Delta}^{s+\Delta}\Phi(s-\lambda)d\lambda\right)+1\right).$$

By Leibniz rule,

$$\frac{d}{ds}\left(\int_{s-\Delta}^{s+\Delta}\Phi(s-\lambda)d\lambda\right) = 2c-1+\int_{s-\Delta}^{s+\Delta}\frac{\partial}{\partial s}\Phi(s-\lambda)d\lambda$$

because Φ is strictly increasing in its argument, $\frac{\partial}{\partial s}\Phi(s-\lambda) > 0$ for all λ. Therefore,

$$\int_{s-\Delta}^{s+\Delta}\frac{\partial}{\partial s}\Phi(s-\lambda)d\lambda > 0.$$

[48] Note that we do not characterize utility for $\lambda \in \{s-\Delta, s+\Delta\}$, in corollary 1. In each case, the conflict subgame has multiple equilibria. Payoffs therefore depend on equilibrium selection. Because λ is uniformly distributed on $[-\gamma,\gamma]$, it is unnecessary to specify payoffs in these two cases to calculate expected utility, as these two cases occur with probability zero.

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It follows that

$$\frac{d}{ds}V(s;\tau) = \frac{\tau}{2}(2c + \int_{s-\Delta}^{s+\Delta} \frac{\partial}{\partial s}\Phi(s-\lambda)d\lambda) > 0\,. \quad (1)$$

We now analyze the technology adoption stage. We assume that the government's utility, U_g, is linear in the support from firms and consumers. Given contribution schedules $r_f(s)$ and $r_c(s)$, the government's equilibrium level of technology adoption solves

$$\max_{s\in[0,1]} V(s;\tau) + r_f + r_c.$$

Firms value national defense, dislike paying more in contributions, and dislike higher levels of technology adoption. Their utility is given by

$$U_f(s, r_f) = V(s;\tau) - r_f + g_f(s),$$

where $g_f(s)$ denotes firms' utility of technology adoption that is strictly decreasing and twice continuously differentiable in s.

Consumers value national defense, dislike paying more in contributions, and like higher levels of technology adoption. Their utility is given by

$$U_c(s, r_c) = V(s;\tau) - r_c + g_c(s),$$

where $g_c(s)$ denotes consumers' utility of technology adoption that is strictly increasing and twice continuously differentiable in s.

We focus on truthful equilibria in which firms and consumers make strictly positive contributions in equilibrium.[49] In a truthful equilibrium, consumers and firms use truthful contribution schedules that promise the government the excess of the group's welfare relative to a fixed baseline level. If group $i \in \{f, c\}$ makes a positive contribution both before and after the government changes the level of technology adoption, a truthful contribution schedule for i pays the government exactly the amount that i's welfare changes. Formally, a contribution schedule is truthful if

$$r_i(s) = \max\{0, V(s;\tau) + g_i(s) - B_i\}$$

for some fixed level of welfare B_i. Because utility functions for all agents are linear in contributions, the equilibrium level of technology adoption is characterized by corollary 1 to proposition 4 in work by Avinash Dixit, Gene Grossman, and Elhanan Helpman.[50]

[49] This is standard in menu-auction models of lobbying. For justification and intuition, see Bernheim and Whinston 1986; Grossman and Helpman 1994; and Dixit, Grossman, and Helpman 1997.

[50] Dixit, Grossman, and Helpman 1997.

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PROPOSITION 2. In a truthful equilibrium with strictly positive contributions $r_f(s^*), r_c(s^*) > 0$.[51]

$$s^* = \underset{s \in [0,1]}{\operatorname{argmax}} \; 3V(s;\tau) + g_f(s) + g_c(s). \tag{2}$$

We further note that in an equilibrium with positive contributions, the government selects an interior level of technology adoption. Consumer welfare, $V(s;\tau) + g_c(s)$, is strictly increasing in s. Therefore, its truthful contribution schedule, $r_c(s)$, must be (weakly) increasing in s. Firms therefore cannot offer a positive contribution if $s^* = 1$, as they could strictly improve their utility by offering no contributions for any s. Similarly, because $r_c(s)$ is weakly increasing in s, if the government selects $s = 0$ in an equilibrium in which $r_c(0) > 0$, then it also adopts $s = 0$ if consumers deviate and $r_c(0) = 0$. This deviation strictly benefits consumers; the same level of technology is adopted as in equilibrium but at a lower cost to consumers in terms of contributions.

REMARK 1. In a truthful equilibrium with strictly positive contributions, $s^* \in (0,1)$.

Note that the objective function in equation 2 in proposition 2 is the sum of differentiable functions and therefore is itself differentiable. Because s^* is interior, it follows that s^* satisfies the first order condition:

$$\frac{\partial}{\partial s}\left[3V(s;\tau) + g_f(s) + g_c(s)\right] = 0.$$

We use this condition to examine how s^* responds to changes in the concentration of the international system, τ. Because s^* is a local maximum, the sign of $\frac{\partial s^*}{\partial \tau}$ corresponds to that of

$$\frac{\partial^2}{\partial s \partial \tau}\left[3V(s;\tau) + g_f(s) + g_c(s)\right].$$

It follows from equation 1 that

$$\frac{\partial^2}{\partial s \partial \tau} V(s;\tau) = c + \frac{1}{2}\int_{s-\Delta}^{s+\Delta} \frac{\partial}{\partial s}\Phi(s-\lambda)d\lambda \; > \; 0.$$

PROPOSITION 3. The equilibrium level of government support for technology adoption is increasing in the competitiveness of the international system:

$$\frac{\partial s^*}{\partial \tau} > 0.$$

[51] Dixit, Grossman, and Helpman 1997.

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Two complementary effects underlie this relationship. First, as τ increases, the government sees a larger benefit in increasing its ability to withstand an international challenge. Second, these contribution schedules change; as τ increases, the relative contributions of firms and consumers change in the favor of the new technology. Firms see less value in opposing technology adoption, and consumers see more.

Our theory centers on τ, the competitiveness of the international system, and specifically, on the systemic source of variation in this probability. We propose that this systemic variation—over time, affecting all countries—underlies global technology waves. τ has two components, the probability that a disagreement will arise (ρ), and distribution of capabilities in the system (γ).

We next analytically link γ to measures of system concentration. Let us, without loss of generality, let $\theta \times n$ denote total capabilities in the international system, where n is the number of countries. We then let λ^* equal $\lambda + \theta$, allowing us to more easily relate capabilities to their expected sum. We can then see that

$$\lambda^* \sim U(\theta - \gamma, \theta + \gamma) \Rightarrow \mathbb{E}(\lambda^*)^2 = \frac{1}{(\theta+\gamma)-(\theta-\gamma)} \int_{[\theta-\gamma,\theta+\gamma]} (\lambda^*)^2 dx = \frac{3\theta^2+\gamma^2}{3}. \quad (3)$$

This makes for the following expectation of the sum of the squared proportion of capabilities as a function of γ, denoted *HHI* (the Herfindahl-Hirschman index):

$$HHI \equiv \mathbb{E}\left(n \times \left(\frac{\lambda^*}{n\theta}\right)^2\right) = \frac{3\theta^2 + \gamma^2}{3n\theta^2} = \frac{1}{n} + \frac{\gamma^2}{3n\theta^2} \Rightarrow \frac{\partial HHI}{\partial \gamma} > 0. \quad (4)$$

Our measure of system concentration (SYSCON, explained in the data section below) and several others are monotonically increasing in the sum of the squared proportion of capabilities (*HHI*):[52] This means there is a positive relationship between γ and system concentration:

$$\frac{\partial SYSCON}{\partial \gamma} > 0. \quad (5)$$

We thus have multiple effects that combine to produce a negative relationship between system concentration and technology adoption.

Within a country, we know the government's marginal utility of supporting technology adoption derived from contributions is decreas-

[52] Although one could specify a new system concentration equal to 1/2 γ, we prefer to stick to SYSCON because using a new metric would disconnect the work from wider scholarship in international relations, which in thousands of papers have favored the use of the system concentration index and related it to a variety of phenomena of interest.

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ing in γ, because a high γ means less conflict, which shifts contribution schedules in favor of supporting technology. Looking outward, we know that governments' marginal utility in the conflict game is decreasing in γ. We straightforwardly assume that government support (s) has a positive effect on realized technology adoption (Y). Both domestically and in relations with other countries, the government's utility from supporting technology adoption is thus decreasing in γ. This combines with the positive relationship between γ and our measures of system concentration, shown in equation 5, to form our main result:

PROPOSITION 4. Equilibrium government support (s^*) and realized technology adoption (Y) is decreasing in system concentration.

$$\frac{\partial s^*}{\partial SYSCON} < 0 \qquad \wedge \qquad \frac{\partial Y}{\partial SYSCON} < 0. \tag{6}$$

This suggests our first hypothesis:

—H1. The less concentrated power capabilities in the international system are, the faster the rate of technology adoption at the country technology–year level.

We argue that H1 is happening not just in many countries and technologies at the same time, but also when measured at the systemic level (averaged across all countries and technologies).

Our second hypothesis:

—H2. The less concentrated power capabilities in the international system are, the faster the global rate of technology adoption.

Our theory does not specify a channel through which government decisions to facilitate technology adoption may affect system concentration, and we do not wish to exclude the possibility of such channels here. We argue that for most countries in the system in the short term, this relationship is unidirectional and causal; changes in the international system precede and impel changes in government policies.

Our third hypothesis:

—H3. In the short term, changes in system concentration Granger-cause[53] changes in technology adoption, and systemic change and technology adoption should be causally linked as cause and effect in case studies.

Although simple, the model and its results are robust to many natural extensions and complications. For instance, a natural concern is

[53] Granger causality indicates whether previous values of one variable are useful in predicting values of a second variable, once the previous values of the second variable (its history) is taken into consideration.

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that that governments face challenges of varying severity. This concern may be answered by an interpretation of p as the product of external challenges' severity times their likelihood.[54] Deterrence, possibly by technological sophistication, is incorporated as well. "Firms" and "consumers" are common names for groups lobbying for or against policies with economic implications. But some firms may favor the adoption of technology and some consumers may oppose it. Our model is indifferent to this: one can more precisely specify r_{firms} and $r_{consumers}$ as the net cumulative effort of those against or in favor of government policies in support of the new technology. This is not to say that political institutions cannot impact the magnitude of the effects we identify; it is a subject we hope that future work explores.

We propose a link between technology adoption and the international system, and contribute an international relations theory that can explain global technology waves, specifying when and under what conditions we may see the international adoption of technology accelerate across countries and technologies.[55]

To provide support for the underlying assumptions and the conclusions arising from them, we demonstrate links between conflict and system concentration empirically in the supplementary material. We show that lower system concentration is related to more militarized interstate disputes, more worldwide military spending, and more wars. For readers who remain skeptical about the link between system concentration and conflict, we also demonstrate a link between such direct measures of conflict and technology adoption (itself a novel result, see tables S1 and S2 in the supplementary material).[56] Although our theoretical justification and formal exposition is novel, the suggestions that competitive pressures tend to be lower for most countries in highly concentrated systems have been made before.[57] Some work links competition to polarity. Bipolar systems in which two states have control over

[54] For instance, one could define p in any given country and year as follows:

$$p \equiv \sum_{c} Probability\ of\ Challenge_{c} \times Severity\ of\ Challenge_{c} \tag{7}$$

in which c indexes possible challenges from abroad, and both probability and severity range from 0 to 1.

[55] The relationship we propose has been investigated among firms. Studies of firms and markets (an imperfect, but useful analogy) find a positive relationship between more competitive industries and technology adoption (for a review, see Holmes and Schmitz 2010); industries with less concentration of revenues among the top firms adopt new technologies faster.

[56] Milner and Solstad 2021b. All tables beginning with the prefix S can be found in the supplementary material.

[57] See, e.g., Waltz 1979; Christensen and Snyder 1990; Huth, Bennett, and Gelpi 1992; and Grant 2013.

a large share of capabilities are theorized to make predicting how great powers will act easier, as both superpowers tend to intervene on behalf of their allies and have an interest in reducing uncertainty about whether they will do so. The sizable advantage of a few countries makes others less interested in spending resources to catch up.[58]

We present a story that is demand-driven: countries seek more technological prowess when faced with a higher likelihood of a challenge from the international system. A complimentary channel relating system concentration to technology adoption is through supply. As with firms in market economies, the larger the number of powerful actors, the harder it is to coordinate against third parties to maintain dominance and increase profits. Although each actor would like to maintain a technological edge, they also benefit more from selling technology (due to higher demand) in high-competition contexts, and especially if buyers are their adversaries' enemies. In contrast, when power is concentrated in a few countries, vested interests may find it easier to coordinate to slow down the pace of technology adoption, securing protection for industries that might otherwise become obsolete. A more concentrated system may also make it easier for states or interest groups to collude and to restrict technology transfer to other countries. In this kind of environment, states can afford to forgo individual benefits from selling technology to maintain their collective technology edge. For instance, studies show that during the bipolar Cold War era when the system was very concentrated, the US and USSR cooperated to limit the spread of nuclear technology. As nuclear superpowers, they were able to collude to prevent its spread.[59]

More competition in the system makes it harder for any state to control the spread of technology and to prevent its diffusion. The concentration of capabilities in the system, as with firms in markets, means competitive pressures are diminished. We believe this channel is important especially for cutting-edge technology, such as the technology to create machines that make computer chips, and for technologies intimately tied to crucial military infrastructure, such as missile guidance systems, where our theory might be less applicable. For most of the time period and most of the technologies we investigate, we find that

[58] There are a number of ways to relate the polarity of the international system, a categorical measure related to but different from concentration, to its competitiveness. But even over the two hundred years investigated here, there is little variation in polarity. Classifications of systems by polarity thus may mask considerable variation in the concentration of capabilities over time (for more on the advantages of incorporating information beyond polarity, see Mansfield 1993).

[59] Kroenig 2010; Colgan and Miller 2019.

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few steps were taken to limit technology transfer, and even if they were taken, they were often overcome. Focusing on the demand side to explain technology adoption broadly is therefore appropriate.

Empirical Analysis

Our focus is on the adoption of new technology, not on innovation or invention. Analysis of international technology adoption has been approached empirically in three ways. The first tracks cross-country citations in patent applications. The second and largest tradition focuses on differences in total factor productivity (TFP). In the latter, the underlying assumption is that the differences between countries' output when holding factor inputs constant is their use of technology. The third approach tracks (especially recently) both the extent and intensity of technology adoption (for example, the number of radios per capita).

We follow the third path and rely on direct measures of technology use because such measures offer two distinct advantages: wider coverage and higher precision. Whereas the necessary data coverage for TFP calculations is limited and patents are filed in small numbers, direct measures can in principle track all technologies in the countries where their use has a written history. Furthermore, direct measures are more precise because they track technology adoption specifically.

We investigate technology adoption both at the country technology–year and system-year levels. Investigations at the country-technology level allow us to incorporate information about countries and technologies, increasing the amount of information and alternative explanations we can access. Our investigations at the systemic level enable us to explicitly link international system characteristics to global technology waves. Using direct measures of technology, made possible in part by our collection of sixteen thousand new observations of countries' technology use (detailed below), we systematically test relationships between the international system and technology adoption for a number of countries.

In addition to our quantitative analysis, we investigate technology adoption in a qualitative case, Sweden's first railroads. This case helps to illustrate our causal mechanism in which calculations about the structure of the international environment make political leaders initiate policies that either slow down or accelerate the adoption of technology. We show that policymakers were motivated by increasing competition in the international system to change their policies, and that these

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changes were consequential in bringing about the more rapid adoption of the new technology.

Data

MEASURING INTERNATIONAL TECHNOLOGY ADOPTION

Directly tracking the adoption of technology has been done for many years, but it is only recently that data sets covering a wide range of countries, years, and technologies have become available. Comin and Hobijn's CHAT data set captures both the presence and, in many cases, the intensity of utilization of many technologies in more than one hundred fifty countries from 1800 to 2003.[60] We follow Comin, Mikhail Dmitriev, and Esteban Rossi-Hansberg in focusing on twenty of these technology types.[61] This data set lists the number of technology units (for example, number of television sets, the number of kilometers of railroad tracks, ship tonnage, and electricity) used in a given country in a given year.[62]

We expanded the CHAT data set to include new observations from the years 1990 through 2008, adding about sixteen thousand country technology–year observations. Care was taken to ensure all country-technology data series were matched exactly, which included manually inspecting the join between old and new data for every single country-technology observation series added. In most cases, a source similar (but updated) to the source in the original data set was used, and the source for every new observation is listed explicitly.[63] We follow Comin, Dmitriev and Rossi-Hansberg in our specification of the dependent variable.[64]

Technology adoption is defined as the yearly change in log number of technology units per capita per year per country:

$$\Delta Y_{i,tech,t} \equiv \text{Log}\left(\frac{\#\ Tech.\ \ Units_{i,tech,t}}{Population_{i,t}}\right) - \text{Log}\left(\frac{\#\ Tech.\ Units_{i,tech,t-1}}{Population_{i,t-1}}\right).$$

We capture only the adoption of new technologies by censoring observations once a technology becomes outdated, defined as the year the adoption level of the current highest adoption country begins to de-

[60] Comin and Hobijn 2009b.
[61] Comin, Dmitriev, and Rossi-Hansberg 2013.
[62] We explore the use of many alternative sets of technologies in the robustness checks below.
[63] Sources for individual observations are available upon request from the authors via email.
[64] Comin, Dmitriev and Rossi-Hansberg 2013.

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cline. This ensures, for example, that sending fewer telegrams after the telephone was invented is not seen as adoption failure.

MEASURING INTERNATIONAL SYSTEM CONCENTRATION

As is standard practice, all our measures of systemic concentration are based on the Composite Index of National Capabilities (CINC, fifth edition.)[65] The scores are created by calculating a state's average share of the world total for six types of resources: urban population, total population, military expenditure, military personnel, iron and steel production, and total energy consumption. We use these to construct many different measures of system concentration on a yearly basis, providing us with results insensitive to the way concentration is calculated.[66]

For our analysis, we use the popular system-concentration score frequently used in studies of international politics, wherein a higher score means capabilities are more concentrated.

System concentration (SYSCON)[67] is defined as:

$$SYSCON_t \equiv \sqrt{\frac{\sum_{i=1}^{n}\left(\pi_{t,i}\right)^2 - \frac{1}{n}}{1 - \frac{1}{n}}},$$

where t denotes the year, and $\pi_{t,i}$ is the share of power resources held by state i in year t, there being n states total. More concentration means less competition, so we expect a negative relationship with international technology adoption.[68] In the supplementary material, we show that all our results are robust to several alternative measures of concentration (for example, the share held by the top four states and the number of possible coalitions among great powers).[69]

CONTROL VARIABLES

We include several control variables identified by other studies of technological adoption that might affect a country's adoption of new technology, and define them below. Civil war is destructive and reduces the efficacy of government policy, and we expect it to reduce technology adoption. Interstate war is also destructive, but it may impel the gov-

[65] Singer, Bremer and Stuckey 1972.

[66] We detail a range of such alternative measures in our robustness checks. These include measures that only incorporate the military and population subindices of CINC scores, and indices that for any country are based only on capabilities in other countries.

[67] Singer, Bremer and Stuckey 1972.

[68] In line with most recent work, e.g., Bas and Schub 2016, we calculate the index based on the capabilities of all states. Scholars have in some cases restricted their sample to major powers.

[69] Milner and Solstad 2021b.

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ernment to mount additional resources to pursue new technology to increase its chance of survival. The effect is indeterminate. In addition, regime type has been found to be especially important for technology adoption.[70] Here, regime type may be thought to reflect both the extent to which governments are responsive to firms versus consumers (or to those against or in favor of adopting new technology) and these groups' ability to put pressure on the government (that is, $r_c(.)$, and $r_f(.)$). It is important to note that in a wider historical perspective, political pluralism and its global spread have been important, but perhaps are not sufficient or necessary conditions for technological dynamism, as Mokyr stresses.[71]

War, civil war (both lagged 1 year) are dichotomous variables from the Correlates of War project.

Polity2 score is a country's political regime type in a particular year on the autocracy-democracy dimension (−10 to 10 scale, with 10 being fully democratic).[72]

Our theory suggests that the international system pressures governments and that this external pressure has both a systemic and a local component. We therefore include models in which we control for the local country-specific pressure explicitly. We use data from the Correlates of War project on military spending, great powers, and country capital-to-capital distances. For any country i, we consider the change in military expenditure of all countries adjacent to i, plus the change in military expenditure of all great powers, the latter inversely weighted by their distance to country i.

Change in neighboring countries military spending is defined as:

$$\Delta Local\ Threat_{i,t} \equiv Log\left(\sum_{j\neq i} Mil.exp_{j,t} \times \frac{\mathbb{1}\{D_{i,j}=0 \vee j \in GP_t\}}{1+\mathrm{Log}(1+D_{i,j})}\right) - Log\left(\sum_{j\neq i} Mil.exp_{j,t-1} \times \frac{\mathbb{1}\{D_{i,j}=0 \vee j \in GP_{t-1}\}}{1+\mathrm{Log}(1+D_{i,j})}\right),$$

wherein $Mil.exp_{j,t}$ is military expenditure, $D_{i,j}$ is a distance matrix, $\mathbb{1}$ is the indicator function, and GP_t is the set of countries that are great powers in year t.[73]

[70] Comin and Hobijn 2009a; Comin, Dmitriev and Rossi-Hansberg 2013.

[71] Mokyr 1994. All relationships also hold unconditionally, i.e., without any of these controls.

[72] Marshall, Gurr, and Jaggers 2019.

[73] In our main specification, Table 2, column 1, we provide models without this predictor to avoid concerns that it might interact with measures of concentration. The measure also makes our analysis slightly more sensitive to missing data (because missing military spending data in one country affects the local threat score of all neighboring countries).

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Our theory postulates that the international system affects technology adoption beyond what can be explained by changes in adoption in other countries; diffusion may operate but systemic pressures for adoption are broader and different in kind. To examine this, we control for spatial diffusion of adoption explicitly.

Spatial distance to technology (SDT). The number of technology units in all other countries scaled by their distance to the country in question and exclusive of system-wide shifts in technology adoption. This value is calculated on a country technology–year basis as[74]

$$SDT_{i,tech,t} \equiv \sum_{j \neq i} \left(Y_{j,tech,t} \times D_{i,j}\right) - \sum_{tech,i} \overline{SDT}_{tech,i,t},$$

where i is a country, *tech* is a technology, t is a year, $D_{i,j}$ is a distance matrix (capital in i to capital in j), and $\overline{SDT}_{t}$ computes the worldwide mean SDT by year. Table 1 provides summary statistics.[75]

In seeking to explain the pace of technology adoption, including measures of gross domestic product (on an annual or annual per capita basis) as a predictor would bias our estimates. This is because including a productivity measure in the conditioning set would show how fast technology was adopted in ways not reflected in productivity, which is not our objective. Although general economic development as measured by GDP can be an asset in international competition, and one consequence of facilitating technology adoption can be economic development, our outcome of interest is technology adoption, not these related concepts. As expected, replicating our country-technology models with GDP per capita included as a predictor slightly reduces the magnitudes of our effects (and sample size), but all relationships remain statistically significant and in the expected direction.[76] In our robustness checks, we estimate models with imputed data, add additional controls, and experiment with a large number of different subsamples of technologies, countries, and years. Results are in all cases robust.

Quantitative Estimation Strategy

All regressions are ordinary least squares, and all models compare changes within a technology and country over time.

[74] As in Comin, Dmitriev, and Rossi-Hansberg 2013. If not demeaned by year, it would by construction eliminate any temporal systemic variation in adoption rates.

[75] In the supplementary material, we provide results using imputed data. Many other robustness checks are detailed below.

[76] Whenever these are reported, we use GDP per capita estimates from Bolt et al. 2018.

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TABLE 1
SUMMARY STATISTICS[a]

Statistic	*N*	*Mean*	*St. Dev.*	*Min.*	*Max.*
Log (technology units per capita)	94815	2.41	3.85	0.00	17.26
ΔLog(technology units per capita	90794	0.04	0.14	−3.69	3.05
Spatial distance to technology, 3-year lag	93925	−0.62	0.90	−3.54	2.74
SYSCON[b]	23728	0.30	0.04	0.22	0.42
ΔLog(military expenditure in neighboring countries)	13783	0.23	2.36	−2.93	21.49
Polity2 score	15408	−0.33	7.11	−10.00	10.00
At war in previous year (0, 1)	23015	0.03	0.18	0.00	1.00
Civil war in previous year (0, 1)	24353	0.04	0.19	0.00	1.00

[a] Country technology–year data. N observations are at the country-year level, except technology units and SDT variables. SDT observations are restricted to the country technology–years in which we observe technology use for the country and technology in question (that is, usable observations).
[b] Singer 1972.

To test hypothesis 1, we estimated equations of the form

$$\Delta Y_{i,tech,t} = \beta_0 + Z_t\alpha_1 + X_{i,t}\beta_1 + Q_{i,tech,t}\beta_2 + \epsilon_{i,tech,t}\ , \qquad (8)$$

where $\Delta Y_{i,tech,t}$ is change in the natural log of technology adoption level per capita at the country technology–year level; $X_{i,t}$ are country and time varying covariates; $Q_{i,tech,t}$ are our country, technology, and time varying variables; Z_t is our systemic variable that changes over time; and $\epsilon_{i,tech,t}$ is the standard error term. β_0 is an intercept capturing technology use generally increasing over time.

Recalling our model above, our theoretical expectation is that the coefficient α_1 is negative (that is, more system concentration means less systemic competition). Our quantitative estimates thus link directly to our formal model, assuming linearity in the proposed monotonic relationships underlying proposition 4. The terms $X_{i,t}\beta_1$ and $Q_{i,tech,t}\beta_2$ capture both local sources of variation in p and proxies for $g_c(.)$, $g_f(.)$, $r_c(.)$, and $r_f(.)$.

Our outcome of interest, faster technology adoption in many countries, is measured on a within country–technology basis. Testing our theory at the country technology–year level rather than system-year level means that we are able to control for country-specific effects and to retain information from our broad sample of technologies.[77]

[77] It is possible to run such regressions on the country-year level, but that would require aggregation of adoption rates of many different technologies for the country and year in question, which would lose

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We next perform tests at the systemic level. We aggregate the rate of change for all technologies in all countries in a given year (moving from over 80,000 to just 188 observations—one for each year). In addition to testing the aggregate relationships, we report models in which we include an additional control for political change in the period, world average Polity2 scores. The systemic model specification is

$$\overline{\Delta Y_t} = \eta_0 + Z_t\eta_1 + \overline{X_t}\eta_2 + \bar{\epsilon}_t\,, \tag{9}$$

where η denotes coefficients, $\overline{(.)}$ is the yearly mean, and other terms are as defined above.[78] We also test the relationship using two alternative measures of system concentration, described in Table S3 of the supplementary material.[79]

Last, we test whether there exists a temporal relationship in line with hypothesis 3 by conducting a series of Granger causality tests. We here again construct a yearly series of technology adoption across all countries and technologies.[80] We construct an alternative set of system concentration and world technology adoption per capita time series, accounting for the effects of war, civil war, and Polity2 score (regime) by summing the residuals of a regression of these variables on SYSCON and technology adoption per capita, respectively.[81] We then test whether in either set: (1) technology adoption was Granger-caused by changes in the international system and (2) technology adoption Granger-caused changes in the international system.[82] We did this with and without incorporating covariates, and with a variety of year lags.

Results

We first plot system concentration and trends in interstate conflict over time, shown in Figure 2. The figure illustrates how our systemic con-

information and thus mask important variation.

[78] $Q_{i,tech,t}$ is a relative term on a within-year basis and thus, across countries has a yearly mean of zero for all technologies. Note that the summary statistics above summarizes SDT observations for country-technology-years in which technology adoption rate was observed, and hence, is slightly different from zero.

[79] Reliability checks using the alternative system concentration measures at the country technology–year level can be found in Table S4 of the supplementary material.

[80] When technologies were censored or series had missing data, we use lagged value on a within-country-technology basis as the source for our technology adoption sum per year. This ensures that this missingness had no contribution to variation in the world-wide measure and thus could not drive our results.

[81] SDT does not vary when aggregated over all countries and technologies.

[82] Specifically, we use the approach suggested in Toda and Yamamoto 1995, wherein the maximum order of integration was established using both Augmented Dickey-Fuller and Kwiatkowski-Phillips-Schmidt-Shin tests.

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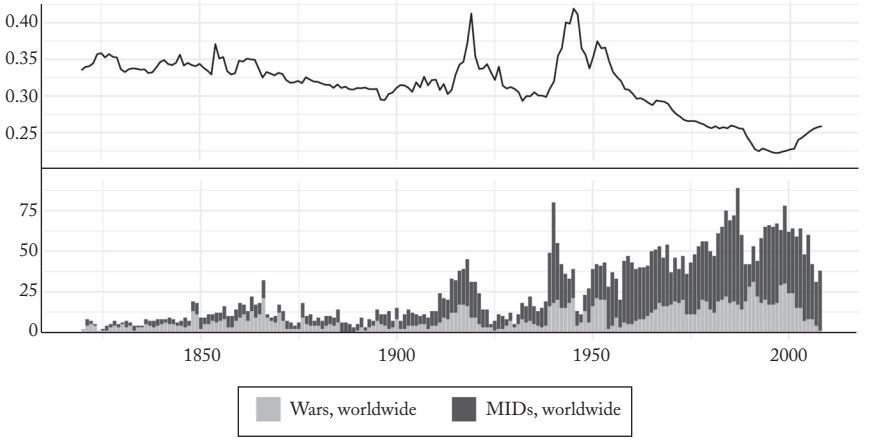

FIGURE 2
SYSTEM CONCENTRATION AND INTERSTATE CONFLICT, 1816–2008[a]

[a] SYSCON (top) and number of states involved in militarized interstate disputes (MIDs) and wars (bottom), from 1816–2008. As seen, the two appear negatively related. Note that the larger spikes in system concentration appear after peaks in MIDs and wars. We argue that low system concentration is associated with a more competitive international system and hence, more disputes. In the supplementary material, we support this claim statistically, and show that our results are robust to using several alternative measures of the competitiveness of the international system.

centration measure has changed over time. We clearly see an inverse relationship between violent manifestations of international competition and system concentration, a relationship we evidence quantitatively in a section on the validity of system concentration as a measure of international competition in the supplementary material.

We present the results of our country technology–year analysis in Table 2. We find clear links between lower concentration and faster adoption of technology. For both the intensity of new technology use and pace of new technology adoption, there is an inverse and statistically significant relationship between our measure of system concentration and technology adoption.

In line with our expectations, we also find that neighborhood threats tend to be positively related to technology adoption and that civil war is negatively related, while the relationship between interstate war and technology adoption is less clear. As we expect, there is also a link between changes in domestic political institutions and technology adoption, with evidence that as a country becomes more democratic, it adopts new technologies faster and more intensely (consonant with changes in $r_f(.)$, $r_c(.)$, $g_c(.)$, and $g_f(.)$,—that is, with consumer and firm's

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TABLE 2
COUNTRY YEAR–TECHNOLOGY TESTS: TECHNOLOGY ADOPTION AND SYSTEMIC FACTORS (1820–2008)

	(1)	*(2)*	*(3)*
SYSCON[a]	−0.336***	−0.334***	−0.333***
	(0.029)	(0.029)	(0.029)
Change in neighboring countries' military spending		0.001***	0.001***
		(0.000)	(0.000)
Log(GDP per capita)			−0.001
			(0.001)
Spatial distance to technology, 3-year lag	−0.041***	−0.042***	−0.042***
	(0.002)	(0.002)	(0.002)
Polity2 score	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
War, lagged one year	0.004	0.004*	0.005*
	(0.003)	(0.003)	(0.003)
Civil war, lagged one year	−0.007**	−0.008**	−0.008**
	(0.003)	(0.003)	(0.004)
Constant	0.108***	0.107***	0.115***
	(0.008)	(0.008)	(0.014)
Observations	82567	80591	77589
R^2	0.089	0.092	0.095
Adjusted R^2	0.089	0.092	0.095
Residual std. error	0.129	0.129	0.128

*p < 0.1, **p < 0.05, ***p < 0.01; country-technology clustered standard errors in parentheses
[a] Singer 1972.

utility from technology and influence over government policy). Spatial distance to technology has a clear negative relationship, which we hypothesize is linked to $g_f(.)$. The benefit of pressuring the government to repress the technology is lower if its use is accelerating in neighboring countries (countries that may decide to export the technology and thus undercut the government's efforts).

The magnitude of these effects is very large. Figure 3 plots the different expected changes in log number of technology units per capita for different levels (−1 standard deviation, mean, and +1 standard deviation) of our predictors (means of 5,000 simulations each, with 95 percent range of observations indicated by bars).[83] The effect of a one standard–deviation downward shift from the mean of SYSCON (from 0.28 to 0.24) is large, and we would expect the technology adoption rate to increase from 4.26 to 5.6 percent per year (≈31 percent faster adoption). Note that this is the expected average increase across all new

[83] We follow the approach suggested in King, Tomz, and Wittenberg 2000.

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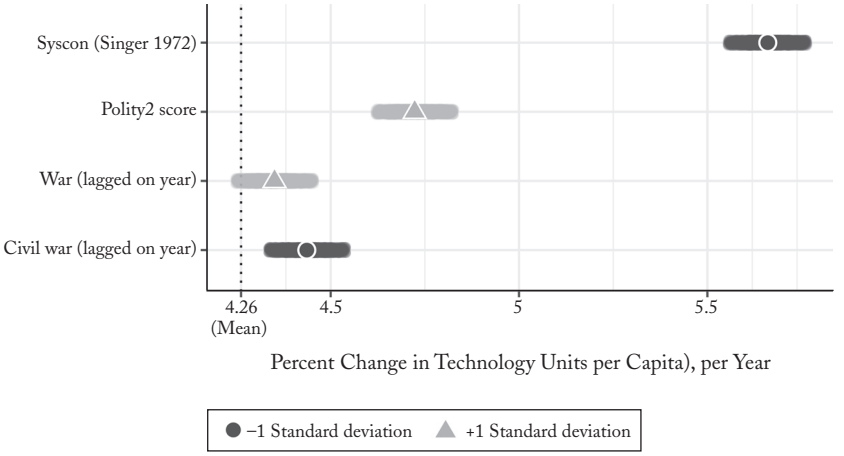

FIGURE 3
SUBSTANTIVE EFFECTS: THE INTERNATIONAL SYSTEM AND TECHNOLOGY ADOPTION[a]

[a] The plot shows the effect of one standard deviation shifts of our predictors on yearly increases in technology units per capita, using the model shown in Table 2, column 1. Effect estimates based on twenty thousand simulations, the mean of which are indicated by points and the 95 percent range of observations are indicated by bars. The baseline change per year is indicated by the dotted line. Among these variables, changes in system concentration has by far the largest effect. Going from the mean to one standard deviation below takes yearly increases in technology units per capita from about 4.26 to 5.6 percent (difference significant at the $p < 0.001$ percent level).

technologies and countries for which we have data, and not just the sum in percentage points. Figure 3 also shows the means and expected changes for a one standard–deviation change in our other independent variables. The systemic effect is larger than that of political regime change, civil war, and interstate war.

In Table 3, we examine our argument at the systemic level. We move from over 80,000 country technology–years to just 188 system years. We again find clear relationships ($p < 0.001$) between our various measures of international system concentration and technology waves, with and without controls. In models without other predictors, our measures of system concentration can account for between roughly 50 and 20 percent of the variation in the worldwide pace of technology adoption.

We find that changes in system concentration Granger-cause changes in technology adoption. Although one cannot establish causality in the sense of cause and effect by this technique, we can show that changes in system concentration are related at statistically significant levels to *later* changes in technology adoption, while the converse is not true.

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TABLE 3
SYSTEMIC TESTS: WORLDWIDE TECHNOLOGY ADOPTION AND SYSTEM CONCENTRATION

	Dependent Variable: Change in Technology Adoption Level Worldwide	
	(1)	*(2)*
SYSCON[a]	–0.352***	–0.225***
	(0.049)	(0.034)
Polity2 score (world average)		0.005***
		(0.000)
Constant	0.132***	0.098***
	(0.016)	(0.011)
Observations	188	188
R^2	0.396	0.643
Adjusted R^2	0.393	0.639
Residual std. error	0.018	0.014
F statistic	51.52***	101.02***

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$; robust standard errors in parentheses
[a]Singer 1972.

As shown in Table 4, we can reject the null hypothesis of no temporal relation in all tests of system concentration ⇒ technology adoption, while we fail to reject this hypothesis for any of our tests of technology adoption ⇒ system concentration.[84] We emphasize that these tests are only evidence of a temporal relation and that the two phenomena are likely interrelated in the long run. Nevertheless, these tests strongly suggest that in the short or medium term, changes in the international system Granger-cause states to respond by adopting new technology.

A relationship and temporal association between international system characteristics and global technology waves is thus evidenced, as is a link between characteristics of the international system and direct measures of technology use. In our robustness checks and in the illustrative case study below, we detail evidence suggesting a causal relationship between the two.

ROBUSTNESS CHECKS, ALTERNATIVE SAMPLES, AND TECHNOLOGY TYPES

We conduct a large number of checks to assess the robustness of our findings, which we summarize here. Full tables and replication code for

[84] Detailed results can be found in Table S5 of the supplementary material.

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TABLE 4
GRANGER CAUSATION: WORLDWIDE TECHNOLOGY ADOPTION AND SYSTEM CONCENTRATION

	System ⇒ *Tech. Adoption*	*Tech. Adoption* ⇒ *System*	*System* ⇒ *Tech. Adoption*[a]	*Tech. Adoption* ⇒ *System*[a]
Lag 1	yes***	no	yes***	no
Lags 1–2	yes***	no	yes***	no
Lags 1–3	yes***	no	yes***	no
Lags 1–4	yes***	no	yes***	no

[a] Accounting for the effects of war, civil war (both lagged one year), and Polity2 via linear model.

all work is provided in the supplementary material and in the *World Politics* Dataverse page, respectively.[85]

We first replicate our results across subsets of time, technologies, and countries. We investigate the relationship of interest during the years 1900–2000 (N = 68,615), on only minor powers (N = 75,374) and on only major powers (N = 7,193). We consider only European countries (N = 25,421) and only non-European countries (N = 57,146) (all in Table S6). We test our theory on many technology samples, by turns excluding railroad network and passengers, other transportation technologies, communication technologies, and industry-related technologies. In other models, we normalize measures of adoption across technologies (making their standard deviation equal). In all cases, the results remain robust.

To alleviate concerns about coverage and nonrandom patterns in missingness, we replicate our analysis with imputed data (see Table S6, column 1). We also replicate our analysis with additional controls: a binary democracy variable,[86] population,[87] and indicators for the Cold War or the five-year interval after a world war (see Table S7). We use the threat measure suggested by Ashley Leeds and Burcu Savun,[88] which uses information about foreign policy similarity in addition to capabilities. In all aforementioned cases, measures of system concentration remain negatively related to technology adoption at statistically significant levels ($p < 0.01$).

Our theory linking changes in the international system to policies boosting technology adoption is conditioned on such technology being useful in withstanding a challenge from abroad. This implies that

[85] Milner and Solstad 2021b; Milner and Solstad 2021a.
[86] Boix, Miller and Rosato 2013.
[87] Bolt et al. 2018.
[88] Leeds and Savun 2007.

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the effects should be magnified if technologies for which that is not the case are dropped from the analysis. Our sample of many different technologies allows us to test this explicitly. We assume that two technologies among the twenty—TVs and ATMs—are less likely to confer an advantage in an international challenge (compared to trucks, railroads, and electricity production facilities). In line with our expectations, the relationship between system concentration and change in technology adoption increases in magnitude by about 20 percent if these two technologies are dropped from the analysis (see Table S6).

Although the invention of the technologies we investigate are quite evenly spread across time, we also test whether measures of system concentration remain robust predictors of technology adoption when we control for the pace of invention of technology. We replicate the specifications in Table 3 adding yearly or five-year average inventions per year as a control. We do this with two samples of inventions, the twenty technologies considered in the main analysis and a larger group of 104 important civil and military technologies (see Table S8). In all cases, the results remain robust.[89]

We next interact our SYSCON measure with our diffusion measure, indicating the spatial distance to technology adoption levels. We find that states become more responsive to the technology adoption of their neighbors when the system is less concentrated (both unconditional effects, including SYSCON, remained statistically significant at the $p < 0.01$ level).

Our investigation focuses on the adoption of new technologies—increase in their use. A related concept is the intensity of their use. We replicate both our systemic and country technology–year analyses using intensity of use rather than the rate of change as our dependent variable and in all cases include a full set of country-technology fixed effects to account for country-technology fit. In every case, we find that lower system concentration is related to more technology use.

This theory is predicated on the claim that low system concentration brings more international competition. Beyond the evidence provided in this article, in Section 3 of the supplementary material, we investigate this claim quantitatively for the case of violent international competition (using data on militarized disputes, wars, and military spending). We find strong evidence that low system concentration indeed is linked to higher levels of competition (see Table S1).

Measures of concentration are sometimes argued to be overly sen-

[89] Future research might consider whether invention can be related to systemic concentration. For the twenty technologies considered here, we do not find this to be the case.

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sitive to how they are specified. We therefore include a section in the supplementary material that tests the reliability of our claims using alternative measures of concentration, which are insensitive to the number of countries, and to capabilities of the top four countries (see tables S3 and S4). Results are robust. We also replicate our country year–technology analyses with measures of concentration constructed using CINC scores that do not include iron and steel production or total energy consumption as components (that is, we calculated states' average share of the world total for urban population, total population, military expenditure, and military personnel). Results were unchanged in direction, slightly larger in magnitude, and remained statistically significant at the $p < 0.01$ level (see Table S9). We estimate models in which system concentration for country i was calculated using data on all countries except i (Table S9). Results were unchanged.

We argue that states adopt technology in more competitive environments to limit their vulnerability to coercion or attack. We argue that states respond to such more competitive environments with policies that go beyond military spending. We therefore ran systemic regressions with the log of world-wide military spending as an additional control (see Table S8). We find that even if we control for military spending at the country level, there remains an independent effect of international system concentration on technology adoption.

We explore the extent to which the impact of system concentration is distributed over time. Table S10 shows models with a lagged dependent variable and in which system concentration remains a strong predictor.

These estimations suggest robust links between international system concentration and the pace of international technology adoption. As our Granger causality tests show, there is also evidence of a temporal relationship, wherein changes in international system characteristics precede changes in worldwide technology adoption. International system concentration and global technology waves are broad concepts, and untangling causal relations between them—however important these might be—will always be fraught with difficulty, which we recognize. To complement our Granger causality tests, we therefore employed two other tools: the internal instruments approach of generalized methods of moments estimators (GMM) and error correction models (ECM). Both approaches, summarized in Tables S11 and S12, respectively, in the supplementary material, support our claim that more system concentration has a negative effect on technology adoption. Specifically, the effect of system concentration retains its sign and statistical significance using the internal instruments of the GMM estimator across nearly all models at the country technology–year level and in each case at the sys-

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temic level—results that address concerns about potential endogeneity.

Error correction models suggest that nontransitory changes in system concentration have a long-run effect on the steady state of technology adoption from both the country-technology and systemic perspectives. To elaborate, given a sustained negative change to system concentration (that is, the system becomes more competitive), we expect that it would cause an upward change in the equilibrium value of technology adoption to which it would converge over the subsequent time periods. Given the statistically significant coefficient estimates of long-run effects and speed of adjustment to equilibrium, this suggests that our results are not a product of the spurious long-run correlation issues endemic to time-series analysis with unit-root variables. At the systemic level, we also find (in addition to the extended effects of persistent changes to system concentration) a short-run, albeit quickly dissipating, effect on technology adoption in the presence of transitory shocks to concentration.[90]

Illustrative Case Study: Swedish Government Establishes Railroads

In this section, we provide a concrete example of the theoretical argument. We argue that changes in Swedish government policy (s^*) toward a major new technology (railroads) can be traced to changes in the international system, namely the Crimean War, which caused a reduction in system concentration (Z_t). We show that these changes in government policy were instrumental to the establishment of a railroad network in the country (Y). The Crimean War marked a breakdown of order in Europe, and states saw themselves as much less secure than they had been previously. As Gordon Craig writes, this "conflict marks a significant turning point in European history. Behind it lay forty years of peace; before it stretched fifteen years in which four wars were fought by the great powers of Europe, with the result that the territorial arrangements of the Continent were completely transformed."[91]

By 1853, representatives in the Swedish Riksdag had debated and rejected proposals for state funding of railroads for a more than a quarter century. Attempts to bring railroads to Sweden by mobilizing private capital had all also failed, most notably those by Count Adolph Eugene von Rosen in 1845 and in 1847–48, who, in both cases, obtained a royal permission to do so.[92] As Hans Modig writes, "It was by no means pre-

[90] We thank a helpful reviewer for suggesting these auxiliary tests.
[91] Craig 1960, p. 267.
[92] Oredsson 1969, pp. 52–56.

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determined that the railroad system in Sweden should be erected and organised by public means and under public direction."[93] Previous government investments in infrastructure, such as the Gota Canal, had been expensive and unprofitable. Opponents of railroad funding remained active, citing among other things, the possibility that it would spread cholera.[94] Large landowners, who feared the political ramifications of industrialization brought about by railroads, would continue to oppose their construction for decades to come.[95]

But the Crimean War, which broke out in October 1853, dominated parliamentary sessions that began in late November, and "the relations of Sweden with foreign powers again came to the foreground."[96] From 1845 to 1853, international system concentration fell by one-third standard deviation, hitting its lowest point since the 1830s, and the more even distribution of capabilities in the system was becoming obvious.[97] Previously dominant, Britain and France were concerned about the growing power of Russia and Prussia, where both military expenditures and economic prowess were on a clear upward trajectory. In Stockholm, initial worries were not about direct attacks on Sweden as part of the conflict, but rather were about the indirect consequences of a war more than a thousand miles away between Britain, France, the Ottoman Empire, and Russia.[98]

The decision for large public investments in railroads was soon made (1853) and was framed by its proponents in explicitly geopolitical terms. In a speech made that year to the Swedish Estates Assembly, Johan August Gripenstedt, who would later oversee the financing of railroads as minister of finance (1856–1866), compared railroads to defense fortifications and argued that they were "so important and have so profound effects, that they cannot be separated from the state."[99] This shift in policy was not due to a discovery of railroads' military use (for example, troop movements), which had been known for some time.[100] Instead, it was because defense had taken on new urgency. As Lena Andersson-Skog writes, "That defense interests contributed to the de-

[93] Modig 1993, p. 56.

[94] Riksdagen 1854, p. 183.

[95] Tyrefors Hinnerich, Lindgren, and Pettersson-Lidbom 2017. See also Schmid and Huang 2017, who document the importance of domestic opponents to railroad construction in the China and Japan around the same time.

[96] Cronholm 1902, p. 280.

[97] A trend, though punctuated by a postwar spike, which continued for the next three decades.

[98] Elgström and Jerneck 1997, p. 219.

[99] Gripenstedt 1871, pp. 152–53, our translation.

[100] In neighboring Denmark, reports on the usefulness of railroads in military operations had been circulating for two decades (see Stiernholm 1854). In Sweden's parliamentary debates of 1853–1854, speakers asserted it as obvious, and the point was not contested.

cision to establish [railroad] trunk lines is clear beyond any doubt."[101] "Authoritarian powers" to plan and lead construction of the lines were given to government actors, mainly Nils Ericson, a colonel in the Navy Mechanical Corps, with the lines to be drawn up with careful consideration of defense needs.[102]

In Sweden, state intervention was essential for establishing the railroad network and highlights the importance of government policy for technology adoption. Despite the fact that railroads would cut freight rates by more than half and travel speeds by nine-tenths, it was only when the state decided to invest that the country's first railroads were built in the latter half of the 1850s.[103] As system concentration continued to fall throughout the 1860s and early 1870s, Swedish expenditure on railroads kept rising. In the first half of the 1870s, almost 15 percent of all government revenue was spent on building railroads.[104] And although governments often are important for what they do not do—for example, by erecting barriers to new technology—the Swedish example also shows that they can be important actors in promoting technology adoption. As one study attests, "It was essential, therefore, that the government should not only build the strategic main lines of the system but also help by guaranteeing the loans which the private railway companies issued abroad."[105]

Discussion

We find that a more competitive international system, as measured by the concentration of resources and as described in the historical record, can be linked to a broad-ranging acceleration of technology adoption. Our large-N analysis indicates a relationship between technology adoption and the structure of the international system. We argue that in the short and medium term, states respond to changes in the international system. Using Granger causality tests, we find that there is a unidirectional temporal relationship in line with our expectations. Our regression specifications are by design sparse. In dealing with this long time frame (1820–2008), there is a sharp trade-off between adding covariates and maintaining good data coverage. More importantly, our estimation strategy relies on tracking changes on a within country–technology basis. This means that country-specific confounding variables would need to be time varying within the diffusion paths of

[101] Andersson-Skog 1993, p. 38; our translation. See also Oredsson 1969, pp. 47–71.
[102] Berger and Enflo 2017, p. 8; Welin 1906, p. 63.
[103] Sjoberg 1956.
[104] Holgersson and Nicander 1968, p. 8.
[105] Kildebrand 1978, p. 606.

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particular technologies within particular countries and at the same time be correlated with our measures of system characteristics. A battery of robustness checks seeks to alleviate concerns about such variables. At the systemic level, we test a range of potential systemic confounders and find our relationship of interest to be robust. We also provide a historical example of how changes in the international system in the latter half of the nineteenth century led to policies that shaped states' adoption of technologies.

It is difficult to separate capabilities from states' use of technology. Any reasonable measure of concentration of capabilities must rely on a conceptualization of capabilities that captures states' resources, and these resources cannot be entirely divorced from the use of technology. We believe that our Granger causality tests and the other tools we employ, GMMs and ECMs, robustness checks with country-specific concentration scores (excluding the contribution of their own capabilities), various subsamples and alternative concentration measures, as well as a historical example, provide multiple sources of support for the relationship in which the competitiveness of the international environment drives adoption decisions in the short and medium term.

The way we measure technology is limited to its physical manifestations. We have not looked at innovations in management practices or education, or the spread of new ideas, for example. Although restricting the scope of our investigation was necessary, we think there is fertile ground for further research on the relationships between competition in the international system and other spheres of knowledge. It is interesting that the Renaissance started in the context of intense competition between city-states in Northern Italy (when for a time, Leonardo da Vinci advised Cesare Borgia) and that what is often named as the most innovative period in Chinese culture and history (475–221 BCE) is known as the Warring States period.

Conclusion

Global waves of technological change seem to occur in the international system, and we have sought to understand what drives these revolutions. Our theory claims that when international system capabilities becomes less concentrated and the system therefore becomes more competitive, governments feel compelled to strengthen their position. They become more likely to change policies that might have constrained their adoption of new technologies or even to enact new policies that promote such adoption. Competitive pressures in the international system thus generate critical incentives in the face of pow-

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erful domestic resistance to new technology. We argue that systemic change may lead to waves of technology adoption in many countries. We develop these claims into a series of hypotheses that we then test.

We examine our proposed relationships using many different sources. Our quantitative evidence spans nearly two centuries, twenty technologies, and almost one hundred and seventy countries. We show that when the international system was less concentrated, international technology adoption was faster, accounting for all time-invariant country-technology effects. Our models show statistically significant and sizable correlations, but we need finer data to show the relationship between government choices about technology and system change. Presenting a specific instance of international system change, we link changes in government policies to concerns about a more competitive international environment. This helps to demonstrate the microfoundations for our claims about systemic pressures and provides further evidence of how important government policy can augment technology adoption.

Our work contributes to the study of international relations and technological change in several ways. First, we show that technology adoption by countries, which is a major factor in fostering economic growth, relies to some extent on pressures from the international system. Domestic politics are not the only thing that matters. International pressures on leaders can induce them to override domestic demands preventing technological change and protecting entrenched interests. Indeed, such international pressure may be the most important influence propelling leaders to allow new technologies. Second, we theorize and provide evidence that specific international system characteristics can be related to global technology waves. Third, while some scholars view a more concentrated international system—one of bipolarity[106] or hegemony[107]—as most desirable, we show that a more diffuse system may lead to better outcomes with respect to technological change.

Our evidence may also be useful in thinking about how the distribution of capabilities in the international system changes. We argue that competitiveness in the international system makes policymakers more likely to facilitate the adoption of new technology. We also know that these technologies may both disrupt existing economic arrangements and be very costly in the immediate term. Over the long term, however, such costly initial investments may lay the foundations for higher-than-otherwise technological development and economic growth.

[106] Waltz 1979.
[107] Kindleberger 1973.

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Supplementary Material

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Data

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Key Words

economic history, international relations, international political economy, technology

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EDITED BY Timothy Cheek

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