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Economic Geography, Politics, and Policy

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Abstract

Globalization has reduced the importance of distance between countries. Yet, within countries, geography matters now more than ever. Economic activities, including production and employment, occur unevenly across space within countries, and globalization consequently impacts various regions differently. Some areas benefit from international economic integration while others lose, and as a result, economic geography shapes citizens' experience of globalization. Economic geography also influences governments' responses to globalization and economic shocks. Economic geography consequently merits the attention of political scientists. By examining economic geography, researchers will find new traction on long-standing theoretical debates and valuable insights on recent developments, including the growing backlash against globalization. The challenges of studying economic geography include causal complexity and measurement issues.

INTRODUCTION

Many observers predicted globalization would bring about the "death of distance" (e.g., Cairncross 1997). While globalization has shrunk the importance of distance between countries, geography matters now more than ever within countries. Economic activities, such as production and employment, occur unevenly across space within countries and, as a result, globalization impacts various regions differently. Some parts of a country benefit from globalization while other areas lose out because of their employment and production profiles (Autor et al. 2013, McCann 2016).

At the same time, more affluent places are increasingly pulling away from poorer ones (Venables 2008). In the United States, for example, the largest metropolitan areas (i.e., those with more than one million residents) accounted for 72% of the nation's employment growth since 2008 and over three-quarters of growth since 2015—even though these areas accounted for just 56% of the overall population (Hendrickson et al. 2018). In developed countries, the productivity gap between the most productive 10% of regions and the bottom 75% grew by nearly 60% over the past 20 years (*Economist* 2017).

Even as regional disparities grow, people move less often within countries. In the United States, the percentage of Americans who moved across state lines each year fell by 50% during the period 1990–2018. Some people consequently remain in "left-behind places" with fewer and fewer economic opportunities. This dynamic explains the growing "geography of discontent" and many of the challenges that governments face today (Hendrickson et al. 2018). In the United Kingdom, for example, the uneven distribution of economic activity has fueled voters' distrust of politicians and political institutions. Voters in the north of England complain that politicians focus undue attention on London. This sentiment stems, in part, from London's disproportionate share of the country's wealth. London accounted for nearly one-fifth of the United Kingdom's gross value added in 1997, and by 2015, London's share had risen to nearly one-quarter (*Economist* 2017). The concentration of economic activity in London and the Southeast helps to explain this region's strong support for remaining in the European Union (Colantone & Stanig 2018a).

Similarly, the French government faces growing discontent among voters frustrated by geographic inequalities. Like London, Paris enjoys a disproportionate share of the country's wealth. The capital region's gross domestic product (GDP) per capita was 1.8 times larger than that of France's other 21 regions in 2011, and the Paris region continues to outpace the rest of the country (Lee & Rogers 2019). The relative wealth of Paris inspired the *gilets jaunes* protests of 2018. An increase in the fuel tax, which disproportionately affected people living outside of Paris where public transport is less available, sparked the initial protests. The fuel tax rapidly set alight other grievances among people living in rural and suburban areas (Lichfield 2019). Support for the *gilets jaunes* grew fastest and remains strongest in the Northeast and Southwest of France (Algan et al. 2019).

As areas within countries grow apart economically, voters pull apart politically (Autor et al. 2016, Rodden 2019). In France, for example, many voters in the Northeast and Southwest turned to extreme candidates in the first round of the 2017 presidential election—voting for Marine Le Pen on the far right and Jean-Luc Mélenchon on the far left (Algan et al. 2019). Candidates and political parties whose principal support comes from less densely populated areas increasingly find themselves at odds with candidates and parties who primarily draw on support from metropolitan areas (Rodden 2019). And the growing tide of populist sentiment emanates, in part, from the unequal economic opportunities across space within countries (Colantone & Stanig 2018a,b). Economic geography is therefore an important and timely subject for scholars of politics and political economy.

In this review, I define economic geography and discuss how the geographic concentration of production and employment differs from the concept of special interests. I illustrate how economic geography can provide new traction on long-standing theoretical questions. I then discuss several topics for which economic geography provides valuable insights, including the growing backlash against globalization. I conclude with a discussion of the challenges of studying economic geography, including measurement issues and causal complexity.

DEFINING ECONOMIC GEOGRAPHY

Economic geography refers to the geographic distribution of economic activities, such as production and employment. Employment tends to be the most politically relevant aspect of economic geography and therefore is my focus here. Employment opportunities are often distributed unevenly across space—both within and across countries. Across countries, inequalities exist in the opportunities for and remuneration of workers with different skill sets. Geographic inequalities in the skill distributions across countries have important economic consequences, as demonstrated by a long-standing literature in international trade (e.g., Stolper & Samuelson 1941). They also have important political consequences (e.g., Milner & Kubota 2005).

While patterns of economic geography across countries influence the flows of goods, people, and capital across countries' borders, I focus here on geographic inequalities within countries. Patterns of economic geography within countries have received relatively less attention to date, particularly among scholars of international political economy. But new research (e.g., Autor et al. 2016, Rickard 2018, Rodden 2019) and recent political developments, like the rise of populism, illustrate the importance of countries' internal economic geography for both politics and policy.

Variation Across Industries

Geographic patterns of employment vary between industries. Some industries employ people in only a few, select locations. Extraction activities, for example, tend to be geographically concentrated near natural resources (Shelburne & Bednarzik 1993, Campos 2012). The Norwegian oil industry, for instance, employs people almost exclusively in a single electoral district (Ekeland 2015). Other industries, however, employ people across the entire country. The Norwegian construction industry has employees in all of the country's 19 electoral districts.

The need to be located close to customers distinguishes geographically concentrated economic activities from geographically diffuse activities. Hotels, hairdressers, and restaurants tend to be geographically diffuse in order to be near local markets (Campos 2012, Chase 2015). In contrast, activities that do not need to be located close to their end customers, such as car manufacturing, tend to be geographically concentrated in select locations—like Detroit in the United States (Campos 2012).

Agriculture generally exhibits high levels of relative concentration even though it is often topographically diffuse. Agricultural activities frequently occur in areas where there are few other employment opportunities. In many rural communities in the Great Plains of the United States, for example, almost everyone is either directly or indirectly employed in the agriculture sector (Krugman 1991). In this way, agriculture tends to be geographically concentrated relative to the distribution of aggregate economic activity (Shelburne & Bednarzik 1993, Brülhart 1998).

Manufacturing tends to be less concentrated than agriculture, on average. However, geographic patterns of manufacturing employment vary across countries. Among developed countries, manufacturing employment is most geographically concentrated in Sweden and least concentrated in Denmark (Pezzini & Byrne 2007). Manufacturing employment in Sweden is 3.5 times more

concentrated geographically than manufacturing employment in Denmark (Pezzini & Byrne 2007). Although not as starkly different, manufacturing employment in the United States is nearly 1.5 times more concentrated than manufacturing employment in the United Kingdom (Pezzini & Byrne 2007).

As these data make clear, manufacturing employment varies across space. Within countries, those regions in which manufacturing employment is concentrated are especially vulnerable to rising imports from developing countries. The "China shock"—where Chinese imports generate negative employment and wage effects in local labor markets (Autor et al. 2016)—transpires precisely because of the uneven geographic distribution of manufacturing employment. A large literature in economics investigates the sources of this variation (e.g., Brülhart & Traeger 2005). Proposed causes include the location of natural resources, deep-water ports, path dependency, and patterns of international trade. In short, myriad reasons exist as to why some areas within countries rely heavily on manufacturing employment.

Special Interests Versus Concentrated Interests

The varied geographic distribution of economic activities illustrates an important point: Special interests need not be geographically concentrated. A special interest group is one that seeks to influence government policy in order to assist a select segment of the country's population. What makes an interest "special" is the small portion of a country's population that share the same interest. The US steel industry is a special interest; it employs just 0.3% of the total US population. Employees in the steel industry share a common interest in government policies—like tariffs on imported steel—that give US steel makers a market advantage. The US steel industry also happens to be geographically concentrated; most of the industry's employees live and work in just three of the 50 US states.

While the US steel industry is a geographically concentrated special interest, not all special interests are equally concentrated. Some are geographically diffuse. The ready-mix concrete industry in the United States, for example, employed just 99,800 people in 2018 according to the US Bureau of Labor Statistics. These employees are spread across the entire country (Gervais & Jensen 2019). Similarly, the forestry sector in Germany employs only a small fraction of the country's population, yet its employees work in every region of the country (Kies et al. 2009). Employment in the forestry sector is similar to the overall distribution of the German population (Kies et al. 2009). As these examples make clear, special interests can be geographically diffuse.

Geographic concentration is distinct from the notion of special interests. Yet scholars sometimes conflate the two and assume—either implicitly or explicitly—that special interests are geographically concentrated. This assumption generates confusion about when and under what circumstances special interests have the greatest political power. Disentangling the concepts of special interests and geographically concentrated groups may generate new insights about the political influence of economic actors.

Implications for Trade Theory

Disentangling these two concepts may be particularly useful for trade theory. In canonical models of trade (e.g., Krugman 1990), countries' characteristics garner the most attention. Countries' distance from one another is a key characteristic in the gravity model of trade (Venables 2008). Countries farther apart trade less with each other, all else equal. Although the importance of distance for bilateral trade flows has declined over time, it remains a robust predictor of trade flows between countries.

While countries' characteristics remain important, new models of trade focus instead on firms' characteristics. New new trade theory identifies firms as the primary actors in trade politics and demonstrates how firms influence countries' trade patterns via lobbying on trade policy (Osgood 2016, Kim 2017, Kim et al. 2019). Despite firms' central importance in new new trade theory, their geographic characteristics are largely overlooked. Scholars focus on firms' size and productivity but generally ignore firms' geographic characteristics (Osgood 2016).

Firms' geographic features may influence both their policy preferences and their political clout. A firm with a single domestic location may enjoy a different amount of political influence than a firm with multiple domestic sites—even if both employ a similar number of people. Relatedly, a firm's political influence may depend on the geographic dispersion of its employees. If a firm's employees live in just one electoral district, the firm will have different political leverage than if its employees were spread across many districts (Olson 1965). The impact of a firm's geographic characteristics on its political influence will vary depending on a country's electoral institutions (Rickard 2018). Taken together, these speculations suggest that economic geography may be an important addition to new new trade theory.

THE POTENTIAL OF ECONOMIC GEOGRAPHY

Resolving Theoretical Debates

Introducing economic geography to theories of policy making and politics can help to resolve long-standing theoretical debates. Purely institutional theories reach conflicting conclusions about how electoral institutions impact economic policy—and trade policy in particular. Introducing economic geography to institutional theories of policy making offers a solution to this long-standing debate (Rickard 2018), which I outline briefly below.

On one side of this debate, scholars argue that plurality electoral systems provide leaders with the greatest incentives to use economic policy to cater to narrow interests. Grossman & Helpman (2005) develop a model to illustrate why this is the case. In their model, two parties compete in legislative elections, and each party has equal chances of winning a given seat in a given district. There are three electoral districts; each district contains one-third of the population and elects one legislator. Grossman & Helpman (2005) assume that for each industry, all capital is owned by residents of a single district. As a result, legislators represent constituents with industry-specific economic interests.

Upon forming the government, the delegation from the majority party seeks to maximize the welfare of its constituents. If the party in power represents all three districts, the legislators will maximize the welfare of the entire country by setting tariffs at zero. In contrast, if the governing party represents only two of the three districts, they will set a positive tariff rate. A nonzero tariff emerges because trade policy is chosen by the majority delegation, and legislators in the minority have limited means to influence policy decisions. Legislators in the majority use tariffs to redistribute income to residents in their own districts, rather than maximize national welfare by setting an optimal tariff of zero. In short, the Grossman & Helpman (2005) model predicts that proportional rule (PR) electoral systems, which are more likely to produce governments that represent all three districts, will produce more broadly beneficial economic policies than majoritarian systems.

A similar prediction emerges from a model developed by Persson et al. (2007). They assume that the geographic distribution of economic groups is the same in all districts. Under this assumption, their model predicts that majoritarian elections will be associated with more narrowly targeted policies and fewer broadly beneficial politics, as compared to PR elections.

Several empirical studies support these authors' predictions. Evans (2009) finds that countries with plurality systems have higher tariffs, on average, than those with PR systems. Using

product-level tariff rates for a cross-section of developed and developing countries, Ardelean & Evans (2013) also show that tariffs are higher, on average, in plurality systems than in PR systems.

Yet, some scholars disagree and argue instead that PR electoral systems provide leaders with relatively greater incentives to cater to narrow interests. Scholars on this side of the debate contend that politicians cannot stray far from the preferences of the median voter in plurality systems without incurring electoral costs and therefore tend not to cater to narrow interests. A formal model developed by Rogowski & Kayser (2002) illustrates why: They demonstrate that majoritarian systems have greater seat–vote elasticities than PR systems, and as a result, a loss of votes translates into a greater loss of seats for parties competing in majoritarian systems. Given this, politicians in plurality systems tend to represent the preferences of the median voter more faithfully than the preferences of special interests. In contrast, politicians competing in PR systems can cater to special interests without having to be overly concerned with any losses they might incur for doing so. Rogowski & Kayser (2002) conclude that politicians in PR systems are therefore relatively more responsive to narrow interests.

A theoretical model developed by Bueno de Mesquita et al. (2005) also suggests that narrow, particularistic economic policies will be more frequent in PR systems than in plurality systems. Their model examines the political consequences of a winning coalition's size. A winning coalition is a subset of the selectorate with sufficient size to give its leadership political power to negate the influence of the remainder of the selectorate and the disenfranchised members of the society. The winning coalition is larger in majoritarian systems than in PR systems, according to Bueno de Mesquita et al. (2005). As the size of the winning coalition grows, the cost of private goods, such as subsidies or product-specific tariffs, increases. According to their logic, narrowly beneficial economic policies will be less frequent in majoritarian systems than in PR systems.

Some evidence supports this claim. Non-tariff barriers are higher, on average, in PR democracies than in majoritarian systems (Mansfield & Busch 1995). PR systems are also associated with higher consumer prices (Rogowski & Kayser 2002; Chang et al. 2008, 2010). Higher consumer prices may reflect governmental policies that privilege producers at the expense of consumers, such as legislatively imposed barriers to trade.

Taken together, these studies make clear that no consensus exists about how different electoral systems affect leaders' incentives and subsequent policy decisions. This disagreement emerges, in part, because existing studies ignore economic geography. Some studies ignore economic geography entirely (e.g., Persson et al. 2007). Others make strong assumptions about the geographic distribution of economic activity. For example, some models explicitly assume that each electoral district contains one unique industry concentrated entirely within the district (McGillivray 1997, 2004; Grossman & Helpman 2005). Although economic activity is "lumpy," industries are rarely contained within a single electoral district. Moreover, different economic sectors and industries display diverse patterns of geographic dispersion, and these patterns vary between countries.

Ignoring the geographic dispersion of voters with shared economic interests would be innocuous if politicians elected via different rules were equally responsive to concentrated (or diffuse) interests. But different electoral systems generate varied incentives for politicians to represent geographically concentrated (or diffuse) groups (Rickard 2012, 2018). Plurality systems generate the greatest incentives for politicians to respond to geographically concentrated groups. PR systems (and particularly closed-list PR systems) create powerful incentives for leaders to cater to the interests of geographically diffuse groups (Rickard 2012, 2018).

In this way, economic geography provides a solution to the long-standing debate over how electoral institutions shape economic policies. Leaders in PR systems will sometimes spend more money on subsidies than leaders in plurality systems—namely, when the beneficiaries are

geographically diffuse (Rickard 2012, 2018). When the beneficiaries are geographically concentrated, leaders in plurality systems will spend more money on subsidies than leaders in PR systems, all else equal. In short, the effect of electoral institutions on economic policy depends on economic geography.

Explaining International Economic Conflict

In addition to resolving long-standing theoretical debates, economic geography can help to explain recent phenomena, including the escalating trade war. Growing tensions between the United States and China stem largely from perceived violations of international economic agreements. Such agreements typically limit governments' ability to provide targeted, particularistic economic benefits to domestic producers. The World Trade Organization (WTO) Agreement on Subsidies and Countervailing Measures regulates the use of producer subsidies. EU State Aid rules similarly limit certain types of subsidies. Although these rules are enforced by the European Commission and binding dispute settlement at the WTO (Davis 2012), some countries nevertheless violate these agreements.

Economic geography can help to explain why countries violate international economic agreements. Economic geography, together with electoral institutions, determines the benefits that leaders accrue by breaking international rules. This is why violations of WTO subsidy rules and EU State Aid rules correlate with countries' electoral institutions and economic geography (Rickard 2009, 2010, 2018). Governments elected via PR electoral systems provide more "illegal" (i.e., non-EU-compliant) subsidies than governments elected via plurality systems when the beneficiaries of such subsidies are geographically diffuse. They do so because the electoral benefits of subsidizing geographically diffuse groups are greatest in PR systems. In Austria, for example, where elections are held via PR, geographically diffuse farm-gate wine producers won a government subsidy equal to 7.58% of their final product price (Rickard 2018). The European Commission concluded that this subsidy violated EU State Aid rules. Although Austrian legislators acknowledged the possibility that the subsidy would run afoul of EU rules, many nonetheless supported the policy. Supportive legislators cited the benefits the subsidy would bring to farm-gate wine producers, who are spread across much of the country, as well as the geographically diffuse tourism industry. One of the few legislators who spoke out against the subsidy did so because he worried that it would not equally benefit all Austrians. He expressed particular concern for citizens living in parts of the country without many (or any) farm-gate wine producers, such as Salzburg. But this legislator did not represent Salzburg. Instead, he represented one of the country's largest wine-producing regions (Lower Austria). This example highlights the electoral importance of geographically diffuse groups in PR systems. Although the legislator's own constituents would benefit from the subsidy, he argued against it because of the unequal geographic distribution of its benefits.

Explaining Varied Governmental Responses to Economic Shocks

Economic geography can also help elucidate why governments react differently to common economic shocks. The 2008 global recession impacted many countries, but governments' responses to the crisis differed. The governments of Sweden and the United States, for example, chose different strategies in response to the financial difficulties that their domestic auto industries faced following the 2008 crisis. The US government funded an $80 billion bailout for Chrysler and General Motors—two Detroit-based auto makers. In contrast, the Swedish government refused to bail out Saab. The Prime Minister, Fredrik Reinfeldt, said he would not put "taxpayer money intended

for healthcare or education into owning car companies" (Ward 2009, quoted by Rickard 2018). Swedish Enterprise and Energy Minister Maud Olofsson told Swedish public radio that "voters picked me because they wanted nursery schools, police and nurses, and not to buy loss-making car factories" (BBC 2009, quoted by Rickard 2018).

Like the US producers, Saab's employees were geographically concentrated. Ninety percent of Saab's employees lived in the southwestern town of Trollhättan (Rickard 2018). In fact, it was virtually impossible to find anyone in Trollhättan who was not somehow connected to Saab. Because Saab was the largest employer in the area, the firm's economic difficulties spelled potential disaster for the city. Yet, the government refused to bail out Saab. Instead, elected leaders prioritized spending on programs like education that would benefit broad, geographically diffuse groups. They did so because of the incentives generated by the country's electoral institutions.

The experience of geographically concentrated auto producers in the United States and Sweden illustrates how different policy outcomes can emerge in response to common economic shocks. The difference arises from the countries' electoral institutions and the varied incentives that these institutions generate for elected leaders. Further research is needed on how geographically concentrated economic shocks impact policy outcomes in different types of democratic systems. Of particular interest may be differences between federal and unitary states. Federalism accommodates territorially based diversity (Bermeo 2002), and subnational governments may be especially responsive to the policy demands of economic actors concentrated in their region (Wibbels 2000, Rodden 2010).

Explaining the Backlash Against Globalization

Economic geography also elucidates the dynamics of the growing backlash against globalization. Although opposition to globalization is increasing in many countries, anti-globalization attitudes are often unevenly distributed across areas within countries. In some regions of England, for example, voters strongly opposed the economic integration resulting from the country's membership in the European Union. Three-quarters of voters in the Lincolnshire city of Boston voted to leave the European Union in the 2016 referendum. But in some parts of London, 75% of voters opted to remain a member of the European Union.

Regionally divided public opinion over international economic integration is due, in part, to economic geography. Nontradable services are unevenly distributed across regions (Gervais & Jensen 2019), as is manufacturing employment. Rising imports of manufactured goods consequently have varied effects on different communities (Autor et al. 2013, Ballard-Rosa et al. 2017). Some regions, namely those with high levels of employment in manufacturing, experience reductions in employment and wages because of increased foreign imports (Autor et al. 2013). Others, like those with high levels of employment in nontradable services, feel few effects from the rising tide of foreign manufactured goods (Autor et al. 2013). As a result, the costs of globalization fall particularly hard on some local communities.

The spatially uneven distribution of the costs of globalization within countries has political consequences. In the United States, voters in congressional districts exposed to greater increases in Chinese imports disproportionately removed moderate politicians from office in the 2000s (Autor et al. 2016). US voters also punished incumbents for trade-related job losses (Margalit 2011) and import shocks (e.g., Feigenbaum & Hall 2015, Che et al. 2016). In the United Kingdom, regions exposed to greater inflows of Chinese goods voted to leave the European Union at higher rates in the 2016 referendum (Colantone & Stanig 2018a). And across 15 European countries, geographically concentrated import shocks are associated with higher vote shares for nationalist, isolationist, and radical right parties (Colantone & Stanig 2018b, Milner 2019).

Explaining Compensation Programs

Economic geography may also influence the design of compensation programs intended to offset the costs of globalization. Workers displaced by international trade tend to be geographically concentrated. Trade-displaced workers are, in fact, more geographically concentrated than the general unemployed population (Pezzini & Byrne 2007, Autor et al. 2013). Given this, trade-displaced workers may receive more generous assistance from governments in plurality systems, where leaders have relatively greater incentives to cater to geographically concentrated groups. Governments in some plurality systems augment general unemployment programs with trade-related adjustment support (Pezzini & Byrne 2007). The US government, for example, funds a program called Trade Adjustment Assistance, which provides selective assistance via strict eligibility criteria to workers who lost their job as a result of foreign trade (Rickard 2015).

Because trade-displaced workers tend to be geographically concentrated, governments in PR countries will be relatively less responsive to their needs. This may explain why governments in PR countries tend to spend relatively more on general programs, like unemployment insurance, that assist all unemployed persons regardless of the reason for their job loss (Persson & Tabellini 2004). In sum, economic geography together with electoral institutions may help to explain the relationship between globalization and compensation—a potentially fruitful and timely topic for further study.

CHALLENGES GOING FORWARD

Two key challenges exist for future research on economic geography: (*a*) measuring patterns of economic geography and (*b*) sorting out causal complexity.

Measuring Economic Geography

Although the uneven distribution of economic activity is obvious to even a casual observer, measuring economic geography is difficult. Constructing measures of economic geography requires vast amounts of highly disaggregated data. Information is needed about where individuals live, where they work, and what industry or sector employs them; and all of this information must be available for small, subnational geographic units, such as local labor markets. Given these demanding data requirements, it is unsurprising that few measures of economic geography exist. The handful of measures that do exist are generally not comparable across countries and fall short of capturing the key theoretical concept of interest.

Trade statistics are sometimes used to approximate patterns of geographic specialization. Early studies used exports as a proxy for production (Brülhart 1998). More recent studies use imports, together with employment data, to estimate the geographic distribution of trade shocks (Autor et al. 2013). The popularity of such trade-based measures stems from the fact that trade statistics are widely available, generally reliable, and highly disaggregated.

To directly measure economic geography, disaggregated employment data are needed. Using employment data, Krugman (1991) calculated Gini indices to measure the geographic concentration of an industry's regional and national employment shares. Gini coefficients measure the inequality among values of a frequency distribution, such as levels of employment in regions of a country. Gini indices subsequently became the standard measure of geographic specialization patterns, in part because Gini indices are straightforward to compute and relatively manageable in their data requirements (Krugman 1991). They also have strong intuitive appeal.

Although appealing, Gini indices' usefulness is limited because they cannot be decomposed into within-country and between-country components. Such decomposition is necessary to

answer questions that lie at the heart of debates in international political economy, such as which industries receive greater trade protection and why. To investigate whether geographic concentration explains part of the cross-industry variation in economic rents from government policy, it is necessary to decompose aggregate geographic inequality measures to estimate individual industries' levels of geographic concentration.

Improvements on the Gini indices gradually emerged. One improvement was the "dartboard approach" (Ellison & Glaeser 1997), which controls for variation in the size distribution of plants in an industry and the size of geographic areas. However, this approach cannot distinguish between industries with concentration in contiguous areas and those concentrated in select parts of a country far apart from one another. To illustrate this problem, consider two industries in France: audiovisual services and motion picture equipment. The motion picture equipment industry is concentrated in two locations at opposite ends of France—Aaton is based in Grenoble and Transvideo is based in Normandy (Dale 2015). In contrast, the audiovisual services industry is concentrated entirely in and around the Paris–Île-de-France region (Dale 2015). The dartboard approach would classify both industries as being similarly concentrated geographically even though the audiovisual services industry is far more topographically concentrated.

The difference between industries with concentration in contiguous areas and those concentrated in select parts of a country far apart from one another matters for politics and policy. For example, the French audiovisual services industry receives generous state support; it is subsidized to the tune of about 1 billion Euros per year (Carnegy 2013). In contrast, the motion picture equipment industry in France receives far less government assistance. Arguably, this is because of the industry's topographical dispersion; the electoral rewards from supplying subsidies to the motion picture equipment industry cannot be captured by any single legislator (Rickard 2018).

Cognizant of this problem, Busch & Reinhardt (2000, p. 708) suggest an alternative measure that calculates geographic concentration by measuring the distance between each employee and the national "centroid" or midpoint for a given industry. While this strategy overcomes the previously discussed problem inherent in the dartboard approach, it requires identifying the center of a given industry, which is challenging and necessarily ad hoc. Furthermore, calculating this variable requires a vast amount of data, and as a result, it exists for only two countries: the United States and the United Kingdom.

More recently, entropy indices have been used to measure geographic concentration (Brülhart & Traeger 2005; Rickard 2012, 2018). These indices have several distinct advantages over earlier measures. One key advantage is their suitability for decomposition analysis. Entropy indices can be decomposed to estimate the geographic concentration of individual sectors within countries and do so in a cross-nationally comparable manner.

While entropy indices have appealing characteristics, their computation requires detailed, highly disaggregated employment data for subnational geographic units. Such data are seldom available. But the European Union requires member states to report data on employment by sector and subnational regions in a cross-nationally comparable format. This requirement makes it possible to construct entropy indices for European countries using the subnational geographic areas defined by the European Union's Nomenclature of Territorial Units for Statistics (NUTS). The NUTS classification is a hierarchical system for dividing up the economic territory of the European Union. NUTS level 0 corresponds to the country level, and increasing numbers indicate increasing levels of subnational disaggregation.

Although the EU data can be used to calculate entropy indices, a further challenge remains. Calculating entropy indices using different aggregations of the same data, such as employment at different NUTS levels, can produce different outcomes (Wong 2009). Economic geographers refer to this as the modifiable areal unit problem. Lee & Rogers (2019) propose a measure that

overcomes the modifiable areal unit problem by taking into account fluctuations in the scale and number of political units considered. They demonstrate how to recover similar outputs regardless of the level of aggregation at which the data are measured.

Although the EU data are invaluable, serious measurement challenges remain outside of Europe. Data challenges are particularly acute in developing countries. As a result, virtually no research systematically tests the consequences of economic geography in developing countries. Yet, anecdotal evidence suggests that the distribution of economic activities may be far more uneven in developing countries than in developed countries. In China, for example, economic growth in the coastal regions outpaces much of the rest of the country. The southern coastal region accounts for nearly 35% of national GDP and attracts a disproportionate amount of foreign investment: 87.5% of foreign direct investment in China went to the southern coastal region in 2017 (*Economist* 2019). At the same time, industrial activity contracted in the west and interior of the country (*Economist* 2019). These patterns point to large and growing geographic inequalities in China—one of the world's largest economies.

As in China, enormous urban agglomerations exist in much of the developing world. Such large geographic inequalities generate difficulties for the formation and functioning of political institutions. They set the stage for regional conflict over trade and taxes (Beramendi & Rogers 2018) and may discourage foreign direct investment (Simmons et al. 2016). Measuring economic geography and testing its effects in developing countries are therefore important and pressing objectives.

Remote sensing provides a potentially promising way to measure economic geography in developing countries. In fact, some analysts have already used remote sensing data to estimate the geographic distribution of economic activity (e.g., Bleakley & Lin 2012). Remote sensing data are collected using aircraft or spacecraft and have become publicly accessible at increasing resolution (Donaldson & Storeygard 2016). An advantage of remotely sensed data is their wide geographic coverage. Satellites collect data around the globe in a consistent manner, across borders and with uniform spatial sampling. Many research satellites also offer substantial temporal coverage, capturing data from the same location at weekly or even daily frequency over several years.

While promising, remote sensing data are not without drawbacks. Night lights, for example, indicate where buildings are located but less accurately estimate where workers and output are located. Furthermore, the usefulness of night lights to measure economic activities depends on the satellites' overpass time. Satellites that pass overhead at 2:00 in the morning, for example, likely underestimate economic activity.

Despite these challenges, the rapid growth of remote sensing data and other geocoded data makes it easier to measure economic geographically. Geocoded census results are increasingly available to academics, and these data can be used to estimate the geographic distribution of workers with particular skills, occupations, and/or employers. Additionally, ever more user-friendly geographic information systems (GIS) allow for the collection and analysis of data in an explicitly spatial fashion (Chase 2015, Branch 2016). GIS technology has been productively employed in groundbreaking studies of representative institutions (Stasavage 2010) and foreign aid (e.g., Findley et al. 2011). Going forward, GIS could be used to code the spatial position of economic groups that share policy preferences, such as employees of a given industry.

Causal Complexity

As researchers capitalize on better data and technologies to measure economic geography, new challenges will emerge. One such challenge is causal complexity. The first generation of political studies of economic geography took patterns of economic geography as given. Because patterns of

economic geography remain relatively stable in the short to medium term, this assumption may be relatively innocuous (Dumais et al. 2002). But in the long run, patterns of economic geography may be influenced by government policy and/or political institutions. This possibility raises concerns about causal complexity. The next generation of studies must therefore grapple with a fundamental question: What explains the uneven distribution of economic activities across space?

A large literature in economics explores this question (Marshall 1920, Krugman 1991). These studies generally conclude that nonpolitical factors explain much of the geographic variation in economic activity. Patterns of geographic concentration can occur "naturally" through market mechanisms alone (Campos 2012, Maloney & Nayyar 2017). Factors that stimulate natural clusters include the availability of raw material, suitable climate conditions, proximity to markets, and an educated work force or research and development facilities (Maloney & Nayyar 2017). Geographic concentration can also be achieved by the strategic actions of large players, such as a university or a multinational company, or private groups like export business associations, credit cooperatives, and industry associations (Maloney & Nayyar 2017). Technology and automation can also generate geographic concentration (Schonfeld 2018).

Various other nonpolitical factors may also influence producers' (re)location decisions. Larger markets offer better matching between employers and employees, buyers and suppliers, or entrepreneurs and financiers (Maloney & Nayyar 2017). To take advantage of better matching opportunities, producers may prefer larger markets to smaller ones, and their preference for larger markets may lead to greater geographic concentration—contributing to urban agglomeration. Producers may also cluster together to learn about new technologies, market evolutions, or new forms of organization (Krugman 1991). Additional benefits of concentration include lower transportation costs and intellectual spillovers (Dumais et al. 2002).

In short, the origins of economic geography are complicated, wide-ranging, and largely nonpolitical. But at least two political factors may impact economic geography and consequently raise concerns for political scientists. First, political institutions may influence geographic patterns of production and employment. If economic actors anticipate the political benefits of geographic concentration in plurality systems, they may strategically choose to cluster together. However, no evidence exists to support this speculation. The geographic concentration of manufacturing employment is similar, on average, in plurality and PR systems (Rickard 2018). Among developed countries, those with PR electoral systems exhibit both the highest (Sweden) and lowest (Denmark) levels of manufacturing sector geographic concentration (Pezzini & Byrne 2007). The highest observed values of geographic concentration occur in Sweden and Australia—two countries with very different electoral systems (Pezzini & Byrne 2007). These observations suggest that producers' location decisions do not vary systematically with a country's political institutions.

However, a country's political institutions might arise in response to economic geography (Rodden 2010). When countries rely heavily on foreign trade because of their size, for example, constitutional authors might purposefully choose electoral institutions that minimize the political clout of groups seeking trade protection (Rogowski 1987). Constitutional authors' decisions about electoral institutions may also be influenced by the geographic distribution of citizens with shared economic interests (Brady & Mo 1992, Rodden 2010). Historically, socialist parties in Europe advocated for proportional electoral rules because their supporters tended to be geographically concentrated in manufacturing and mining areas (Rodden 2010). Given the geographic distribution of socialist voters, socialist parties expected to do better under PR than plurality electoral rules, and consequently lobbied for the adoption of PR. In the United States, historical evidence suggests that the initial choice of apportionment in state legislatures was a function of economic geography (Beramendi & Jensen 2018). Exploring how economic geography impacts institutional design is an important topic for future research.

Second, economic policies may influence patterns of economic geography. Serious concerns about causal complexity would arise if the policy outcomes that scholars sought to explain using economic geography were themselves a cause of geographic patterns of production and employment. Subsidies, for example, may influence economic geography. Firms might (re)locate strategically in order to win subsidies from governments. If true, this would present an inference problem for studies of economic geography's influence on subsidies.

However, firms' location decisions appear largely unresponsive to government subsidies (Midelfart-Knarvik & Overman 2002, Jensen 2018). In the United States, the biotechnology industry is concentrated in five urban centers. This high level of geographic concentration persists despite the fact that 41 of 50 US states have significant funding programs designed to spur development of the life sciences industry (Pezzini & Byrne 2007). In the United Kingdom, a £100,000 increase in the expected government subsidy is associated with only a 1% increase in the probability of relocation (Devereux et al. 2007). In the US state of Texas, 85% of the firms that received subsidies indicated that the money had absolutely no impact on their location decision (Jensen 2018). In Norway, civil servants responsible for the allocation of subsidies report that they have never seen a firm relocate in order to win more subsidies (Rickard 2018). Norwegian bureaucrats acknowledged that it was more difficult for a firm in Oslo to win subsidies because of the higher concentration of firms in that district; however, no firm moved out of Oslo in order to increase its chances of winning subsidies from the government (Rickard 2018). Taken together, this evidence suggests that government-funded subsidies do not significantly influence most firms' location decisions. Future work is needed to explore how other types of government policies, such as tariffs, may influence patterns of economic geography (Schonfeld 2018).

Despite these nontrivial challenges, research on economic geography has made great strides in recent years. Even greater advances lie ahead—particularly when scholars work together across disciplinary and subdisciplinary divides.

SUMMARY POINTS

1. Ignoring the geographic dispersion of voters with shared economic interests would be innocuous if politicians elected via different rules were equally responsive to concentrated or diffuse interests, but this is not the case. Different electoral systems generate varied incentives to represent geographically concentrated or geographically diffuse groups.

2. Similar patterns of economic geography can produce different policy outcomes, depending on countries' electoral institutions.

3. Likewise, identical electoral institutions can produce different policy outcomes depending on a country's economic geography.

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