The Effect of Economic Policies/Behavior on Contemporary Threats to Democracy

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Abstract

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In the last decade, the world has witnessed increased democratic back-sliding as democratic institutions came under threat from a myriad of different directions. Most prominently there has been a marked increase in weakening checks on executive power, which impede the power of the opposition to challenge executive decisions. In Africa, the Senegalese President Wade altered legislative rules to his benefit and created a new upper house filled with his own appointees. In Eastern Europe, Viktor Yanukovych (President of Ukraine) banned multi-party blocs and gave himself the ability to hire and fire cabinet members and governors. This dissertation contributes new theories on the impact of economic policies/behavior on political phenomena (patronage and populism) detrimental to contemporary democratic institutions, such as checks on executive power. The papers in this dissertation present evidence for how economic policies and behavior affect democracy in areas of the world where we have seen the most back-sliding over the last decade (Central and Eastern Europe) and the weakest democratic institutions (Africa). These papers are not conclusive in answering why democratic-back-sliding occurs or why weak democracies remain stagnant, but they offer novel theories on the effect of specific economic policies/behaviors on contemporary threats to democracy.

Introductory Chapter: The Effect of Economic Policies/Behavior on Contemporary Threats to Democracy

Kevin Aslett

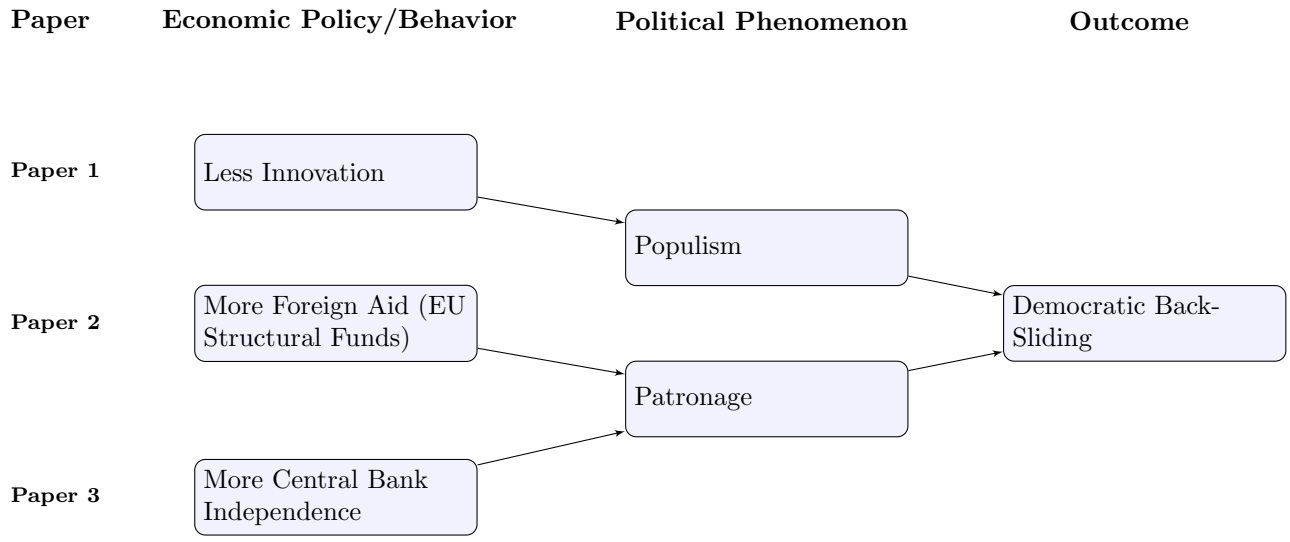
Introduction

In the last decade, the world has witnessed increased democratic back-sliding as democratic institutions came under threat from a myriad of different directions. Most prominently there has been a marked increase in weakening checks on executive power, which impede the power of the opposition to challenge executive decisions. In Africa, the Senegalese President Wade altered legislative rules to his benefit and created a new upper house filled with his own appointees (Harkness 2017). In Eastern Europe, Viktor Yanukovych (President of Ukraine) banned multi-party blocs and gave himself the ability to hire and fire cabinet members and governors (Bermeo 2016). This dissertation contributes new theories on the impact of economic policies/behavior on political phenomena (patronage and populism) detrimental to contemporary democratic institutions, such as checks on executive power. The papers in this dissertation present evidence for how economic policies and behavior affect democracy in areas of the world where we have seen the most back-sliding over the last decade (Central and Eastern Europe) and the weakest democratic institutions (Africa). These papers are not conclusive in answering why democratic-back-sliding occurs or why weak democracies remain stagnant, but they offer novel theories on the effect of specific economic policies/behaviors on contemporary threats to democracy (specifically patronage and populism).

This dissertation contributes to an arm of Political Economy that analyzes how economic policy or behavior affects political structures and outcomes. The first paper of this dissertation studies the consequences of innovation (an economic behavior) on populism in Central Europe, the second paper studies the effect of a new system of foreign aid within the European Union (EU Structural Funds) on patronage in Central Europe, and the third paper investigates the effect of a democratic reform, Central Bank Independence, on patronage in Africa. To test these theories, the following papers use novel methodological techniques to identify causal inference (diffusion-regression state-space models and instrumental variables) and original datasets (all railways, and train stations across Poland in three separate time slices: 1939, 1946, and 2019 ; 496,617 patents ; institutional data from European Union Structural Funds in Hungary).

The first paper of this dissertation investigates the economic behavior of innovation that some have blamed for increased support for populism across the globe. The paper "Technological Change and Populism" finds that innovation reduces support for populist political leaders. This contradicts a wider literature that has placed a portion of the blame for the rise of populism at the door of automation and innovation. Given that populist parties, if in power, weaken key institutions of liberal democracy (checks and balances, protections for the minority, etc.) this counter-intuitive finding indicates that automation should not be feared, but rather encouraged. The second and third papers of this dissertation counter-intuitively find that economic policies recommended to improve economic stability and promote democracy (Central Bank Independence and European Structural Funds) have contributed to the incidence of patronage, a phenomenon that weakens democratic accountability, inclusive policy-making, and mass-based political parties in young democracies. The second paper, "Principal-Agent Problems Within EU Funds: A Case Study of Patronage in Hungary", finds that foreign aid intended to support democratic institutions actually increases the incidence of patron-client relationships between incumbents and elites when domestic political actors are allowed full control of the distribution of these funds. The third paper, "Central Bank Independence: Creating a Political Food Cycle in the Developing World", finds that a policy designed to reduce cash-dependent patronage (central bank independence) increases the incidence of patronage in other policy areas (specifically food policy). Although effective in reducing the business cycle, central bank independence creates a similar staple food political cycle with similar consequences such as weakening democratic accountability, inclusive policy-making, and mass-based political parties in young democracies. The final two papers similarly find that these specific economic policies designed to strengthen democratic institutions actually incentivize patronage electoral strategies that weaken checks and balances and political contestation essential to liberal democracy. Figure 1 outlines the three papers of this dissertation and their similar goals of explaining the effect of economic policies/behavior on threats to democracy.

Figure 1: Dissertation Overview



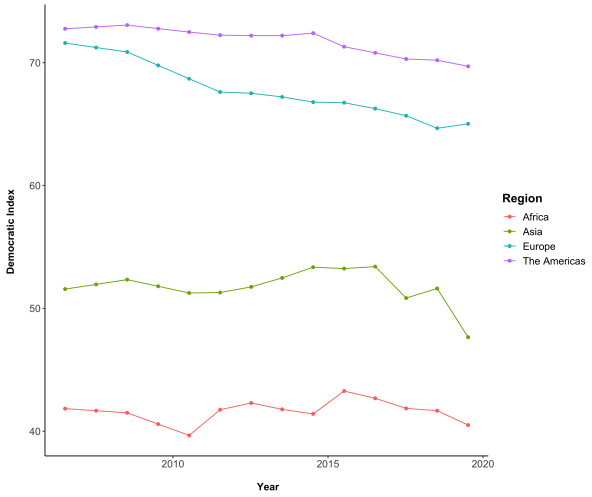
The rest of this introductory chapter follows as such: The next subsection details the regions under which democracy appears most at threat (Central and Eastern Europe and Africa). I then explain specific contemporary threats to democracy in these regions and how the papers in my dissertation address them. The final subsection outlines how this dissertation fits into other current and future work.

Where is Democracy Most Under Threat?

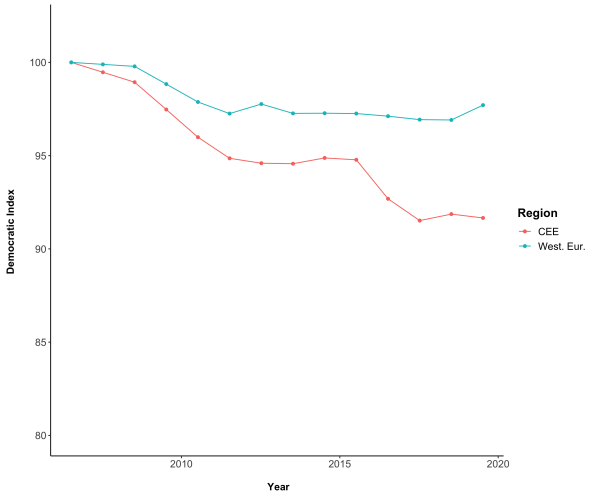
Over the last fifteen years, Europe has witnessed the highest level of steady democratic erosion and Africa has consistently scored the lowest on democratic indices (Figure 2a). Within Europe, democratic institutions in Central and Eastern Europe are most at risk relative to the consolidated democracies of Western Europe (Figure 2b). Poland and Hungary are two Central and Eastern European countries that are most representative of this decline (Figure 2c). Given that these were originally considered successful reformers since the fall of the Soviet Union, these cases are surprising and ideal cases to study if we want to understand what catalyzes democratic back-sliding. Two of the three papers analyze what has contributed to higher levels of populism and patronage (two threats to democracy) in Central and Eastern Europe.

Although Africa has not witnessed dramatic democratic back-sliding it has the lowest democracy score of any continent making this a key place to understand what holds back democratic development. The second paper of the dissertation investigates patronage, a phenomenon that negatively influences African democracies.

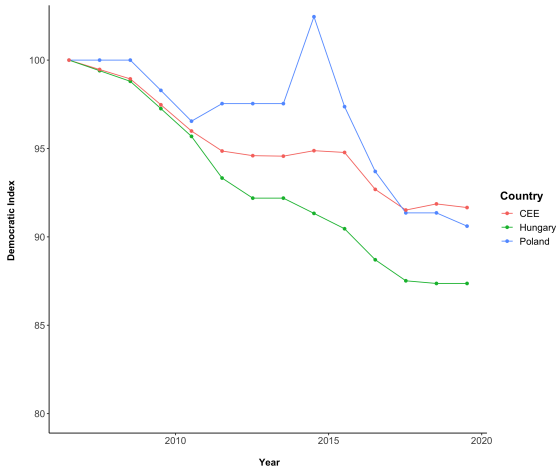
Figure 2: Democratic Indices



(a) Proportion of Responses to False/Misl. Articles



(b) Proportion of Responses to True Articles



(c) Proportion of True Responses to False/Misleading Articles by source bias

Democratic Back-Sliding in Central Europe

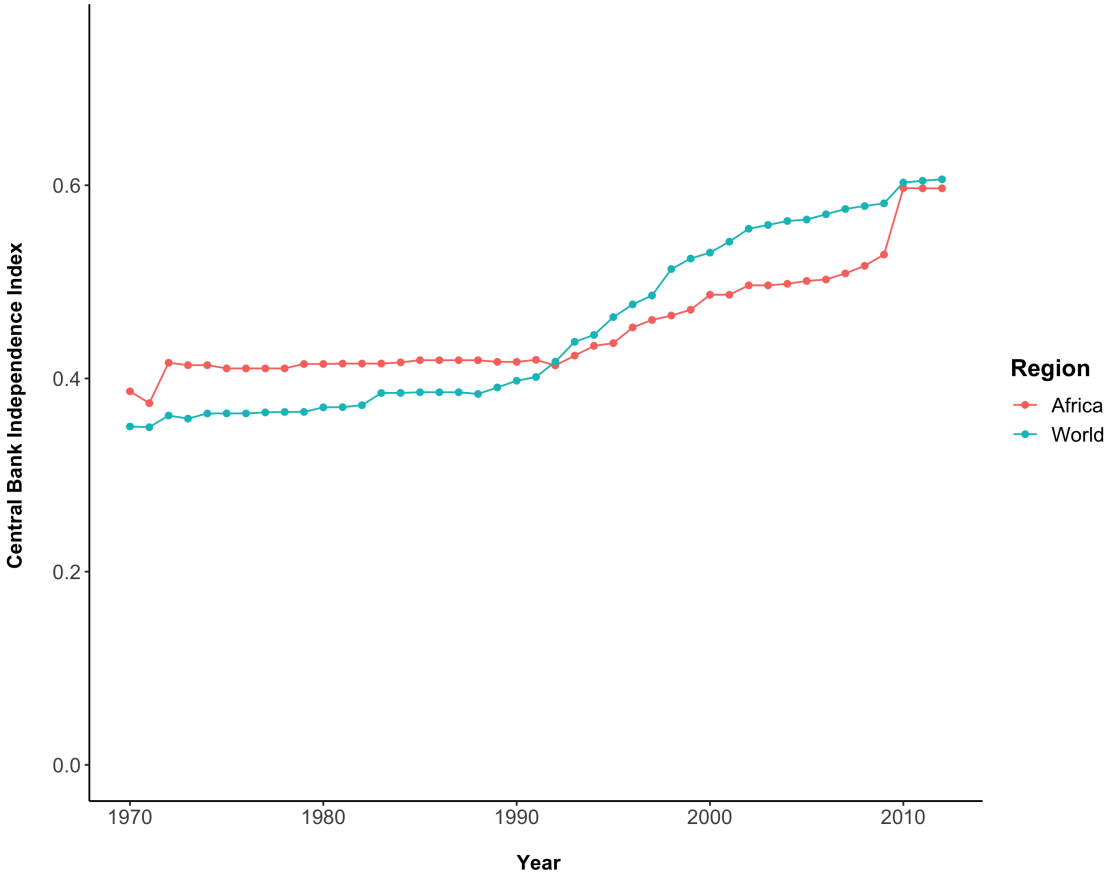
A rise in democratic back-sliding in Central and Eastern Europe has been attributed to both a rise in patronage and in populism. Although corruption in EU Funds spending has been connected to high-level politics and organized crime leading to distorted political competition and the removal of checks on power (Fazekas and King 2019, Mungiu-Pippidi 2014), it originally was a democratizing force. The positive incentives attendant with European Union (EU) accession and European Union Structural Funds received considerable attention as one of the primary drivers of both democratization and economic development in Central and Eastern Europe (CEE) following the collapse of the Soviet Union (Kelley 2004; Vachudova 2005, Simmons 2011). Since post-Soviet states joined the European Union, their positive influence on democracy has reversed. Abundant Principal-Agent problems within the structure of distribution are partly to blame for recent democratic back-sliding in Central and Eastern Europe and the second paper of my dissertation explains how. In addition to patronage, the success of populist political parties and leaders has decreased protections for minorities and reduced the power of unelected independent bodies such as the judicial branch. In post-communist Europe, right-wing populist political parties (such as Prawa i Sprawiedliwość in Poland and Fidesz in Hungary) have more than doubled their support, from an average of about 15% in the early 1990s to 35% by 2015 (Grzymala-Busse 2017). They have been the pioneers in democratic-back-sliding among formerly successful Post-Soviet states. The rise of this right-wing populism across the globe has been partly attributed to innovation and the automation that comes with it. I test this theory in my first paper and I actually find that areas with higher levels of innovation are less likely to support populist political parties and candidates.

Democratic Institutions in Africa

Democratization in Africa has witnessed progress and setbacks over the last two decades. Democracies have been formally institutionalization, but endemic corruption persists as democracies remain unconsolidated. One example of a formal institutional change that has produced unintended consequences is Central Bank Independence. Central banks have become more independent from their elected officials as a part of larger democratic reforms (Haan et al. 2018, Masciandaro and Romelli 2019)[1]. Figure 3 displays an increase in Central Bank Independence in Africa and across the world that has mirrored democratic reforms.

[1] A shift that correlated with a pattern of delegations of policy decisions to independent experts (Gilardi 2002, Jordana, Levi-Faur, and Marın 2011)

Figure 3: Average Central Bank Independence Across The World and Africa



The intuition behind this specific reform is simple: political incumbents have incentives to use monetary tools with a short-sighted perspective, especially on the eve of elections (Sargent, Wallace, et al. 1981, Barro and Gordon 1983). As markets became more efficient in the developing world, political intervention in monetary policy became more risky and central bank independence from political influence became imperative for the health of any market economy (Rogoff 1985, Lohmann 1992,Persson and Tabellini 1993, McCallum 1995). This check to detrimental political power that removes decisions from "day-to-day" political pressures is a key feature of democratic policy-making. This essence of "constitutionalism" is central to the functioning of democracy, by which certain decisions are made difficult to reverse (Drazen 2002, McNamara 2002). Others have argued that central bank independence violates some rules of democracy, specifically because their policies have significant distributional implications. Therefore they should be subject to greater democratic oversight (For detailed arguments see Johnson 2006, Eijffinger and Hoeberichts 2000, De Haan 1997, Levy 1995, Bowles and White 1994)[2]. In my final paper, I challenge the political accountability notion of central bank independence that political actors are more disciplined under an independent central bank (Bodea and

[2]A fierce argument was waged over the democratic nature of the establishment of the European Central Bank (Elgie 1998,Elgie 2001,De Haan and Amtenbrink 2000).

Higashijima 2017). Although they become more disciplined in fiscal terms, they make up for the loss of this tool, by becoming more risk-acceptant to other policies such as food policy [3]. Democratic reforms such as central bank independence have unintended consequences for democracy. In this specific case in Africa, I find that it increases the likelihood of patronage in food policy on the eve of elections.

Specific Threats To Democracy Addressed In Papers

Populism

The first paper in this dissertation addresses the threat of populism and contradicts the widely held belief that innovation is partly to blame for the rise of populism. Rather, it supposes that innovation builds resistance to populist appeals. This is important to understand given that populist political parties in power consistently pursue policies that clash with fundamental tenets of liberal democracy. Populist ideology specifically challenges the checks and balances and protections for the minority (often overlap with individual civil rights) that liberal democracy stresses (Coppedge et al. 2011).

Populist ideologues preach that the will of "the people" must be followed and this general will cannot be interfered with by unelected, unrepresentative institutions. This directly contradicts the checks and balances liberal democracies depend upon, most notably the judicial branch. Elected populist leaders often engage in antagonistic relationships with the judicial branch and legislative branch that serve as a check on power and protect the civil rights of minorities not considered a part of "the people." Examples of this exist in Latin America where the populist left have been pricy to considerable electoral success and Central and Eastern Europe where right-wing populists rule. Prawa i Sprawiedliwość in Poland proposed that the president should be allowed to legislate without the impediment of the legislative branch (Sadurski 2005). The threat to checks and balances comes equally from the populist left, as witnessed in Latin America. Immediately following his election, Chavez in Venezuela revamped the country's institutional framework by: (1) successfully closing the congress, where he held a minority of support ; (2) re-engineering an electoral system, to boost his power (3) ending the ban on consecutive terms, and (4) creating a new national Congress that could be easier to manipulate (Kurt 2013). Populist leaders in Ecuador (De la Torre 2013) and Bolivia (Lehoucq 2008) followed suit and consolidated power to the executive branch. Theoretical tensions between populist ideology and liberal democracy have manifested itself in the attempted and successful removal of checks and balances in Latin America and the Post-Soviet sphere.

Populist rhetoric also threatens the rights of minorities not designated as apart of "the people." Populism

[3]Economic reforms have in the past changed electoral strategies. In Uganda, in response to economic and political reforms President Museveni's government created new districts to compensate for the loss of other patronage resources lost through reforms (Green 2010).

"rejects all limitations on the expression of the general will, most notably the constitutional protection of minorities" (Mudde 2004). Protection of minority rights runs counter to the populist conception of democracy. Populist actors ultimately separate society into two distinct groups, "the pure people" versus "the corrupt elite." They highlight the necessity for politics to follow the general will of this pure group. There are numerous examples of populist attacks on minority rights across Europe. The main populist party in Italy (The Northern League) proposed a multitude of resolutions that discriminated against minorities, particularly the Romany and Muslim minority groups: (1) Banned the construction of Romany camps (2) Made construction of mosques dependent on local referendums and therefore the practice of a religion dependent on the will of the people. (3) Said that Muslims must celebrate rites in Italian (an obligation only forced upon those that practice Islam). The latter two also infringed on the individual rights of individuals to practice religion, another tenet of liberal democracy, which has been under threat by populists. Prawa i Sprawiedliwość in Poland proposed that the rights of ethnic and religious minorities in the current constitution should be removed (Pankowski 2010). The rise of populism in Latin America and Europe threatens liberal democracy across these continents.

Patronage

An extensive literature has already outlined that corrupt foreign aid (in my case European Union Structural Funds) can increase incidence of patronage and erode democratic institutions via two mechanisms: (1) lowering the representativeness of democracy and (2) weakening political competition.

The second paper of my dissertation details the process with how economic aid was co-opted, arguing that principal-agent problems within the distributional system of European Union Structural Funds have intensified democratic back-sliding in Hungary and across the Post-Soviet sphere. The third paper of my dissertation details how creating obstacles to patronage in one policy sphere (monetary policy) may result in patronage in another policy sphere (food policy).

Patronage detailed in my second paper limits political competition, a necessary condition for a healthy democracy, although political competition does not alone guarantee it. In young democracies (especially in Post-Communist countries), those that face credible competition are much more likely to build institutions that constrained themselves and future electoral winners, because it lowers their cost to exit (Grzymala-Busse 2007). Grzymala-Busse (2007) argues that robust political competition creates incentives to avoid state exploitation and create accountability measures that create obstacles to procuring political rents in the future. In the second paper of my dissertation I focus on how party state capture occurred in Hungary after a pillar of political competition, the social democratic left became impotent by a plethora of self-

induced issues. Given a lack of any party competition, state capture followed. Fidesz then doubled down on reducing democratic competitions arguing that democracy has failed 'the people' (Innes 2014). In addition, European Union Funds began pouring into the country as a reward for past democratic development and entry into the European Union. Patronage detailed in my second paper limits political competition, a necessary condition for a healthy democracy, although political competition does not alone guarantee it. In young democracies (especially in Post-Communist countries), those that face credible competition are much more likely to build institutions that constrained themselves and future electoral winners, because it lowers their cost to exit (Grzymala-Busse 2007). Grzymala-Busse (2007) argues that robust political competition creates incentives to avoid state exploitation and create accountability measures that create obstacles to procuring political rents in the future. I explain how state capture occurred in Hungary after a pillar of political competition, the social-democratic left became impotent by a plethora of self-induced issues. Given a lack of any party competition, state capture followed. Fidesz then doubled down on reducing democratic competitions arguing that democracy has failed 'the people' (Innes 2014). Orban and Fidesz turned to a pool of public funds, European Union Funds, to consolidate their power. This economic aid, European Union funds, distributed without proper accountability measures and oversight stimulated rent-seeking behavior and curtailed the capacity of citizens to hold rulers accountable. Increasing the pool of public resources in countries with already poor regulatory and accountability institutions results in democratic back-sliding (Djankov, Montalvo, and Reynal-Querol 2008), although increasing these resources in countries with robust democratic institutions does not (Menaldo 2016).

Other Impacts of Technology/Innovation on Democracy

The papers in this dissertation are centered on the effect of economic policies/behaviors on two threats to democracy (populism and patronage). I find that innovation reduces the support for populist policies, central bank independence can increase the incidence of patronage in other policy areas, and principal-agent problems within the distribution of aid increase the likelihood of patronage. I plan to continue to build on my work looking at the effect of innovation and technological development on a different threat to democracy, misinformation.

This research area ties closely to the first paper of the dissertation, which focuses on the effect of innovation on populism. Innovation and technological progress has lowered costs to producing and distributing news, which has been accused of increasing the proportion of misinformation consumed in news diets. Misinformation increases polarization and reduces trust in democratic institutions, but little is known. Specifically, I hope to contribute theories on the following research questions: (1) Who is most susceptible to misinfor-

mation? (2) How does misinformation spread across social media platforms? What interventions can slow its spread? (3) What are the effects of misinformation on political beliefs (polarization, trust in democracy, etc.)? What interventions can weaken belief in misinformation?

Misinformation or as some call it "fake news" is not a new feature of politics. In 1782, Benjamin Franklin—then the American ambassador to France—printed a fake issue of a real Boston newspaper in which he fabricated a story that Indigenous Americans had sent the scalps of more than 700 colonists to the King of England. The spurious story quickly spread and was picked up by newspapers throughout the Northeast. Although fake news is not a new feature of American politics, the scale and speed of its diffusion through new innovations such as social media networks pose additional challenges. A growing body of research on fake news online provides evidence for patterns of production (Allcott, Gentzkow, and Yu 2019), sharing (Stella, Ferrara, and De Domenico 2018, A. Guess, Nagler, and Tucker 2019a, A. M. Guess, Nyhan, and Reifler 2020), and exposure (Allcott and Gentzkow 2017, A. Guess, Nyhan, and Reifler 2018, A. Guess, Nagler, and Tucker 2019b). However, relatively little is known about whether people are susceptible to believing fake news when they encounter it online. I plan to explain who is most susceptible to fake news and why.

The spread of fake news and misinformation online has become a heightened concern during the COVID-19 crisis when uncertainty in the information ecosystem has increased and there has been a spike in online activity due to government lockdowns. By tracking the flow of misinformation over a multitude of different platforms (Facebook, Twitter, Reddit, and YouTube) I can identify the origin of misinformation and how it traverses different platforms.

Researchers and policymakers have grappled with the growing problem of online misinformation spread via social platforms. Multiple recent studies have established key regularities in the prevalence and spread of misinformation over U.S.-based online networks. Older Americans are more likely to both consume and share this misinformation with others (Guess et al. N.d., 2019). A leading explanation for this second pattern is that age is negatively correlated with digital media literacy — that people in older generations are less likely to possess the skills that come second nature to today's "digital natives." Understanding the relationship between digital media literacy and susceptibility to dubious sources of online content is crucial for designing interventions to counter the spread of misinformation. Unlike some competencies, these skills can potentially be taught, raising the possibility of scalable solutions. Given how little is known about the lasting impact of such initiatives — both online and in the classroom — I view this as an important opportunity for basic research as well as a way to provide useful feedback on the efficacy of browser tools such as NewsGuard as well as text-interventions such as those devised by non-governmental organizations such as *First Draft*.

The following three papers of my dissertation contribute novel theories on the effect of contemporary

economic policy/behaviors on threats to democracy (specifically patronage and populism). My first paper finds that innovation lowers support for populist political parties and candidates. This piece contradicts a large literature that has placed part of the blame for populism on innovation and the automation that it comes with. My second paper finds that principal-agent problems inherent in foreign aid distribution increases the incidence of patronage. It finds that European Union Structural Funds, once believed to be a democratizing force in post-Soviet Europe actually contributes to democratic back-sliding in this region. The final paper finds that central bank independence increases the incidence of patronage in other policy areas (in the case of this paper: food policy).

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Paper 1: Innovation and Populism

Kevin Aslett

Abstract

The most recent wave of populism has generated a plethora of theories to explain its rise, one being innovation, automation, and technological progress. In this manuscript, I utilize an exogenous shock to innovation to test this theory and determine if areas with higher levels of innovation are more likely to support populist candidates and/or political parties. I actually find the contrary. Drawing on an original geolocated data set of 496,617 patents, and railroad placement and destruction during the Second World War in Poland this paper finds evidence that innovation makes areas more resistant to populist appeals. Exploiting differences in railroad destruction during World War 2 as an instrument for innovation, I estimate large negative effects on populist support. In contrast, areas not blessed by innovation are more supportive of populist political parties. This paper tests two theoretical mechanisms: innovation suppresses populist sentiments in sparsely populated areas because it increases the mobility of populations, or it increases local human capital. I find evidence for the former, but not the latter. This paper supposes that economic factors, such as innovation, affect support for populism, but not in the direction we previously believed.

Introduction

What are the fundamental causes of populism? Although there is little consensus on the answer to this question, economic factors have received considerable attention in recent years. During the Great Recession in Europe, an increase in unemployment was associated with the rise in populist support (Algan et al. 2017) and the election of Trump in 2016 was also partly attributed to economic insecurity and anxiety (Inglehart and Norris 2016). These studies argue that automation's effect on job loss increases economic anxiety and subsequently support for populist leaders and political parties. This paper seeks to contribute to this line of work by analyzing a country, Poland, that has a wide variation in levels of innovation within the country and has elected and re-elected a populist party (Prawa i Sprawiedliwosc; Law and Justice) to power in both the executive and legislative branches, most recently back into the executive branch on June 28th, 2020. Specifically, this paper proposes and tests a theory that innovation builds resistance to populist appeals. This paper tests two mechanisms through which innovation has this impact: (1) increases the mobility of populations, and (2) increases local human capital.

To estimate the impact of innovation on populist support, I need a source of exogenous variation in innovation. In this paper, I propose a theory of differences in innovation sub-nationally and exploit this theory to derive a possible source of exogenous variation. My theory rests on two premises: (1) transportation infrastructure increases levels of innovation in rural areas. Coordination failures often explain low levels of firm innovation in rural areas, but transportation infrastructure lowers costs to accessing the public stock of ideas and can break these coordination failures; (2) destruction of railroad lines during World War 2 in Poland was random and most importantly exogenous to economic development indicators that may encourage innovation, and (3) railroad infrastructure that survived World War 2 has persisted and affected where rail stations that exist presently.

Based on these three premises, I use variation in railroad lines untouched by World War 2 damage as an instrument for innovation. I use original data to test this: (1) geolocated active railway stations in current Polish territory in 1939 (pre-World War 2) using historical railroad maps, historical timetables, and online railroad databases, (2) geolocated stations made inaccessible or destroyed during World War 2 using historical maps, timetables, and documents, (3) geolocated active railroad stations and lines in Poland in 2018 using official Polskie Koleje Państwowe SA maps, and (4) geolocated registered patents in Poland between 2000 and 2018.

To substantiate this, I regress populism voting by innovation, and instrument the latter by railroad destruction. My data allows me to identify the effect of exogenous removal of innovation on voting patterns in current-day Poland in three separate tests: (1) I use municipalities, where the most damage to railways would

be expected, as an instrument for lower levels of innovation. (2) I limit my analysis to only municipalities where the majority of fighting at the end of World War 2 occurred and use three different measures of railroad destruction as instruments for innovation: active rail stations still accessible after the war; a dummy variable activated if all rail stations active in the municipality at the beginning of the war became inaccessible due to damage during the war; percentage of all rail stations that became inaccessible due to damage during the war. (3) I expand my analysis to all municipalities across current Poland that contained a railroad station entering World War 2 and use remaining railway stations after World War 2 as an instrument for innovation. Across these tests, there is a strong (first-stage) relationship between World War 2 railroad destruction and innovation, which is interesting in its own right. The regression shows that railroad destruction more than 70 years ago partly explains populism voting in current-day Poland. I also document that this relationship works through the channels I hypothesize: railroad destruction in World War 2 is a major determinant of innovation levels in Poland today; and there is a strong correlation between the railroads remaining after World War 2 and railroads that exist today.

The exclusion restriction implied by my instrumental variable regression is that destruction of railways and rail stations 70 years ago has no effect on support for populist appeals, other than their effect through innovation. The major concern with this exclusion restriction is that railroad destruction may be negatively correlated with areas already more susceptible to populist appeals, which would have a direct effect on voting outcomes. I believe that this is unlikely to be the case and that my exclusion restriction is plausible given that irreversible damage to railways in World War 2 was relatively random and not located in strategic areas. I explain this further in later sections.

I focus specifically on railways in Poland for a two reasons. It is the cheapest form of transportation, given that the railroads are owned by the state and subsidize travel. After the fall of the Soviet Union there was only about one car per 10 residents of Poland (World Bank, 1992). Up to the 21st Century, most traveled by train or bus[1]. For longer distance trips, the train is still more convenient, if one is near a train station.

The paper is structured as follows. The next section presents the main hypotheses of this paper and identifies prior research on what drives innovation and creates appeal for populist policies, including studies that look at economic drivers of populism. Section 3 describes my key instrument for innovation, the destruction of transportation infrastructure during World War 2, and outlines historical evidence that provides support for my exclusion restriction. Section 4 presents the data, the research design, and multiple methods in which I test this theory. Section 5 presents the main results, and Section 6 concludes.

[1]Since communism fell there has been a significant increase in car purchases, but train infrastructure is still a preferred mode of transportation

Innovation/Technological Change and Populist Rhetoric

A minimalist definition by Mudde and Kaltwasser (2013) places populism as "a thin-centered ideology that considers society to be ultimately separated into two distinct groups, "the pure people" versus "the corrupt elite." It argues that politics should be an expression of the general will of the people. For the purpose of this manuscript, I will focus strictly on right-wing populism. This form of populism does not pursue an agenda of redistribution, but rather positions themselves as "nativists" protecting "ordinary people" against the "elites." The election of Trump, the Brexit vote, and the continued dominance of populist parties in Central Europe (Prawa i Sprawiedliwość and Fidesz) are all examples of the recent rise of right-wing populism. Recent work has focused on three explanations for this recent rise of populism: (1) cultural backlash such as racial resentment, anti-immigration sentiments and anxiety (Donovan and Redlawsk 2018, Inglehart and Norris 2016) ; (2) globalization (Rodrik 2018) ; (3) innovation and technological change. This article focuses on the third leg of populist support.

In light of massive advances in computerization, robotics, and automation, concern has grown that innovation and technology change will lead to a replacement of human workers (West 2018, Frey 2019) and a painful disruption (Brynjolfsson and McAfee 2014). Studies at the individual-level find that in response to these automation shocks, workers become more likely to support redistribution and right-wing populist policies/candidates (Anelli, Colantone, and Stanig 2018 Thewissen and Rueda 2019, ; Gingrich 2019). Economic anxiety from this technological development leads vulnerable workers to misdirect blame on out-groups, such as immigrants and workers in foreign countries (Zhang 2019, Wu 2019), which increases support for right-wing populism. If automation threatens more jobs in the future as many predict (Levy 2018), the popularity of populist policies should only increase.

These studies establish that those most vulnerable to innovation may be most vulnerable to populist rhetoric, but they incorrectly assume that innovation and automation increase the aggregate support for populist political parties. The aggregate effect of automation on populist support is theoretically underdeveloped and lacks empirical support (Mudde and Rovira Kaltwasser 2018). Individuals vulnerable to automation constitute a minority of support for populist radical right parties and do not disproportionately vote for populist parties (Norris et al. 2005, Spier 2010). Work that has attempted to quantify the aggregate effect of technological change and innovation find that aggregate outcomes are actually, on average, positive (Kurer 2020). The perception of relative economic decline among politically powerful groups rather than actual impoverishment increases support for right-wing populist parties during periods of innovation (Kurer and Gallego 2019). This paper builds on this work and tests the effect of innovation on different localities within a country and finds that it decreases voting for populist political parties. This paper then tests the

mechanisms through which innovation affects support for populist political parties. Innovation can increase the level of movement of people between these areas. Innovation can also increase the level of human capital. I explain the rationale for these two mechanisms below.

Although the populist literature has focused on the effect of immigration from abroad on populist voting, less work has focused on the effect of migration within a country on voting for populist political parties. Populist support as of late has been explained using a schism that has split the global population into mobile, cosmopolitan people who reject populism and stationary workers, who live in the same, stable social and geographical environments (Goodhart 2017). Mobile workers understand immigration as an advantage, but stationary workers see it as a threat. Given that innovation breeds a more dynamic labor market we would expect more of these mobile workers to be produced in areas of innovation. The "creative destruction" of innovation outlined by Schumpeter (Schumpeter 1942) forces workers to become mobile. A canonical example of this is the high-tech industries of Silicon Valley, which produced rates of turnover as high as 35–40% in the 1970s (Carnoy, Castells, and Benner 1997; Saxenian 1994). This level of turnover led to high levels of emmigration and immigration between municipalities in the bay area. Innovation expands economic opportunities but also reshapes an individual's entire outlook and through this lowers support for populist rhetoric. Areas that have higher levels of innovation contain individuals more likely to travel between other areas and be less prone to the "nativism" and "us versus them" rhetoric that populist leaders iterate. A literature in sociology has argued that the experience of migrating increases tolerance regardless of the size of the destination community (Stouffer 1955 ; Wilson 1991), or in other words, agreeableness, which is a strong indicator for low levels of support of populist parties (Bakker et al. 2016). Bakker et. al. (2016) find that the personality trait of agreeableness is strongly negatively correlates with support for populist candidates and political parties. Out of all personality traits agreeeableness has the strongest effect on populist voting-more than authoritarian personalities. Therefore, movement of people caused by innovation increases tolerance and agreeableness of those that are induced to migrate. This increase in tolerance reduces support for populist rhetoric.

I also test if innovation affects populism voting through higher levels of local human capital. Research has found that innovative firms attract human labor to immigrate to areas where they are located (Faggian and McCann 2009) and are more likely to invest in training of their labor force, thus increasing local human capital (Ballot, Fakhfakh, and Taymaz 2001 ; Gallié and Legros 2012). Through immigration of human capital and the generation of human capital innovative firms increase human capital in the areas where the exist. In line with the literature on skill demand, I expect that high-skilled workers reap a disproportionate share of the economic benefits from an evolving economy. These workers are less vulnerable and less likely to express greater support for right-wing populist policies and candidates (Frey, Berger, and C. Chen 2018,Im

et al. 2019). The type of labor residing in these municipalities with higher levels of innovation are less likely to vote and support populist political parties given that they are not vulnerable to economic shocks that increase populist support.

I test these hypotheses using an original dataset from Poland. Post-communist Europe is the ideal location to study right-wing populism, as populist parties have more than doubled their support, from an average of about 15% in the early 1990s to 35% in 2015 (Grzymala-Busse 2017). Poland, specifically has been dominated by the populist political party, Prawa i SprawiedliwoŚć (PiS ; Law and Justice). Their presidential candidate, Andrzej Duda won the Presidential run-off in 2015 against the Pro-EU Bronisław Komorowski and narrowly won re-election in June of 2020 against the former mayor of Warszawa, Rafał Trzaskowski. They also secured a majority of seats in the Sejm in the 2015 and 2019 legislative elections. Given the success of this populist party in Poland and the success of populism in the region, it is an ideal case to study right-wing populism.

The Instrument and Historical Background

I hypothesize that transportation infrastructure destruction during World War 2 is an effective instrument for the level of innovation in localities today; and current levels of innovation affects levels of support for populist appeals. In this section, I discuss and substantiate this hypothesis. In this next subsection I discuss the link between transportation infrastructure and innovation in sparsely populated areas. Then, I turn to the historical case, destruction of railroad infrastructure during World War 2.

Transportation Infrastructure and Innovation

Innovation is defined in this manuscript as the action of applying a set of known facts and principles to an application in a different industry that yields potential profits. Markets tend to work inadequately in developing countries (Hirschman 1958; Rostow et al. 1971) and these imperfections of markets drew increased attention. They have been explained by learning externalities [2] and coordination failures [3]. Transportation infrastructure can solve some of the coordination failures that have been best modeled by Hoff and Stiglitz (2001). Coordination failure models are useful when explaining the decision of private firms to spend on research and design projects (the type of investment most likely to drive macro-economic growth) in sparsely populated areas. Firms base their innovation/R & D spending on the public pool of ideas they can

[2] learning by doing (Matsuyama 1992) ; human capital expenditures (Azariadis and Drazen 1990) ; learning costs (Hausmann and Rodrik 2003)

[3] wage premium in manufacturing (Murphy, Shleifer, and Vishny 1992) ; infrastructure (Murphy, Shleifer, and Vishny 1989) ; specialized intermediate inputs (Rodrik 1996) ; spillovers associated with research and design spending and wealth (Hoff and Stiglitz 2001)

benefit from. As the public stock of ideas increases, the benefits grow (Romer 1986). Closer proximity to transportation infrastructure increases the access of private firms to the public pool of ideas. In turn, this increases the spillover benefits from the public pool of ideas and the benefits for investing in innovation/R & D. This manuscript can then suppose that transportation infrastructure development explains private firm innovation in sparsely populated areas (dependent variable).

To illustrate the impact of transportation infrastructure on firm-level decisions to undertake these innovation/R & D projects, I put forth a basic model of coordination failure. This model demonstrates how different levels of transportation infrastructure affect the tipping point that leads to a high or low equilibrium of firm spending on innovation/R & D.

Private firms in any economy base their decisions on their competitors and in a large emerging economy where no firm is large enough to dictate the decisions of others, it is unlikely that a decision by one firm can change the calculations of all other firms in the market. Instead, individual firms are beholden to changes in the whole herd of firms (large-N coordination problem where one individual firm cannot change the decision of others). If an individual firm can use a public idea to improve their production process, they are more likely to engage in that innovation/R & D project. Innovations that apply a set of known facts and principles to an application in a different industry yield potential profits and do not incur the high costs of improving firm processes. Examples of this are abundant: (1) Transferring airplane wheel technology to the baby stroller industry developed the first foldable lightweight baby buggy. (2) The Dyson vacuum company used technology from a local sawmill to increase the amount of debris collected by their vacuum. (3) Wine companies have reduced their packaging costs by borrowing the same packaging design used for eggs. Firms improve their own operations through new innovations and other firms feed off of the innovations to improve their own production process. Therefore, a large public stock of ideas lowers the cost of innovating, because other companies have taken on a portion of the initial fixed cost for the innovation. Given this, the public stock of ideas becomes the most influential variable in determining one firm's decision to innovate and spend on research and design. As the public stock of ideas increases, so does the number of potentially profitable applications of these ideas and the individual firm's incentive to invest in innovation/R & D (Romer 1986). This kind of innovation is most common in firms in emerging economies, where I am testing this theory. Most commonly, firms invest in research and design that is not on the cutting edge of innovation. Rather, these firms are implementing processes created by larger firms in developed economies to their own production process.

These dynamics are illustrated formally building off a model put forth by Hoff and Stiglitz (2001) in which the profit (utility) of any firm (assumed identical) depends on prices, their own level of innovation/R & D (their action $r_i \in 0, 1$), and the level of innovation/R & D of all others (their action $r \in 0, 1$). They

find coordination failures result in a separate equilibrium of high and low firm innovation/ R & D spending. Firms in an environment of high public stock of ideas have an incentive to increase their innovation spending and vice-versa.

In a market with n profit-maximizing firms, each firm's utility is given by: $U_1^i[r_i, r, b, p(r)]$, where p denotes prices, $r_i \in 0, 1$. In a critical departure from Hoff and Stiglitz (2001), I incorporate the degree to which firms can access spillover benefits from public ideas described above. The parameter b, which is continuous on the unit interval ($b \in 0, 1$), represents the barrier to accessing spillover benefits from the public stock of ideas. Accessing a public pool of ideas is not instantaneous and is often an arduous process of consulting with experts in other fields. Although the internet can disseminate information, firm to firm contact still dictates most firm decisions and the transfer of technology. It is difficult to garner all the knowledge one needs from a blueprint and understand new innovations without any consultation. These transaction costs consist of meeting and working with other firms, hiring laborers who can apply their knowledge of other processes to a new industry, attending conferences outlining new processes, etc. The parameter b represents the transaction costs firms face in accessing the public pool of ideas, which can raise the incentive for an individual firm to engage in R & D spending.

As b approaches 0 the environment becomes one in which there are no roads and no technology to communicate with other firms. Even if the public stock of ideas is large, firms may not be able to access these ideas. As b approaches 1, access to the public pool of ideas and the experts who devised them becomes costless (likely impossible). Of course, most firms operate somewhere between these extremes. However, while there is cross-national variation in infrastructure that may explain why firms in a given state would invest more or less in Innovation/R & D, there is also meaningful variation within countries. This can partly be explained by the parameter b. This parameter b is high in sparsely populated areas, but these costs are low in cities. In cities, a multitude of firms, laborers, and research centers (universities) exist spatially near to each other and firms create networks with each other and build social capital. The power of cities to bring together ideas and catalyze research and design is not a novel concept (Feldman and Audretsch 1999, Jones and Romer 2010), but analyzing the variation in research and design among sparsely populated areas is. This manuscript will tackle this.

Following Hoff and Stiglitz (2001), I focus on the set of symmetric equilibria, meaning all firms will in equilibrium follow the same strategy (represented by r). Each firm's utility — $U_i(r_i, r, b, p(r))$ — is a function of their own investment in R & D (r_i), all other firms investment in R & D (r), b, and $p(r)$, the price. Each agent chooses its action to maximize its profit, given the actions of others. (Each agent is small enough that there are no strategic interactions, and it ignores its effect on p.) The reaction function is below:

$$U_1^i[r_i, r, b, p(r)] \tag{1}$$

Firms are going to choose the r_i^* that maximizes utility conditional on values of r, b, and $p(r)$. The equilibrium strategy r^* is defined by the agents maximum choice given r, b, and $p(r)$. Equation (1) states that, given r, a firm cannot obtain a higher payoff through a marginal change in their own action. Rather, higher actions by all firms, as depicted by r, force an individual firm to follow suit as $(r' > r)$. The interior, symmetric equilibria that solve the first equation are as follows:

$$U_1^i[r_i^*, r^*, b, p(r^*)] \tag{2}$$

The relationship between r_i and r implied by this equilibrium is depicted in Figure 1. Assuming a moderate level of infrastructure, we can examine how firms' marginal returns to increased investment (r_i) change as a function of the investment occurring in that market change (r). This abstractly displays the levels of r_i given corresponding r and the marginal return of increasing investment (the relation between the reaction curve and the 45-degree line) under normal conditions.

Figure 1: Dual Stable Equilibria in a Model with Symmetric Actors Under Normal Conditions

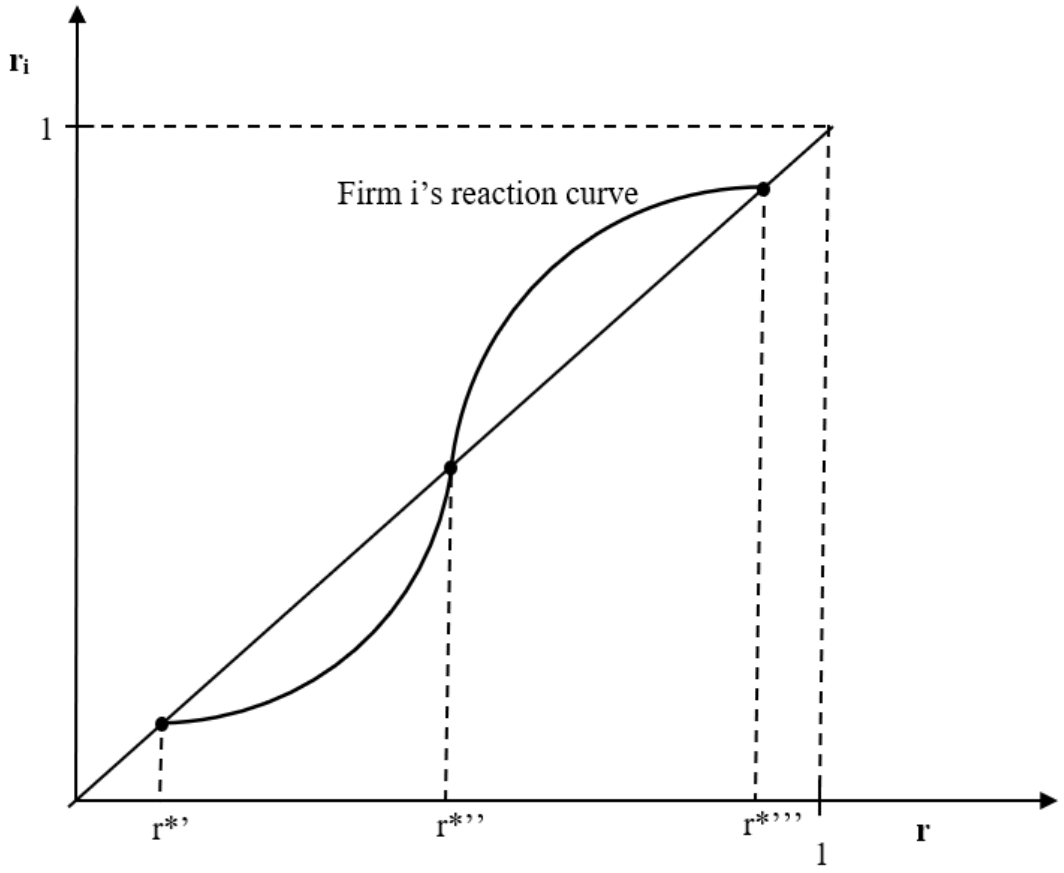


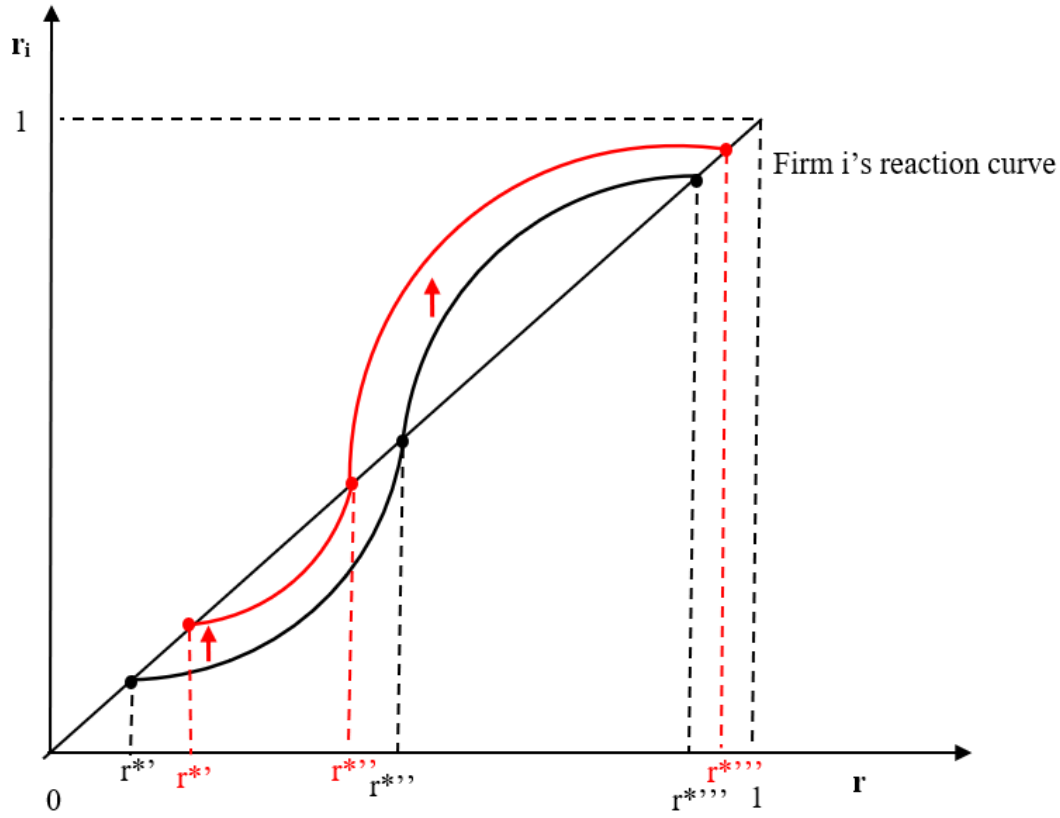
Figure 1 illustrates a low investment equilibrium where total R & D investment in the market $r = r^{*\prime}$ and a high-investment equilibrium where total R & D investment in the market $r = r^{*\prime\prime\prime}$, such that $r^{*\prime} < r^{*\prime\prime\prime}$.

A shock that changes the level of innovation/R & D spending by each firm to a level even slightly above the tipping point $r^{*\prime\prime}$ can generate a response that shifts the equilibrium to $r^{*\prime\prime\prime}$. An example of this shock could be the fall of the Soviet Union and the removal of barriers to foreign firms in Central and Eastern Europe. New ideas flooded into these markets and catalyzed innovation among domestic private firms. This shock was most felt in major cities such as Warsaw or Budapest, but the effect was dramatic. Of course, if the level of r is close enough to the tipping point ($r^{*\prime\prime}$), a smaller shock such as the development of an affordable computer (an innovation used by most industries to improve processes) could at the right moment push firms across the tipping point and from a low to high-investment equilibria.

Figure 1 displays the effect of positive spillovers across firms, but if the firms are based in an urban area, where other firms with other ideas are abundant and spatially close, the cost to accessing these ideas would be low. This would mean that access to the public stock of ideas would increase (as demonstrated by an increase in b). One can see the consequences of this change for my equilibrium depicted in Figure 2. This

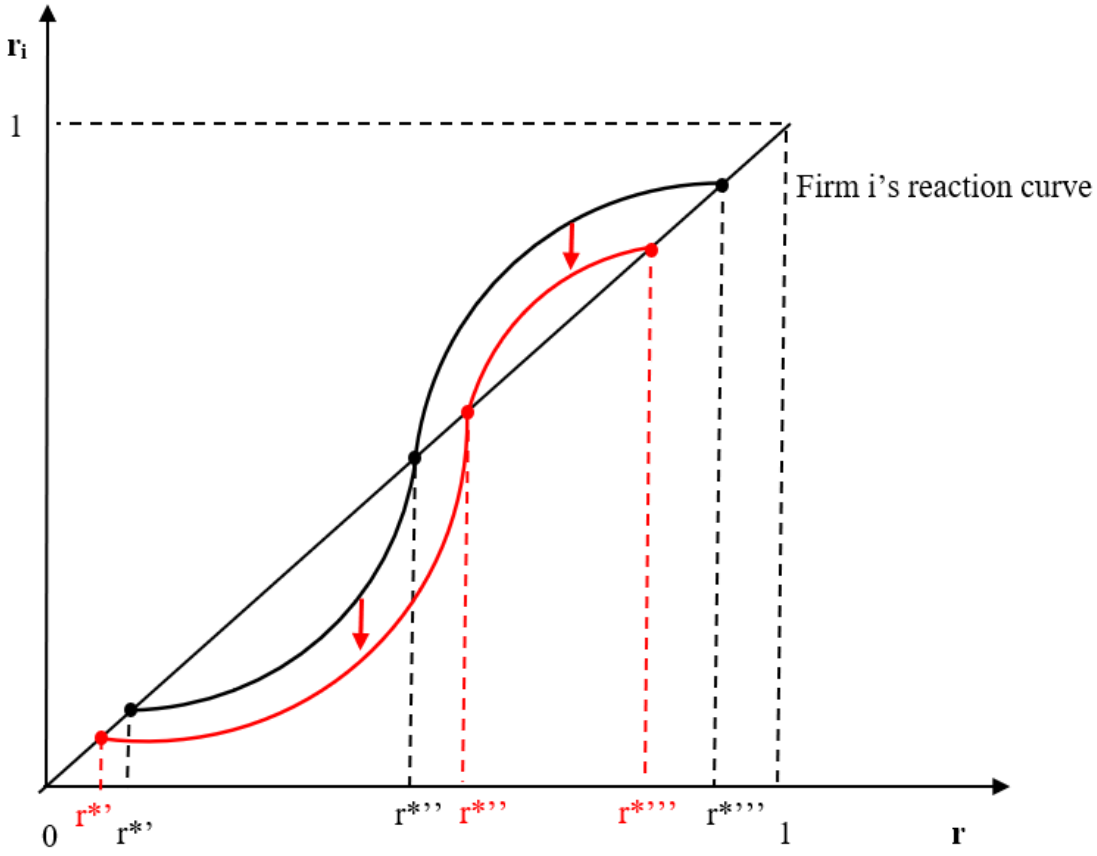
would lower the tipping point $r^{*\prime\prime}$ and make the high investment in R & D equilibrium, $r^{*\prime\prime\prime}$ more likely all else equal (shift moves black line to red line).

Figure 2: Dual Stable Equilibria in a Model with Symmetric Actors with a higher parameter b



In a sparsely populated area, where firms are often spatially more distant from each other, transportation systems are less expansive and efficient, and ideas are less likely to travel as easily between firms. These increased transaction costs to accessing the public pool of ideas can be operationalized by lowering the parameter b in this equation. Figure 3 displays how the reaction curve would change from the normal conditions displayed in Figure 1 if parameter b were lowered to a level below normal conditions (shift moves black line to red line):

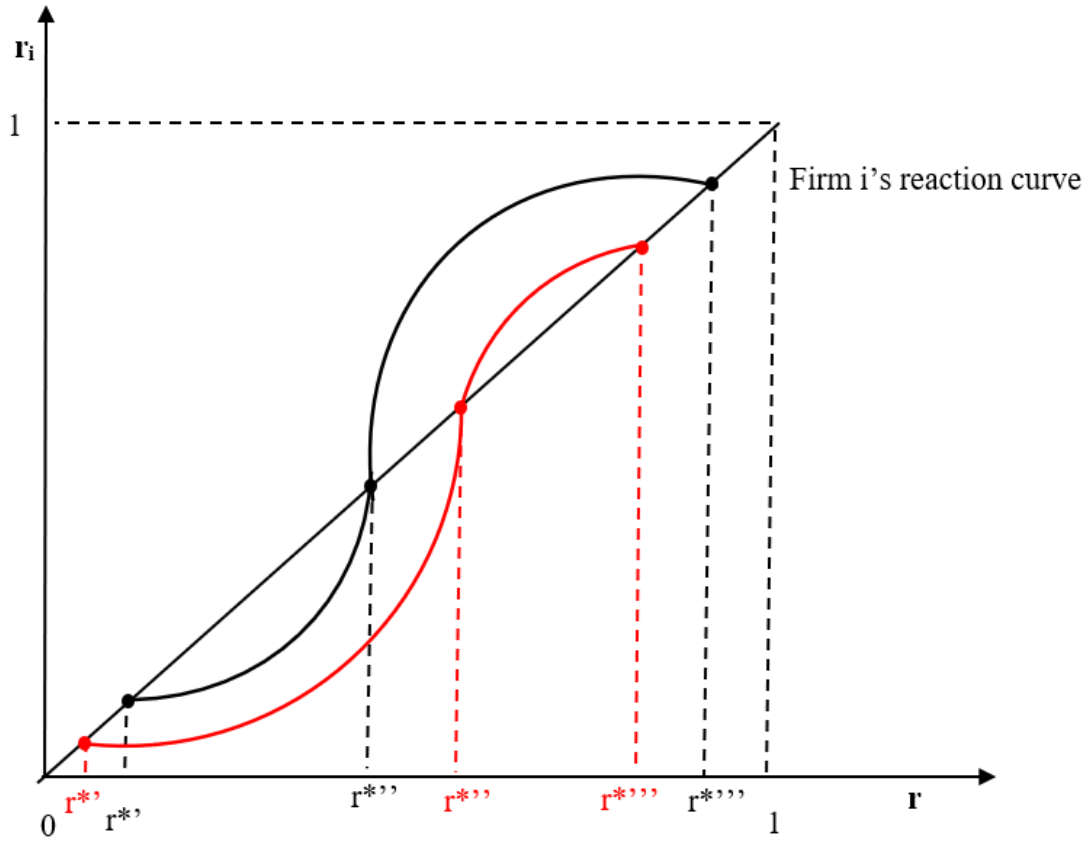
Figure 3: Dual Stable Equilibria in a Model with Symmetric Actors with a lower parameter b



This would move the $r^{*\prime\prime}$ tipping point higher up the 45-degree line. This raises the level of individual firm investment required to reach the highest equilibrium all else equal.

The conclusion from this supposes that innovation is higher in cities and lower in sparsely populated areas, something one can easily see globally, but not all sparsely populated areas are identical and some have transportation infrastructure that makes urban hubs more accessible thereby increasing parameter b. Access to transportation systems that can quickly move individuals between towns or even cities result in an increase in spillover benefits from the public stock of ideas even if the stock ideas stayed constant. The absence of this access to this transportation infrastructure would result in the opposite. Therefore, innovation spillovers are larger in sparsely populated areas with much more effective transportation systems that cut down transaction costs. The difference between two sparsely populated areas with different levels of b is displayed below:

Figure 4: Dual Stable Equilibria in a Model with Symmetric Actors at high and low levels of b



Line 1 in black (represents areas of low population density with more expansive transportation system) has a lower tipping point than line 2 in red (representing areas of low population density with less expansive effective transportation system). This indicates that innovation is more likely to be prevalent in sparsely populated areas where there is access to transportation systems that link them to urban hubs than in other areas.

Instrument: World War 2 Damage To Railways in Poland

The exclusion restriction implied by my instrumental variable regression is that the destruction of railways and rail stations 70 years ago has no effect on support for populist appeals, other than their effect through innovation. The major concern with this exclusion restriction is that railroad destruction may be positively correlated with areas resilient to populist appeals, which would have a direct effect on voting outcomes. For example, Germans could have strategically defended economic hubs that are more likely to incur damage to their transportation infrastructure, but also be less likely to vote for populist political parties. I believe that this is unlikely to be the case and that my exclusion restriction is plausible given that irreversible damage to

railways in World War 2 was relatively random. The Russians quickly broke through German lines during the Vistula-Oder offensive and scattered German forces were forced to abandon strategic posts and fight in unplanned areas of Poland (mainly Northern Poland).

Consequences from World War 2 have shaped Europe and legacies from World War 2 exist today, especially in Poland. Suffering was widespread across the globe, but Poland was arguably one of the nations that suffered most. Approximately 17% of Poland's estimated population in 1939 died during the war (Wojciech and Szarota 2009). In addition to human life, the current Polish territory suffered long-lasting infrastructure damage. Given that the initial invasion by Nazi Germany and the Soviet Union in 1939 was quick and the Germans caught the Soviet Union by surprise in 1941 when they invaded Eastern Poland, most long-lasting infrastructure damage occurred at the end of the war from 1944-1945 as the First Belorussian and First Ukrainian Front of the Red Army pushed towards Berlin. Briefly, I focus on two types of infrastructure that suffered extensive destruction during this period: urban infrastructure and transportation infrastructure. Physical damage to cities varied widely across Poland, but rarely lingered. Warszawa was damaged by Soviet aerial and artillery bombardments, two separate uprisings (*Powstanie W Getcie Warszawskim* in 1943 and *Powstanie Warszawskie* in 1944), and German demolition crews ordered by Hitler to completely destroy the city before they fled. By the time, the city shifted to Soviet control in January, 1945 over 85 % of buildings were completely destroyed and the pre-war population of 1,300,000 had been reduced to 162,000 (Davies 2003). Although this destruction seemed insurmountable, Warszawa was quickly rebuilt and became, once again, the economic hub of Poland. Railways, especially those in sparsely populated areas, were much less likely to be rebuilt after facing such levels of damage.

A historical accounting of all railway stations in 1939 entering World War 2 (4,096 active rail stations) finds that over 12 % of all railway stations active at the start of the war in current Polish territory had become inaccessible due to impassable bridges or lines that were irreversibly destroyed by the end of the war. This damage was not minor damage that temporarily halted access, it was random, sensational destruction (often escalated by the actual liquidation by advancing Russian forces of railways too damaged to be easily repaired). These railways destroyed were rarely rebuilt (only 13% were ever rebuilt). Figure 13 in the Appendix shows railways that were destroyed and those that were destroyed, but rebuilt. I also find that the number of stations remaining after World War 2 correlates strongly with the number of active railway stations exist today (correlation of just above 0.37). Figure 14, a scatterplot, visualizes this relationship in the appendix.

Figure 5 displays all active passenger rail stations entering World War 2 in 1939 and Figure 6 displays all rail stations that become inaccessible, because of World War 2 damage (either to the railway line or the stations itself). Tables 16 through 30 in the Appendix details all 495 railway stations made inaccessible, the reason for that station's inaccessibility, and the line it ran on.

Figure 5: Active Passenger Rail Stations in Poland Entering World War 2

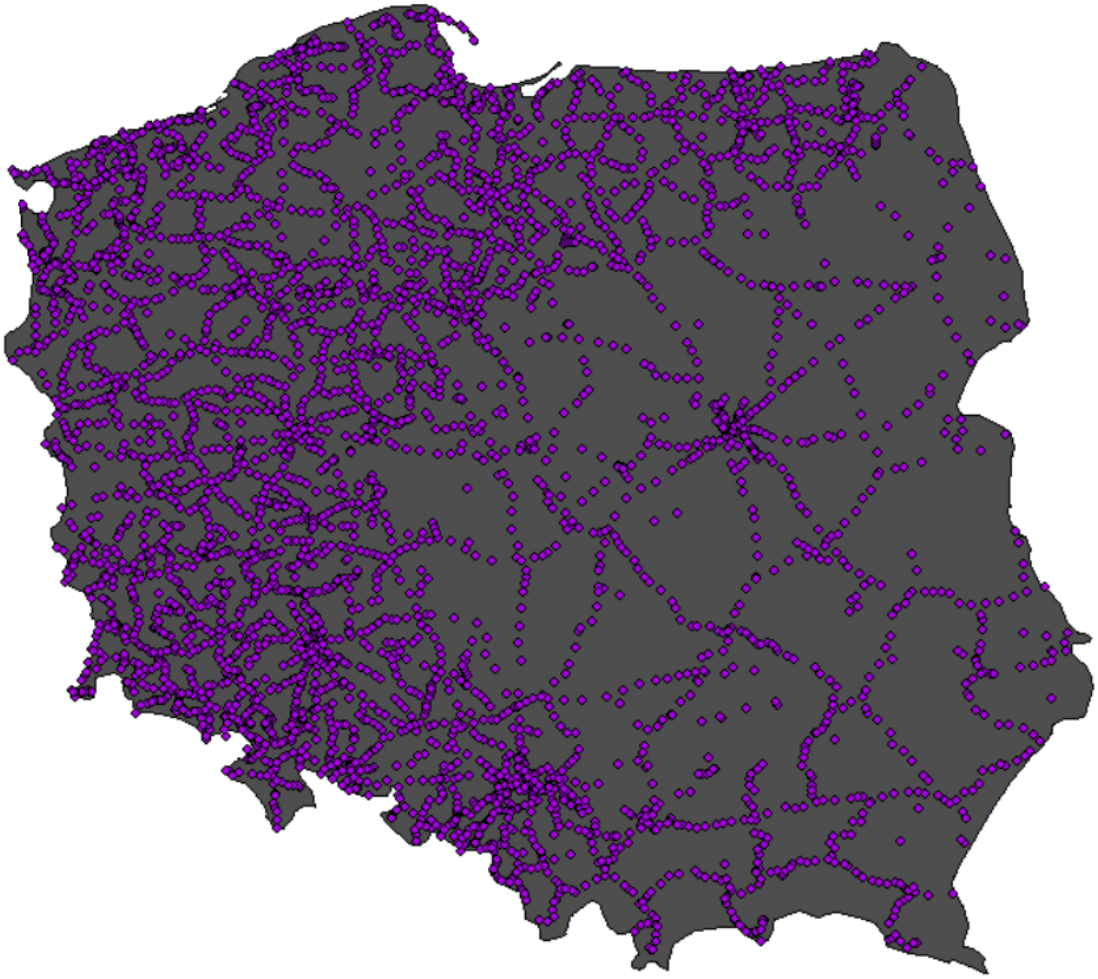


Figure 6: Active Passenger Rail Stations Made Inaccessible in Poland during World War 2

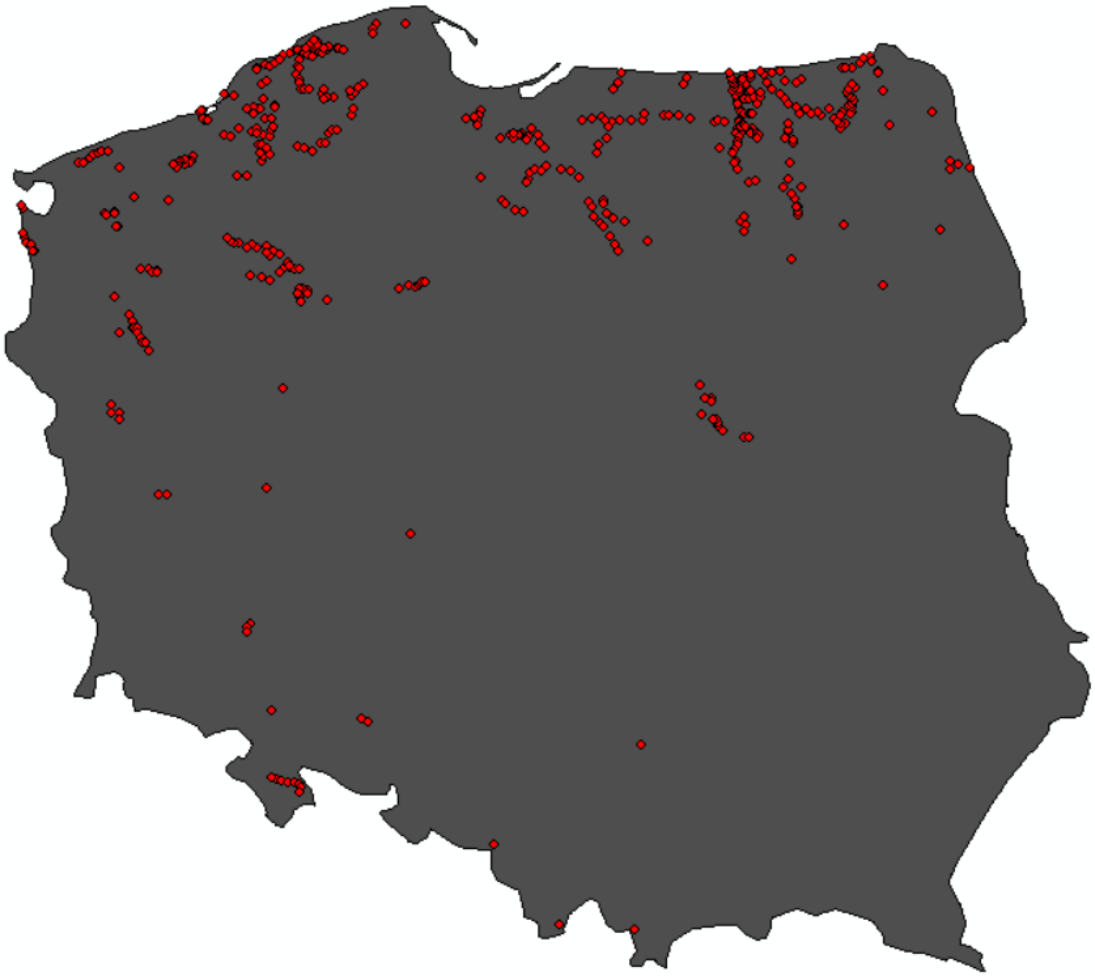
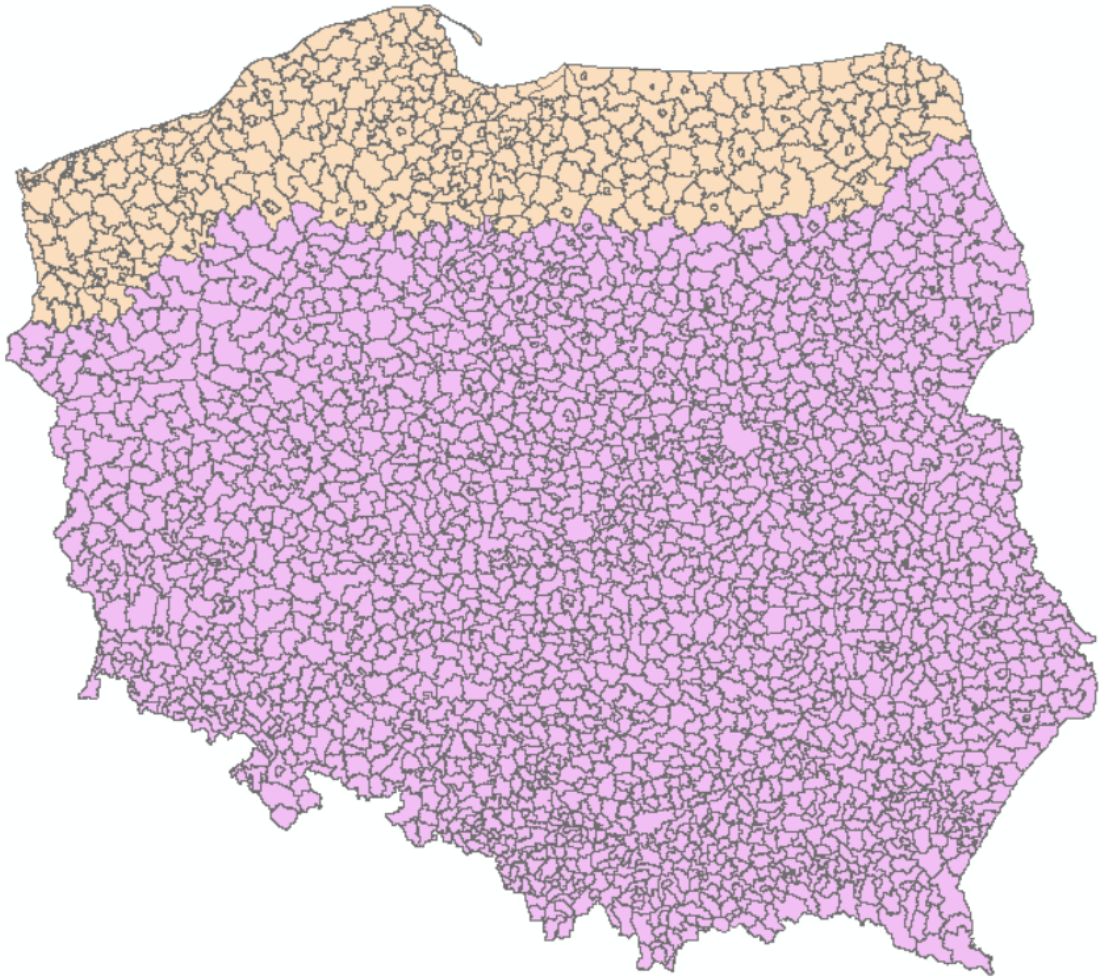


Figure 5 shows that railways were much more extensively built in formerly East Prussia and Pomerania, due to the need to connect the far-reaching areas of Prussia with the rest of Germany (Lijewski 1959). Figure 6 shows that damage does not appear to be focused on strategic junctures throughout Poland, but rather concentrated in formerly East Prussia and Pomerania. This strongly correlates with where the majority of fighting occurred. The Red Army's Vistula-Oder offensive pushed through Poland beginning on January 12th, 1945 and Russians quickly broke through German lines and swept through the middle of current Poland and southern Poland as they tried to reach Berlin by the end of the month. They captured Warszawa and Kraków (undamaged) within a week, Łódz a few days later, and Poznań a week later (Beevor 2007). The 1st Belorussian Front led by Marshal Georgy Zhukov reached Kienitz on the other side of the Oder river and current day German territory before the end of January, only sixty-eight kilometers from Berlin, but was forced to halt. The Germans had held their ground in what is currently Northern Poland (then, Pomeranian and East Prussia). This forced Zhukov to suspend the march to Berlin and re-direct his army north where

the majority of fighting within Poland ensued (Duffy 2014). The German front in Northern Poland slowly moved backwards toward the Baltic and ceded the territory displayed in Figure 8[4]. This area was defended with vigor and therefore resulted in heavy damage to railways relative to Central and Southern Poland where railways remained almost untouched. Within this area over 40% of municipalities that contained an active rail station entering World War 2 lost access to at least one active rail station, due to damage stemming from fighting.

Figure 7: Area Of Poland Where The Majority Of Fighting Occurred

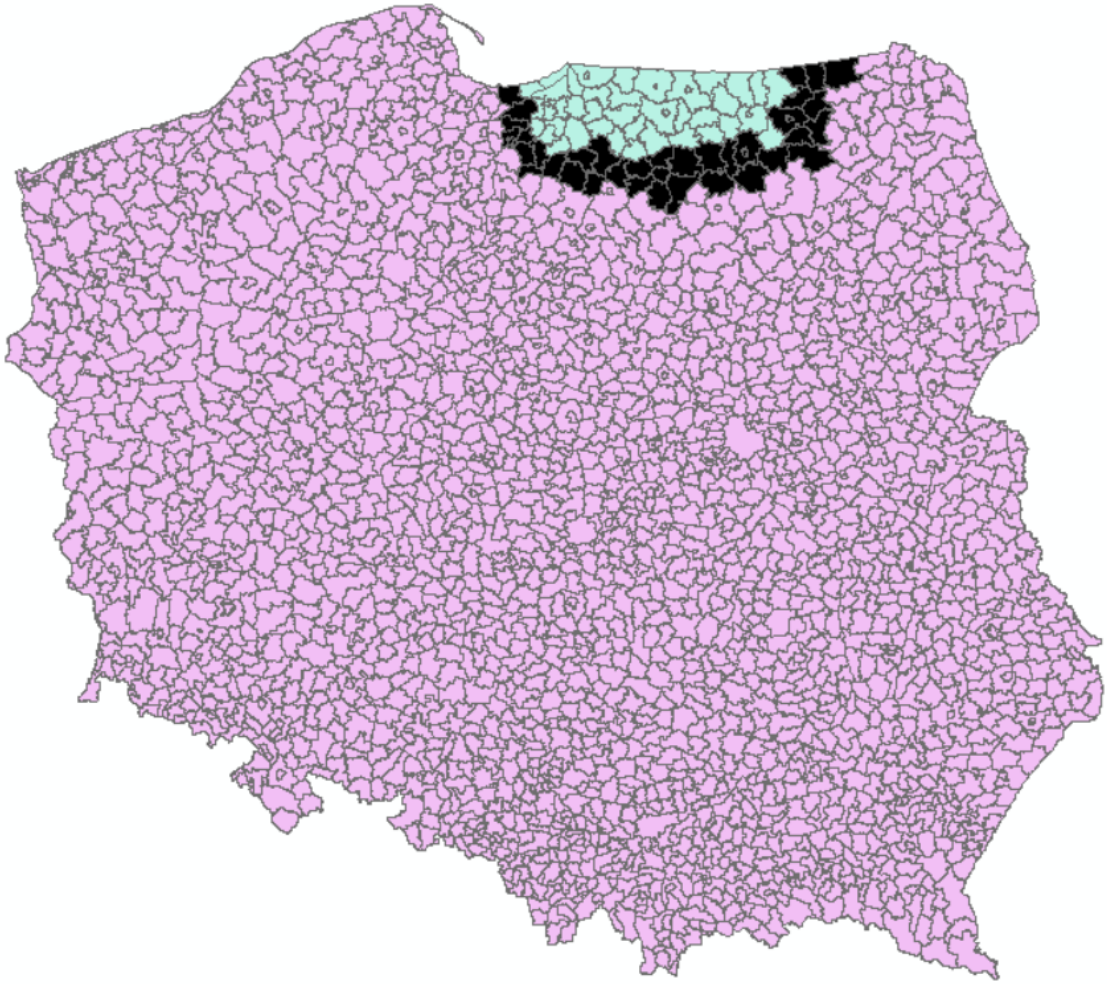


Much of this fighting was a slow withdrawal by the Germans through rural areas and fierce fighting in cities such as Kołobrzeg. This narrative excludes the area between Giżycko, the Vistula Spit and Pasłek in the northern part of Poland that now borders Russia (Województwo Warmińsko-Mazurskie). At the beginning of the Red Army's foray into Poland, the Soviets ran into dogged opposition and relentless counter-attacks from the Germans in East Prussia (Snyder 2011), but by the end of January the Red Army's Fifth Tank

[4]Created using historical Russian and German War maps

Guards had successfully sealed off the Fourth German Army and the remnants of the Third Panzer division from the rest of the Reich leaving them stranded in the heavily fortified and strategic Giżycko. This forced German forces to fight their way back to the coast to reach the German Second Army stationed in Elblag. They abandoned their defenses at Giżycko against the wishes of Hitler and slowly fought their way through the Russian Forty-Eighth Army across a battle line of 25 to 30 kilometers until they successfully made contact with German forces at Elblag and Pasłek (Duffy 2014). There, they maintained an encirclement around the Vistula Split, which was called "Heiligenberg Cauldron." With their backs to the Baltic Sea, the Germans mounted counter-attacks inland and defended over the next few months, but eventually ceded the territory to the Russians at the end of March. Fighting continued on the Vistula Split until the end of the war. This area of heavy fighting is graphically presented in Figure 8 in teal. This represents the most fiercely fought area of Poland during the war. Municipalities within 10 kilometers that were ceded by Germans with little resistance are colored black. Later, in the methods section, I compare municipalities in these two areas.

Figure 8: Area where German 4th Army fought through Russian lines and defended the Heiligenbeil Cauldron

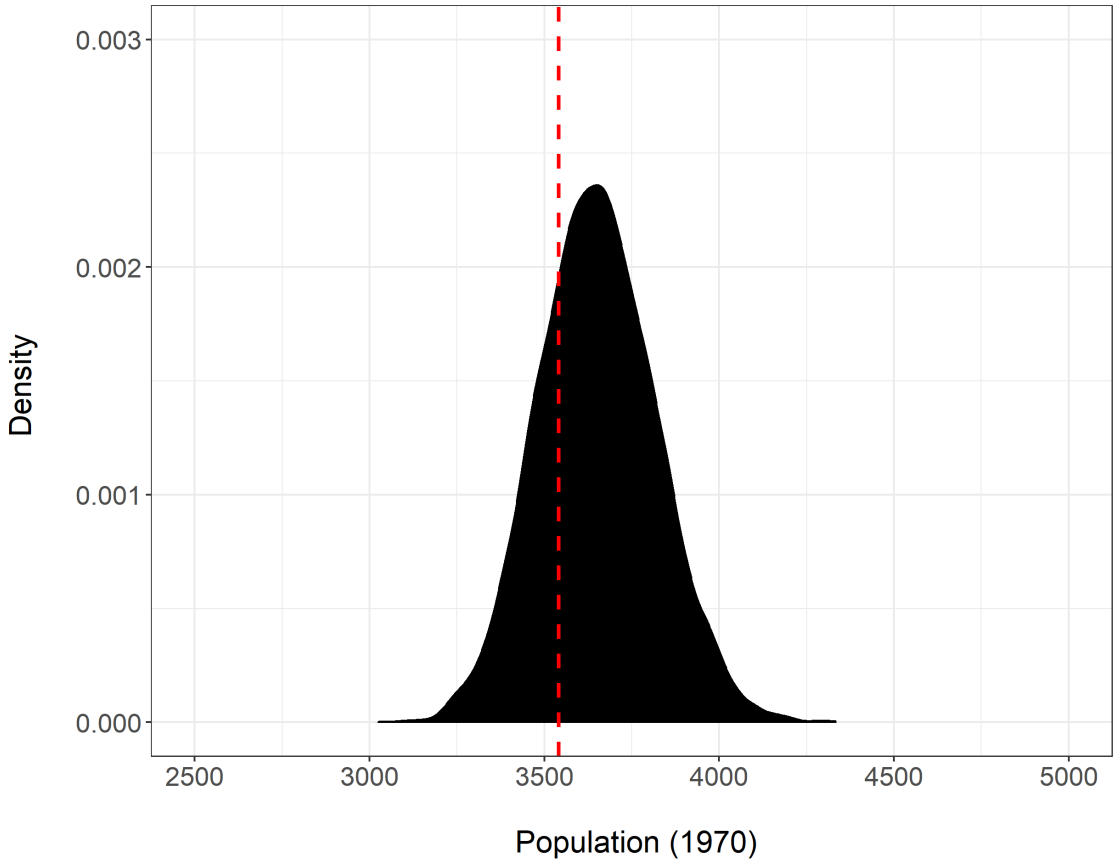


Most of the fighting and subsequent damage within Poland at the end of World War 2 was relatively random given that strategic German fortifications were quickly abandoned given the tremendous advantage in men the Russians held over the Germans by this point in the war (Often six to one in some battles). Instead, most of the fighting that did occur was German forces chaotically fighting in open territory avoiding encirclement.

A concern remains that destruction may be severely biased towards areas where the population is sparse and areas further away from urban centers. If areas victim to railroad damage are further away from urban centers or have smaller populations then they are less likely to breed innovation and predisposed to populist rhetoric. If this were the case, railroad destruction itself may not have had an effect, but rather where the damage occurs is predisposed to being less innovative and/or becoming supportive of populist candidates/political parties. I run a basic randomization test to determine if railroad damage is severely biased over these statistics.

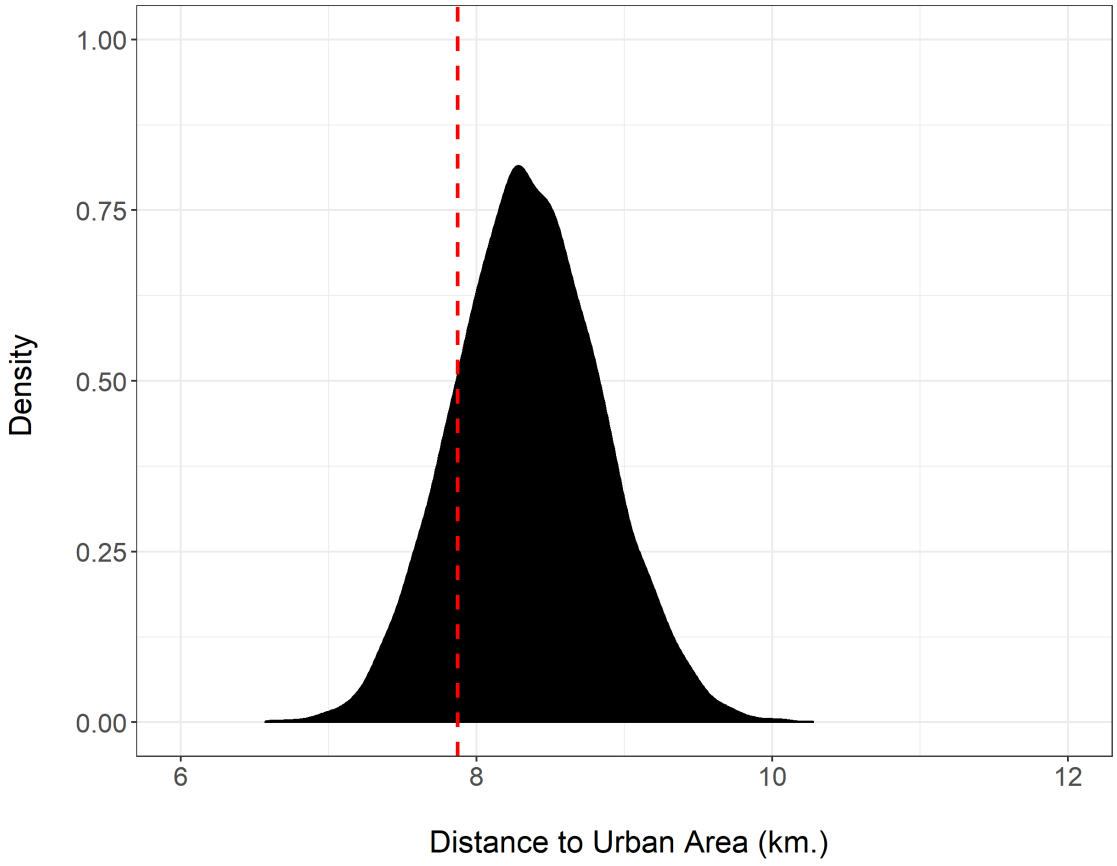
Given that 141 municipalities suffered a loss of a railroad station due to war damage out of a possible 1,083 municipalities that contained a railroad station entering World War 2 (with a population density under 100 km^2), I create a distribution of the mean population (1970) of 141 randomly drawn municipalities (without replacement) from the original 1083 municipalities and display it in Figure 9. This figure displays the distribution of the mean population (1970) of 10,000 random draws of 141 municipalities and the actual mean population (1970) of municipalities that suffered railroad damage (red dotted line). More than 20 percent of the randomly simulated averages falls below the actual mean population (1970) of municipalities that suffered railroad damage.

Figure 9: Distribution of Average Population (1970) Given Random Railroad Destruction



I also create a distribution of the mean distance to an urban area for 141 randomly drawn municipalities (without replacement) from the original 1083 municipalities and display it in Figure 10. This figure displays the distribution of the distance to an urban area (km.) of 10,000 random draws of 141 municipalities and the actual average distance to an urban area of municipalities that suffered railroad damage (red dotted line). More than 20 percent of the randomly simulated data fall below the actual average distance to an urban area of municipalities that suffered railroad damage. This indicates that railroad damage appears relatively random and not severely biased in either direction.

Figure 10: Distribution of Average Distance To An Urban Area Given Random Railroad Destruction



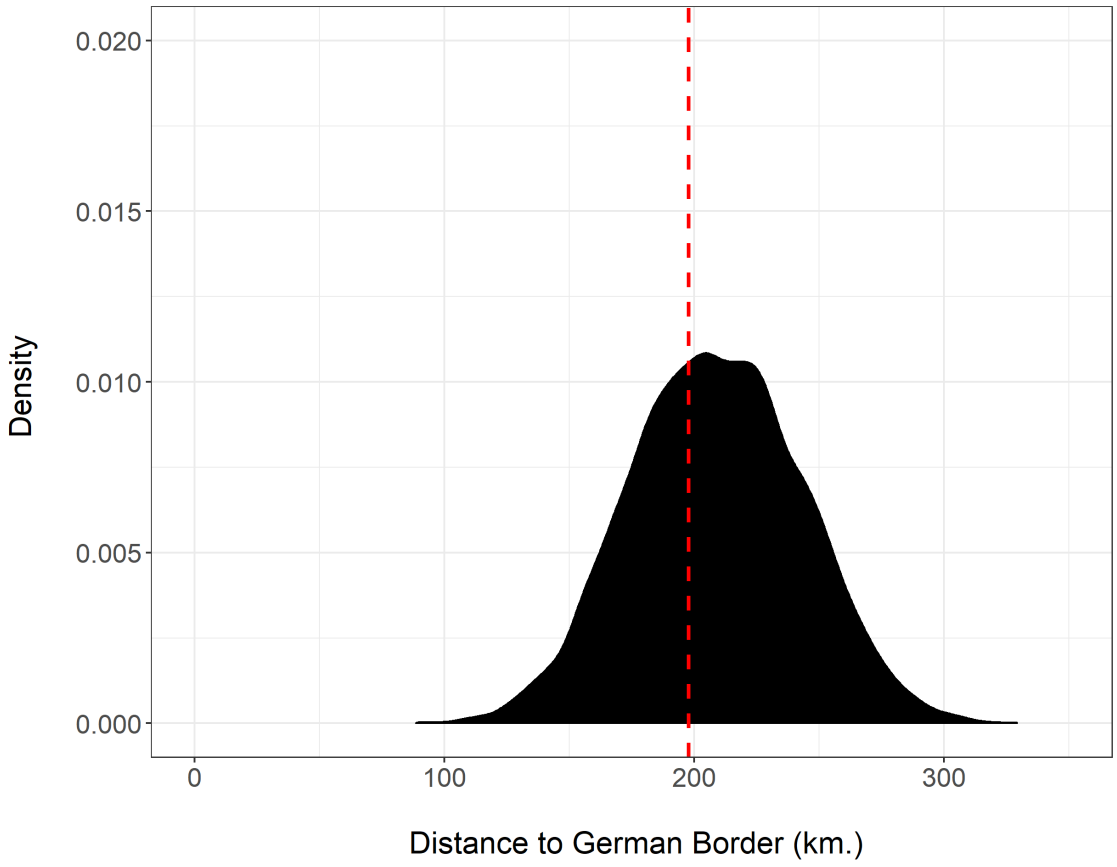
In addition, the rebuilding of railways was largely random as it was dependent on the level of damage to the railway. After World War 2, there were limited resources allocated for rebuilding of railroads and these decisions were left to different District Directorates of State Railways (*Dyrekcje Okregowa Kolei Państwowych*), which controlled different regions. Decisions to rebuild were mainly based on the level of damage to the railways and whether there were nearby resources available to rebuild them. For example, the Slawkowo-Ryn line was rebuilt, because there were other severely damaged railways nearby where materials could be re-enlisted to rebuild the Slawkowo-Ryn line (*Historia mragowskiej waskotorówki* 2020). The bridge rebuilt over the Welno river near Oborniki Wialko Polskie did not suffer irreparable damage, so was repaired within the year. Following this trend, damage to bridges were much more likely to be repaired than whole lines that were liquidated during the war, because they did not require as much costly railway line.

Although the decision to rebuild a rail line appears to be driven by randomly assigned damage during the war, it is possible the political leanings of a municipality could have biased which railways were rebuilt. For example, more liberal areas may have politicians more likely to expend resources to rebuild railways. I can test if this is the case by determining if rebuilding appears to occur in more liberal areas. Given that

areas closer to Germany have long held more liberal values than areas in Eastern Poland (Grosfeld and Zhuravskaya 2015, one proxy for liberal political leaders is the distance of the municipality to the German border.

Given that 12 municipalities were blessed with rebuilt railways out of a possible 141 municipalities that suffered railway damage, I create a distribution of the mean distance to the German border of 12 randomly drawn municipalities (without replacement) from the original 141 municipalities and display it in Figure 11. This figure displays the distribution of the average distance to the German border of 10,000 random draws of 12 municipalities and the actual mean distance to the German border of municipalities that suffered railroad damage (red dotted line). More than 40 percent of the randomly simulated averages fall below the actual average distance to the German Border of municipalities that suffered railroad damage. This indicates that the act of rebuilding rail lines appears relatively random and not severely biased.

Figure 11: Distribution of Average Distance To The German Given Random Railroad Reconstruction



Given the randomness of damage to railways stemming from the end of World War 2 and their reconstruction, I can test whether this exogenous destruction of railways and rail stations 70 years ago has an effect on support for populist appeals through innovation, I run three tests: (1) I test whether areas where the fiercest

fighting occurred in Northern Poland lowered support for populist political parties through innovation (2) I test whether the destruction of railways in areas where the majority of the fighting occurred at the end of World War 2 lowers support for populist political parties through innovation (3) I test whether the number of stations remaining after World War 2 across all of current-day Poland (largely determined by if there was significant fighting around the railway line) lowers support for populist political parties through innovation.

Data and Descriptive Statistics

Dependent Variables:

Patents

This manuscript relies on an original dataset collected by the author of intellectual property registered (patents, utility models, and industrial designs) in Poland with the Urzad Patentowy Rzeczpospolitej Polskiej between 2000 and 2018 (496,617 registrations). For simplicity, in the paper, patents include: patents, utility models, and industrial designs as they are all very similar. Every firm's address as it was written on the registered patent was geolocated to a municipality within Poland and that municipality received one unit value for every firm listed on a registered patent. Figure 18 in the appendix displays a map with the number of patents per municipality across Poland. Below I describe the patenting process in Poland.

For the sake of this manuscript I focus specifically on three types of intellectual property rights: patents, utility models (defined as technical solutions which affect the production, construction or assembly of products) and industrial designs (relate to changes in product appearance). I use all of these variations of intellectual property to measure innovative activity, because they all fit under the definition of intellectual property. In Poland, a patent is defined by the examination office as a "new and useful technical solution, concerning the shape or construction. A utility model is considered to be a useful solution if it has a practical meaning in the process of manufacture or use of products. An industrial design model is a form of a product or of its part, which is new and has an individual character given to it especially externally.

These three types of intellectual property rights differ on a few important levels: duration of protection, cost, examination period, and what the license can be granted for, but applicants for each type of intellectual property must submit the same application. They must submit a written description of the invention, drawings (when necessary), claims (precise legal statements that define technical features), and an abstract that includes technical aspects. If the examiners feel that the application is insufficient, then they may ask for additional drawings, designs, etc. An examination period focuses on the novelty, inventive step, and applicability of the invention. In this phase, they may ask the applicant to amend or complete parts of

the application within a given period of time. Patents are granted upon the moment that an application is filed (given that they are accepted), but the examination period for a patent lasts somewhere between two to three years. Utility models have less stringent patent requirements during the examination period and take less time. The examination period for industrial designs are the quickest (lasting two to three months). Depending on the complexity of the case, it usually costs $5,000 to $8,000 for a patent attorney to draft a patent application and patent description. The official fees vary temporally, but they have always stayed lower than $1,000. Relative to a patent, it is less expensive to apply for a utility model or an industrial design. Once awarded, a patent can be granted for a maximum of twenty years, a utility model can be granted for ten years, and a industrial model can be granted for twenty-five years.

Once a patent, utility model, or industrial design is awarded, they are enforced by lawsuits litigated before civil courts (although starting on July 31st, 2020 patent infringement cases were litigated before special intellectual property courts). Typically, a patent owner files a suit with a motion for preliminary injunction enclosed, which, if successful, restricts the infringing activity until a decision is reached. Preliminary injunctions are decided on quickly (a couple of weeks). After a decision is reached, legal costs are awarded to the successful party and there are a multitude of potential remedies: (1) A permanent injunction on the cessation of the violation (2) The return of unlawfully earned benefits (3) Unlawful products or materials must be withdrawn from the market, destroyed, or awarded to the plaintiff as a substitute for monetary damages (4) A monetary order for the damage inflicted. On a 51-country cross-national property rights protection measure (Papageorgiadis and Sofka 2020) that measures how well and often do courts protect property right, Poland lies near the median. Poland received a score of 5.3 out of 10 (average 2010-2017) which places them in between countries known for having low success rates in patent infringement cases, such as China (average score of 3.4), and countries known for effectively upholding intellectual property rights, such as the United States (average score of 7.1).

Filing a patent with the Polish office does not preclude one's ability to patent Europe-wide, but to have a patent upheld across Europe-wide, one must apply to the European patent office. Filing a patent with the European patent office and the Polish patent office are two separate procedures. Filing a patent with the European patent office now covers 25 out of 28 EU member states, but not Spain, Croatia, and Poland. Therefore, to have a patent protected in Poland you have to register the patent with the Polish patent office. A European patent will not give you intellectual property protection in Poland.

From a random sample of 500 patents in my dataset registered in Poland between 2000 and 2018, I found that 54% were registered by firms, 29% were registered by academic institutions, 15% were registered by an individual or individuals, and 2% were registered by a combination of academic institutions and firms. I also divided these patents into NAICS Industry categories and I found they were divided into the following

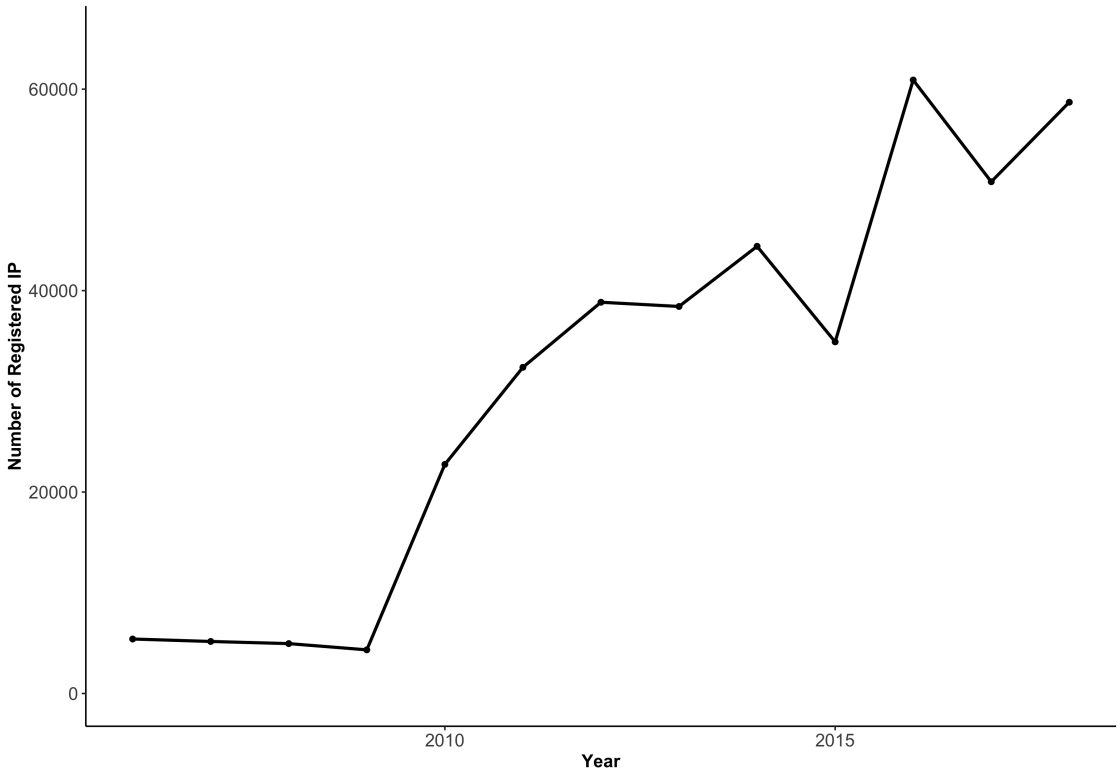
proportions presented in Table 1.

Table 1: Percentage of patents in each NAICS category:

NAICS Industry	Percentage
Food	1.1
Wood	1.9
Chemical Products	19.4
Pharmaceutical and Medicines	3.2
Nonmetallic Mineral Products	5.1
Primary Metal	0.9
Fabricated Metal Products Machinery	6.5
Communications Equipment	1.3
Semiconductors and Other Electronic Equipment	14.5
Electrical Equipment, Appliances, and Components	6.1
Transportation Equipment	1.4
Motor Vehicles, Trailers, and Parts	4.3
Aerospace Products and Parts	0.7
Furniture and Related Products	2.9

Intellectual property rights were seldom awarded for the first twenty years after the transition to a market economy began, but there has been a significant increase over the last ten years. A figure depicting this increase is presented below in Figure 12. In the appendix this same figure is presented with strictly patents and utility models (excluding industrial models), and strictly patents.

Figure 12: Registered Intellectual Property in Poland (Patents, Utility Models, and Industrial Designs) by year



These types of intellectual property represent a proxy for innovation in general. Although there is plenty of innovation that is not captured by this measure (such as process innovation), firms that engage in product innovations in Poland (measured here) are also much more likely to engage in process innovations not measured here than other firms in Poland (Kelles-Krauz 2019). Innovation is an important factor that increases productivity in firms in Poland (Szczygielski and Grabowski 2014 ; Arendt and Grabowski 2017). Work has also found that innovation as measured by the number of patent applications increases the likelihood a firm begins to export products out of Poland (Cieślik, Michałek, and Szczygielski 2016). Innovative firms are more likely to become productive and competitive outside of the Polish market.

Voting Share for Prawa i Sprawiedliwość

Voting for the populist, nationalist political party in Poland (Prawa i Sprawiedliwość) is measured during four different elections: (1) The run-off Presidential election on June 28th, 2020 between Rafal Trzaskowski (Platforma Obywatelska) and Andrzej Duda (Prawa i Sprawiedliwość) (Table 1) ; (2) The run-off Presidential election on May 24th, 2015 between Bronislaw Komorowski (Platforma Obywatelska) and Andrzej Duda (Prawa i Sprawiedliwość) ; (3) The legislative election for seats in the Sejm on October 13th, 2019 ; (4) the legislative election for seats in the Sejm on October 25th, 2015 (Table 4). During the legislative election in 2015, there were two prominent populist political parties: Prawa i Sprawiedliwość and Kukiz'15. Therefore,

support for populist policies was have been split between between these two political parties. To account for this I also produce the voting percentage of these two parties in each municipality. For the models in this paper I only present results for the most recent 2020 election, but I provide results for the other three elections in the appendix for some of the models.

Notable Independent Variables

Railways destroyed or inaccessible due to damage from World War 2

Using historical documents, maps, and railroad databases I identify all railroad stations inaccessible due to World War 2 damage. I geolocated and identified 495 stations that became inaccessible out of 4,096 stations that were active when the war began. I use historical maps from 1939[5] as well as two databases of railroad stations across Central Europe[6] to identify those that existed and were destroyed during the World War 2. 10 tables in the appendix detail the stations that were destroyed giving the station name, the line the station was on, and a reason for its inaccessibility (bridge was impassable, line was damaged and then liquidated by the Russians, etc.). Using this dataset, I can identify municipalities that lost access to transportation infrastructure due to exogenous damage from the war and have never had these railroad stations/lines rebuilt after the war. I use three separate measures:

(1) Stations Left After World War 2

The number of stations that were active and accessible before World War 2 and after within the municipality.

(2) Proportion of Stations Inaccessible After WW2

The number of stations that became inaccessible due to World War 2 damage divided by the number of stations that were still accessible post World War 2 within the municipality.

(3) Stations Destroyed During World War 2

The number of stations that became inaccessible due to World War 2 damage.

Other Independent Variables

I use the following controls, because they may threaten the exclusion restriction. It is possible that they correlate with the error term and leaving them out may confound the results.

Distance To German Border

Areas further from the German border are more likely to witness railroad destruction and less likely to support populist political parties/candidate. The majority of railroad destruction occurred further away

[5]Pre-war Poland territory: http://maps.mapywig.org/m/German$_maps/various/IV_Mil$ – $Geo_(duplicates)/Eisenbahnkarte_von_Polen_1939.jpg; Pre$ – $warGermanterritory$: $https$: $//www.landkartenarchiv.de/deutschland_eisenbahnkarten.php$

[6]https://www.bazakolejowa.pl ; https://www.atlaskolejowy.net/

from the German border. The further a municipality sits from the German border the less likely it has liberal values, such as tolerance that would make people less likely to vote for populist political parties and candidates. Given this, I suspect that this variable is correlated with the error term and should be controlled for. I use distance to the current Polish-German border by kilometers from the centroid of the municipality. Voting for populist political parties and candidates increase as the distance to the German border increases.

Population Density

Areas with higher population density were more likely to suffer railroad destruction as a higher proportion of the violence during World War 2 in Poland were centered around cities and areas of higher population density. Urbanization has shown to increase liberal values such as tolerance. Therefore, areas with a higher population density are also more likely to hold liberal values of tolerance. This variable's omission may confound the results and it should be included in at least one model. Population density by municipality is collected from the Government of Poland Statistics website (www.stat.pol.gov). It is used as a control variable and to segregate the densely populated municipalities from the sparsely populated municipalities. A map of all population density of each municipality across Poland are displayed in Figure 17 the appendix.

Religiosity

Areas with higher levels of religiosity are more likely to support populist political parties/candidates and less likely to have new railways built in their area. Religious belief is one of the strongest indicators of support for the populist political party in Poland and these religious beliefs are strongest in rural areas of Poland where railroads are less likely to have new rail-lines built after they are destroyed. It is likely that this variable is correlated with the error term and should be controlled for. Religiosity has an effect on voting within Poland as some political parties are significantly more socially conservative (Prawa i Sprawiedliwość). I control for any cultural explanations for differences in innovation or voting using a measurement of religiosity. I use the same religiosity measure created by Grosfeld and Zhuravskaya (2015)). This dataset measures religiosity using a self-reported survey of mass attendance across counties in Poland (from the Polish Institute of Statistics of the Catholic Church ;Instytut Statystyki Kościoła Katolickiego). The county-level data is assigned to each municipality.

Economic Activity

Areas with higher levels of economic development are less likely to support populist political parties/candidates, but more likely to have new railways built in their area. Economically developed areas are more likely to have new rail-lines built to connect these areas to the rest of Poland. Areas with robust economies are also less likely to vote for populist political parties, because they are less vulnerable to economic shocks that drive support for populist political parties/candidates. It is likely that this variable is correlated with the error term and should be controlled for. To generate a quantitative measure of economic activity, I use an

increasingly common proxy for economic activity: nighttime lights. I use GiS and nighttime lights data to trace municipality brightness, by examining the brightness across all municipalities in Poland. Nighttime lights (also referred to as luminosity, or brightness) have consistently shown to be a good proxy for human activity and economic development (Weidmann and Schutte 2017, X. Chen and Nordhaus 2019; Ghosh et al. 2013, Min et al. 2013, Henderson, Storeygard, and Weil 2012). A map of Nighttime lights data from 2013 is displayed in the appendix of this paper. This data is available from the National Oceanic and Atmospheric Administration (https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html). I use the Average Visible, Stable Lights, & Cloud Free Coverage data. The raw data is a geolocated TIFF image file. Each pixel contains a brightness value, from 0 (the darkest) to 63 (the brightest). I generate municipality level light data for 2013-2015 by taking the average pixel brightness for the municipality by year. The night-time lights picture used to calculate this data is displayed in Figure 15 in the appendix.

Technological Development

Areas with higher levels of technological development are more likely to have new rail-lines built connecting them to the rest of Poland and less likely to support populist political parties/candidates. Technological development lowers the cost of building new railway lines and these areas are more likely to prescribe to liberal values such as science that opposes the rhetoric of the current populist political party in power. Measured by municipality. This variable's omission may confound the results and it should be included in at least one model. The average percentage of primary schools with computer access for students between 2010 and 2015 (www.stat.pol.gov) is used to create a measure of this variable.

Summary Statistics

This paper focuses specifically on areas that are sparsely populated, so I limit this analysis to municipalities with under 100 people per km^2. For the models in this paper I only present results for the municipalities under this threshold, but I provide results for other thresholds in the appendix for some of the models (under 75 people per km^2 ; under 125 people per km^2). Given that I instrument railway station destruction, I also limit this analysis to strictly municipalities that contain at least active railroad station entering World War 2, because this analysis is uninterested in areas without railway access entering World War 2. After this filtering, I am left with 1,083 municipalities. Summary statistics for the variables in these municipalities are presented in the table below.

Table 2: Summary Statistics For All Variables

Variables	N	Mean	Standard Dev.	Max	Min
Railroad Stations Remaining	1,083	2.53	2.015	10	0
Percent Destroyed	1,083	2.53	2.015	10	0
Destroyed Dummy Variable	1,083	2.53	2.015	10	0
After World War 2					
Population Density	1,083	52.118	21.12	99	6
Distance to City	1,083	8.39	6.39	29.35	0.10
Distance From German Border	1,083	194.47	121.1	442.25	0
Patents	1,083	29.91	58.40	716	0
Economic Development	1,083	0.04	.025	0.28	0.01
Technological Development	1,083	82.9	13.73	100	25
Human Capital	1,083	18.23	28.44	0.04	159.8
Movement of People	1,083	27.53	10.79	117.23	11.39
Unemployment Rate (2018)	1,083	5.22	2.63	17.7	0.7
Unemployment Rate (2014)	1,083	9.25	3.55	24.4	2.1
Religiosity	1,083	0.29	0.12	0.71	0.014
PiS Voting Percentage (2020 Presidential)	1,083	59.32	13.03	92.76	27.85
PiS Voting Percentage (2015 Presidential)	1,083	53.5	14.09	93.58	15.40
PiS Voting Percentage (2019 Sejm)	1,083	50.78	12.413	86.49	21.83
PiS Voting Percentage (2015 Sejm)	1,083	38.74	12.04	83.53	5.132
Populist Part Voting Percentage (2015 Sejm)	1,083	48.25	12.03	88.43	10.41

Methods

Quantitative analyses often deal with issues of causal inference using an instrumental variable approach. The simplest identification strategy might use different measurements of innovation (number of registered patents) as a proxy for the level of innovation. However, to the extent that where patents exist today is likely an indication of behaviors that correlate with voting, this identification strategy is invalid (patents could be correlated with ϵ_i). Instead, I use whether the railroad stations and lines were destroyed during World War 2 as an instrument for areas that were not blessed with innovation and technological change. This identification strategy is valid as long as the destruction of railroad stations during World War 2 is uncorrelated with ϵ_i and destruction of railroad stations during World War 2 has no effect on voting for populist political parties today other than through their influence on innovation.

To test for endogeneity, I compare estimates from a method that is robust to endogeneity (in this case Instrumental variable estimation) to estimates from a method that is not (in this case, OLS). If the two sets of estimated coefficients vary highly, this indicates endogeneity (Wooldridge 2010). I implement the commonly used Durbin-Hausman-Wu approach to test for this.

There are two possible mechanisms through which innovation has an effect on support for populist political parties: increased mobility of inhabitants and higher levels of human capital. I test if I can reject either of these mechanisms.

I run three separate tests and a multitude of different measurements of railway damage to instrument for levels of innovation. First, I investigate the area of northern Poland between Giżycko and Heiliginburg Cauldron, where the fiercest fighting occurred. I compare municipalities where this fighting occurred to municipalities within 10 kilometers of this fighting that were relatively untouched. This is presented earlier in Figure 8. Second, I expand the scope of my analysis to areas north of Marshal Zhukov's push through Central Poland where the majority of the fighting took place in Poland. I use three different variables to measure railroad destruction: (1) remaining rail stations accessible after the war (2) destroyed dummy variable (all the rail stations in a municipality became inaccessible due to damage in the war) (3) percentage of all rail stations that became inaccessible due to damage in the war. Finally, I expand the scope of my analysis to all of Poland and municipalities that contained a railroad station entering World War 2. Given large levels of destruction is rare in the rest of Poland, I only use the measurement of remaining railway stations after World War 2 and determine if it correlates with populist voting through innovation.

Results

Test 1: Comparing Municipalities near Heiliginburg Cauldron and Outside

I use whether or not a municipality was a part of the most intense fighting in Poland as an instrument for lower levels of innovation. I compare municipalities that were involved in this intense fighting, previously identified in Northern Poland (Figure 8) and municipalities within 10 kilometers of the fighting but not a part of the fighting. If this fighting occurred in the municipality the dummy variable for that municipality is assigned a 1, if it is outside of the fighting is it is assigned a 0. I run both an OLS regression and an instrumental variable model with the dummy variable for fighting on all municipalities with a population density under 100 km^2.

In Table 4, the OLS results from Models 1 and 2 imply that the number of registered patents are negatively associated with voting for the populist political party. However, Models 1 and 2 may be affected by endogeneity bias, which can affect both the estimated coefficients and standard errors. Models 1 and 2 report the instrumental variable estimates of the association between innovation and populism voting. The F-statistics reported by the first-stage regressions in Models 1 and 2 are above the threshold of ten suggested by Staiger and Stock (1997). After controlling for the biasing effects of endogeneity, I find that innovation as determined by the location of intense fighting during World War 2 (where there was likely high levels of infrastructure damage) is strongly negatively associated with vote share for the populist political party.

Table 3: Results

	Dependent variable:			
	Voting % for PiS (2020 Presidential Run-off)			
	OLS		*instrumental variable*	
			Intense Fighting	
	(1)	(2)	(3)	(4)
Patents	-0.133***	-0.131***	-0.343**	-0.427*
	(0.026)	(0.029)	(0.117)	(0.185)
Population Density		-0.010		0.231
		(0.055)		(0.170)
Observations	72	72	72	72
R^2	0.273	0.273	-0.407	-0.822
Adjusted R^2	0.262	0.252	-0.427	-0.875
Residual Std. Error	6.899	6.947	9.595	11.000
F Statistic	26.249***	12.962***		
Weak Instrument P-Value			0.0080**	0.0369*
Wu-Hausman Test P-Value			0.0074**	0.0080**
Note:			*p<0.05; **p<0.01; ***p<0.001	

Test 2: Municipalities with the most fighting In Poland

In this second test, I widen the scope of my analysis to sparsely populated municipalities (population density under 100 people per km^2) where the majority of the fighting occurred in Poland (north of Marshal Zhukov's push through Central Poland). This is presented graphically in Figure 6. I also limit the analysis to municipalities that contained a railroad station entering World War 2. I use three different variables to measure railroad destruction: (1) rail stations remaining after the war (2) dummy variable for whether all rail stations became inaccessible due to damage in the war in municipality (3) proportion of all rail stations that became inaccessible due to damage in the war.

In Table 4, the OLS estimates in Model 1 imply that the number of registered patents are negatively associated with voting for the populist political party. The F-statistic reported by the first-stage regressions in Model 1 is above the threshold of ten suggested by Staiger and Stock (1997). However, Models 1 may be affected by endogeneity bias, which can affect both the estimated coefficients and standard errors. Models 2, 3, and 4 report the instrumental variable estimates of the association between innovation and populism voting. After controlling for the biasing effects of endogeneity, I find that innovation as determined by

three different measures of railroad infrastructure destruction during World War 2 (outlined in the previous paragraph) is strongly negatively associated with vote share for the populist political party.

Table 4: Results

	Dependent variable:			
	Voting % for PiS (2020 Presidential Run-off)			
	OLS	*instrumental variable*		
		Stations Remaining	*All Destroyed*	*Percentage Destroyed*
	(1)	(2)	(3)	(4)
Patents	-0.088***	-0.345*	-0.291*	-0.289*
	(0.026)	(0.150)	(0.140)	(0.141)
Observations	151	151	151	151
R^2	0.071	-0.541	-0.311	-0.267
Adjusted R^2	0.065	-0.552	-0.320	-0.275
Residual Std. Error	9.582	12.341	11.383	11.188
F Statistic	11.344***			
Weak Instrument (P-Value)		0.00585**	0.0066*	0.0114*
Wu-Hausman Test (P-Value)		0.0227***	0.0775	0.1228
Note:				*p<0.05; **p<0.01; ***p<0.001

A major empirical implication of my theory is that transportation infrastructure is key for network and agglomeration effects that drive innovation, so I would expect that areas that are treated with the most damage to transportation infrastructure are likely to witness the highest effect. I test this by dividing this damage into minor and major infrastructure damage. Minor damage areas are characterized by rail stations that became inactive due to damage solely to bridges. This damage did not affect other transportation infrastructure such as roads. Major damage areas are characterized rail stations that became inactive due to damage to the whole line that resulted in its liquidation. In these areas it is likely that war damage also affect types of transportation infrastructure such as roads. Given this, I divide railway damage into minor and major damage and run the same IV model as above. I compare areas of that were completely cut off due to bridge damage to municipalities that contained an active rail station after World War 2 in Model 1 and 3. I compare areas of that were completely cut off due to whole line damage to municipalities that contained an active rail station after World War 2 in Model 1 and 3. These results are presented below in Table 5. Models 3 and 4 report the instrumental variable estimates of the association between innovation and populism voting using these minor transportation infrastructure damage (Bridge Damage) and major transportation infrastructure damage (whole line damage). After controlling for the biasing effects of endogeneity, I find

that innovation as determined by major infrastructure damage is strongly negatively associated with vote share for the populist political party.

Table 5: Results

	Dependent variable:			
	Voting % for PiS (2020 Presidential Run-off)			
	OLS		*instrumental variable*	
			Bridge Destruction	*Whole Line Destruction*
	(1)	(2)	(3)	(4)
Patents	-0.079*	-0.089**	2.608	-0.303*
	(0.037)	(0.029)	(8.186)	(0.160)
Observations	84	144	84	144
R^2	0.053	0.064	-60.773	-0.304
Adjusted R^2	0.041	0.057	-61.527	-0.313
Residual Std. Error	10.158	9.249	82.023	10.913
F Statistic	4.548*	9.639**		
Weak Instrument (P-Value)			0.741	.011*
Wu-Hausman Test (P-Value)			0.0072**	0.107
Note:				*p<0.05; **p<0.01; ***p<0.001

Test 3: All Municipalities with Active Railroad Stations Entering World War 2

For the final test, I expand the scope to all sparsely populated municipalities in Poland (population density under 100 people per km^2). I also limit the analysis to municipalities that contained a railroad station entering World War 2. I use the number of accessible railroad stations after World War 2 as an instrument for innovation.

In Table 6, Models 1, 2, and 3 report results from simple OLS models depicting the relationship between patents and voting for the right-wing populist political party in Poland (Prawa i Sprawiedliwość) in the run-off presidential election on June 28th, 2020 between Rafal Trzaskowski (Platforma Obywatelska) and Andrzej Duda (Prawa i Sprawiedliwość).

In Table 6, the OLS estimates in Models 1, 2, and 3 imply that the number of registered patents are negatively associated with voting for the populist political party. The F-statistics reported by the first-stage regressions in Models 1, 2, and 3 are above the threshold of ten suggested by Staiger and Stock (1997). Given that Models 1, 2, and 3 could be affected by endogeneity bias, models 4, 5, and 6 report the instrumental variable estimates of the association between innovation and populism voting. Remaining rail stations post-World War 2 serve as an instrument for innovation. After controlling for the biasing effects of endogeneity, I find

that innovation as determined by remaining rail stations post-World War is strongly negatively associated with vote share for the populist political party. The same results hold for three other recent elections: (1) The run-off Presidential election on May 24th, 2015 between Bronisław Komorowski (Platforma Obywatelska) and Andrzej Duda (Prawa i Sprawiedliwość) ; (2) The legislative election for seats in the Sejm on October 13th, 2019 ; (3) the legislative election for seats in the Sejm on October 25th, 2015. The results for these models are listed in the appendix[7]. I also run this analysis with a different threshold for population density (75 km^2 and 125 km^2). The results for these models are listed in the appendix and they do not change.

Table 6: Results

	Dependent variable:					
	Voting % for PiS (2020 Presidential Run-off)					
	OLS			*instrumental variable*		
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.060***	-0.061***	-0.056***	-0.392**	-0.232**	-0.402*
	(0.007)	(0.007)	(0.007)	(0.154)	(0.074)	(0.168)
Population Density	0.116***	0.092***	-0.085**	0.350***	0.214**	0.276
	(0.016)	(0.016)	(0.028)	(0.112)	(0.056)	(0.182)
Distance to German Border	0.055***	0.054***	0.055***	0.048***	0.050***	0.044***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.004)	(0.008)
Religiosity		18.802***	15.871***		19.662***	17.744***
		(2.590)	(2.490)		(5.565)	(5.567)
Technology Development			-0.066**			-0.138*
			(0.023)			(0.056)
Economic Development			-177.420***			-60.933
			(22.790)			(76.651)
Observations	1,082	1,082	1,082	1,082	1,082	1,082
R^2	0.337	0.376	0.421	-1.017	0.010	-1.103
Adjusted R^2	0.337	0.376	0.417	-1.023	0.005	-1.1167
Residual Std. Error	10.231	9.939	9.525	7.876	12.546	18.149
F Statistic	165.418***	142.599***	110.982***			
Weak Instrument P-Value				0.0087**	0.00069**	0.0153*
Wu-Hausman Test P-Value				0.00016***	0.003**	0.00007***
Note:						*p<0.05; **pj0.01; ***p<0.001

[7]Given the split of the populist vote in the 2015 Sejm election, a table in the appendix presents populist voting percentage results by summing the voting percentages of these two parties in each municipality

Mechanism Analysis

This paper tests two theoretical mechanisms: innovation suppresses populist sentiments in sparsely populated areas because it increases the mobility of the population, increases local human capital, or both. Below are brief descriptions of how I measure each variable:

Human Capital

Measured by the number of college graduates per 10,000 citizens. Data is from the Government of Poland Statistics website (www.stat.pol.gov).

Mobility of People

This measures the level of emmigration and immigration of people in and out of the muncipality. To calculate this, I take the sum of all people who emmigrated out of and immigrated into a municipality between 2005 and 2015 divided by the total population in 2005. I then multiply this by 100. This returns a percentage of people who moved in and out of the municipality over ten years.

To test these mechanisms, I report results from simple OLS models depicting the relationship between these mechanisms and voting for Prawa i Sprawiedliwość in the run-off presidential election on June 28th, 2020 utilizing my main instrument for innovation (remaining World War 2 stations). In Table 7, the OLS estimates in Models 1, 2, and 3 imply that the level of mobility in and out of a municipality is negatively associated with voting for the populist political party. However, Models 1, 2, and 3 may be affected by endogeneity bias, which can affect both the estimated coefficients and standard errors. Models 4, 5, and 6 report the instrumental variable estimates of the association between mobility and populism voting. After controlling for the biasing effects of endogeneity, I find that higher levels of mobility as determined by the remaining railroad infrastructure after World War 2 is strongly negatively associated with vote share for the populist political party. I run a similar analysis for a measure of human capital (college graduates per ten thousand) and although the OLS estimates imply that local human capital is negatively associated with voting for the populist political party, the instrumental variable models report no effect. Therefore, I can reject human capital as a possible mechanism. The results are reported in Table 8. As a robustness check I also run mediation analysis on these two mechanisms and I find similar results. I use a bootstrapping method of Preacher Hayes (2004) to address the power limitations of other methods. This method computes the point estimate of the indirect effect over a 1,000 random samples. The effect of innovation on likelihood of voting for a populist political party is estimated to be twenty-four percent mediated via the movement of people. Whereas, the effect of innovation on likelihood of voting for a populist political party is barely mediated via the human capital. The mediation analysis actually estimated that human capital reduces the negative effect of innovation on voting for populist candidates/political parties. The full results of these

models and figures can be found in the appendix.

Table 7: Results: Population Movement

	Dependent variable:					
	Voting % for PiS (2020 Presidential Run-off)					
	OLS			*instrumental variable*		
	(1)	(2)	(3)	(4)	(5)	(6)
Population Movement	-0.460***	-0.437***	-0.425***	-1.657**	-1.691**	-1.620**
	(0.029)	(0.030)	(0.028)	(0.560)	(0.586)	(0.563)
Population Density	0.073***	0.056***	-0.124***	0.072**	0.076**	-0.070
	(0.014)	(0.014)	(0.025)	(0.023)	(0.026)	(0.049)
Distance to German Border	0.047***	0.047***	0.049***	0.023	0.024*	0.027*
	(0.003)	(0.003)	(0.003)	(0.012)	(0.012)	(0.011)
Religiosity		11.840***	9.219***		-7.587	-8.630
		(2.663)	(2.568)		(10.141)	(9.465)
Technological Development			-0.048*			-0.027
			(0.021)			(0.037)
Economic Development			-183.533***			-147.920***
			(20.648)			(39.099)
Observations	1,082	1,082	1,082	1,082	1,082	1,082
R^2	0.434	0.457	0.503	-0.785	-0.440	-0.364
Adjusted R^2	0.432	0.453	0.498	-0.793	-0.449	-0.376
Residual Std. Error	9.394	9.223	8.836	16.690	15.016	14.632
F Statistic	182.018***	128.551***	115.573***			
Weak Instrument (P-Value)				0.0155*	0.0051*	0.00593**
Wu-Hausman Test (P-Value)				0.00036***	0.0003***	0.000261***
Note:						*p<0.05; **p<0.01; ***p<0.001

Table 8: Results: Human Capital

	Dependent variable:					
	Voting % for PiS (2020 Presidential Run-off)					
	OLS				*instrumental variable*	
	(1)	(2)	(3)	(4)	(5)	(6)
Human Capital	-0.093***	-0.089***	-0.087***	3.009	2.891	3.059
	(0.013)	(0.013)	(0.013)	(5.792)	(5.507)	(6.353)
Population Density	0.085***	0.061***	-0.117***	0.085	0.018	-0.237
	(0.016)	(0.016)	(0.028)	(0.128)	(0.152)	(0.344)
Distance to German Border	0.058***	0.057***	0.060***	-0.044	-0.044	-0.058
	(0.003)	(0.003)	(0.003)	(0.192)	(0.188)	(0.239)
Religiosity		17.120***	15.091***		40.899	33.245
		(2.991)	(2.917)		(49.956)	(44.685)
Technological Development			-0.029			-0.221
			(0.024)			(0.442)
Economic Development			-177.744***			-260.566
			(23.047)			(262.190)
Observations	1,082	1,082	1,082	1,082	1,082	1,082
R^2	0.347	0.377	0.421	-29.079	-31.998	-37.269
Adjusted R^2	0.344	0.373	0.415	-29.216	-32.231	-37.638
Residual Std. Error	10.249	10.032	9.597	69.579	73.004	78.004
F Statistic	116.835***	85.604***	75.264***			
Weak Instrument (P-Value)				0.538	0.556	0.591
Wu-Hausman Test (P-Value)				0.0003***	0.0002***	0.00001***
Note:						*p<0.05; **p<0.01; ***p<0.001

It is possible that railroad infrastructure itself causes an increase in the mobility of people, rather than innovation. To reject this alternative hypothesis, I run a simple OLS model that tests whether population movement correlates with patents in municipalities that have no active rail stations. Results from this model (Table 9) show a strong correlation between the number of patents and the movement of people in municipalities. This would indicate that higher levels of innovation correlates with higher level of population movement regardless of railway placement.

Table 9

	Dependent variable:
	Patents
Mobility	2.637***
	(0.254)
Population	0.125***
Density	(0.011)
Distance to	1.021
German Border	(1.125)
Observations	1,075
R^2	0.197
Adjusted R^2	0.194
Residual Std. Error	75.421
F Statistic	65.725***
Note:	*p<0.1; **p<0.05; ***p<0.01

Conclusion

European politics has been disrupted by a rise in populist rhetoric and subsequent erosion of democratic institutions in countries where these parties have gained power. This article studies the degree to which innovation at the local level contributed to this development. I leverage an exogenous shock to innovation and find that areas treated by innovation have lower levels of support for populism than areas not blessed with this economic dynamism. Three separate tests provide evidence that directly contradicts literature that has supposed that innovation and accompanying automation increase support for populism.

This suggests we should not be worried about economic evolution in relation to its effect on support for populism. Rather, encouraging innovation may be important to slow down and reverse the rise of right-wing populism throughout Central and Eastern Europe. Andrzej Duda won the 2020 presidential run-off by 2 percentage points (similar margin of victory in the 2015 run-off). Given innovation's negative influence on populism support, encouraging innovation may reverse these slim margins of populist victory in the future and aid democracy in Central Europe.

To be sure, this paper only provides a partial explanation of the variation in the success of right-wing populists. There are certainly other causes such as globalization and cultural backlash that are untouched by this paper. Nonetheless, this manuscript contributes to our understanding of the effect of innovation on populism voting. Further research is needed to answer additional questions brought up by the analysis in

this paper. For example, it would be worthwhile to look more closely into potentially other ways innovation can have impacts on support for populism. This paper touches on two mechanisms, population movement, and human capital, but only finds evidence to support the former. Other potential avenues with which innovation can affect voting patterns may exist and should be explored.

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Appendix

Figure 13: Inaccessible Railroad Stations During World War 2 and Those Rebuilt

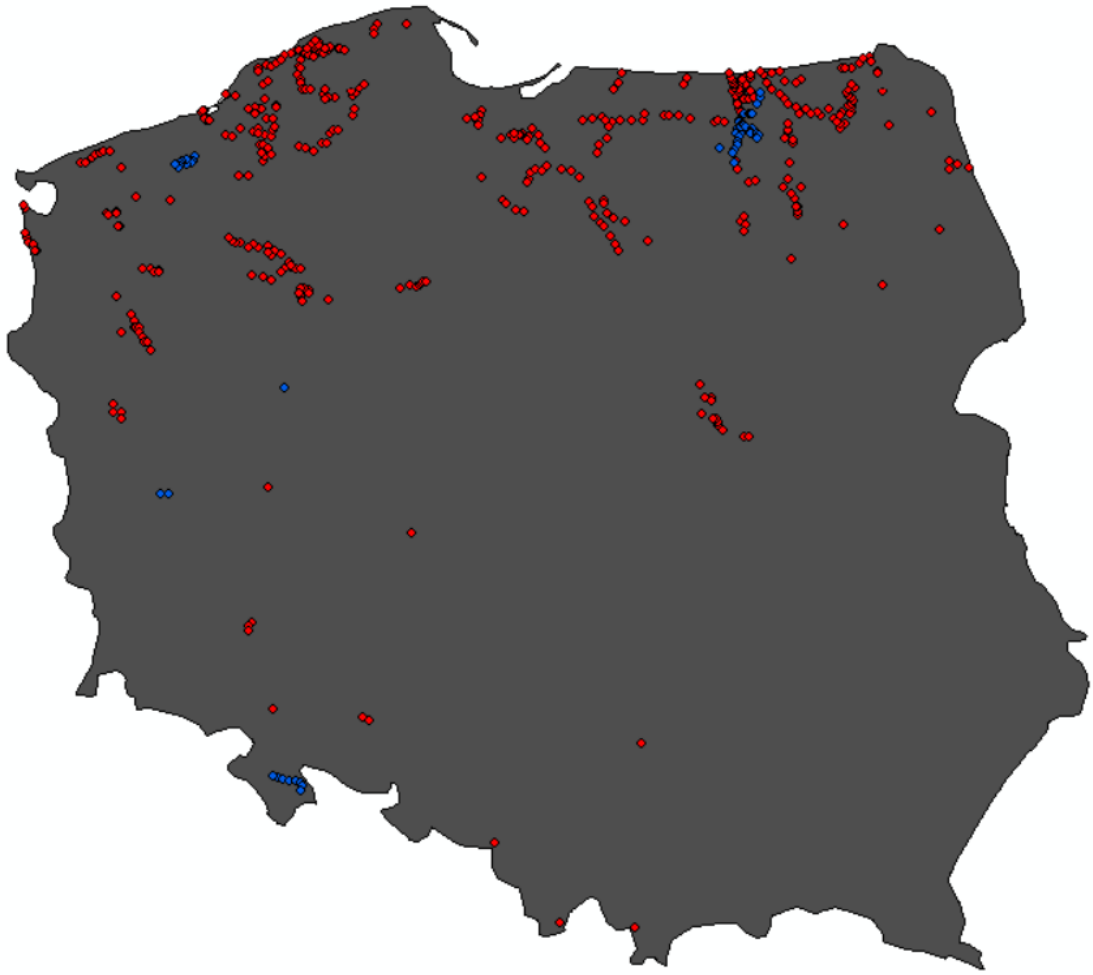


Figure 14: Scatterplot: Stations Remaining After World War 2 And Current Railway Stations

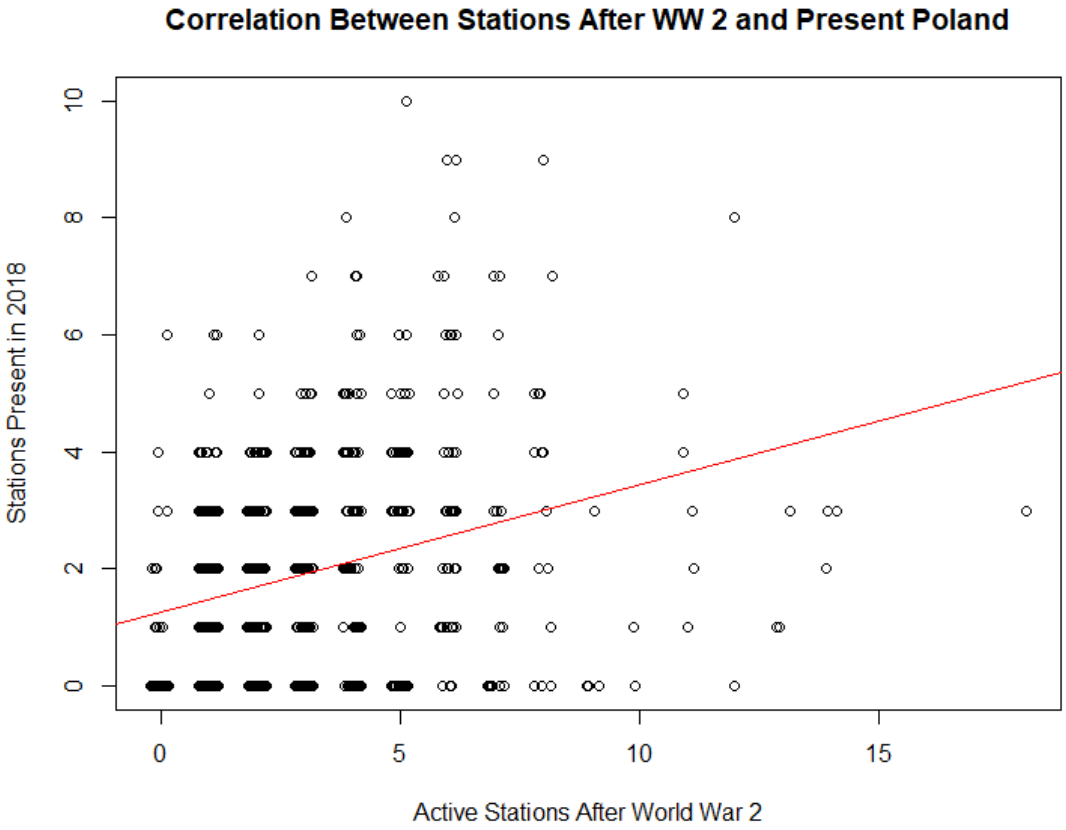


Figure 15: National Oceanic and Atmospheric Administration Nighttime Light Data

Figure 16: Active Train Stations (red circle) and Train Stops (blue circle) (as of January 1st, 2019)

Figure 17: Population Density of Municipalities Across Poland (person by km^2)

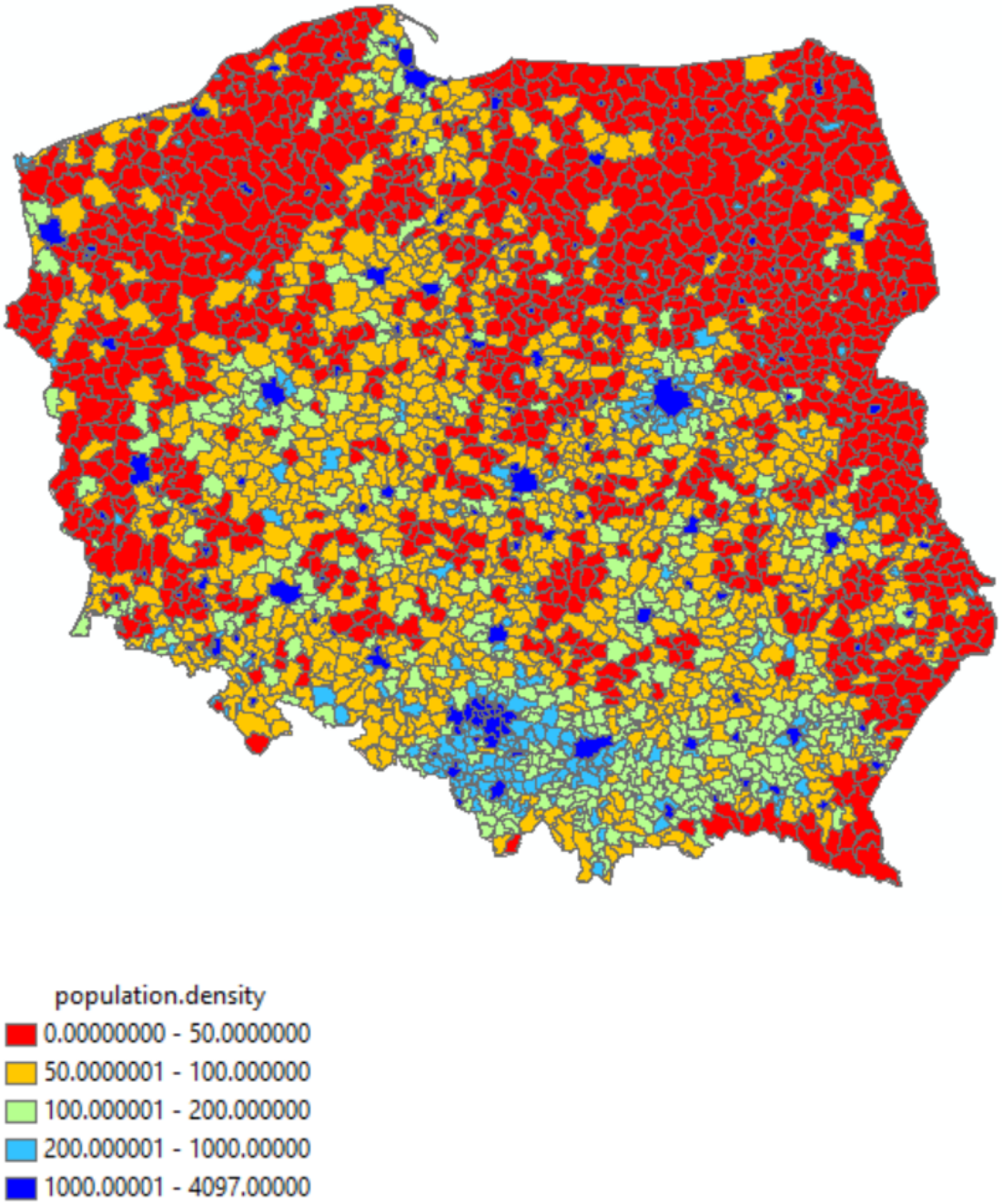


Figure 18: Patents Per Municipality

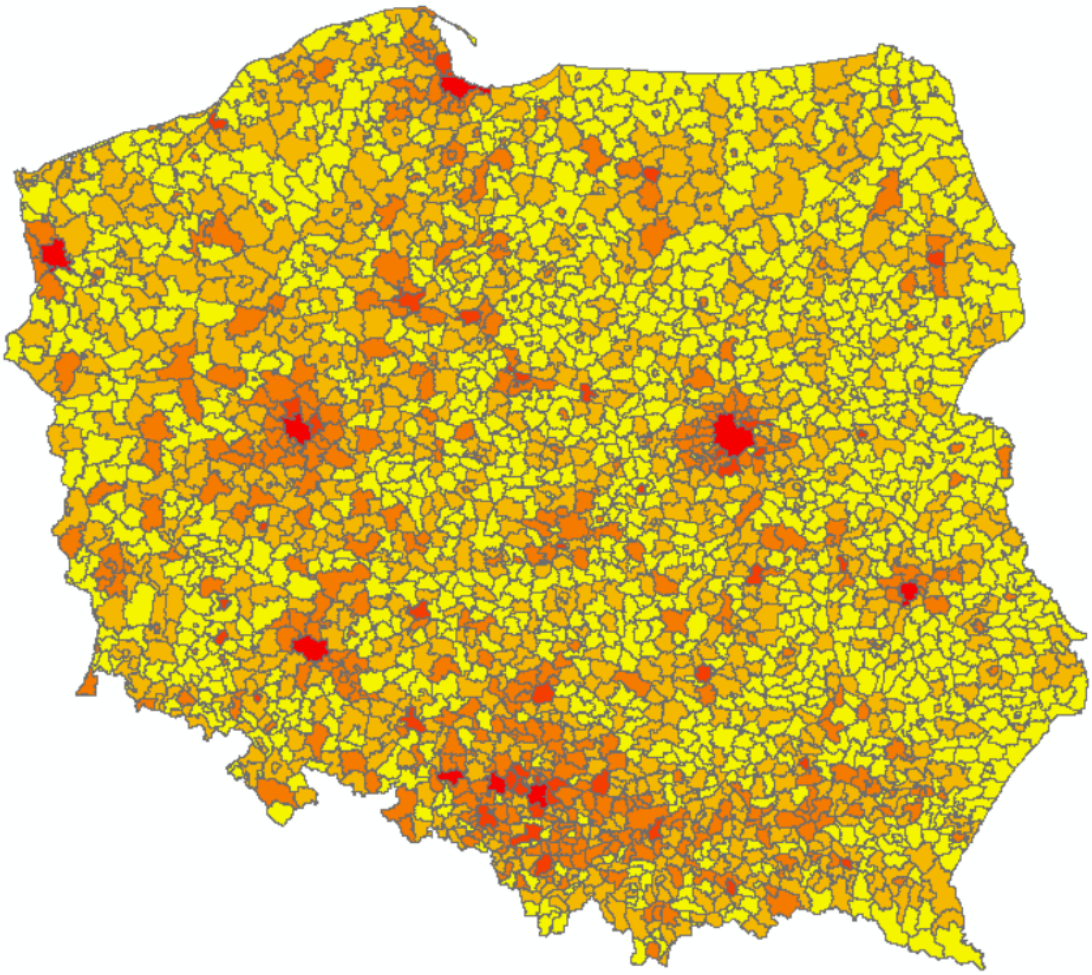


Figure 19: Legend: Number of Patents

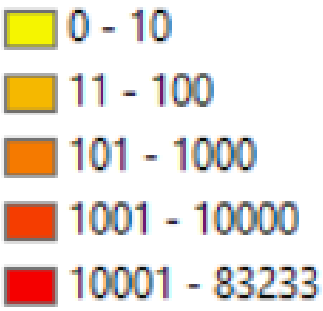


Table 10: Results

	Dependent variable:					
	Voting % for PiS (2015 Presidential Run-off)					
	OLS				*instrumental variable*	
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.042***	-0.041***	-0.037***	-0.331**	-0.315**	-0.327*
	(0.006)	(0.006)	(0.006)	(0.127)	(0.118)	(0.132)
Population Density	0.184***	0.149***	-0.043	0.422***	0.369***	0.314
	(0.017)	(0.017)	(0.029)	(0.109)	(0.099)	(0.171)
Distance to German Border	0.064***	0.066***	0.067***	0.048***	0.056***	0.054***
	(0.003)	(0.003)	(0.003)	(0.008)	(0.007)	(0.008)
Religiosity		8.827**	6.057*		3.009	1.036
		(2.788)	(2.714)		(5.491)	(5.535)
Technological Development			-0.066**			-0.132*
			(0.024)			(0.054)
Economic Development			-199.510***			-69.131
			(24.766)			(75.033)
Observations	1,082	1,082	1,082	1,082	1,082	1,082
R^2	0.380	0.409	0.449	-0.912	-0.818	-0.902
Adjusted R^2	0.377	0.405	0.445	-0.919	-0.829	-0.917
Residual Std. Error	11.120	10.719	10.357	19.522	18.796	19.245
F Statistic	161.984***	116.910***	103.205***			
Weak Instrument (P-Value)				0.0092**	0.0047**	0.0057**
Wu-Hausman Test (P-Value)				0.0004***	0.0004***	0.00006***

Note: *p<0.05; **p<0.01; ***p<0.001

Table 11: Results

	Dependent variable:					
	Voting % for PiS (2019 Sejm)					
	OLS			*instrumental variable*		
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.044***	-0.041***	-0.038***	-0.318**	-0.310**	-0.316*
	(0.005)	(0.005)	(0.005)	(0.121)	(0.116)	(0.125)
Population Density	0.102***	0.076***	-0.099***	0.331**	0.293**	0.244
	(0.015)	(0.015)	(0.026)	(0.104)	(0.098)	(0.162)
Distance to German Border	0.056***	0.056***	0.057***	0.042***	0.046***	0.044***
	(0.003)	(0.003)	(0.003)	(0.008)	(0.006)	(0.008)
Religiosity		11.399***	8.407***		6.208	3.590
		(2.475)	(2.425)		(5.127)	(5.211)
Technological Development			-0.066**			-0.130*
			(0.021)			(0.051)
Economic Development			-182.200***			-56.188
			(22.201)			(71.220)
Observations	1,082	1,040	1,021	1,082	1,040	1,021
R^2	0.364	0.396	0.436	-1.124	-1.096	-1.155
Adjusted R^2	0.362	0.393	0.432	-1.132	-1.109	-1.172
Residual Std. Error	9.918	9.585	9.256	18.122	17.859	18.100
F Statistic	154.039***	112.937***	97.946***			
Weak Instrument (P-Value)				0.025**	0.017*	0.0022*
Wu-Hausman Test (P-Value)				0.0004***	0.0003***	0.0001***

Note: *p<0.05; **p<0.01; ***p<0.001

Table 12: Results

	Dependent variable:					
	Voting % for PiS (2015 Sejm)					
	OLS			*instrumental variable*		
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.033***	-0.032***	-0.029***	-0.225*	-0.213*	-0.219*
	(0.005)	(0.005)	(0.005)	(0.097)	(0.091)	(0.097)
Population Density	0.141***	0.107***	-0.022	0.301***	0.253***	0.212
	(0.015)	(0.015)	(0.026)	(0.083)	(0.076)	(0.125)
Distance to German Border	0.051***	0.052***	0.052***	0.041***	0.046***	0.044***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.006)
Religiosity		10.958***	8.291***		7.467	5.007
		(2.451)	(2.427)		(3.985)	(4.051)
Technological Development			-0.064**			-0.107**
			(0.021)			(0.039)
Economic Development			-133.658***			-48.379
			(22.150)			(54.913)
Observations	1,082	1,082	1,082	1,082	1,082	1,082
R^2	0.325	0.362	0.387	-0.450	-0.365	-0.417
Adjusted R^2	0.322	0.359	0.382	-0.455	-0.373	-0.429
Residual Std. Error	9.912	9.492	9.263	14.526	13.888	14.084
F Statistic	129.753***	97.982***	79.889***			
Weak Instrument (P-Value)				0.0243*	0.017*	0.0216*
Wu-Hausman Test (P-Value)				0.0153***	0.0127***	0.0075***

Note: *p<0.05; **p<0.01; ***p<0.001

Table 13: Results

	Dependent variable:					
	Voting % for populist parties (2015 Sejm)					
	OLS			*instrumental variable*		
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.034***	-0.033***	-0.030***	-0.240*	-0.226*	-0.234*
	(0.006)	(0.005)	(0.005)	(0.101)	(0.095)	(0.102)
Population Density	0.143***	0.111***	-0.025	0.315***	0.267***	0.227
	(0.015)	(0.016)	(0.027)	(0.087)	(0.079)	(0.132)
Distance to German Border	0.048***	0.051***	0.050***	0.038***	0.043***	0.041***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.006)
Religiosity		9.351***	6.712**		5.625	3.183
		(2.493)	(2.474)		(4.162)	(4.257)
Technological Development			-0.063**			-0.110**
			(0.022)			(0.041)
Economic Development			-141.226***			-49.593
			(22.578)			(57.713)
Observations	1,082	1,082	1,082	1,082	1,082	1,082
R^2	0.306	0.340	0.365	-0.583	-0.489	-0.560
Adjusted R^2	0.304	0.336	0.360	-0.589	-0.497	-0.572
Residual Std. Error	10.045	9.655	9.442	15.175	14.503	14.802
F Statistic	119.025***	88.824***	72.882***			
Weak Instrument (P-Value)				0.0243*	0.017*	0.0216*
Wu-Hausman Test (P-Value)				0.0104*	0.0082**	0.00436**

Note: *p<0.05; **p<0.01; ***p<0.001

1.1 Different Population Density Thresholds:

Table 14: Results: Population Density under 75 people per km^2

	Dependent variable:					
	Voting % for PiS (2020 Presidential Run-off)					
	OLS			*instrumental variable*		
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.045***	-0.045***	-0.042***	-0.277*	-0.280*	-0.295*
	(0.007)	(0.007)	(0.007)	(0.126)	(0.121)	(0.120)
Population Density	0.170***	0.138***	-0.136**	0.307***	0.265***	0.096
	(0.023)	(0.024)	(0.043)	(0.081)	(0.074)	(0.130)
Distance to German Border	2.564***	2.546***	2.569***	2.120***	2.170***	2.076***
	(0.148)	(0.153)	(0.153)	(0.325)	(0.303)	(0.342)
Religiosity		15.405***	13.715***		15.935**	13.998**
		(3.160)	(3.073)		(4.854)	(5.069)
Technological Development			-0.061*			-0.107*
			(0.025)			(0.046)
Economic Development			-206.128***			-139.317**
			(26.294)			(53.544)
Observations	803	777	760	803	777	760
R^2	0.358	0.389	0.428	-0.434	-0.436	-0.556
Adjusted R^2	0.354	0.384	0.421	-0.443	-0.449	-0.575
Residual Std. Error	9.920	9.680	9.298	14.824	14.847	15.334
F Statistic	88.762***	70.052***	62.304***			
Weak Instrument (P-Value)				0.0123*	0.0097**	0.0074**
Wu-Hausman Test (P-Value)				0.0106*	0.00263**	0.00436**

Note: *p<0.05; **p<0.01; ***p<0.001

Table 15: Results: Population Density under 125 people per km^2

	Dependent variable:					
	Voting % for PiS (2020 Presidential Run-off)					
	OLS				*instrumental variable*	
	(1)	(2)	(3)	(4)	(5)	(6)
Patents	-0.031***	-0.030***	-0.027***	-0.252*	-0.227*	-0.237*
	(0.004)	(0.004)	(0.004)	(0.121)	(0.103)	(0.110)
Population Density	0.075***	0.052***	-0.096***	0.320*	0.258*	0.240
	(0.013)	(0.013)	(0.020)	(0.136)	(0.111)	(0.180)
Distance to German Border	0.058***	0.055***	0.057***	0.044***	0.048***	0.045***
	(0.003)	(0.003)	(0.003)	(0.009)	(0.007)	(0.009)
Religiosity		17.440***	14.676***		10.271	7.084
		(2.711)	(2.637)		(6.478)	(6.834)
Technological Development			-0.062**			-0.159*
			(0.022)			(0.068)
Economic Developemnt			-190.293***			-43.274
			(19.904)			(87.226)
Observations	1,091	1,091	1,091	1,091	1,091	1,091
R^2	0.359	0.420	0.463	-1.687	-1.201	-1.406
Adjusted R^2	0.356	0.416	0.458	-1.697	-1.216	-1.428
Residual Std. Error	10.231	9.753	9.333	20.939	19.004	19.755
F Statistic	146.872***	105.570***	95.383***			
Weak Instrument (P-Value)				0.0359*	0.0261*	0.0292*
Wu-Hausman Test (P-Value)				0.00011*	0.00018**	0.00004***
Note:						*p<0.05; **p<0.01; ***p<0.001

Inaccessible Railroad Stations Due to Damage During World War 2

Table 16: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
1	Kaczy Dół	Wawer - Miłosna	Destroyed during Fighting. Eventually liquidated by Russian	N
2	Milosna	Wawer - Miłosna	Destroyed during Fighting. Eventually liquidated by Russian	N
3	Wilknity	Pieniezno-Korneva	Destroyed during Fighting. Eventually liquidated by Russian	N
4	Lelkowo	Pieniezno-Korneva	Destroyed during Fighting. Eventually liquidated by Russian	N
5	Glebock	Pieniezno-Korneva	Destroyed during Fighting. Eventually liquidated by Russian	N
6	Skitno	Bartoszyce -	Destroyed during Fighting. Eventually liquidated by Russian	N
7	Judyta Domarada	Bartoszyce -	Destroyed during Fighting. Eventually liquidated by Russian	N
8	Klimki	Wegorzewo -	Destroyed during Fighting. Eventually liquidated by Russian	N
9	Olszewo Wegorzewskie	Wegorzewo -	Destroyed during Fighting. Eventually liquidated by Russian	N
10	Pueraria	Wegorzewo -	Destroyed during Fighting. Eventually liquidated by Russian	N
11	Prynowo	Wegorzewo -	Destroyed during Fighting. Eventually liquidated by Russian	N
12	Perly	Wegorzewo -	Destroyed during Fighting. Eventually liquidated by Russian	N
13	Ruskie Pole	Wegorzewo -	Destroyed during Fighting. Eventually liquidated by Russian	N
14	Giemlice	Giemlice - Pszczółki Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
15	Steblewo	Giemlice - Pszczółki Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
16	Kozliny	Giemlice - Pszczółki Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
17	Gospodarstwo Kozliny	Giemlice - Pszczółki Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
18	Krzywe Kolo	Giemlice - Pszczółki Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
19	Pszczolki Waskotorowe	Giemlice - Pszczółki Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
20	Czatkowy	Kozliny - Czatkowy	Destroyed during Fighting. Eventually liquidated by Russian	N
21	Świetliki	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
22	Rozgart	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
23	Fiszewo Waskotorowe	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
24	Szlagnowo	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
25	Stare Pole Waskotorowe	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
26	Jonaszewo	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
27	Królewice	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 17: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
28	Królewo	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
29	Malbork Waskotorowy	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
30	Stalewo	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
31	Kaczynos	Malbork Kałdowo - Świetliki	Destroyed during Fighting. Eventually liquidated by Russian	N
32	Głeboki Bród	Tobołowo-Głeboki	Destroyed during Fighting. Eventually liquidated by Russian	N
33	Zawojki	Spychowo Waskotorowe - Grabowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
34	Dabrowy Waskotorowe	Spychowo Waskotorowe - Grabowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
35	Myszyniec Stary	Spychowo Waskotorowe - Grabowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
36	Rozogi	Spychowo Waskotorowe - Grabowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
37	Bobrownik	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
38	Laniewo	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
39	Wolnica	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
40	Opin	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
41	Lichtajny	Ostróda - Olsztynek	Destroyed during Fighting. Eventually liquidated by Russian	N
42	Mielno	Ostróda - Olsztynek	Destroyed during Fighting. Eventually liquidated by Russian	N
43	Gierzwałd	Ostróda - Olsztynek	Destroyed during Fighting. Eventually liquidated by Russian	N
44	Szczepankowo Domkowo	Ostróda - Olsztynek	Destroyed during Fighting. Eventually liquidated by Russian	N
45	Kraplewo	Ostróda - Olsztynek	Destroyed during Fighting. Eventually liquidated by Russian	N
46	Kruczy Las	Orneta - Morag	Destroyed during Fighting. Eventually liquidated by Russian	N
47	Sportyny	Orneta - Morag	Destroyed during Fighting. Eventually liquidated by Russian	N
48	Miłakowo	Orneta - Morag	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 18: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
49	Niebrzydowo Wielkie	Orneta - Morag	Destroyed during Fighting. Eventually liquidated by Russian	N
50	Maliniak	Orneta - Morag	Destroyed during Fighting. Eventually liquidated by Russian	N
51	Jasionno	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
52	Markusy	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
53	Stare Dolno	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
54	Kwietniewo	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
55	Zalewo	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
56	Janiki Wielkie	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
57	Majdany Wielkie	Elblag - Miłomłyn	Destroyed during Fighting. Eventually liquidated by Russian	N
58	Turznica	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
59	Smykówko	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
60	Zajaczki	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
61	Klonowo	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
62	Marwałd	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
63	Dabrówno	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
64	Brzeźno Mazurskie	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
65	Uzdowo	Samborowo - Turza Wielka	Destroyed during Fighting. Eventually liquidated by Russian	N
66	Włóki	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
67	Smukała Dolna	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
68	Żołedowo	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
69	Jastrzebie	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
70	Wilcze	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
71	Strzelce Górne	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
72	Gadecz	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
73	Hutna WieŚ	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
74	Kusowo	Smukała - Właże	Destroyed during Fighting. Eventually liquidated by Russian	N
75	Boguszyny	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
76	Przekolno	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
77	Bedargowo	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
78	Bedargowiec	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
79	Jarosławsko	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 19: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
80	Żabicko	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
81	Bobrówko Krajeńskie	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
82	Sokólsko	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
83	Bronowice	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
84	Strzelce Krajeńskie	Strzelce Krajeńskie Wschód - Lubiana	Destroyed during Fighting. Eventually liquidated by Russian	N
85	Bładkowo	Nowogard - Dobra	Destroyed during Fighting. Eventually liquidated by Russian Nowogardzkie Południowe	N
86	Osowo Gaj	Nowogard - Dobra	Destroyed during Fighting. Eventually liquidated by Russian Nowogardzkie Południowe	N
87	Osowo Nowogardzkie	Nowogard - Dobra	Destroyed during Fighting. Eventually liquidated by Russian Nowogardzkie Południowe	N
88	Jarchlino	Nowogard - Dobra	Destroyed during Fighting. Eventually liquidated by Russian Nowogardzkie Południowe	N
89	Radoslaw Nowogardzki	Nowogard - Dobra	Destroyed during Fighting. Eventually liquidated by Russian Nowogardzkie Południowe	N
90	Jarchliniec	Nowogard - Dobra	Destroyed during Fighting. Eventually liquidated by Russian Nowogardzkie Południowe	N
91	Wegierce	Jastrowie - Wegierce	Destroyed during Fighting. Eventually liquidated by Russian	N
92	Piecewo	Jastrowie - Wegierce	Destroyed during Fighting. Eventually liquidated by Russian	N
93	Jastrowie Miasto	Jastrowie - Wegierce	Destroyed during Fighting. Eventually liquidated by Russian	N
94	Głodowo	Jastrowie - Wegierce	Destroyed during Fighting. Eventually liquidated by Russian	N
95	Pomysk Maly	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
96	Soszyca	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
97	Jerzkowice	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
98	Jasień	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
99	Oskowo	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
100	Kostroga	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
101	Czarna Dabrówka	Lebork - Bytów (237)	Destroyed during Fighting. Eventually liquidated by Russian	N
102	Polanów	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
103	Mieszalki	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 20: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
104	Czechy	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
105	Buszynko	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
106	Drzewiany	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
107	Górawino	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
108	Chocimino	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
109	Rzerzyca Wielka	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
110	Rochowo	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
111	Mzdowo	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
112	Krag Miastecki	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
113	Podgórki	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
114	Zukowo Slawienskie	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
115	Jacinki	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
116	Manowo Majatek	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
117	Wyszewo	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
118	Smogorzewice Korzybskie	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
119	Wiewiórowo	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
120	Kosciernica Waskotorowa	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
121	Naclaw	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
122	Nadbór	Manowo - Jacinki	Destroyed during Fighting. Eventually liquidated by Russian	N
123	Gologóra	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
124	Kwasowa	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
125	Kazerzewo	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
126	Ostrowiec Slawienski	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
127	Podgóry Waskotorowe	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
128	Zegocino	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
129	Swiecianowo	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
130	Sulechowo Waskotorowe	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
131	Lejkowo	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
132	Laski Pomorskie	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
133	Bukowo Slawienskie	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
134	Swierczyna	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
135	Wietrzno	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
136	Chocimino	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
137	Zydowo Pomorskie	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
138	Borkowo	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
139	Jacinki	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
140	Gołogóra	Linia Sławno - Gołogóra	Destroyed during Fighting. Eventually liquidated by Russian	N
141	Dobra Nowogardzkie Północ	Nowogard - Dobra Nowogardzkie Południowe	Destroyed during Fighting. Eventually liquidated by Russian	N
142	Bobolice Las Miejski	Grzmiaca - Korzybie	Destroyed during Fighting. Eventually liquidated by Russian	N
143	Kepno Slupskie	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
144	Dominek	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
145	Komnino	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 21: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
146	Osieki Slupskie	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
147	Objazda	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
148	Machowinko	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
149	Wytowno	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
150	Przewloka	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
151	Objazda Majatek	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
152	Dominek	Kepno Słupskie - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
153	Zelkowo	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
154	Karzcino	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
155	Swochowo	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
156	Siemianice	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
157	Slupsk Ryczewo	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
158	Cegielnia	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
159	Lekwica	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
160	Zoruchowo	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
161	Klecino	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
162	Glówczyce	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
163	Wykosowo	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
164	Przebedowo Slupskie	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
165	Chocmirówko	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
166	Bedziechowo	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
167	Rumsko	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
168	Dargoleza	Linia Słupsk - Cecenowo	Destroyed during Fighting. Eventually liquidated by Russian	N
169	Zelazo	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
170	Siecie	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
171	Stojcino	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
172	Gardna Wielka	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
173	Czysta	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
174	Siecie-Wierzchocino	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
175	Smoldzino	Komnino - Smołdzino	Destroyed during Fighting. Eventually liquidated by Russian	N
176	Debnica Kaszubska	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
177	Jamrzyno	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
178	Budowo	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
179	Motarzyno	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
180	Dobieszewo Slupskie	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
181	Niemczewo	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
182	Slupsk Przymiescie	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
183	Zalesiczki	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
184	Zalesie Slupskie	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
185	Krepa Slupska	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 22: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
186	Lubun Pomorski	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
187	Lubuniec	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
188	Skarszów Dolny	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
189	Starnice	Linia Słupsk - Budowo	Destroyed during Fighting. Eventually liquidated by Russian	N
190	Dobry Pomorski	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
191	Jankówko	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
192	Bazyny	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
193	Drweczno	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
194	Opin	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
195	Wolnica	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
196	Laniewo	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
197	Bobrownik	Słobity - Bartoszyce	Destroyed during Fighting. Eventually liquidated by Russian	N
198	Rakowko	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
199	Golubie	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
200	Kierpurdeje	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
201	Dubeninki	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
202	Blakaly	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
203	Zytkiejmy	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
204	Meszno	Russia - Botkuny	Destroyed during Fighting. Eventually liquidated by Russian	N
205	Bielany Bialostockie	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
206	Dubasno	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
207	Rozanystok	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
208	Ostrowie	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
209	Dlutowo	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
210	Jeze	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
211	Turowo Duze	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
212	Paski Wielkie	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
213	Dziadowo	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
214	Kaleczyn Mazurski	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
215	Wilki	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
216	Karszno	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
217	Nowe Warpno	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
218	Rieth	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
219	Ludwigshof	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
220	Hintersee Nord	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 23: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
221	Hintersee	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
222	Zopfenbeck	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
223	Nowe Warpno Zalno	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
224	Stolzenburger Glashutte	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
225	Rzedziny Cegielnia	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
226	Rzedziny	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
227	Lenzen	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
228	Buk Szczecinski	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
229	Dobra Szczecinska	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
230	Redlica	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
231	Wawelnica Szczecinska	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
232	Stolec	Szczecińskie - Nowe Warpno	Destroyed during Fighting. Eventually liquidated by Russian	N
233	Pobledzie	Pobłedzie - Bachanowo	Destroyed during Fighting. Eventually liquidated by Russian	N
234	Błaskowizna	Pobłedzie - Bachanowo	Destroyed during Fighting. Eventually liquidated by Russian	N
235	Bachanowo	Pobłedzie - Bachanowo	Destroyed during Fighting. Eventually liquidated by Russian	N
236	Derlacz	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
237	Skrzeszew	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
238	Wojtostwo	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
239	Glinka	Linia Krzelów - Leszno Dworzec Mały	Destroyed during Fighting. Eventually liquidated by Russian	N
240	Lubiaż	Wołów - Malczyce	During fighting the bridge over the Odrze river was destroyed	N
241	Rogow Legnicki	Wołów - Malczyce	During fighting the bridge over the Odrze river was destroyed	N
242	Kawice	Wołów - Malczyce	During fighting the bridge over the Odrze river was destroyed	N
243	Radoszowice	Linia Szydłów - Lipowa Ślaska (329)	During fighting the bridge over the Nysie Kłodzkiej river was destroyed	N
244	Radoszowice Wschód	Linia Szydłów - Lipowa Ślaska (329)	During fighting the bridge over the Nysie Kłodzkiej river was destroyed	N
245	Osiek Grodkowski	Linia Szydłów - Lipowa Ślaska (329)	During fighting the bridge over the Nysie Kłodzkiej river was destroyed	N
246	Nicponia	Kwidzyn - Kisielice	During fighting the bridge over the Gardedze river near Wilków was destroyed	N
247	Krzykosy	Kwidzyn - Kisielice	During fighting the bridge over the Gardedze river near Wilków was destroyed	N
248	Rozajny Wielki	Kwidzyn - Kisielice	During fighting the bridge over the Gardedze river near Wilków was destroyed	N
249	Wilkowo Kwidzyńskie	Kwidzyn - Kisielice	During fighting the bridge over the Gardedze river near Wilków was destroyed	N
250	Limża	Kwidzyn - Kisielice	During fighting the bridge over the Gardedze river near Wilków was destroyed	N

Table 24: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
251	Sarnowo	Lidzbark Warmiński - Satopy Samulewo	Destroyed during Fighting. Eventually liquidated by Russian	N
252	Kierwiny	Lidzbark Warmiński - Satopy Samulewo	Destroyed during Fighting. Eventually liquidated by Russian	N
253	Rokitnik	Lidzbark Warmiński - Satopy Samulewo	Destroyed during Fighting. Eventually liquidated by Russian	N
254	Bisztynek	Lidzbark Warmiński - Satopy Samulewo	Destroyed during Fighting. Eventually liquidated by Russian	N
255	Reszel	Satopy Samulewo - Nowy Młyn	During retreat, Germans destroyed bridges over the rivers Nowy Młyn and Satopy	N
256	Klewno	Satopy Samulewo - Nowy Młyn	During retreat, Germans destroyed bridges over the rivers Nowy Młyn and Satopy	N
257	Pieckowo	Satopy Samulewo - Nowy Młyn	During retreat, Germans destroyed bridges over the rivers Nowy Młyn and Satopy	N
258	Rogi Waldowice	Linia Rudnica - Kniazin	Destroyed during Fighting. Eventually liquidated by Russian	N
259	Jarnatów	Linia Rudnica - Kniazin	Destroyed during Fighting. Eventually liquidated by Russian	N
260	Lubniewice	Linia Rudnica - Kniazin	Destroyed during Fighting. Eventually liquidated by Russian	N
261	Glisno	Linia Rudnica - Kniazin	Destroyed during Fighting. Eventually liquidated by Russian	N
262	Radoslaw Slawienski	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
263	Marszewo	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
264	Zlakowo	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
265	Golecino Zalaskie	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
266	Duninowo	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
267	Wodnica Ustka	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
268	Staniewice	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N
269	Postomino	Sławno - Ustka	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 25: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
270	Snopki	Pisz - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
271	Trzonki	Pisz - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
272	Kociól	Pisz - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
273	Nowe Guty	Pisz - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
274	Pianki	Giżycko - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
275	Ublik	Giżycko - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
276	Konopki Wielkie	Giżycko - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
277	Milki	Giżycko - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
278	Ruda Staswiny	Giżycko - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
279	Upalty	Giżycko - Orzysz	Destroyed during Fighting. Eventually liquidated by Russian	N
280	Kaleczyn Mazurski	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
281	Dziadowo	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
282	Jeze	Pisz - Kolno	Destroyed during Fighting. Eventually liquidated by Russian	N
283	Choczewko	Wejherowo - Garczegorze (230)	Destroyed during Fighting. Eventually liquidated by Russian	N
284	Przebedowo Leborskie	Wejherowo - Garczegorze (230)	Destroyed during Fighting. Eventually liquidated by Russian	N
285	Zwartówko	Wejherowo - Garczegorze (230)	Destroyed during Fighting. Eventually liquidated by Russian	N
286	Karlikowo	Wejherowo - Garczegorze (230)	Destroyed during Fighting. Eventually liquidated by Russian	N
287	Jakubowo	Linia MyŚlice - Szlachta (218/238)	Destroyed during Fighting. Eventually liquidated by Russian	N
288	Obrzynowo	Linia MyŚlice - Szlachta (218/238)	Destroyed during Fighting. Eventually liquidated by Russian	N
289	Cieszeowo Wielkie	Linia MyŚlice - Szlachta (218/238)	Destroyed during Fighting. Eventually liquidated by Russian	N
290	Monasterzysko Wielkie	Linia MyŚlice - Szlachta (218/238)	Destroyed during Fighting. Eventually liquidated by Russian	N
291	Stary Dzierzgoń	Linia MyŚlice - Szlachta (218/238)	Destroyed during Fighting. Eventually liquidated by Russian	N
292	Folwark	Linia MyŚlice - Szlachta (218/238)	Destroyed during Fighting. Eventually liquidated by Russian	N
293	Wierzbowo	Mragowo - Ruciane Nida	Destroyed during Fighting. Eventually liquidated by Russian	N
294	Piecki	Mragowo - Ruciane Nida	Destroyed during Fighting. Eventually liquidated by Russian	N
295	Krutyn	Mragowo - Ruciane Nida	Destroyed during Fighting. Eventually liquidated by Russian	N
296	Ukta	Mragowo - Ruciane Nida	Destroyed during Fighting. Eventually liquidated by Russian	N
297	Dretynek	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
298	Lubkowo	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
299	Piaszczyna	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
300	Kramarzyny	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N

Table 26: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
301	Trzebiatkowa	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
302	Tuchomie	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
303	Tuchomko	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
304	Niezabyszewo	Bytów - Miastko	Bridge blown up by Germans retreating over Studnica river	N
305	Gryzy	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
306	Doliwy	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
307	Gordejki	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
308	Wronki Wesołowo	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
309	Orłowo Mazurskie	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
310	Gradzkie	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
311	Jurkowo Wegorzewskie	Olecko - Kruklanki	Bridge blown up by Germans retreating over Sapina river	N
312	Pozezdrze	Wegorzewo - Kruklanki	Destroyed during Fighting. Eventually liquidated by Russian	N
313	Ogonki	Wegorzewo - Kruklanki	Destroyed during Fighting. Eventually liquidated by Russian	N
314	Wyludy	Wegorzewo - Kruklanki	Destroyed during Fighting. Eventually liquidated by Russian	N
315	Brozowka	Olecko - Kruklanki	Destroyed during Fighting. Eventually liquidated by Russian	N
316	Budry	Wegorzewo - Gołdap	Destroyed during Fighting. Eventually liquidated by Russian	N
317	Banie Mazurskie	Wegorzewo - Gołdap	Destroyed during Fighting. Eventually liquidated by Russian	N
318	Bocwinka	Wegorzewo - Gołdap	Destroyed during Fighting. Eventually liquidated by Russian	N
319	Dabrówka Polska	Wegorzewo - Gołdap	Destroyed during Fighting. Eventually liquidated by Russian	N
320	Jablonskie	Wegorzewo - Gołdap	Destroyed during Fighting. Eventually liquidated by Russian	N
321	Wegorzewo Miejski Las	Wegorzewo - Gołdap	Destroyed during Fighting. Eventually liquidated by Russian	N
322	Trzebieszewo Kamienskie	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
323	Jatki	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
324	Gostyniec	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
325	Niczonów	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
326	Karnice Gryfickie	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
327	Goclawice	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
328	Czaplin Maly	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
329	Trzebiatów Przedmiescie Gryfickie	Linia Wysoka Kamieńska - Trzebiatów	Destroyed during Fighting. Eventually liquidated by Russian	N
330	Pozrzadlo Dwór	Linia Kozy Pomorskie - Poźrzadło Dwór	Destroyed during Fighting. Eventually liquidated by Russian	N
331	Dolice Waskotorowe	Linia Kozy Pomorskie - Poźrzadło Dwór	Destroyed during Fighting. Eventually liquidated by Russian	N
332	Inica	Linia Kozy Pomorskie - Poźrzadło Dwór	Destroyed during Fighting. Eventually liquidated by Russian	N
333	Bytowo Waskotorowe	Linia Kozy Pomorskie - Poźrzadło Dwór	Destroyed during Fighting. Eventually liquidated by Russian	N
334	Sulibórz	Linia Kozy Pomorskie - Poźrzadło Dwór	Destroyed during Fighting. Eventually liquidated by Russian	N
335	Pozrzadlo Wies	Linia Kozy Pomorskie - Poźrzadło Dwór	Destroyed during Fighting. Eventually liquidated by Russian	N
336	Janislaw	Wyszogóra - Resko Północne	Destroyed during Fighting. Eventually liquidated by Russian	N
337	Zerzyno	Wyszogóra - Resko Północne	Destroyed during Fighting. Eventually liquidated by Russian	N
338	Resko Poludniowe	Wyszogóra - Resko Północne	Destroyed during Fighting. Eventually liquidated by Russian	N
339	Mielno Kapielisko	Koszalin - Unieście	Destroyed during Fighting. Eventually liquidated by Russian	N
340	Pradno	Koszalin - Unieście	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 27: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
341	Przeciszewko	Koszalin - UnieŚcie	Destroyed during Fighting. Eventually liquidated by Russian	N
342	Buczyska	Koszalin - UnieŚcie	Destroyed during Fighting. Eventually liquidated by Russian	N
343	Patnowo	Koszalin - UnieŚcie	Destroyed during Fighting. Eventually liquidated by Russian	N
344	MŚcice Kol. Miejska	Koszalin - UnieŚcie	Destroyed during Fighting. Eventually liquidated by Russian	N
345	UnieŚcie	Koszalin - UnieŚcie	Destroyed during Fighting. Eventually liquidated by Russian	N
346	Samborsko	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
347	Ciosaniec Pomorski	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
348	Klomino	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
349	Nadarzyce	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
350	Turze	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
351	Motarzewo	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
352	Milkowo	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
353	Broczyno	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
354	Brzeznica	Czaplinek - Jastrowie	Destroyed during Fighting. Eventually liquidated by Russian	N
355	Annopole	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
356	Tarnówka	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
357	Lowisko	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
358	Zabrodzie	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
359	Wiesiolka	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
360	Ostrowiec Walecki	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
361	Klukowo	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
362	Wegierce	Wałcz - Złotów	Destroyed during Fighting. Eventually liquidated by Russian	N
363	Badecz	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
364	Gmuruwo	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
365	Rudna Wyrzyska	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
366	Mosciska Wyrzyskie	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
367	Stare	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
368	Sedziniec	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
369	Kostrzyne	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
370	Augustynowo	Wysoka Waskotorowa - Kocik Młyn	Destroyed during Fighting. Eventually liquidated by Russian	N
371	Srokowo	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
372	Stara Rózanka	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
373	Winda	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
374	Jankowice	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
375	Chojnica	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
376	Woplawki	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
377	Skierki	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
378	Niedzialki	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
379	Szczeciniak	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
380	Solanka	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 28: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
381	Silec	Linia Ketrzyn Waskotorowy - Srokowo	Destroyed during Fighting. Eventually liquidated by Russian	N
382	Rudwie	Winda - Barciany	Destroyed during Fighting. Eventually liquidated by Russian	N
383	Barciany	Winda - Barciany	Destroyed during Fighting. Eventually liquidated by Russian	N
384	Skandlawki	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
385	Lesk	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
386	Leknica Las	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
387	Wilczyny	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
388	Bajory Wielkie	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
389	Stary Dwór Barcianski	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
390	Gesiki	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
391	Glówczyno	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
392	Cacki	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
393	Bobrowo	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
394	Markuzy	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
395	Moltajny	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
396	Górki	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
397	Kurklawka	Barciany - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
398	Swietajno Waskotorowe	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
399	Olecko Waskotorowe	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
400	Siejnik	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
401	Kukowo Folwark	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
402	Kukowo	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
403	Kukowo Las	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
404	Zajdy	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
405	Gize	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
406	Dudki Oleckie	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
407	Kondratowo	Olecko Waskotorowe - Świetajno Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
408	Dworek Mazurski	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
409	Sedranki	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
410	Pienki	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
411	Dabrowskie	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
412	Lenarty	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
413	Biala Olecka	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
414	Budki	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
415	Drozdowo	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
416	Mieruniszki Folwark	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
417	Mieruniszki Poludnie	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
418	Mieruniszki Centrum	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
419	Mieruniszki Pólnoc	Garbas - Olecko Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	N
420	Dubasno	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N

Table 29: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
421	Ostrow	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
422	Rozanystok	Kamienna Nowa - Russia	Destroyed during Fighting. Eventually liquidated by Russian	N
423	Skrzeszew	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
424	Derlacz	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
425	Wojtostwo	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
426	Cegielnia Psucka	Legionowo Piaski - Nasielsk	Destroyed during Fighting. Eventually liquidated by Russian	N
427	Slodowiec	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
428	Zdobycz Robotnicza	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
429	Bielany	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
430	Mlociny Wies	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
431	Mlociny Park	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
432	Pancerz-Buraków	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
433	Lomianki	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
434	Palmiry	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
435	Palmiry składnica amunicji	Warszawa - Palmiry	The line was largely demolished by the Germans during their retreat	N
436	Podczerwone	Podczerwone	Destroyed during Fighting. Eventually liquidated by Russian	N
437	Gloski	Gloski	Destroyed during Fighting. Eventually liquidated by Russian	N
438	Warszawa Młocińska	Warszawa - Palmiry	Destroyed during Fighting. Eventually liquidated by Russian	N
439	Przysieka	Potok Lubuskie - Przysieka	Destroyed during Fighting. Eventually liquidated by Russian	N
440	Karolewo Bsz	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
441	Czerniki	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
442	Gierloz	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
443	Mazurolandia	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
444	Parcz	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
445	Radzieje Wegorzewskie	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
446	Kamionek Wielki	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
447	Przystan	Ketrzyn - Wegorzewo	Destroyed during Fighting. Eventually liquidated by Russian	Y
448	Zelazno	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
449	Oldrzychowice Klodzkie	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
450	Oldrzychowice SZKB	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
451	Trzebieszowice	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
452	Radochow	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
453	Ladek Zdroj	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
454	Ladek Stojkow	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
455	Stronie Slaskie	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
456	Krosnowice Klodzkie	Klodzko Nowe - Stronie Slaskie	Bridge over the Stronie river was blown up during fighting	Y
457	Bialograd	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
458	Laczenko	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
459	Leczno	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
460	Kamosowo Stanomino	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y

Table 30: Rail Stations Destroyed During World War 2

	Station Name	Line	Reason	Rebuilt
461	Kamosowo	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
462	Nasutowo	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
463	Zagorze	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
464	Rychowo	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
465	Podwilcze	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
466	Rarwino	Bialogard Waskotorowy - Rarwino	Bridge over the Nogat river was blown up during fighting	Y
467	Slawkowo Dwor	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
468	Slawkowo	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
469	Turwagi	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
470	Poganowko	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
471	Ketrzyn Poganowko	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
472	Langanki	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
473	Zwierzyniec Mazurski	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
474	Boza Wolka	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
475	Boze	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
476	Wyszembork	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
477	Popowo Saleckie	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
478	Mrynowo Mragowskie	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
479	Mragowo Park	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
480	Mragowo Waskotorowe	Ketrzyn Waskotorowy - Mragowo Waskotorowe	Destroyed during Fighting. Eventually liquidated by Russian	Y
481	Zalesie Ketrzynskie	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
482	Godzikowo	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
483	Nakomiady	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
484	Balowo	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
485	Salpik	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
486	Gniezdzienko	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
487	Knis Podewsie	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
488	Knis Podewsie	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
489	Glabowo	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
490	Ryn Strzelnica	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
491	Canki	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
492	Ryn	Slawkowo - Ryn	Destroyed during Fighting. Eventually liquidated by Russian	Y
493	Oborniki Wielkopolskie	Oborniki Wielkopolskie	Bridge over the Welno river was blown up during fighting	Y
494	Radowice	Konotop - Sulechów	Bridge over the Obrzyca river was blown up during fighting	Y
495	Cigacice	Konotop - Sulechów	Bridge over the Obrzyca river was blown up during fighting	Y

Figure 20: Registered Patents and Utility Models in Poland by Year

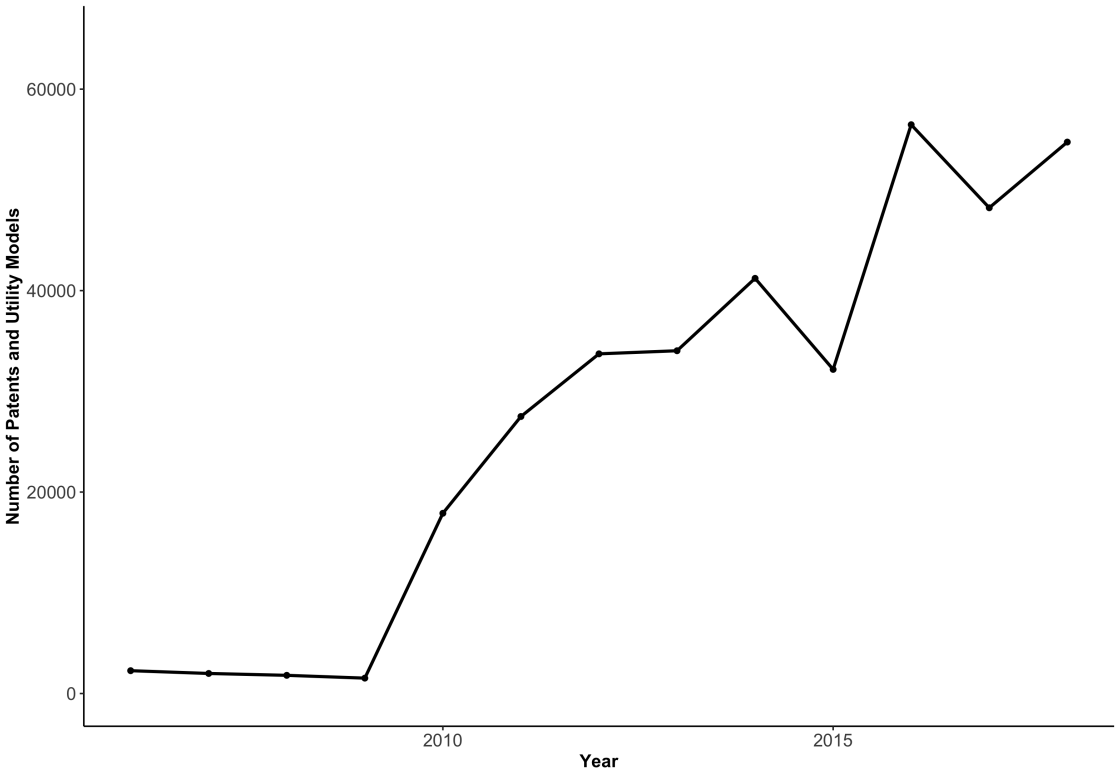
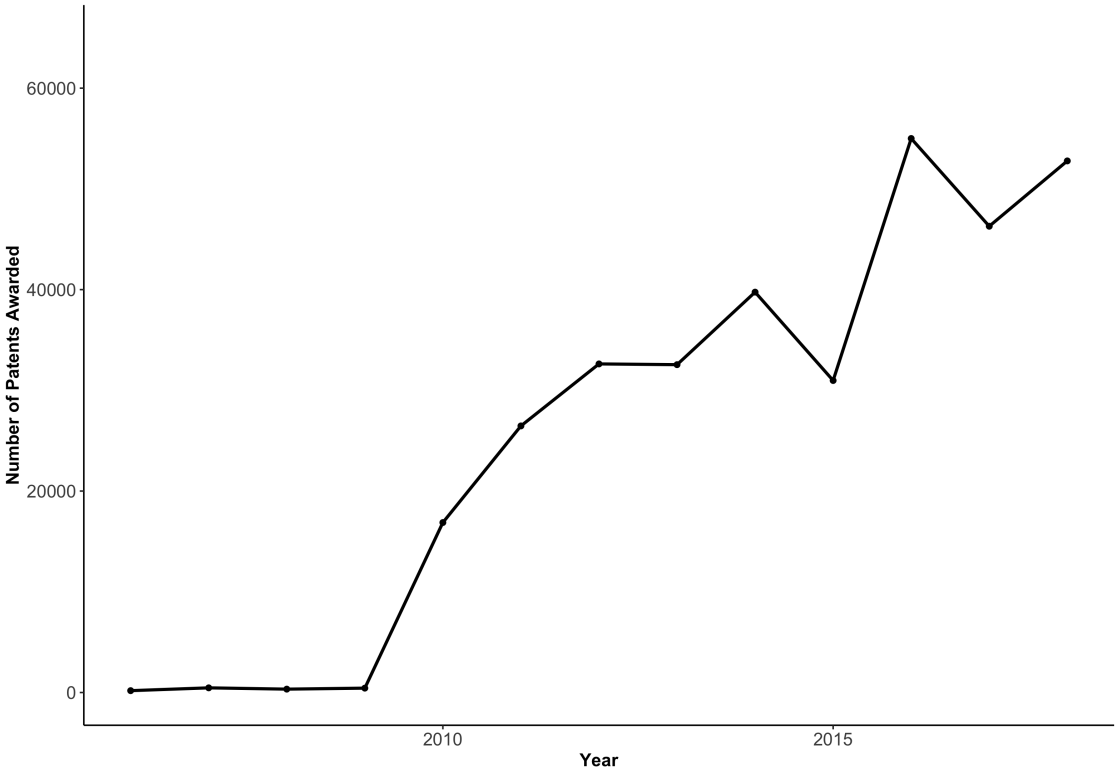


Figure 21: Registered Patents in Poland by Year



Mediation Analysis - Movement of People

Table 31: Results: Mediation Analysis - Movement of People

			95 % Confidence Interval	
	Estimate	P-Value	Lower	Upper
Indirect Effect:				
Patents → Mobility → Support for Populism	-0.448	0.0000***	-0.29	-0.615
Direct Effect:				
Patents → Support for Populism	-1.399	0.0000***	-1.12	-1.66
Total Effects:				
Patents → Support for Populism	-1.847	0.0000***	-1.53	-2.155
Proportion of total effect mediated:	0.243	0.0000***	0.167	0.33

Note: *p<0.05; **p<0.01; ***p<0.001

Figure 22: Mediation Analysis Results for Movement of People

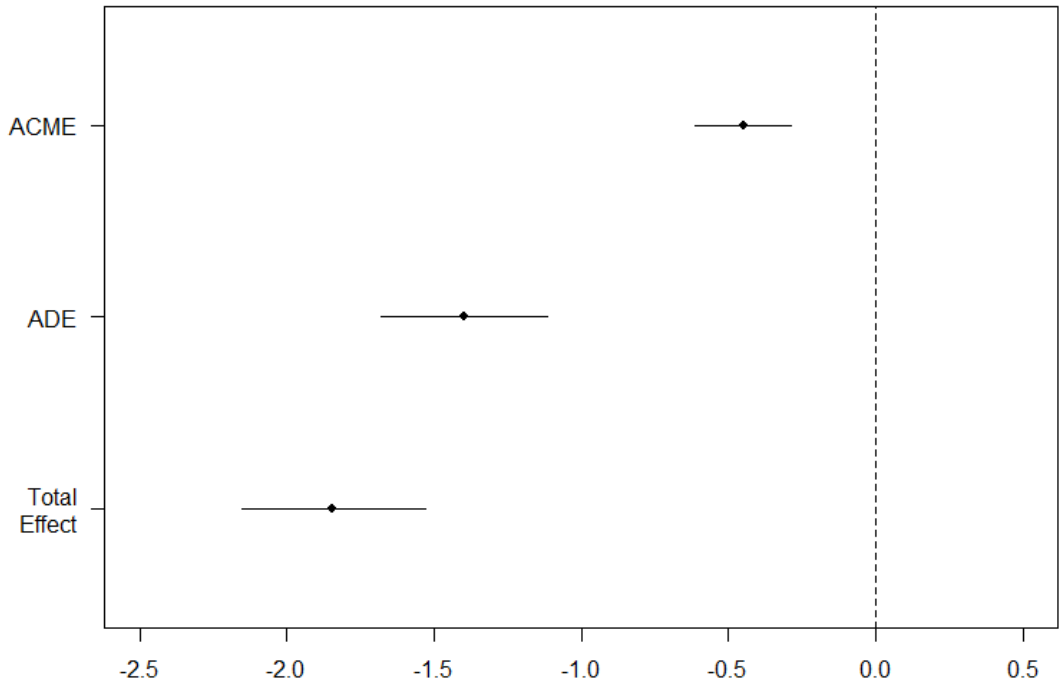


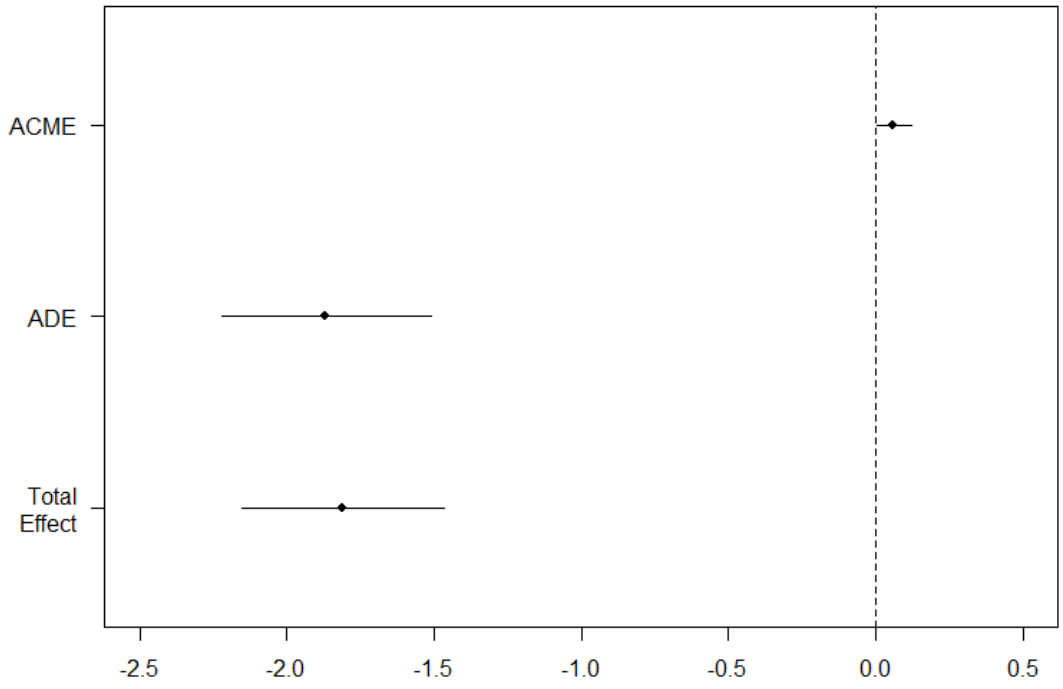
Table 32: Results: Mediation Analysis - Human Capital

			95 % Confidence Interval	
	Estimate	P-Value	Lower	Upper
Indirect Effect:				
Patents → Human Capital → Support for Populism	0.05719	0.036*	0.00424	0.12
Direct Effect:				
Patents → Support for Populism	-1.869	0.0000***	-1.51	-2.22
Total Effects:				
Patents → Support for Populism	-1.812	0.0000***	-1.46	-2.15
Proportion of total effect mediated:	-0.03155	0.036*	-0.074	0.00

Note: *p<0.05; **p<0.01; ***p<0.001

Mediation Analysis - Human Capital

Figure 23: Mediation Analysis Results for Human Capital



Paper 2: Principal-Agent Problems Within EU Funds: A Case Study of Patronage in Hungary

Kevin Aslett and Beatrice Magistro

Abstract

EU Structural Funds are responsible for both economic growth and democratic back-sliding in Post-Soviet states. This paper explains the latter of these two consequences by utilizing a principal-agent framework to analyze the distribution of these funds. We argue that the EU, the principal, is detached from the distribution and auditing processes, while member states, the agents, are in full control. As a result, member state governments can legally redesign the funds' distribution structure into a machine of patronage that undermines democratic institutions. This process is detailed through a case study of Hungary.

Introduction

The positive opportunities attendant with European Union (EU) membership, such as access to EU structural and cohesion funds (EU funds), have received considerable attention as one of the primary drivers of both democratization and economic development in Central and Eastern Europe (CEE) following the collapse of the Soviet Union (Kelley 2004; Simmons 2011; Vachudova 2005). These funds constitute a large part of GDP in recipient member states and they are key to supporting development in CEE (Fazekas & King 2018), but certain features of EU funds, such as the lack of constraints or mechanisms of punishment, have made it easier for these funds to be co-opted in regimes like Hungary, and allowed for democratic back-sliding (Dimulescu et. al. 2013; Fazekas & Toth 2016; Innes 2014). Studies suggest that, as in the case of development aid (Brautigam 2000; Knack 2001), EU funds can worsen corruption, by increasing the pool of public resources available for rent-seeking (Fazekas & King 2018; Mungiu-Pippidi 2014) and the European Union has been relatively ineffective at punishing member states for the subsequent corruption and democratic back-sliding (Donno 2010; Smith 2013).

This did not go unnoticed as European leaders, such as *Emmanuel Macron*, have criticized Central and Eastern European states.[1] In line with *Macron*'s call to arms, the European Union has both shifted funds away from Central and Eastern Europe and proposed reforms that link the receipt of these funds to the strength of democratic institutions,[2] through the introduction of a rule of law conditionality principle. Although correctly identifying the general problem, the proposed changes do not address the root of the problem within EU funds. In this paper, we analyze the implementation process of EU funds using the principal-agent framework. In line with Blom-Hansen (2005), we argue that even considering recent reforms to EU funds, the EU as a principal is detached from the distribution and auditing of these funds, while member states, as agents, are in full control. In countries where the rule of law is weak and corruption is already a significant issue (as in some CEE countries) EU funds can become just another source of graft after re-structuring of the distribution and auditing processes, and can ultimately contribute to democratic back-sliding. Other work has argued that corruption concerning EU funds can be attributed to widespread corruption issues already within the country (Dimulescu et. al. 2013), overly formalistic compliance, and EU funds overriding domestic accountability mechanisms in public organizations entirely dependent on external funds (Fazekas

[1] In 2017, Macron began accusing CEE countries of hijacking and called for reform (Barker & Byrne 2017).
[2] Macron also proposed that European Union Structural Funds be linked to corporate tax rates (Chassany 2017) or certain social changes (Barker & Byrne 2017).

& King 2018). Although we agree that these factors do indeed play a role, we argue that the inherent mechanism that allows these issues to come to life is the principal-agent problem within EU funds. This is detailed in this paper through a case study of Hungary, the most prominent example of democratic backsliding among CEE countries.

Principal-agent problems arise when the motives of the agents differ significantly from those on whose behalf they are operating, the principals. In the context of EU funds, the EU acts as the principal, while member states act as agents. The objective of the EU Funds is the promotion of EU's goals and principles,[3] while making sure that the member states are not violating the financial interests of the EU by fraudulent or corrupted practices. However, the EU can only ascertain imperfect information on the actions of member states, and control over national and sub-national governments is limited given the high costs of sanctioning and monitoring. The combination of conflicts of interest, asymmetric information, and potential for moral hazard makes it necessary for the principal to set up a contract that includes oversight, incentives to comply, and sanctions in case of deviation from the stated course of action (Moe 1984). In practice, to overcome asymmetric information and moral hazard problems, the EU has for the most part relied on building legal constraints (conditionalities), but this strategy has had marginal effects, as enforcement from the EU level is non-existent (Viță, 2018). Conditionalities have been ineffective, because, as this paper will elucidate, the responsibility of the distribution and monitoring of EU funds is entirely in the hands of the agents, i.e., domestic actors. The insulation of member states from the international organization level to manage EU funds allows member states to legally redesign EU funds and turn them into machines of patronage. Finally, we argue that the new proposal to introduce a rule of law conditionality, although potentially producing positive effects in certain areas, may not generate a change in incentives, as it adds one more legal constraint without reducing member states' full control over the implementation and monitoring of EU funds. This explains both the prevalence of corruption of EU funds and its consequences, including democratic back-sliding, in CEE states.

To further illustrate our argument, we provide an in-depth case study of Hungary, a back-sliding member state. This case study outlines the changes *Fidesz* made to the structure of EU funds to centralize and co-opt its domestic distribution. An analysis that tracks kickbacks to firms affiliated with *Viktor Orbán* lends support to our argument that it was full control the member state has over the implementation and monitoring phases that led to the largest increase in the flow of EU funds to these firms. Given these findings, the European Union should consider

[3] Generally, these goals are focused on reducing regional disparities in income, wealth, and opportunities.

expanding its influence past tracking rule of law and judicial independence and into the structure of these distribution systems. This reform would consist of either taking part directly in the implementation process, thus aligning the principal and agents' incentives, and/or in the monitoring process, hence reducing information asymmetry.

We first present the current state of the art on patronage and democratic backsliding in Central and Eastern Europe, then we discuss the findings and importance of previous research on EU funds as sources of corruption and the principal-agent problem r. We then describe EU funds and specifically how these funds are structured at the distribution and auditing stages. The case study of Hungary is then investigated by detailing the changes to these structures to centralize control of these funds to partisan members. We find that it is not until *Fidesz* successfully re-structured EU funds for the 2014-2020 period that these funds became an effective source of patronage. We conclude by evaluating how current EU proposals will impact the outlined issues inherent with EU funds and whether the case study of Hungary can be generalized to other CEE states.

Patronage and Democratic Backsliding in Central and Eastern Europe

Democratic backsliding has been documented across multiple CEE states in the last few years (Bruszt 2015; Greskovits 2015; Kornai 2015; Krastev 2016). The choice of our case study is justified by the fact that the most prominent example of this phenomenon has been Hungary. Figure 1 shows Freedom Ratings on Political Rights (PR) and Civil Liberties (CL) from the annual Freedom in the World surveys from 1990 to 2019 for CEE countries. Both of these ratings are measured on a one-to-seven scale, with one representing the highest degree of Freedom and seven the lowest. It is no surprise that Central and Eastern Europe was considered a democratic success story in the 1990s, given how rapidly their democracies consolidated. However, since the 2010s the region has faced some serious democratic difficulties, more evidently so in the one-time democratic front-runners, Hungary and Poland. Since Fidesz's rise to power in 2010, Viktor *Orbán* has successfully managed to eliminate checks on the Hungarian executive, by undermining the separation of powers, the independence of the judiciary, and the freedom of the media (Kornai 2015). As shown in Figure 1, Hungary represents the sharpest drops in levels of political rights and civil liberties, and it was the first country of the CEE group to be downgraded to Partly Free by the Freedom in the World Survey in 2018. Perceived corruption as measured by favoritism of Government Officials in Hungary, presented in Table 1 also appears to have worsened the most in Hungary

Figure 1: Freedom Ratings on Political Rights (PR) and Civil Liberties (CL) from the annual Freedom in the World surveys from 1990 to 2019 for CEE countries. PR and CL are measured on a one-to-seven scale, with one representing the highest degree of Freedom and seven the lowest. Smoothed lines aid the identification of patterns in the presence of overplotting.

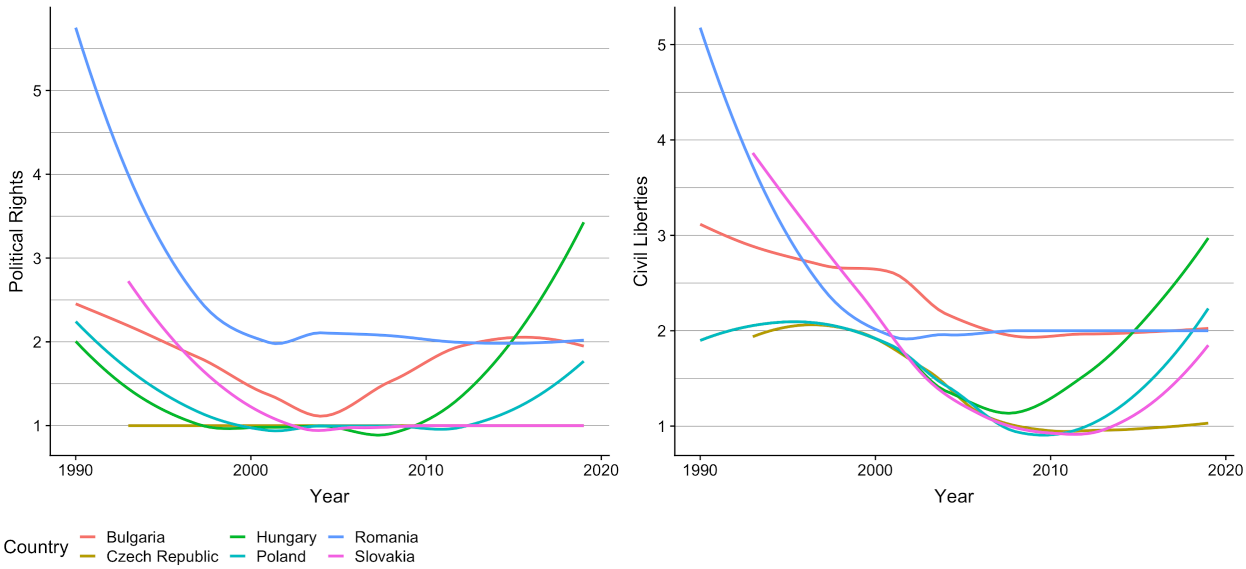


Table 1. Favoritism by Government Officials

	2008	2009	2011	2013	2015	2017	Change (since '11)
Hungary	2.4	2.4	2.8	2.5	2.2	1.9	-0.9
Estonia	3.5	3.6	4.0	4.1	4.2	4.2	+0.2
Czechia	2.5	2.6	2.4	2.4	2.8	2.6	+0.2
Lithuania	2.9	3.0	3.2	3.1	3.2	2.9	-0.3
Latvia	2.9	2.7	2.9	3.1	2.8	2.5	-0.4
Slovakia	.2.3	2.1	2.1	1.9	1.9	1.9	-0.2
Poland	2.5	3.1	3.3	3.1	3.1	2.8	-0.5

Source: World Economic Forum, Competiveness Report.

How does democratic backsliding matter for the EU and what is its connection to corruption? EU funding can serve as a source of economic rent, which can ultimately be distributed among those in power and their supporters. This kind of patronage limits political competition, a necessary condition for a healthy democracy, although it does not alone guarantee it. In young democracies (especially in Post-communist countries), those that face credible competition are much more likely to build institutions that constrain themselves and future electoral winners, because

it lowers their cost to exit (Grzymala-Busse 2007). Grzymala-Busse (2007) argues that robust political competition in CEE states has immediate effects on state exploitation and Weberian democratic standards (p. 15, footnote 39). Dimitrova (2018) notes that "state capture subverts the very fabric of young democracies, undermining both input legitimacy (political representation) and output legitimacy (effective public policies/universal provision of public goods) (Tudoroiu 2015). By subverting and using key institutions such as the judiciary, administrative or regulatory agencies, and parliaments, networks uniting politicians and businessmen create a permanent coalition of power, which affects both public resources and democratic accountability" (Dimitrova 2018: 263). In Hungary, party state capture occurred when a pillar of political competition, the social democratic left in both instances, was knocked out by a plethora of self-induced issues. Party state capture followed Fidesz's rise to power using conspiracy-rich nationalist appeals that closed down democratic competitions arguing they have failed 'the people' (Innes 2014).

Foreign aid without proper accountability measures and oversight stimulates rent-seeking behavior and to curtail the capacity of citizens to hold rulers accountable. High levels of foreign aid are associated with measures of backsliding (Djankov 2008). Increasing the pool of public resources in countries with already poor regulatory and accountability institutions will likely result in increased cost to exit as well as lower political competition creating a perfect storm of democratic back-sliding in Central and Eastern Europe. Thus EU funds are unlikely to have the same negative effect in Western European countries with strong and democratic institutions, but can easily become problematic in Central and Eastern Europe, as they may have the same issue that oil rents have had in countries with already fragile institutions. Furthermore, while nearly all regions in CEE countries are eligible for EU structural funds (and all CEE countries are eligible for the Cohesion Fund), in most other EU countries only a few regions are entitled to such funds, making it harder to centralize their operation and management at the national level. Conversely, since most regions in CEE states fall below the EU funds threshold of 75% of GDP, there are more incentives to centralize and capture these funds.[4]

[4] List of eligible regions from the 2014/99/EU: Commission Implementing Decision of 18 February 2014 setting out the list of regions eligible for funding from the European Regional Development Fund and the European Social Fund and of Member States eligible for funding from the Cohesion Fund for the period 2014-2020 (notified under document C(2014) 974), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014D0099, accessed in July 2020.

In the next section, we describe more in-depth how EU funds can become sources of corruption, and we set the stage for explaining, using the principal-agent framework, the mechanisms through which EU funds facilitate state capture.

EU funds as sources of corruption

Although our critique of EU funds is unique, in that we identify the mechanisms that make corruption possible within the process of management and distribution of EU funds, our pessimistic analysis of EU funds does not stray from the literature. Recent works suggest that EU funds are associated with increased levels of corruption (Bachtler & Gorzelak 2007; Bodensten & Kemmerling 2012; Bouvet & Dall'Erba 2010; Dellmuth, Schraff & Stoffel 2016; Dimulescu et.al. 2013; Dumčiuvienė & Adomynienė 2014; Fazekas & Tóth 2016; Fazekas & King 2018; Murakozy & Telegdy 2016). Bouvet and Dall'Erba (2010) look at several NUTS I and II regions in 12 EU countries between 1989 and 1999 and find that regions that are politically aligned with the national government get more structural funds compared to regions governed by the opposition. Murakozy and Telegdy (2016) obtain similar results for Hungarian municipalities, especially when the applicant is a public entity or the purpose of the project revolves around construction. Similarly, Dellmuth Schraff and Stoffel (2016), analyzing data from France and Italy, find that electoral institutions provide politicians with incentives to use structural funds to buy votes in NUTS 3-level counties. Bodenstein and Kemmerling (2012) find that the official allocation criteria are not sufficient determinants to explain the distribution of structural funds and that politics at the regional level plays a strong role in explaining the deviations from the official criteria. Other critiques show that EU funds are distributed to wealthier areas that supported coalition parties in the previous election (Bloom & Petrova 2013). Fazekas & King (2018) take these critiques one step further, examining the effects of EU funds on corruption in the Czech Republic and Hungary, and by proxy, institutions themselves.[5] They estimate that EU funds increase corruption risk by up to 34%. Overly formalistic compliance and EU funds overriding domestic accountability mechanisms in public organizations entirely dependent on external funds are to blame for this increase (Fazekas & King 2018). This dovetails with a complex process for the disbursement of EU funds, which becomes mostly accessible to already corrupt actors. Similar to Fazekas & King (2018), Mungiu-Pippidi (2014) concludes: 'In fact, most countries that received more funding regressed. This finding supports previous studies showing that higher aid levels lead in fact to worse governance outcomes in neo-patrimonial or competitive-

[5] In the language of Acemoglu & Robinson, Fazekas & King conduct a study of what happens when exogenous funds are injected into a region with (relatively mildly) 'extractive' institutions.

particularistic contexts' (Mungiu-Pippidi 2014, p.29). This paper attempts to take a deeper analysis to explain the mechanisms that generate corruption and weakened democratic institutions in newer EU states.

The principal-agent framework in the context of EU structural funds

The study of the implementation of EU funds has been dominated by the multi-level governance framework, which claims that decision-making competencies in the EU are not the responsibility of any one single actor, but are shared among actors at different levels (Hooghe & Marks 2001). However, this model fails to specify which actors and which levels are causally important and when. Hence, alternative frameworks have been offered to study who controls the implementation of EU funds. For this paper, we focus on the principal-agent framework and the central question we investigate is what allows corruption to occur. In outlining our framework, we borrow from Blom-Hansen (2005)'s work in the context of EU cohesion policy, complement it with recent changes to EU structural funds, and apply it to the case of Hungary.

The principal-agent problem can arise when actions by an agent impact the well-being of the principal. This problem is exacerbated most prominently when an agent has an incentive to deviate from the principal's interest and it is costly for the principal to observe that (Moe 1984). This leads to agent behavior that is very different from what is best for the principal. Agency loss measures the difference between the best possible outcome for the principal and the consequences of the acts of the agent. Research on delegation (Lupia & McCubbins 1998) shows that agency loss is minimized when the principal and the agent share a common interest, and when the principal is knowledgeable about the consequences of the agent's acts. Hence, to minimize agency loss the EU may (1) choose an agent whose interests align with theirs, (2) include conditionalities in the contract with agents so to force a change in incentives, (3) monitor the agent's actions, and 4) sanction agents who deviate from the contractual terms and thus enforce conditionality.

In the past three decades, EU funds have been used to promote economic and social cohesion amongst European regions. The primary objective of these funds is to make European regions more competitive (Blom-Hansen 2005; Dellmuth, Schraff & Stoffel 2016). At the same time, EU regulations prescribe a set of institutional guarantees regarding both the distribution of funds and the control of the process, to make sure that the financial interests of the EU are not violated by fraudulent or corrupted practices (Kallay 2015; Murakozy & Telegdy 2016). The sheer volume of these funds raises concerns over whether their implementation is in line with EU goals. If domestic actors have discretion when distributing EU funds, this increases the likelihood of corruption to enter the allocation process,

potentially affecting the effectiveness of such funds (Dellmuth, Schraff & Stoffel 2016). Even if only a small part of such funds were affected by corruption, the negative consequences would likely be quite pervasive in terms of misallocation and distorted economic incentives, harming the entire EU cohesion project (Fazekas & King 2018; Murakozy & Telegdy 2016). The effects are likely to be even more severe if corruption is linked to high-level politics, potentially affecting democratic backsliding (Fazekas & King 2018).

While EU funds originate from the EU, the projects are designed and implemented by member states (Blom-Hansen 2005; Kallay 2015; Murakozy & Telegdy 2016). These projects are supposed to achieve supranational priority objectives determined by the EU, while not violating EU rules on the distribution of these funds. At the national level, member states are required to draw up Partnership Agreements which have to focus on the thematic objectives set by the European Commission for the relevant seven-year period (Kallay 2015). The thematic objectives are quite broad, so they do not prevent member states from achieving their own objectives (Kallay 2015). Based on these Partnership Agreements, member states draw up Operational Programmes that must be approved by the Commission, and finally, projects are the lowest level of the decision-making process. Upon their accession to the EU in 2004, all new CEE member states became eligible for cohesion funds (open to countries with a GNI per capita at or below 90% of the EU average). Most NUTS 2 regions are also eligible for the highest levels of regional funds such as ERDF, ESF, etc. (open to EU regional statistical territories – NUTS 2 in the case of Hungary - that are at or below 75% of the regional average GDP per capita as well as unemployment indicators). Collectively, these pools are a significant funding source – as noted above, equal to around 3% of Hungarian GDP with significant direct and indirect effects on the national economy (KPMG 2016).

Since EU funds have such an important role, they come with strings attached — conditionality and strengthened oversight mechanisms (Fazekas & King 2018; Kallay 2015). Several laws regulate how corruption and fraud are defined, detected, and dealt with (Kallay 2015). Hence, the member states are not only expected to achieve the stated priority objectives, but they are supposed to also comply with a rather large number of formal rules and procedures regarding the distribution of EU funds (Murakozy & Telegdy 2016). However, the EU system of checks and balances is weak, allowing member states to easily remold objectives formulated at the EU level, and exposing funds to political manipulation and misallocation (Blom-Hansen 2005; Murakozy & Telegdy 2016). The Commission is the actor responsible to check that the EU budget is implemented correctly, however, its means and incentives to

detect and interfere with domestic funding strategies are limited, since oversight procedures and sanctions are costly (Blom-Hansen, 2005; Dellmuth & Stoffel, 2012).

More specifically, in an attempt to establish contractual solutions to surmount the principal-agent problem, conditionalities are an established EU governance tool. It is a requirement that EU spending complies with a set of EU policy standards and it is subject to withdrawal in case of failure to do so. However, there are systemic weaknesses in the design and application of these control mechanisms (Bachtler & Ferry 2015). In the 1994-2013 period, two conditionalities were present in EU funds: the macroeconomic conditionality attached to the cohesion fund and the infringement conditionality attached to structural funds. However, such conditionalities existed only on paper. The former singled out one country in its entire history (Hungary in 2012), while the latter was used to safeguard EU financial interests (Italy 2008) but the country never complied with the breached provisions. The 2014-2020 period experienced an expansion of conditionalities, however, enforcement has proven incredibly difficult (Viță 2018). Although legal constraints exist on paper, there has been practically no enforcement, hence sanctioning has not been an effective deterrent for agents, which leads us to the potential causes for such failure in the design and application of conditionalities.

As far as choosing an agent that shares the interests of the principal is concerned, currently, this is not an option, as the agents are the member states, who control the implementation of EU funds. Similarly, monitoring is fully controlled by member states. Each member state should designate three types of authorities: the managing authority, which manages funds and ensures that funds are allocated in line with thematic objectives and that both Community and national rules are respected; the certifying authority, which is entitled with certifying expenditures before submitting them to the Commission; and the audit authority, which is responsible for checking the functioning of the management and control system (Murakozy & Telegdy 2016). In the following sections on the structure of EU funds, we explain in depth how the distribution and monitoring of EU funds are entirely in the hands of member states, leaving plenty of room for corruption to impact the distribution of funds. Specifically, in the Hungarian case, Fidesz' centralization and co-optation of the distribution process worsened asymmetric information, by lowering the amount of information available to the principal (specifically lowering financial support for auditing procedures), and increased the costs of monitoring for the EU, the principal.

We investigate the mechanisms that make corruption possible with respect to EU funds and argue that the full control over the distribution and monitoring of EU funds allows member states to legally redesign EU funds and

turn them into machines of patronage given that member state governments' incentives diverge from the EU and the EU lacks the means and incentives to monitor member states' actions. This matters because if corruption distorts an economic-based allocation of EU funds, this may undermine the funds' effectiveness, as several pieces of evidence suggest it is the case (Dellmuth, Schraff & Stoffel 2016; Fazekas & King 2018; Murakozy & Telegdy 2016).

The implementation of EU Funds

Although the priorities for EU funds are decided by negotiations between the European Commission and national governments, the distribution of these funds is handled strictly within the member states. Specifically, we analyze two aspects of EU funds that are under the full control of domestic institutions: (1) the distribution and (2) auditing of these funds. Both are briefly outlined below.

The distribution of EU funds: Structure and control of managing and intermediate bodies

In terms of fund utilization, the managing authority and the intermediate bodies control the process. European Union law mandates that 'it is necessary for member states to designate a managing authority, a certifying authority and a functionally independent auditing authority for each operational program'.[6] According to Transparency International's analysis of the pertinent regulations:

> The managing authority bears the main responsibility for the effective and efficient implementation of the funds. Its main tasks are: (i) program management and monitoring, (ii) financial management and controls; and (iii) project selection.[7]

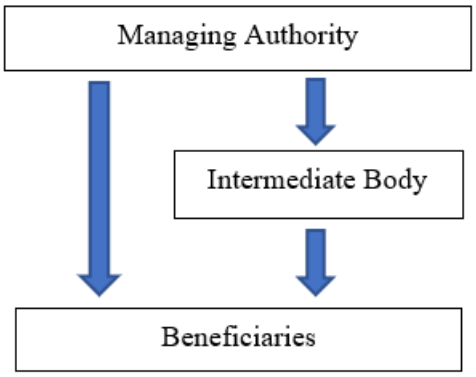
Member governments are required to maintain a structural funds office in Brussels and submit annual reports and audits to relevant EU bodies, but only projects with costs totaling over €50 million are subjected to a thorough EU approval process (a check to be eliminated in the 2021-2027 period) – a very high threshold in light of the scale of the overall budget and weaknesses in local governance capacity (Kállay 2015). Projects below this cost threshold, i.e., the majority of initiatives funded through these windows, are only required to adhere to a loose set of guidelines

[6] EU Regulation 1303/2013 of the European Parliament and the Council.

[7] EU Regulation 1303/2013 of the European Parliament and the Council, Recital 108.

designed by Brussels, but run exclusively by the domestic managing authorities and intermediate bodies. The managing authority serves a planning role and sometimes a distributive function, while the intermediary entity distributes funding and oversees implementation, with a certifying body which performs audit functions. In terms of fund utilization, the managing authority and the intermediate bodies'[8] control are displayed in figure 2 below.

Figure 2: Line of implementation of Fund:



Hence, since the distribution of EU funds is run exclusively by managing authorities and intermediate bodies, a political party capable of making legal changes to the structure of these EU funds (rules differ by member state) can centralize these bodies to have unchecked control of EU funds. Full control of these managing and intermediate bodies allows the party in power to change the rules of the game under which firms/government entities apply and win not only EU grants, but also the contracts associated with all EU-funded projects.

These institutions, and the Hungarian government's successful co-optation of them, will be tracked and discussed in the case study section.

The Auditing of EU funds

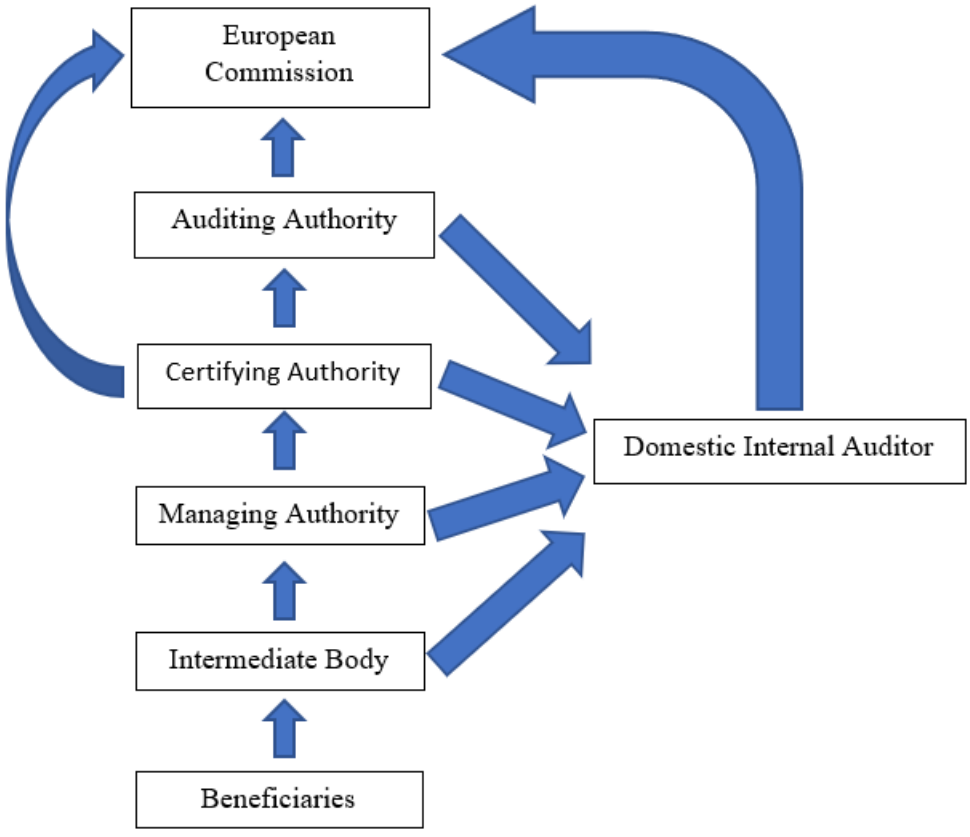
In terms of auditing, European Union law mandates that 'it is necessary for member states to designate a managing authority, a certifying authority and a functionally independent auditing authority for each operational

[8] Intermediate body defined as 'any public or private body which acts under the responsibility of a managing or certifying authority, or which carries out duties on behalf of such an authority, in relation to beneficiaries implementing operations.' (EU Regulation No 1303/2013, Article 2).

program'.[9] The certifying authority draws up and submits to the Commission payment applications, draws up the accounts, certifying their completeness, accuracy, veracity, and that the expenditure entered in them complies with applicable Union and national rules. 'The law allows the tasks of the certifying authority to be carried out by the managing authorities … The law [also] allows member states to designate intermediate bodies to carry out certain tasks of the managing or the certifying authority' (Kállay 2015, p. 26).

The structure of distribution is approved at the European level, but member states are given significant autonomy when choosing the systems by which funds are ultimately distributed. When auditing to determine if and where funds were misused, there is both a domestic and European mechanism. The domestic mechanism within each member state is displayed in figure 3.

Figure 3: Auditing Structure (line of auditing)



[9] EU Regulation 1303/2013 of the European Parliament and the Council.

Figure 3 illustrates how the European Commission depends on the certifying authority, auditing authority, and domestic internal auditor to acquire data on fund distribution within recipient member states. Given that the auditing authority receives most of its information from the certifying authority, the certifying authority defines what the auditing authority sends to the Commission. The certifying authority and the domestic internal auditor have primary control over the information the Commission receives.

The other auditing mechanism that allows the EU to conduct their own independent audits is through the European Anti-Fraud Office (OLAF). Once OLAF finds a case of fraud or misuse, they cannot prosecute corruption themselves, rather they rely on the national prosecutor, to whom the information is transferred. If the national prosecutor decides not to prosecute, OLAF cannot sanction the member state independently.

Within the auditing process, three positions are essential within the framework of EU funds: Certifying Authority, Domestic Internal Auditor, and National Prosecutor. These three positions could effectively shield misbehavior from the European Union.

In the following section, we provide evidence for our argument, explaining the process with which *Fidesz* co-opted EU funds by centralizing and placing *Fidesz* loyalists in the distribution process (in management and intermediate bodies) and the three institutions tasked with auditing EU funds (Certifying Authority, Domestic Internal Auditor, and National Prosecutor).

EU Structural Funds in Hungary I: Bidding, Allocation, and Centralization in Budapest

Hungary is an ideal place to study what has led to the co-optation of European Union Structural Funds given that it is a typical Central and Eastern European EU member state, a large beneficiary of EU funds, and like other CEE states has been accused of corruption within their system of EU funds distribution. During the 2000s Hungary was considered a successful reformer, with GDP per capita converging to the EU average and corruption perception indices close to the median for Central and Eastern European EU member states (Transparency International 2012). It is also one of many CEE states that have witnessed democratic back-sliding, comparable to Poland, Romania, the Czech Republic, and Croatia (Economist Intelligence Unit 2019), over the last decade. As a typical CEE state, we can extrapolate why EU funds have been turned into a system of patronage that has contributed to the erosion of democratic institutions across Central and Eastern Europe (Innes 2014).

We find that *Fidesz* has gained control of EU funds through both the centralization of the distribution system and placing *Fidesz* loyalists in leading positions of the managing authorities and intermediate bodies tasked with overseeing the distribution process. We outline how the ability to change the distributive system allows *Fidesz*, the agent, to funnel EU funds to loyal firms, to the detriment of the European Union, the principal.

Since its election, *Fidesz*'s centralization of the EU funds distribution system has been exceedingly thorough. Upon their rise to power, *Fidesz* was able to further increase the level of centralization by strengthening both the role of the various line ministries in Budapest and the overall oversight of the Prime Minister's Office (PMO), while reducing the role of regional operational programs. Before *Fidesz*' rise to power, the *Results of the Negotiations of Cohesion Policy: Strategies and Programmes 2007–13* (published by the EU)[10] stated that regions still 'played an important role at the national level with participation in project selection and monitoring as managing authorities.

Figure 4. Hierarchy of Operational Programs in 2007-2013 Funding

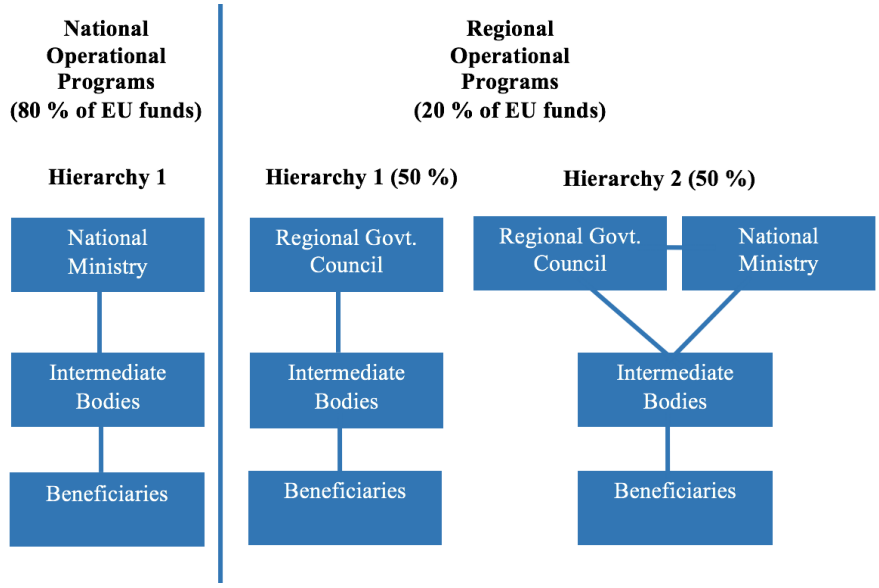


Figure 4 illustrates the organizational structures utilized during the 2007-2013 funding cycle, whereby national ministries maintained influence over approximately *90%* of EU structural funds and possessed sole oversight over *80%* of those funds. It is essential to note here that *Fidesz* inherited this institutional structure upon entering

[10]'Results of the negotiations of Cohesion Policy strategies and programmes 2007–13', EU Cohesion Policy, available at: http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/negociation/country_hu_en.pdf, accessed December 2019.

office. However, the party subsequently expanded its control over the distribution of EU funds by increasing the central government's role in the bidding process; overhauling the administration in charge of EU structural funds; replacing staff with *Fidesz* partisans; and repealing transparency laws (Nyikos & Talaga 2015). Each of these measures is discussed in turn below.

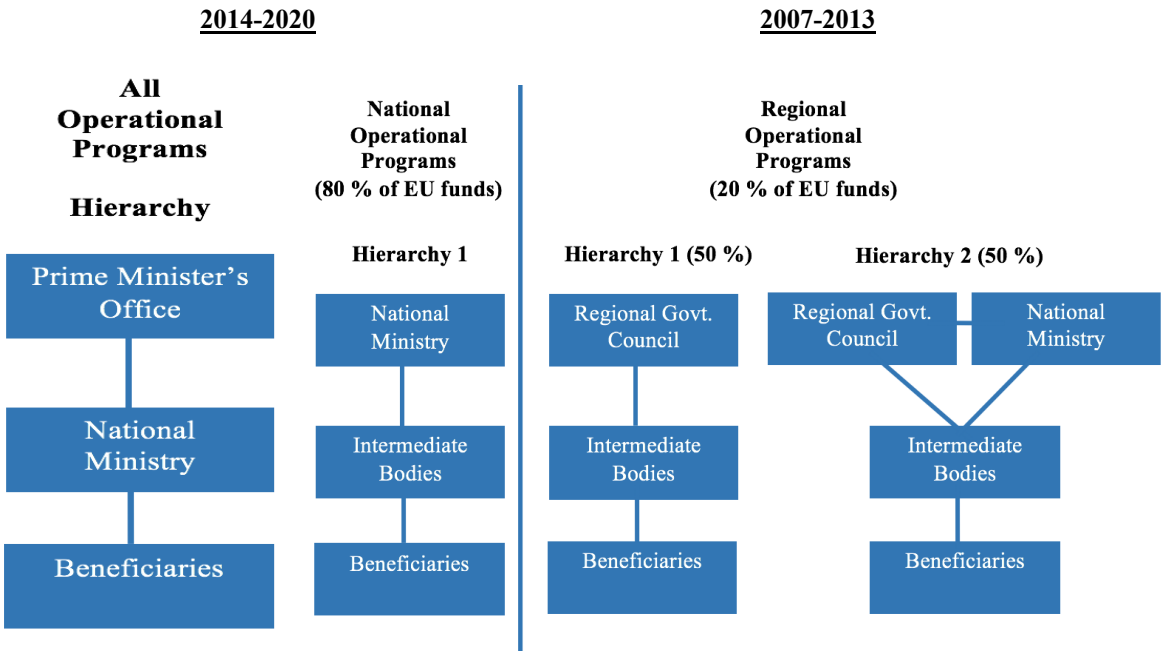
Fidesz streamlined and centralized the EU funds process, eliminating independent agencies, and consolidating central coordination of EU funds in the PMO. In 2010, the regime decreased the number of intermediate bodies that oversee bidding processes for national operational programs to centralize the system into the hands of *Fidesz* supporters (Nyikos & Talaga 2015). In 2011, *Fidesz*-controlled government departments placed more than a dozen administrative functions in the hands of party officials and eliminated the role of decentralized institutions, e.g., local government councils, in the Structural Funds process (Buzogány & Korkut 2013). The new '*Szechenyi* Plan' placed the independent NFU (National Development Agency), the main overseer of public procurement in Hungary, in a subordinate position to the *Fidesz*-controlled Ministry of National Development. This reform was completed in tandem with a 'house cleaning' of staff, mass lay-offs across all levels of the bureaucracy, completing the party's overhaul of the EU funds process. By 2012, the National Development Agency found itself under the direct control of the PMO and the regional development councils were eliminated (Magyar 2016). Brussels' interpretation of this change, in the previously cited 2007-13 summary report noted: 'At the end of 2012, the supervision of the NSRF implementation became part of the Prime Minister's office, under the control of a new State Secretary. This institutional change implied a further centralization and a greater speed of expenditure.'[11] This addressed concerns regarding low absorption rates, but gave the national government more control of distributing funds to supporters.

In addition to the centralization of these funds, all regional and national operational programs were by 2014 operated by *Fidesz*-controlled national ministries in Budapest. In 2014, central coordination efforts previously in the hands of the National Development Agency were placed directly under the responsibility of the PMO. This meant that for the 2014-2020 funding cycle, all EU funds were implemented by *Fidesz*-staffed ministries (intermediate bodies). Only three of the ten operational programs were operated by ministries other than the Ministry of National Economy,

[11] 'Ex post evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF): Task 3 Country Report Hungary, p. 15. Available at: https://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/expost2013/wp1_hu_report_en.pdf, accessed December 2019.

Ministry of National Development, or the PMO. The 2014-2020 period looked exceedingly different from the 2007-2013 structure, as illustrated in figure 5.

Figure 5. Hierarchy of Operational Programs in 2014-2020 Relative to 2007-2013 Funding Cycle.



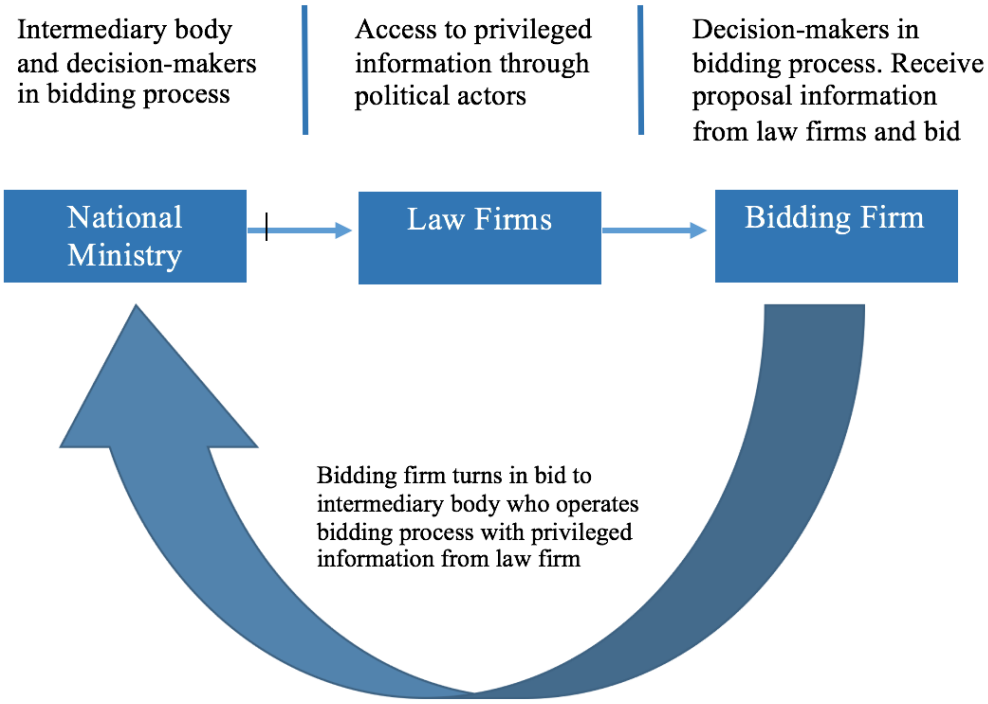
The number of managing authorities and intermediate bodies was significantly reduced and those organizations were subsequently run exclusively by *Fidesz* loyalists. Local governments lost influence over structural funds distribution over the last five years (Buzogány & Korkut 2013). Moreover, *Fidesz* stripped the vast majority of local governments of any purview over discretionary funds. As of 2016, 2,900 out of 3,200 localities in Hungary did not have access to any public discretionary funds. Absent these funds, regional councils are unable to apply for co-

funding from the EU, as they are unable to provide the matching funds required to receive EU support. This effectively limits EU grants to those firms, provinces, and few localities permitted access to discretionary funds.

Control of the intermediate and managing bodies tasked with distributing these funds proved particularly important as these entities appointed by *Fidesz* made the bidding process for EU contracts increasingly difficult. EU co-funded projects contract domestic private companies to fulfill particular duties, but the process is dictated by the member state where the project exists. In 2010, *Fidesz* implemented new regulations that increased the complexity of this bidding process while concomitantly raising the overall costs of public procurement projects, thereby limiting the pool of bidders to large firms with connections to the state (Magyar 2016).

Political connections also became necessary to navigate the newly complex bidding process as only law firms with inside information on how to correctly fill out the applications could guarantee the awarding of contracts (Lakner 2017). The law firms given this information were also designated to work with businesses that were run by *Fidesz* loyalists. This made it relatively simple for those overseeing the bidding process to abusively disqualify candidates that were not perceived to be *Fidesz* loyalists. Owing to asymmetric information and the absence of transparency or a thorough proposal review process in Brussels, these intermediaries were able to guarantee the selection of proposals that served the interest of *Fidesz*, regardless of quality or cost (Kállay 2015). The relationship, now commonplace in Hungary's public procurement process, is set out in figure 6 below.

Figure 6. EU Structural Funds Bidding Process in Hungary.



To eliminate the money trail that this process naturally creates (kickbacks from firms to law firms), *Fidesz* abolished laws requiring transparency in the accounting documents of law firms in order to obscure kickbacks law firms receive through this process (Magyar 2016). In addition to rent-seeking firms, corporate entities that win bids for EU funds can extract rent via several different strategies, including falsifying invoices and transferring the extra money to offshore accounts (Kállay 2015). These offshore flows have been facilitated by *Fidesz*' elimination of transparency laws over foreign asset transfers, thereby providing firms the confidentiality essential to hide rents from auditors (Magyar 2016, p. 93, 102, 264).

To ensure that the *Fidesz* political family could benefit from the vast pool of EU funds, the party passed legislation eliminating obstacles such as rules regarding conflict of interest (Magyar 2016). Individuals and firms closely linked to politicians (even *Orbán* himself) are permitted to participate in bidding for structural funds-based projects. Not only were the institutions overseeing structural funds managed by *Fidesz* loyalists, but so too were officials with purview over EU funds (e.g., those in the Ministry of Development and the Ministry of National Economy).

By 2013, the over-complication of the EU funds bidding process; the elimination of transparency laws over law firms and international fund transfers; removal of conflict of interest legislation; and the hiring of a new, loyal

bureaucracy were collectively able to shroud the EU funding process from scrutiny by Brussels and local civil society, allowing *Fidesz* to gain full control over the distribution process. Centralization was particularly salient as it facilitated coordination over the allocation of EU funds to firms and organizations that support *Fidesz*. The degree of centralization in the system that preceded *Fidesz*' accession to power considerably facilitated eventual, deeper consolidation once it gained power. By allowing it to have complete control of the distribution process, the agent, *Fidesz*, was able to co-opt the system for its benefit (funnel EU Funds to political allies), against the interests of the European Union, the principal.

EU Structural Funds in Hungary II: Budapest's Reforms of Auditing, Monitoring, and Indictments

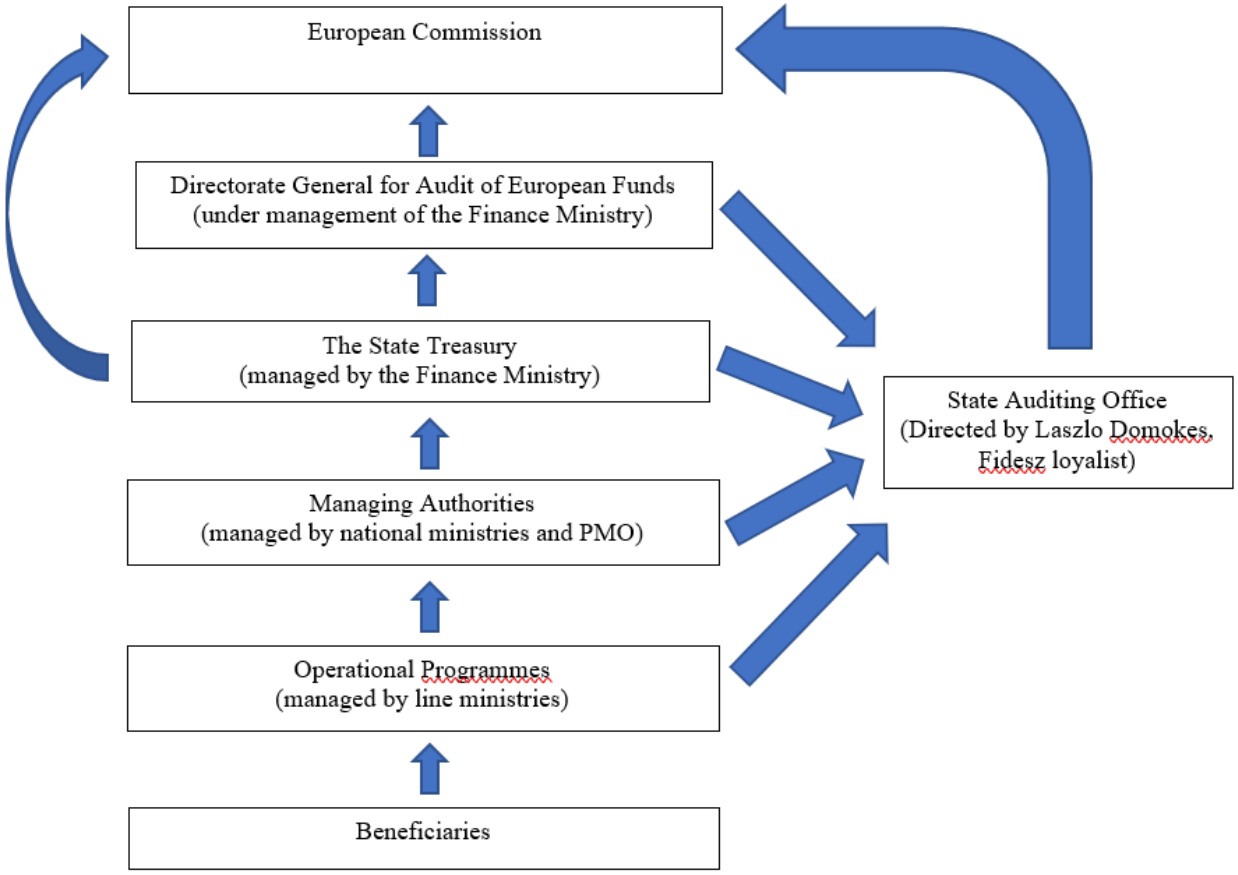
Although capturing the distribution process is essential to co-opt these funds, without control of auditing, this machine of patronage would likely be constrained by mass calls of corruption by the institutions overseeing this process. Agency loss increases with monitoring costs and asymmetric information, two factors worsened by shielding the EU from properly auditing funds within a member state. To do this, *Fidesz* transferred the management of the auditing processes of co-funded EU projects to its loyalists. During both the 2007-13 and 2014-20 funding period, only one certifying and audit organization existed (Nyikos & Talaga 2015). Therefore, in Hungary, the only bodies that report directly to the European Commission are the one certifying authority, the one auditing authority, and the one domestic internal auditor. Placing these institutions under the directive of long-standing *Fidesz* loyalists was simple. Although relatively easy for *Fidesz*, this process stands in stark contrast to neighboring countries. In Poland, for example, there are 17 certifying and audit organizations, which makes shielding this process from the EU much more difficult. The system that *Fidesz* inherited likely made the process outlined below smoother than in other member states.

The certifying authority is the first level check, submitting expenditure declarations to the Commission. The State Treasury, under the authority of the Minister of National Economy, is assigned to act as a certifying authority. The State Treasury, run by *Fidesz*-loyalist *József Mészáros*, is under the purview of the Finance Ministry until recently directed by *György Matolcsy*, former Member of Parliament for *Fidesz* (2006-13), and subsequently governor of the National Bank of Hungary. Authority over the Finance Ministry was transferred to *Mihaly Varga* in 2013, who has been a member of *Fidesz* since its origins in 1988 (serving as its vice president in 2005-13) and a member of the National Assembly from 1990 until the present.

The audit authority is responsible for carrying out system audits and individual audits to ensure program efficiency and effectiveness. These documents are then submitted to the Commission through annual control reports and annual opinions. Authority for this in Hungary is controlled by the Directorate General for Audit of European Funds, an entity also under the authority of the Finance Ministry (Fortvingler 2013). Both of these institutions are also under the oversight of the State Auditor's office, the agency that directs internal audits of the auditing authorities and certifying authorities.[12] The State Audit Office is currently led by former *Fidesz* lawmaker *Laszlo Domokos*, prior to this appointment served as a *Fidesz* member of the National Assembly for twelve years.[13,14] Essentially all entities within the auditing system are managed by *Fidesz* loyalists who have a long history of serving *Fidesz* and are officially tasked with reporting to the European Commission any misuse of funds. These are the only domestic organizations that can formally prepare audits for the European Commission's use, thereby all official reporting on possible EU funds misuse to Brussels runs through the *Fidesz* 'chain of command' (Fortvingler 2013). [15] A lack of auditing from independent auditors who are not loyal *Fidesz* politicians will probably increase the likelihood of procedural indicators of corruption, which we test for later in the paper.

Figure 7. Reporting Lines for Auditing in Hungary (Managing Ministries/Directors)

[12] 'The structural funds institutional system in Hungary', available at: https://www.palyazat.gov.hu/the_structural_funds_institutional_system_in_hungary, accessed December 2019
[13]' Domokos László', available at: http://www.parlament.hu/internet/plsql/ogy_kpv.kepv_adat?p_azon=d003&p_ckl=39, accessed December 2019.
[14] 'The State Audit Office of Hungary - An Introduction', 2013, available at: https://www.aszhirportal.hu/en/presidential-greeting/the-state-audit-office-of-hungary-an-introduction, accessed December 2019.
[15] 'The structural funds institutional system in Hungary', available at: https://www.palyazat.gov.hu/the_structural_funds_institutional_system_in_hungary, accessed December 2019.



Outside of these domestic audit organizations the EU's anti-fraud watchdog OLAF, as noted above, can investigate cases of funds misuse or corruption. Ultimately reports are given directly to the member state in secrecy to protect the identities of the individuals involved. Therefore, it is up to the Hungarian government to decide whether to publish an OLAF report or not.[16] OLAF has raised concerns about specific European-funded projects in Hungary, but it relies on national prosecutors to investigate. In the 2017 OLAF report, Hungary had 49 investigations closed with recommendations to the national government, second only to Romania in numbers of investigations and more than double the 20 investigations conducted in Poland (a much larger recipient of EU Funds). Of the 49 cases referred to the Hungarian government, 20 had no action taken by local judicial authorities; 9 cases were dismissed; and only 8 were prosecuted. These developments are particularly disconcerting in light of the realities of the elimination of

[16] 'The OLAF report 2017', 2017, available at: https://ec.europa.eu/anti-fraud/sites/antifraud/files/olaf_report_2017_en.pdf, accessed December 2019.

judicial independence in Hungary discussed above. This would indicate that most misuses of funds found by OLAF are left unprosecuted by the judicial branch in Hungary.

The Ministry of National Development has taken on a significantly larger role in the process as described above. To take the central role in directing these funds it needed to increase its capacity to deal with the allocation of these funds. This increase in capacity was co-funded by EU grants displayed in table 2 (listed and discussed in more depth in the appendix). Once *Fidesz* came to power, EU grants began to be utilized to support the centralization of the EU funds process. This contrasts with the dramatic reduction in funding to support auditing organizations.

Table 2. Funds Allocated to the Ministry of National Development (in € - number of grants in parentheses)

Years	Total Received	Support for Intermediate and Auditing Organizations	Funding to Centralize Operations to Ministry	Creation/Support of other programs
2007-2009	84,566,857 (5)	68,982,175 (2)	0 (0)	15,584,681 (3)
2011-2013	77,818,247 (8)	0 (0)	9,525,380 (5)	68,292,867 (3)

Source: https://www.palyazat.gov.hu/tamogatott_projektkereso ; Authors' classifications

Table 2 demonstrates that before *Fidesz* took control, the ministry allocated just under €69 million of their €84.5 million (81.5%) in EU grants to support auditing and monitoring organizations of EU funds within Hungary. After *Fidesz* took control of the ministry in 2010, despite similar funding levels, no EU funds were used to support auditing and monitoring. Rather, a significant portion was allocated to centralize and to increase capacity at the *Fidesz*-controlled ministry. In 2012 and 2013, €1.5 million of EU funds subsidized the previously discussed centralization of laws and processes. Along with the implementation of new organizational structures, changes to impact assessments and strategies, and the new rules regarding bidding processes, the jurisdiction of the ministry over the EU funds allocation process was expanded. An additional €8.1 million of EU funds were allocated for capacity building in *Fidesz* controlled ministries. EU funding partly underwrote the process of centralization. This demonstrates a distinct change in the priorities of *Fidesz* versus *MSZP* (political party in power before *Fidesz*). *Fidesz* sought to centralize the system and limit resources to auditing institutions, which mirrors much of the conclusions drawn from the prior two subsections. Ultimately the practices outlined by Fidesz worsened asymmetric information, by lowering the amount of information available to the principal (specifically lowering financial support for auditing procedures), and increased the costs of monitoring for the EU, the principal. This created a situation ripe for agency loss that we witness in EU funds distribution in contemporary Hungary.

Hungarian Use and Misuse of Regional and Cohesion Funds: Funding Fidesz

EU funds have increased the funding pool available to *Fidesz* and allowed them to: (1) distribute rents to economic and political elites to consolidate support and (2) reward the political administration/bureaucracy through kickbacks from bid-winning firms. Furthermore, EU funds purchase the loyalty of the bureaucracy, weakening of opposition parties, and ensure the fiscal health of the *Fidesz* political regime - all of which have been elements of the neo-authoritarian rollback of democratic institutions (Bellin 2004). Given our previous analysis, we expect indicators of corruption to rise after *Fidesz*'s successful centralization and co-optation of the process through which EU funds are distributed and audited. Once the agent, *Fidesz*, was able to effectively raise monitoring costs, asymmetric information, and gain full control of the distribution during the 2014-2020 EU funds cycle, we expect to see *Fidesz* distributing rents to firms close to the party. To test our theory for when European Union funds were co-opted by *Fidesz* we look at three distinct periods: **2008-2010:** when Fidesz was out of power, **2011-2015:** when *Fidesz* was in power, but the new structure of EU funds had not been implemented and was not distributing funds yet (it takes two years for the new EU funding period to begin effectively distributing grants and awarding contracts). **2016-2018:** *Fidesz* is in power and the redesigned EU funds are distributing funds and awarding contracts. We would expect no or a small increase in funds funneled to these firms between the 2008-2010 and 2011-2015 when *Fidesz* comes to power, but a much larger increase when moving into the 2016-2018 period.

We analyze indicators in corruption in both grants and subcontracts awarded to firms to carry out European Union funded projects, but mainly subcontracts. For all contracts awarded for projects that receive European Union Funds we look at three common procedural indicators that have been used to identify grand corruption: (1) Award decisions not based on the lowest price of the bid ; (2) Shorter time periods between the initial call for proposals and the deadline for applications (3) Lower number of applications. We also analyze contracts and grants awarded to firms with a strong connection to *Fidesz*. We analyze the amount of EU Funds awarded to them as well as procedural indicators of grand corruption. Given our hypothesis, we expect that procedural indicators of corruption and funds distributed to firms connected to *Fidesz* are highest after which centralization of these funds has taken place. We expect small increases after *Fidesz* rose to power, but ultimately the largest increase during the 2016-2018 period once this system has been fully reformed.

EU Funds in Hungary

Between 2008 and 2018, 12,749 contracts were awarded to Hungarian firms from projects partly funded by the European Union. We display the proportion of award decisions not based on the lowest price of the bid during the time periods between the initial call for proposals and the deadline for applications and the number of applications each call for proposals received in Table 3. Explanations for how these procedural corruption indicators change over time are listed below.

Table 3. Procedural corruption indicators by time period

Measure/Period	2008-2010	2011-2015	2016-2018
Percentage of bidding criteria based on the lowest price	49.9	50.4	**22.6**
Average Duration of Call for Proposal (days)	43.85	44.7	**38.6**
Average Number of Applications (per 10,000 Euros awarded)	5.13	1.7	**0.50**

(1) Decisions based on factors other than the lowest price has increased

The simplest indication of restricted competition in line with our theoretical definition is when bids are not chosen based on the criteria of the lowest price. This allows for institutions to award contracts above-market prices and makes the extraction of corrupt rents more possible. It also complicates the auditing process as it is difficult to determine if the contract was rightly awarded. Hence, the incidence of this type of bidding is one of the most basic corruption proxies. This is also specifically important in the Hungarian case as audits of European Union funded projects in Hungary have accused contracts and grants of being drastically overpriced (European Parliament 2018: 5). Table 3 presents the average incidence of this type of bidding over three periods. The proportion of contracts without low price criteria increased slightly after *Fidesz* came to power, but decreased by 56 % after EU funds were centralized. The type of contracts changing between these time periods could explain these differences, so we run a simple linear regression controlling for the type of contract (Service, Works, or Supply contracts are all possible

categories) and the total amount awarded by the contract. We find similar results controlling for these other potential confounders (results for these models are presented in the appendix).

(2) Duration of Application Period

We also test if the duration of the application period – the number of days between advertising a tender and the submission deadline – changes over these time periods. If the application period is too short to prepare an adequate bid, it can serve corrupt purposes. It limits those that can apply and allows for the issuer to informally tell a well-connected company about the opportunity before others. Table 2 presents average application periods in three periods of interest for all 8,971 Hungarian calls for proposals funded by European Union Funds between 2008 and 2018 publicly available. There is almost no change once Fidesz enters power, but a reduction of five days in application period length in the 2016-2018 period. We find that application periods are lowest in the 2016-2018 period, while there is no difference once Fidesz enters power. The type of contracts changing between these time periods could explain these differences, so we run a simple linear regression controlling for the type of contract (Service, Works, or Supply contracts are all possible categories). We find similar results controlling for these other potential confounders (results for these models are presented in the appendix). We still find that calls for proposals during the 2016-2018 period was between four and five days shorter than in the other periods. Application periods were 12% shorter once Fidesz came to power.

(3) Number of applications:

Another indicator of restricted competition is when there are only a few applications for a contract. This allows institutions to award contracts at above-market prices and makes the extraction of corrupt rents more likely. We find that the average number of applications to win contracts falls once Fidesz enters power, but falls even lower after the EU Structural Funds are centralized. The type of contracts changing between these time periods could explain these differences, so we run a simple linear regression controlling for the type of contract (Service, Works, or Supply contracts are all possible categories). When we run a simple linear regression and control for the number of awards offered per contract and the type of contracts (work, service, or supply) we find similar results. The number of applications in the 2016-2018 period relative to the 2008-2010 period is halved. For two of the three indicators for procedural corruption, there is no increase when Fidesz comes to power, but red flags arise only after

European Union Structural Funds are fully centralized. For the third indicator of corruption, there is a reduction after Fidesz comes to power and again after EU funds are centralized, possibly indicating increases in procedural irregularities after both events.

Firms with Fidesz Connections

The previous subsection outlines increases in indicators of procedural corruption in all contracts awarded to firms from European Union projects, but we don't know if these firms were blessed with more contracts and grants directly from European Union funds or if these procedural indicators of corruption were apparent in contracts awarded to firms with connections to the Orbán regime. The following section presents evidence of both. Firms connected to Orbán witnessed large increases in EU contracts and grants and procedural indicators of corruption also appear to increase after European Union Structural funds were centralized in Hungary.

(1) Firms with connections

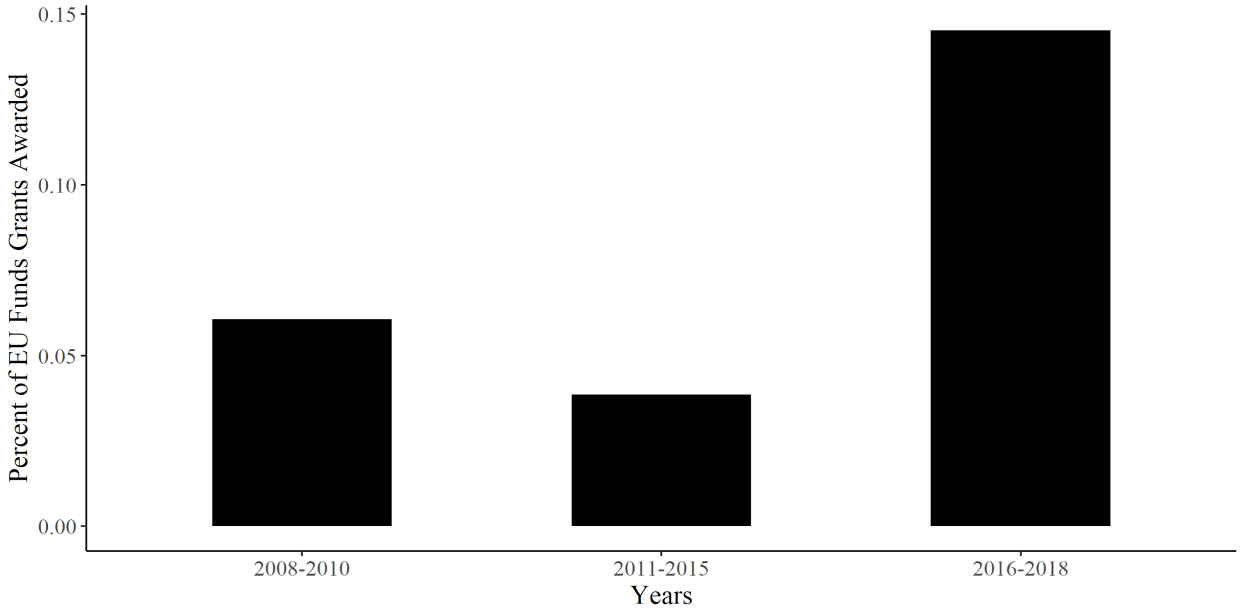
One particularly illustrative example of *Orbán* using these EU funds to reward economic actors and create a system of kickbacks is the football club in *Felcsút*, his hometown. Although there are multiple strategies by which *Fidesz* and their allied economic elites funnel EU money for their own gains, this paper notes with particular interest one of *Orbán*'s main hobbies and sources of wealth: the Foundation for the Upbringing of *Felcsút* Youth Athletes (FUNA). In 2004, *Viktor Orbán* established this foundation in his home village. The foundation not only dovetailed with *Orbán*'s passion for football but also provided a means for the PMO to receive kickbacks from economic elites who receive preferential tax or regulatory policy and national procurement and EU co-funded grants from *Fidesz.* In return for preferential treatment, firms contribute tax-free donations to FUNA. While as previously noted, *Fidesz* made contributions to all football clubs tax-free, FUNA has benefitted the most from these contributions. This advantage is not the subject of this section, rather analyzing the distribution of EU funds to firms that sponsor FUNA, allows us to analyze when *Fidesz* was able to effectively begin distributing rents (in the form of EU funds).

(2) Funds distributed to these firms:

Below, figure 8 presents the number of grants distributed to FUNA sponsors as a percentage of all EU funds distributed in the three time periods outlined earlier. This figure indicates that there is a slight decrease in EU funds

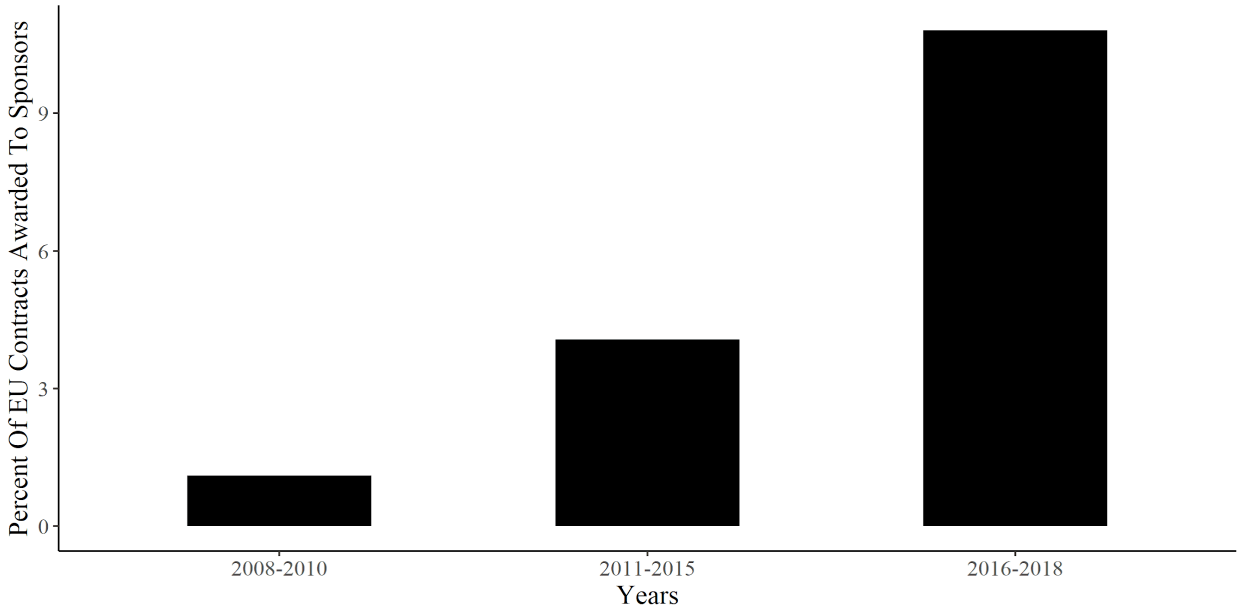
awarded to these firms as *Fidesz* comes into power, but a large increase (over three times the previous period) once the EU Structural Funds system has been redesigned by *Fidesz*.

Figure 8. EU Grants Won by PFLA Sponsors as Percent of Total EU Grants Awarded



Directly winning EU bids is one tool to support patrons, but a more hidden and nuanced approach adopted by the regime has been to award sub-contracts for these projects. Figure 9 displays the number of funds in contracts distributed to PFLA sponsors from 2008 to 2018 as a percentage of all EU contracts awarded in Hungary. Figure 9 indicates that there is a steady increase as *Fidesz* immediately comes into power (can be explained by the reduction in rule of law and judicial independence), but the largest increase occurs once the EU Structural Funds system has been altered and is distributing funds. To address confounding explanations, an analysis of when sponsors were founded indicates that all of these firms were established before 2005 (except for one in 2011, Búzakalász 66 Felcsút Kft.). Given that this company received no EU grants or contracts, this firm's later founding cannot explain the spike in EU grants and contracts over this period.

Figure 9. Contracts Won by PFLA Sponsors as Percent of Total Contracts Awarded



We also observe irregularities and strong indicators of corruption when we analyze where these sub-contracts are won and the process with which these contracts are distributed.

(3) Share of these funds that are from two different organizations: *Magyar Kogzut Non-Profit* and *Nemzeti Infrastruktúra Fejlesztő* (NIF ; National Infrastructure Development):

In competitive markets, it is unlikely that the same companies win all of the contracts of a given issuer, hence the very high share of the winning company within all of the contracts awarded by the issuer in a given period can indicate rigged competition. This has been identified as one of the most reliable "red flags" in the literature (Kenny & Musatova 2010). Two of the largest distributors of EU Funds are *NIF Zrt.* and *Magyar Kogzut Nonprofit*, two state-owned construction firms that are in charge of most large transportation infrastructure projects, funded by European Union Funds. Given that many firms that sponsor Felcsút are viable subcontractors for these projects (*Mészáros és Mészáros, Duna Aszfalt, STRABAG Általános Építő Kft.*, and *R-KORD Kft*) we analyze if contracts awarded to these firms increase over these periods. We find a dramatic increase in the percentage of contracts from these firms going to sponsors of FUNA over this period. After EU funds became centralized over fifty percent of contracts from *Magyar Kogzut* were awarded to Felcsút sponsors and over forty percent of contracts decided by the *NIF Zrt*. were awarded to Felcsút sponsors, a marked increase from before.

Figure 10. Percentage of contracts awarded to Felcsut sponsors by *Magyar Kogzut* (MK) and *NIF Zrt.* (NIF)

77% of all contracts to sponsors of FUNA were awarded from the *NIF Zrt.* or *Magyar Kogzut* and account for most of the increase in funds to these firms. In addition to these contracts awarded from the same organizations, the sources of grant money have also increased from only a few programs. Grants awarded to the Felcsút firms in the 2010-2015 period were awarded from a plethora of different EU funds programs: GOP, KMOP, TAMOP, KDOP, DAOP, KEOP. While grant money post-2015 came from only two EU funds programs: GINOP and VEKOP.

(4) Procedural Indicators of Corruption

We also find that procedural indicators for corruption for those contracts awarded to Felcsút sponsors were lowest in the period after European Union Structural Funds were successfully centralized. The table below shows that the percentage of bidding decisions based on the lowest price and the average duration of calls for proposals did not dramatically drop until the 2016-2018 period.

Table 4. Procedural corruption indicators by for contracts awarded to Felcsút sponsors

Measure	2008-2010	2011-2015	2016-2018
Percentage of bidding criteria based on the lowest price	61.9	53.4	**7.6**
Average Duration of Call for Proposal (days)	41.07	49.52	**36.73**
Average Number of Applications (per 10,000 Euros awarded)	1.63	0.28	**0.30**

No change in the average number of applications between the 2016-2018 period and the 2011-2015 period can be explained by an increase in FUNA sponsors applying for the same contracts and getting awarded different parts of the contract. Multiple large contracts in the 2016-2018 period were split between multiple Felcsút sponsors. This indicates that although many bids were made, rents could still be extracted. The evidence presented here indicates that once *Fidesz* redesigned the EU funds process of distribution and auditing within Hungary, a large increase in EU funds to politically connected firms affiliated with *Orbán* followed. This redesign was the most important reform that strengthened the clientelistic network that aids *Fidesz'* power consolidation.

Proposed European Union Legislation

Democratic back-sliding and a series of threats to the rule of law in EU countries (most notably Hungary and Poland) have led the EU to recognize that a generalized culture of lackluster monitoring of EU funds by member states should be revisited. Hence, the proposed plan for the 2021-2027 period of EU Structural Funds aims to further expand and consolidate the use of conditionalities, including the addition of a novel rule of law conditionality, applicable to all EU budget expenditure (Viță 2018). In its current form, the EU lacks sufficient means to uphold respect for the rule of law.[17] Furthermore, the proposed reform aims to punish offending nations in the wallet, by withdrawing EU funds to countries found to violate EU founding values, including respect for human rights, the rule of law, judicial

[17] There is the 'nuclear option' of the so-called Article 7 TEU procedure, which allows for the suspension of voting rights of member states found to be in 'serious and persistent breach' of EU values, however, this has to be unanimously supported, and especially in the case of Hungary and Poland this is unlikely to lead to any actual sanctions since they can count on each other's vetoes.

independence, and freedom of expression. However, the current proposal lacks any measures aimed at limiting the member states' full control over the distribution and auditing of EU funds, which we argue is ultimately the largest cause of corruption. If the EU funds distribution and auditing processes have been entirely captured by the central government as we demonstrate has been the case in Hungary, the likelihood that the EU will have the ability to monitor and enforce the newly introduced conditionality is low.[18]

On February 5th, 2018, the European Commission proposed 'the protection of the Union's budget in case of generalized deficiencies as regards the rule of law in the member states' and on December 17th, 2018, the committees on Budgets and Budgetary Control offered amendments on the proposal alluded to at the beginning of this paper. The proposal and the amendments offered indicate a shift by the European Commission to regain its leverage over member states. This rule of law conditionality attempts to reduce the negative or null effect of EU funds on democracy in some member states by enhancing the monitoring of these funds and by punishing generalized deficiencies as regards the rule of law through ultimate suspension. The recent proposal[19] lays down generalized deficiencies as regards the rule of law where they affect or risk affecting the principles of sound financial management or the protection of the financial interests of the Union, which includes five specific situations: (1) endangering the independence of the judiciary; (2) failing to prevent, correct and sanction arbitrary or unlawful decisions by public authorities, withholding financial and human resources affecting their proper functioning or failing to ensure the absence of conflicts of interests; (3) limiting the availability and effectiveness of legal remedies; (4) endangering the administrative capacity of a member state to respect the obligations of Union membership; (5) measures that weaken the protection of the confidential communication between lawyer and client. Furthermore, a generalized deficiency as regards the rule of law in a member state may be established when one or more of the following, in particular, are affected or risk being affected: (1) the proper functioning of the market economy; (2) the proper functioning of the authorities carrying out financial control; (3) the proper functioning of investigation and public prosecution services concerning the prosecution of fraud; (4) the prevention and sanctioning of tax evasion and tax competition and the proper functioning

[18] In addition, within the current system, the Commission ultimately depends on the justice systems of every country to prosecute violations involving the EU budget. This issue is also left unaddressed.

[19] 'MFF – Proposal for a regulation on the protection of the Union's budget in case of generalized deficiencies as regards the rule of law in the member states', 2019, available at: http://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-mff-protection-of-eu-budget-in-case-of-rule-of-law-deficiencies, accessed December 2019.

of authorities contributing to administrative cooperation in tax matters; (5) the proper implementation of the Union budget following a systemic violation of fundamental rights. The proposal also foresees creating a panel of independent experts (to be appointed in part by national parliaments and in part by the EU parliament) that would assist the Commission in identifying generalized deficiencies as regards the rule of law in a member state. Taking into account the judgments of the panel of experts and all other relevant information, the Commission will then notify the member state in question, along with the Council and the EU Parliament of the existence of potential risk for the financial interests of the EU. After hearing the opinions of the relevant country, the Commission will decide on the existence of a generalized deficiency, and this will be considered approved unless the EU Parliament or Council reject or amend it. This mechanism avoids unanimity and lengthy proceedings and is a direct response to breaches of judicial independence in Poland and Hungary.

This reform aims to address the problems identified with EU funds in this paper, specifically weakening the ability of these regimes to use funds for their clientelist purposes. It also targets democratic back-sliding on the issue of judicial independence and conflicts of interest among public officials. Given the breach of any of these measures, the European Commission would impose appropriate measures that include suspending, reducing and restricting access to EU funding in a manner proportionate to the nature, gravity, and scope of the deficiencies until they cease to exist. That leverage would appear to address issues with these funds and use these funds to affect behaviors from member states, a distinct shift from previous EU regulations. Unfortunately, the issues of EU funds that we raised are largely untouched by these EU regulations. Our illustration of the process of EU funds distribution in Hungary fully outlines the problems with structural fund distribution: full control by member states over distribution and auditing detaches the EU from the process and disables effective monitoring of these funds. Of the reforms proposed by the EU, judicial independence appears most likely to have a positive effect, given that control of the National Prosecutor's Office by *Fidesz* has allowed the shielding of misuse of funds. If the National Prosecutors Office were to be independent this would likely lead to a decline in corruption, although given that all other actors involved in this process are led by *Fidesz* loyalists and the full control *Fidesz* has over the structure of these funds, Hungary may simply re-structure these funds to complicate the monitoring process and make rent-seeking more difficult to spot for OLAF or a new independent national prosecutor to take action. Enhanced monitoring is a step in the correct direction, but inevitably, full control of the structure of these funds by a national political party could still shield them from monitoring. Given best practices in the foreign aid literature, it is important that the EU has a capacity to evaluate

funds based on feedback from the intended beneficiaries and scientific testing, which can then be used to reward success or penalize failure. Drawing upon this literature, we would suggest moving to audit, certifying, and managing authorities that have been co-opted by *Fidesz* to the EU level if EU funds were to continue to exist into the future, aligning the incentives of principal and agents and reducing information asymmetry. Although a neatly written proposal, this would result in a drastic shift of power from member states to the European Union, a reform unlikely to be easily agreed upon by the member states.

Discussion

In this paper, we argued that the EU, the principal, is detached from the distribution and auditing processes, while member states, the agents, are in full control. This allows member states to co-opt these funds for their own interest, which contributes to notable corruption that has fueled democratic backsliding in some EU member states such as Hungary. Our analysis posits that by 2014, *Fidesz* effectively centralized and controlled the distribution and auditing of EU funds, while shrouding the process from scrutiny by Brussels and local civil society. The degree of centralization in the system that preceded *Fidesz*' accession to power facilitated eventual, deeper consolidation once it gained power.[20] This brings into question the generalizability of the case study of Hungary to the rest of the Post-Soviet European Union states. Hungary's already centralized system contrasts with nearby member states. Hungary maintains only one certifying/audit organization with twenty oversight organizations managing fifteen operational programs. This stands in stark contrast with its Visegrad counterpart, Poland, which has seventeen certifying/audit organizations, and seventy-four organizations overseeing twenty operational programs. In Poland sixteen of the seventeen certifying/audit organizations are controlled by regional governments (many of which during Law and Justice's reign have been controlled by the opposition party). This puts forth more obstacles to the creation of a patronage machine for the current government in Poland. Although more audit organizations make this difficult, a general lack of EU oversight would still allow domestic parties to shield the monitoring of these funds from the EU, the principal. The decentralization of audit organizations may be an option available to the EU that would be more easily agreed upon by member states. The effect of decentralization on the distribution of these funds is an interesting question, but one for a different paper. Although the EU has taken steps to address recent cases of democratic

[20] A decentralized system of EU funds distribution in Poland may partly explain why this level of corruption is less rampant in Poland. Although the level of centralization of EU funds distribution is interesting, it is a discussion for a different paper.

backsliding, the new rule of law conditionality proposal does not address the inherent principal-agent problem underlying EU funds, which, as our evidence clearly showed, has contributed to corruption and the consolidation of power that is eroding democratic institutions in these new EU member states.

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Appendix

Table 4. EU Co-Funded Projects for Auditing and Centralization of Distribution During 2007-2013 Funding Period

Grant Number	Date	Award	Description
6.1.1– Financing an Intermediate Body	01/09/09	17,619,437,000 Ft (~68,825,925 Euros)	Financing of project implementation and project level financial and monitoring activities related to the Transport Operational Program
6.2.2 – Support From Managing Authority	02/02/09	3,600,000,000 Ft (~14,062,500 Euros)	Expert Support For Managing Support for Transport Operational Program
6.2.1 – Operation of the Monitoring Committee	06/05/09	40,000,000 Ft (~156,250 Euros)	Supporting the running costs of the Public Monitoring Committee and its subcommittees
6.1.0/C/09 - Promoting campaigns to promote sustainable livelihoods and associated behavioral patterns (awareness-raising, information, training)	07/31/09	128,005,076 Ft (~500,020 Euros)	'Speak to your father!' Campaign
6.1.1– Financing an Intermediate Body	08/26/09	261,673,472 Ft (~1,022,162 Euros)	Finances the activities of KIOP contributing organizational tasks
1.2.6/A-2011 - Simplification of laws and processes	03/13/12	165,109,320 Ft (~644,958 Euros)	Simplification of laws and processes in traffic authority and administrative and energy-related procedures
KEOP 8.1.2/B Az OP – Implementation of Minsitry	06/04/12	16,000,000 Ft (~62,500 Euros)	KEOP Special Operations 2012-2015
ÁROP 1.1.19-2012 - Preparation of Impact Assessments and Strategies	12/12/12	175,000,000 Ft (~683,593 Euros)	Preparation of Impact Assessments and Strategies in the Ministry of National Development
ÁROP 1.2.18/A-2013 - Organizational development program for state administration bodies	11/25/13	34,000,000 Ft (~132,812 Euros)	Implementation of the organizational development of the Ministry
KEOP 8.1.1 Az OP - technical-administrative implementation	07/09/14	17,383,006,971 Ft (~67,902,371 Euros)	KEOP contributing organizational tasks
VOP 1.1.1 - Ensuring the capacity of institutions	04/15/15	1,163,097,414 Ft (~4,543,349 Euros)	Managing of Environmental Programs
VOP 1.1.1 - Ensuring the capacity of institutions	04/15/15	901,290,659 Ft (~3,520,666 Euros)	Managing The Transport Operational Program
KEOP 7.14.0/15 - Preparation of the energy efficiency improvements of the Governmental Offices and Ministries	09/25/15	83,967,000 Ft (~327,996 Euros)	Application by the Ministry of National Development on the proposal for the preparation of the energy efficiency improvements of Government Office and Ministries in the period 2014-2020

Table 5. FUNA Sponsors (who received EU co-funding support and contracts)

FUNA Firm Sponsors (32)	Firm sponsors Who Received EU grants in 2008-2018 Period (12)	Firm sponsors Who Received EU Public Procurement contracts Between 2008-2018 (15)
Mészáros és Mészáros Kft.	Mészáros és Mészáros Kft.	Mészáros és Mészáros Kft.
Strabag Építő Zrt.	Strabag Építő Zrt.	MOL Nyrt.
MOL Nyrt.	MOL Nyrt.	Pharos 95 Kft.
Pharos 95 Kft.	Pharos 95 Kft.	R-Kord Kft.
Búzakalász 66 Felcsút Kft.	Duna Takarék Bank Zrt.	Békés Drén Környezetvédelmi, Víz- és Mélyépítési Kft.
Penny Market Kft.	Coca-Cola HBC Magyarország Kft.	Stadler Trains Magyarország Vasúti Szolgáltató Kft.
Duna Takarék Bank Zrt.	R-Kord Kft.	Magyar Suzuki Zrt.
Puskás Akadémia Sport Hotel	Koch és S Kft.	Diagnosticum Zrt.
FHB Jelzálogbank Zrt.	Sokon Kft.	Duna Aszfalt Kft.
Coca-Cola HBC Magyarország Kft.	Diagnosticum Zrt.	Agro-Felcsút
Békés Drén Környezetvédelmi, Víz- és Mélyépítési Kft.	Magyar Suzuki Zrt.	Fejér-B.Á.L. Zrt.
R-Kord Kft.	Békés Drén Környezetvédelmi, Víz- és Mélyépítési Kft.	R-Kord Kft.
VIVIEN Víz Kft.		Dolomit Kőbányászati Kft.
Stadler Trains Magyarország Vasúti Szolgáltató Kft.		VIVIEN Víz Kft.
Ilzer Italgyártó Zrt.		Olajterv Zrt.
CBA Kereskedelmi Kft.		
Gánt Kő és Tőzeg Kft.		
Alcsúti Arborétum		
Magyar Suzuki Zrt.		
Marchfeldrasen R Gyepgyártó és Forgalmazó Kft.		
Diagnosticum Zrt.		
Koch és S Kft.		
Duna Aszfalt Kft.		
Fejér-B.Á.L. Zrt.		
Olajterv Zrt.		
Sokon Kft.		
Eurovéd Security Team		
JAKO Magyarország Kft.		
Dolomit Kőbányászati Kft.		
Agro-Felcsút Kft.		
Atis-Fa Kft.		

Source: https://www.pfla.hu/?q=static/supporters

Table 6. When were FUNA sponsors founded? (First registered as companies)

Company	Date First Record of Company
Mészáros és Mészáros Kft.	**07/24/2001**
Strabag Építő Zrt.	**11/13/2002**
MOL Nyrt.	**01/03/1993**
Pharos 95 Kft.	**01/10/1995**
Duna Takarék Bank Zrt.	**09/27/2001**
Coca-Cola HBC Magyarország Kft.	**12/05/2005**
R-Kord Kft.	**1997 (exact date not available)**
OTP Bank	**11/28/1991**
Sokon Kft.	**01/10/1991**
Diagnosticum Zrt.	**01/06/1995**
Magyar Suzuki Zrt.	**05/05/1993**
Békés Drén Környezetvédelmi, Víz- és Mélyépítési Kft.	**08/22/2000**
Búzakalász 66 Felcsút Kft.	**02/22/2011**
Koch és S Kft.	**11/07/1997**

Source: https://www.ceginfo.hu/

Table 7. OLS Regression Results: Decisions based on factors other than the lowest price

	Model 1	Model 2
2011-2015	-.0153 (0.009)	-.005 (0.010)
2016-2018	0.266*** (0.014)	0.27*** (0.013)
Works Contract	0.042*** (0.012)	
Service Contract	-0.0899*** (0.0090)	
Contract Award Amount	0.000 (0.00)	

Observations: 12,749
R-squared: 0.04754
F-Score: 128.2***

Note: * p < 0.05 ; ** p < 0.01 ; *** p < 0.001

Table 7. OLS Regression Results: Application Period Duration

	Model 1	Model 2
2011-2015	1.1745***	0.858**
	(0.310)	(0.290)
2016-2018	-4.685***	-5.219***
	(0.299)	(0.293)
Works Contract	3.25***	
	(0.306)	
Service Contract	-0.412	
	(0.268)	

Observations: 8,972
Adjusted R-squared: 0.07452
F-Score: 181.6***

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 7. OLS Regression Results: Number of Applications

	Model 1	Model 2
2011-2015	-1.381***	-1.255***
	(0.310)	(0.307)
2016-2018	-2.643***	-2.83***
	(0.430)	(0.429)
Works Contract	-1.024*	
	(0.401)	
Service Contract	-1.306***	
	(0.323)	
Number of Awards	0.052***	
	(0.006)	

Observations: 12,749
Adjusted R-squared: 0.0122
F-Score: 32.13***

Note: * p < 0.05 ; ** p < 0.01 ; *** p < 0.001

Paper 3: Central Bank Independence: Creating a Political Food Cycle in the Developing World

Kevin Aslett

Abstract

Research on vote-seeking programmatic strategies has focused on cash-dependent programs, but rising food insecurity throughout the developing world has shifted focus to food-oriented vote-seeking programmatic strategies. To lower costs to research, I propose a novel method to measure food market interventions on the eve of elections. A diffusion-regression state-space model can be used to determine the difference between the actual food price and the counterfactual food price in urban areas. I validate this method and apply it to test whether limiting central bank lending to the government increases the likelihood of food-oriented vote-seeking programmatic strategies. I identify positive and negative food price shocks shortly before elections across 45 cities in 11 African countries during the food crises between 2007 and 2011. This method identifies negative food price shocks only in countries where central bank lending to the government is forbidden and positive price shocks on the eve of elections in countries where lending from the central bank to the government is a part of the central bank's charter. In addition, I exploit an exogenous shock to central bank lending in Niger and find that the elimination of lending from the central bank to a government resulted in negative food price shocks before the next election shortly thereafter. I also find that all negative food price shocks occur in urban areas with high levels of incumbent support. This indicates that central bank independence may have consequences for the type of vote-seeking programmatic strategies implemented on the eve of elections. This paper tests if fiscal constraints faced by incumbents dictate the strategies they choose.

Introduction

Political incumbents on the eve of elections are faced with a menu of political strategies to increase their vote share. Over the last fifteen years, food subsidization, food distribution, and other food policies have become a salient issue and subsequently a more popular choice by political incumbents. On the eve of the recent executive election in Venezuela (May 21st, 2018) the incumbent's campaign (Nicholas Maduro) distributed eggs and chicken in exchange for votes. In a campaign speech Maduro directly cited this program stating "I give and you give" (Mcdonald, DeKornfield, and Casey 2018, May 21). In 2009, the Indonesian regime strategically ensured that rice reserves were stocked to stabilize and lower rice prices on the eve of the election (USDA 2009). In 2010, Mozambique engaged in an extensive food subsidization program for the six months before their election (Pinstrup-Andersen 2016). These food-oriented policies differ from more popular cash-centered policies where incumbents use fiscal programs to distribute cash through food stamps and other public service programs. This paper tests if fiscal constraints faced by incumbents dictate the strategies they choose.

For researchers, there are methodological challenges to measuring where food-oriented programmatic strategies are implemented cost-effectively. Monitoring the distribution of food or local food policies in the food-insecure world can be very difficult. Announced plans by the government are easy enough to identify but we know that food policies are not implemented consistently across countries (Mason and Ricker-Gilbert 2013 , Olomola 2013), especially with votes at play. To identify significant food interventions, I contribute a new method. By creating a synthetic control, a counterfactual, I can identify how food prices vary in relation to their counterfactual on the eve of an election to determine if an intervention occurred. I validate and use this method to test whether fiscal constraints such as cutting off lending from the central bank to the incumbent government makes a food market intervention more likely. Specifically, this paper finds that incumbents faced with resource constraints such as limited lending from the central bank shift their electoral strategies from cash-dependent to food-oriented vote-seeking strategies. As pressure from international organizations, foreign investors, NGOs, and donors (Polillo and Guillén 2005, Acemoglu et al. 2008, Dincer and Eichengreen 2013) makes central bank independence more prevalent in the developing world, understanding the effect of these policies on incumbent political strategies become more important.

The remainder of this paper is organized as follows: first I discuss prior research on food policy and central bank independence and present a model and theory for how central bank independence affects the incidence of different patronage strategies on the eve of elections. I then describe my method for identifying interventions in the staple food price market on the eve of elections and validate it using the case study of the 2010 Presidential election in Mozambique. Using this method, I identify significant food market interventions

that occurred across 48 cities in 11 African countries during the food crises between 2007 and 2011 and find negative food price shocks only in cities where the incumbent government cannot receive loans from the central bank. I then exploit an exogenous shock on central bank independence in Niger to test whether food-oriented vote-seeking strategies are more likely after this shock. In the lead up to the election a year before this exogenous shock, staple food prices across Niger did not stray from the synthetic control. A year after this exogenous shock, staple food prices in four out of six cities dropped relative to the counterfactual before the next election. The four cities where staple food prices dropped, were all cities where the major opposition party received very little support. The cities that did not witness this drop in prices were cities where the major opposition party maintained high levels of support. This result supports the hypothesis that fiscal constraints such as limiting central bank lending to the government make a food-oriented vote-seeking strategy a more attractive option.

Background Literature: Food Policy Choice

Food policy is an increasingly important area to understand given food price volatility and food scarcity is becoming more prevalent and has recently led to civil unrest in the form of riots and civil war (Jones, Mattiacci, and Braumoeller 2017, Weezel 2016, Fjelde 2015, Smith 2014). Given these grim consequences, research has begun to explain the policy choices of governments around staple foods, especially when pressured by upcoming elections. Clear political incentives on both the demand and supply side of food markets have influenced government decisions (Swinnen et al. 2018)[1]. Rapidly increasing food prices have cost politicians elections (Watson 2017) and governments have responded by implementing price-stabilising food-oriented programs on the eve of elections, most notably in Mozambique, Senegal (Resnick and Mather 2016), South Africa (Kirsten 2012), and India (Iyer 2013, August 26). These food market interventions are more likely to occur in areas where the incumbent enjoys the highest level of support, supporting the core supporter model (Cox and McCubbins 1986). Regions in Malawi and Zambia that support the winning party in previous elections tend to receive more subsidized fertilizer vouchers than other areas (Mason and Ricker-Gilbert 2013). Nigeria's food reserve distribution also tends to follow this model. Olomola (2013) has shown that grain stocks are apportioned to regions based on whether those regions supported the president, rather than by measures of need. Given the electoral and civil consequences of staple food price volatility, it is not surprising that political incumbents attempt to control the market on the eves of elections. These studies often rely on extensive fieldwork due to data availability issues that create obstacles for meta-analyses of food policies (Martin-Shields and Stojetz 2019). Single country case studies are informative but lack external validity.

[1]For an overview of work on the counter-cyclical nature of food policy see B. L. Gardner 1987 and Swinnen and De Gorter 1993

To solve these problems I implement a new method that identifies food policy interventions on the eves of elections (Athey and Imbens 2017). This method attempts to lower the cost of research by analyzing the outcome of these policies: food price. By comparing how food prices differ from a synthetic control, the field can identify significant food price interventions on the eves of elections and test new food policy theories. To be clear, this does not replace extensive fieldwork as fieldwork is an important part of this work. It can be used in tandem with fieldwork or to test a phenomenon identified in the field across many other countries. This adds important external validity to field work.

Background Literature: Fiscal Constraints And Central Bank Independence

In this manuscript, I use a novel method to test a new theory about food-oriented policy. I propose that given constraints to cash resources political actors shift their electoral strategies from cash-dependent strategies to food-dependent ones. Given that central bankers provide cheap credit to political actors to fund cash-dependent electoral strategies such as clientelism (Ocampo and Cabrera 1980), I expect that limiting lending from the central bank to the government will force governments to distribute non-cash goods, given scarcity[2]. Limiting lending from the central bank to a government limits access to funds everywhere, but much more so in developing countries where credit is hard to come by. Given this, limiting lending form the central bank limits fiscal expenditure in election years (Agoba et al. 2020). With fewer fiscal levers to pull incumbents are more likely to engage in programmatic vote-seeking food policy strategies in election years. If so, it is likely they target areas with the highest level of support for incumbents.

Given that promises made by politicians mean little to voters in these areas, delivering goods may be the most effective strategy to win votes (Keefer and Vlaicu 2005). Often the distribution of these goods keeps the peace in this unequal and ethnically divisive states (North, Wallis, Weingast, et al. 2009). Extracting rents are necessary for most of those in power within these states. To stay in power most rely on paying off the military, rewarding economic elites, and paying off enemies so they don't oppose him. Given that bureaucracies are unable to effectively collect taxes, there is increased pressure to collect revenue in other avenues (Menaldo 2016). Fiscal constraints imposed by the relationship between central banks and elected officials may force political actors to turn to other areas in which they can extract rents, while at the same time winning votes (specifically, policies such as export taxes and selling food reserves at lower prices fall into this category).

[2]Consequences of this policy change have already been illustrated: In Colombia, incumbents reacted to an increase in central bank independence by increasing public wages and military spending (Echeverry 2002; Dávila Ladrón de Guevara et al. 2000).

Over time, central banks have become more independent from their elected officials as a part of larger democratic reforms (Haan et al. 2018, Masciandaro and Romelli 2019)[3]. The intuition behind this specific reform is simple: political incumbents have incentives to use monetary tools with a short-sighted perspective, especially on the eve of elections (Sargent, Wallace, et al. 1981, Barro and Gordon 1983). As markets became more efficient in the developing world, political intervention in monetary policy became riskier and central bank independence from political influence became imperative for the health of any market economy (Rogoff 1985, Lohmann 1992, Persson and Tabellini 1993, McCallum 1995). This check to detrimental political power, which removes decisions from "day-to-day" political pressures, is a key feature of democratic policy-making. This essence of "constitutionalism" is central to the functioning of democracy, by which certain decisions are made difficult to reverse (Drazen 2002, McNamara 2002). Others have argued that central bank independence violates some rules of democracy, specifically because their policies have significant distributional implications. Therefore they should be subject to greater democratic oversight (For detailed arguments see Johnson 2006, Eijffinger and Hoeberichts 2000, De Haan 1997, Levy 1995, Bowles and White 1994)[4]. I challenge the political accountability notion of central bank independence. Specifically, that political actors are more disciplined under an independent central bank (Bodea and Higashijima 2017). Although these actors clearly become more disciplined in fiscal terms, they make up for the loss of this tool by becoming more risk-acceptant in other policy areas such as those related to food[5]. In the next section, I outline this theory and then test whether central bank independence does indeed have an effect on the incidence of food-oriented vote-seeking programmatic strategies.

Theory

Liquid cash is the most desired good in any economy because of its convertibility. It has been used to purchase voters across low-income, food-insecure democracies through clientelist networks and vote-seeking programmatic policies. This strategy is reliant on cheap credit from the central bank (the only lending institution that offers favorable rates) that gives them access to the cash that funds these programs. In the case that the central bank is not allowed to lend to the government, easy access to the most fungible item for distribution (cash) is blocked and incumbents shift to the second most sought-after commodity item. In food-insecure regions of the world this is cheap, staple food.

[3]A shift that correlated with a pattern of delegations of policy decisions to independent experts (Gilardi 2002, Jordana, Levi-Faur, and Marın 2011)

[4]Also an academic debate around the democratic nature of the European Central Bank at the outset of its creation (Elgie 1998, Elgie 2001, De Haan and Amtenbrink 2000).

[5]Economic reforms have in the past changed electoral strategies. In Uganda, political actors responded to economic and political reforms by creating new districts to compensate for the loss of other patronage resources lost through reforms (Green 2010).

Staple foods are the second most valuable good behind legal tender and serve as a substitute[6] as they make up a high proportion of the consumption of poor voters. Distribution of food aid not only provides a good to voters, but it also reduces the price of food as it lowers demand for existing goods on the market. Given that these prices are already low, small nominal fluctuations in price can result in a large relative increase in voters' living standards.

Distribution of food aid has been used to distribute cheap or free food to constituents and keep prices of staple foods low on the eve of an election (USDA 2009, Nkonya and Barreiro-Hurle 2019). This can be done by emptying the country's food reserves or distributing food aid provided by International organizations, such as the FAO. Given that political incumbents look to maximize their own benefits on the eve of elections, this food policy likely targets cities in which their core supporters exist to increase turnout (Cox and McCubbins 1986). Given that voters in these poorer democracies maintain a high discount rate, and place a heavier weight on current conditions relative to past experiences (paralleling the Bartels voting model), I expect this to be an effective strategy that incumbents invest in[7] (Bartels 1996).

Given this, incumbents are more likely to intervene in food markets on the eve of the election if access to central bank credit is blocked, even if it sacrifices long term market stability. Costs of implementing these policies are often conferred after the election and are outweighed by the potential increase in support. Possible costs after the election are higher levels of price instability (as food price stabilizing measures have been drained) and monetary costs of filling depleted food reserves. Ultimately tax-payers pay for these food policies and these food policies serve as an illusion to voters. NGOs also pay for these policies as the World Food Program (WFP) and USAID often intervene in areas of high food insecurity when food reserves have been depleted.

This manuscript finds the political salience of staple foods and the low short-term cost of food-dependent programmatic policies lead political actors to treat food policy after central bank independence the same as they treat monetary policy before central bank independence. One advantage relative to the political business cycle is that they can potentially ameliorate the economic situation in the short term, while increasing revenues and/or rent potential. Certain policies such as food reserve distribution or the taxing of exports can increase short-term revenues, while also lowering prices on the eve of elections. Not all food policies produce revenues, but I expect these revenue-generating policies appear most frequently in states that have fiscal constraints imposed.

The following model, I more clearly illustrates how limiting lending from the central bank increases

[6]Other essential goods such as water or coal could be of similar value in these communities, but the cost of distributing water and coal is much higher than cheap staple food already stored in food reserves or policy such as an export ban

[7]Given previous studies on agricultural bias, applying this rational model to incumbents on the eve of elections is appropriate (Kasara 2007,De Gorter and Tsur 1991)

the costs to cash-dependent vote-seeking strategies and makes food-centered programmatic policies more attractive.

Model

1 Players and Preferences

There are two actors in the model: Government and a representative household. For simplicity, this model only uses two types of goods. One is food and the other is any other kind of good (medicine, water, clothes, etc.). Food in this instance encompasses cheap, staple food that most poor populations consume in food-insecure areas. Food can be purchased privately by the household or also provided by the government through the distribution of food aid. If food is provided by the government it does not affect the marginal utility the household gains from the food. The quality of the food is the same if it is privately purchased or provided by the government. Clearly, households prefer if the goods are provided by the government.

This model portrays household utility as a Cobb-Douglass utility function using these two goods,

$$U(a, g, p) = \alpha \ln(a) + (\alpha - 1) \ln(g + p) \tag{1}$$

Where a is the representative household's consumption of the private good, p is the private consumption of staple foods by individuals, and g is the government's provision of staple foods. The parameter, γ is the weight households place on all other goods relative to cheap, staple food. Households finance their expenditure dependent upon a budget constraint,

$$(1 - t)y = c + p, \tag{2}$$

where y is the household's income and t is the tax rate.

Incumbent political parties care about the consumption of households relative to their own ability to maximize their vote count on the eve of an election to stay in power. This model assumes that incumbent political parties want to maximize their vote count because competitive elections where an incumbent political party wins can spiral into political violence. Higher support reduces the likelihood of political violence post-election. In developing democracies, expenditures are distributed into two main strategies on the eve of elections to maximize vote totals. In one cash-dependent strategy, political parties redistribute resources

to voters to win their support (clientelism or programmatic policies) or to voters that already support them to increase voter turnout. Although ideal in that there are relatively low transaction costs to redistributing money from their coffers to voters, it becomes difficult to mask the use of government expenditures for clientelistic and patronage uses. Therefore, central bank loans often fund these programs, given the level of lending allowed from the central bank to the government (I). Another strategy, distributing food at lower than market prices increases levels of food consumed by individuals keeping income constant and increases the utility of voters. This in turn increases the likelihood that they vote for the incumbent.

The decision of which policy to engage in: clientelism/patronage (c) or food distribution (g) on the eve of election is demonstrated by a vote maximization function:

$$\phi(I, c, U) = I \ln(c) + U(a, g, p), \tag{3}$$

where $0 < I < 1$ and 0 means that central bank lending to the government is never allowed and 1 means there are no barriers to the central bank lending to the government. Given these parameters, the government chooses c and g. On the eve of an election, incumbent strategies are also constrained by an expenditure constraint,

$$ty = c + g \tag{4}$$

where t is the tax rate and y is income.

2 Equilibrium

I model the interaction between the household and government as a one-shot Stackelberg game where the government moves first. It is difficult for the government to monitor individual behavior, but easy for individuals to monitor government behavior in regards to food distribution, which impacts the household distribution of their disposable income to the two goods in this model. Solving for the equilibrium requires backward induction. The household's consumption of food is given by maximizing its utility function (with respect to p) subject to its budget constraint. This yields an optimal consumption of food by the household as

$$p^* = (1 - \alpha)(y(1 - t) - \alpha g) \tag{5}$$

The first-order condition given by Equation (5) demonstrates that the household's optimal expenditure on food is increasing by total household income and decreasing by how much the government distributes in food. The household allocates between food and all other goods, so if government distribution of food increases than household income used on other goods increase.

In the first stage of the game, the government must incorporate the household's optimal provision of goods, which is given by equation five into its vote maximization function. Once this substitution is completed, the government's optimal distribution of food is determined by maximizing the vote function (with respect to g) subject to its budget constraint. The government's optimal provision of welfare goods is given by

$$g^* = ty/(I+1) \tag{6}$$

Equation (6) demonstrates that given constant income, the government's optimal provision of food distribution increases when central bank independence is higher and vice-versa. This indicates that governments are more likely to distribute food to vulnerable populations when the central bank is not allowed to lend to the government.

Given this, I test the following hypothesss:

H1. *Negative staple food price shocks are more likely to occur on the eve of elections in countries where the central bank is limited in lending to the government than countries where the central bank can lend to the government.*

I also test where this food distribution is targeted. Plausibly it could be distributed to unattached (swing voters), the opposition, core supporters, or any combination of the three. Work in this area have argued that swing voters are not showered with benefits, but often disenfranchised by leaders in developing democracies (Robinson, Torvik 2009). Swing voters rarely exist in large numbers in these countries as most voters are already accounted for and vote based on ethnic cleavages (Burnall 2001, Nugent 2001, Posner 2005). Work has shown that opposition voters benefit from these policies (Kasara 2006), but this is rarely the case on the eve of an election. Post-election, there is strong incentive in developing countries to placate the opposition with the distribution of goods, which may ease tensions and lower the risk of civil conflict. This may result in taxing core supporters more (Kasara 2006). Incentives to provide public goods to opposition areas exist, but not with the intent of winning vote, rather increasing the costs to civil unrest. The eve of an election is a different period in which turnout may matter and creating incentives for turnout directly before an election seems rational. Given this, in the short period of before an election, I expect resources to be diverted to core supporters rather than other groups.

H2. *Negative staple food price shocks are more likely to occur on the eve of elections in cities with high levels of incumbent support than cities without high levels of incumbent support.*

The model outlined above does not address heterogeneous effects of policies on revenue generation (the left side of equation 4) or rent extraction that may fund more clientelism. Implementing an export tax could function to both lower prices and generate revenue through taxation to fund higher levels of clientelist/patronage (c). This could act to both lower prices and generate more funds for clientelist and patronage policies. This attempts to solve the gap in financing that barring the central bank from lending creates.

I test these hypotheses using a novel method (Bayesian structural time series model) for identifying staple food price shocks on the eve of elections.

3 A Bayesian Time Series Approach to Identifying Food Market Interventions

A lack of data on food policies, such as food distribution, has made identifying these food market interventions difficult. Successful studies on food distribution rely on costly fieldwork and are therefore limited to a few areas (Bobenrieth, Wright, and Zeng 2012, Abbott 2013, Fraser, Legwegoh, and Krishna 2015, Laio, Ridolfi, and D'Odorico 2016). To reduce the cost of studying the effect of food policies I propose a novel method of identifying food price shocks that are beyond normal fluctuations of food prices using a Bayesian structural time-series model.

A standard approach to causal inference in time-series cross-sectional data is based on a linear model of the observed outcomes in the treatment and control group before and after the intervention, a difference-in-differences (DID) design. It is relatively simple to estimate the difference between pre-treatment and post-treatment treated unit with the pre-post difference in the control group, but a DID relies on the assumption that the average outcomes of treated and control units follow parallel paths absent any treatment (Angrist and Krueger 1999, Angrist and Pischke 2008, Antonakis et al. 2010). In reality, actual parallel pre-treatment trends are very difficult to find and often those that are used are not supported by data. They also do not account for serial correlation. When fitted to serially correlated data these models often yield overoptimistic inferences with too narrow uncertainty intervals (Bertrand, Duflo, and Mullainathan 2004 ; Hansen 2007). This is of particular importance for this analysis as I am identifying shocks in over 80 cities and food-price combinations. It would be impossible to identify perfect control units that follow parallel paths, because for most cities and food prices, they do not exist. This paper uses a method that specifically solves this problem and makes wide-scale causal inference without identifying control units that follow a perfectly parallel path.

I use Bayesian structural time-series on the basis of a diffusion-regression state-space model to create a distribution of counter-factuals that I can compare to the actual price (for a detailed account of this method see Brodersen et al. 2015). This model solves the issues with a DID analysis that I highlighted above: (1) To solve the issues of static models that yield overoptimistic inferences with too narrow uncertainty intervals, this method utilizing a regression component that precludes a rigid commitment to a particular set of controls. It does so by integrating out our posterior uncertainty about the influence of each predictor as well as our uncertainty about which predictors to include in the first place. By doing this and allowing the model to flexibly accommodate different kinds of assumptions about the latent state and emission processes underlying the observed data (local trends and seasonality), I can avoid overfitting and narrow uncertainty intervals. (2) Static models also assume that the effect of a control series does not evolve over time. This approach deals with this by using a fully Bayesian approach to infer the temporal evolution of counterfactual activity and incremental impact. This should account for both serial correlation and heteroskedasticity within the pre-treatment data when calculated a counter-factual.

Using this approach I construct a synthetic control for each food price that acts as a control unit that should follow a parallel path absent any treatment. I construct this control using two sources of information: (1) the time-series behavior of the response itself, prior to the intervention (2) the behavior of other time series that were predictive of the target series prior to the intervention. In this case, the control series is composed of food prices in cities of neighboring countries that do not have an election during the period and have been found to correlate with the treated unit during the pre-treatment period. Given it received no treatment (no election occurred), I can there-in assume the relationship between the treatment and the control series that existed during the pre-treatment period will continue during the post-treatment period. This allows me to estimate the counterfactual time series up to the point in time where the relationship between treatment and controls can no longer be assumed to be stationary (treatment is received).

The framework of this model allows me to select a large set of potential controls by placing a spike-and-slab prior on the set of regression coefficients and by allowing the model to average over the set of controls (George and McCulloch 1997). In this case where I am creating a counter-factual for over 80 cities, this model is the perfect fit as I have significant numbers of controls (food prices in neighboring cities), but little knowledge of how they correlate. This model estimates the effect of these controls on the outcome of interest and creates a counter-factual time-series given the value of the target series. I am then able to subtract the predicted food price from the observed response during the post-intervention period. This produces a semiparametric Bayesian posterior distribution for the causal effect. I run 10,000 iterations for each food price to create this distribution. Using this distribution, I report the average effect and 95 % credibility intervals for the effect. Below, I report the average effect and the credibility intervals for each city and food

price that witnessed a positive or negative shock where-in the credibility interval does not cross zero. I also report the control time series that was used for each city in the appendix.

This general approach has been applied to various problems, including estimating the economic impact of the reunification of Germany on West Germany (Abadie, Diamond, and Hainmueller 2015), changes to mortality rates after health care reform (Sommers, Long, and Baicker 2014), and the effect of vaccines on hospitalizations from influenza (Bruhn et al. 2017). I utilize this approach and an abundance of available food price data (collected by the FAO) at the city level to detect food market interventions on the eve of elections. This solves challenges surrounding a lack of data on the effect of food policy on the eves of elections and where these policies are concentrated. This approach improves our ability to detect food market interventions leading up to elections across different areas (data permitting) with different local biases and trends. I validate this method first by testing if it identifies a known food market intervention in the rice market in Mozambique on the eve of their presidential election in 2009.

4 Segmented Markets

Basic microeconomic theory would suppose that we should never or rarely witness prices fluctuate across cities in the same city given market-clearing behaviors such as arbitrage, but I do identify varied prices over these short-term periods of three months because price transmission is slow in the food markets studied. Despite the increased opening of these food markets to global trade over the last 15 years, the rise in world food prices and food prices sub-nationally are not transmitted in a uniform and systematic manner to each food market and this has actually only worsened. In Africa, the variation in real prices post-2000 was substantially greater than that in the 1980s and 1990s (Naylor and Falcon 2010). Food-insecure countries have the lowest levels of price transmission globally (Cudjoe, Breisinger, and Diao 2010). Low levels price transmission between localities and world prices have been reported in almost all countries apart of this studyMali, Niger, Ethiopia (Baltzer 2013, Ghana (Cudjoe, Breisinger, and Diao 2010), Kenya, and Tanzania (Minot et al. 2010). This segmentation between local markets can be explained by a few different factors:

(1) **Transaction Costs:** Often remote areas in Africa are very difficult to reach due to poor transportation infrastructure, so if there are arbitrage opportunities, the revenue from the endeavor would have to outweigh cost of transporting goods, which is often extremely high. Work on transportation costs in Sub-Saharan Africa has found transportation costs of food are five times higher than elsewhere (Porteous 2019). Most differences in grain prices in Sub-Saharan Africa can be attributed to these high transportation costs (Brenton, Portugal-Perez, and Régolo 2014).

(2) **Information Asymmetry:** Arbitrage depends upon access to cheap information. However, in-

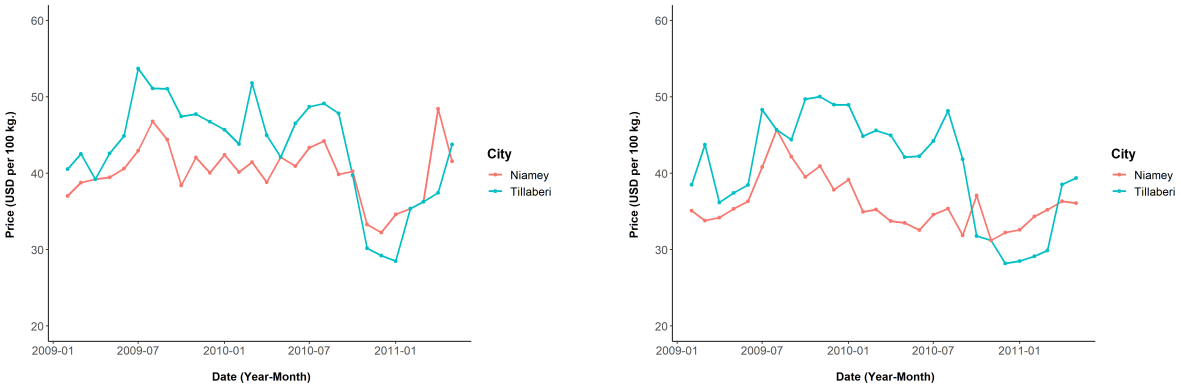
formation is rarely cost-less. Due partly to costly information, excess price dispersion across markets is common (Stigler 1961, Brown and Goolsbee 2002). This is especially the case in developing countries, where infrastructure is not built to easily communicate information (Jensen 2007). Technological advances in these countries have reduced price dispersion (one study has reported a reduction of over 15 % with the introduction of mobile phones), but it still exists. Areas that are geographically distant and smaller cities are less likely to witness price transmission between other cities or across borders (Aker 2010).

(3) **Government Intervention:** When governments are a part of the import and food distribution process in countries dependent on imports price-transmission is less likely to occur. In periods of food crisis, countries often play a major role in importing food, as it the Niger government historically has. Government intervention has slowed price transmission (Myers and T. Jayne 2012). There is a higher likelihood of political rents being extracted when the government facilitates price-transmission between borders and within the country.

(4) **Interpersonal Trust:** Interpersonal trust often facilitates trade. Farmers and traders tend to trade only within sub-national or ethnically homogeneous regions (or pay higher transaction costs for trading across ethnic lines) (Robinson 2016). Degree of price transmission varies widely within countries and is critical in determining local prices, particularly in more remote parts of a country (Conforti 2004, Abdulai 2000, Baffes and B. Gardner 2003). This also transcends ethnic bounds as low trust can also be found among traders and farmers of the same in-group (Fafchamps and Gabre-Madhin 2006, Thomas S Jayne et al. 2010).

Later in the paper, I investigate negative price shocks in Niger, which has seen low levels of regional market integration in sorghum markets due to poor infrastructure and government interventions. Arbitrage is rare in Niger, because most traders lack adequate finance to incur the transportation cost and pay high taxes imposed by the government (Zakari, Ying, and Song 2014). This leads to market segmentation witnessed in figures below that compare the prices of Millet and Sorghum in nearby cities. Markets may not converge for 6 to 12 months at a time. Given obstacles to price convergence in Sub-Saharan Africa, price shocks in localities across Africa occur and can be identified.

Figure 1: Food prices in Tillaberi and Niamey



(a) Millet prices

(b) Sorghum prices

Figure 2: Food prices in Agadez and Zinder

(a) Millet prices

(b) Sorghum prices

Method Validation: Mozambique in 2009

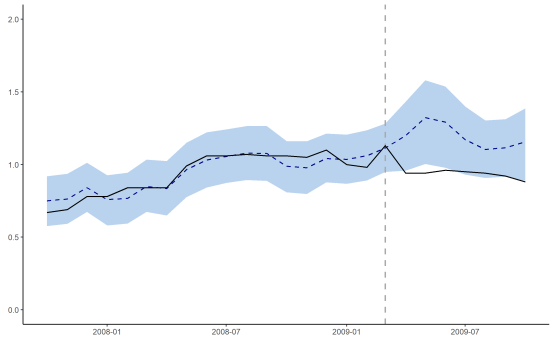
I validate this method's propensity to identify the market interventions by testing iton a known food market intervention in Mozambique on the eve of the 2009 election. About six months prior to the Mozambique election on the 28th of October, 2009, the Mozambique government implemented massive food and oil subsidies and other effective but costly trade policy measures that reduced rice prices on the eve of the election with their eyes toward re-election (Pinstrup-Andersen 2016). I test whether this method can identify this negative price shock.

I collected monthly city-level rice price data for staple foods from the Food and Agricultural Organization's (FAO) Global Information and Early Warning System (GIEWS) in Mozambique[8] from 2007 to 2010. To evaluate changes in rice prices on the eve of the election, I performed a simple comparison of actual

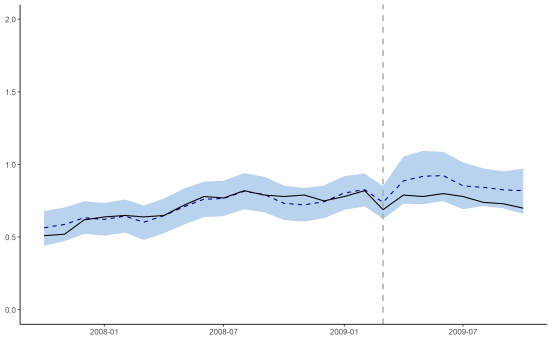
[8]This dataset focuses only on food insecure urban areas as chosen by the FAO and this manuscript only focuses on staple foods within that country of study

food prices and their counter-factual in the 6-month period before the election (when subsidies were implemented)[9]. The actual price with 95 percent credibility intervals is displayed for the four cities in Mozambique below in figures 3a-3d. Figure 4 displays the calculated average effect by month of during six-month pre-election period on rice prices with 95 percent credibility intervals. The price of rice in USD (per kilogram) is on the y-axis.

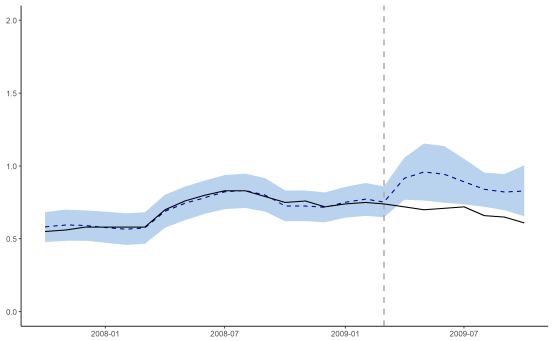
Figure 3: Actual Rice Price (black line) and Counterfactual Rice Price (dotted line) in Mozambique



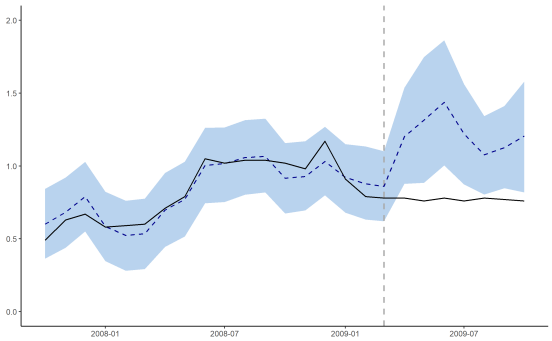
(a) Rice Prices in Manica, Mozambique



(b) Rice Prices in Maputo, Mozambique



(c) Rice Prices in Maxixe, Mozambique



(d) Rice Prices in Nampula, Mozambique

[9]I use an 18-month pre-intervention period to calculate the counter-factual and rice prices in cities from neighboring countries to create the counter-factual (only prices that correlated over 0.25 were used to create the counterfactual)

Figure 4: Average Effect of Pre-Election Period on Rice Prices Cities in Mozambique on the eve of the election in October, 2009

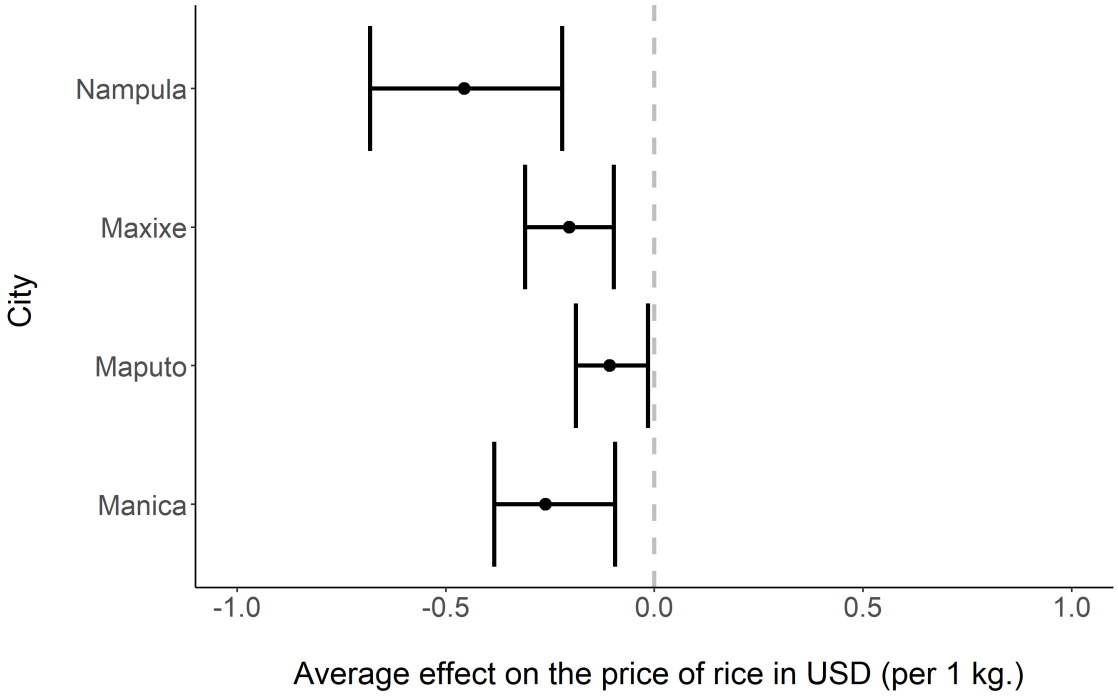
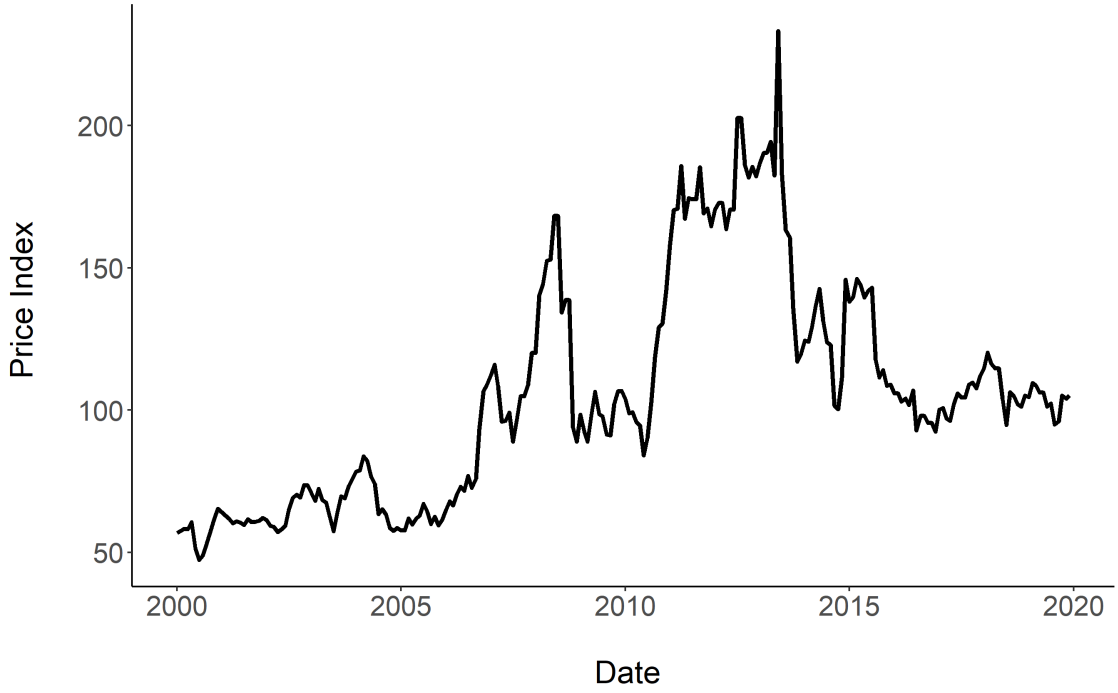


Figure 4 shows that rice prices significantly deviated from the counterfactual in the lead up to the election. According to this method in the six months leading up to the election prices were \$0.25 and \$0.50 per kg. lower than the counterfactual. Rice prices were about 20 to 40% lower than the predicted counterfactual (around \$1.00 per kg.). A negative effect was identified in each city (this policy was implemented nationwide). This result validates this method.

Cross-Country Analysis

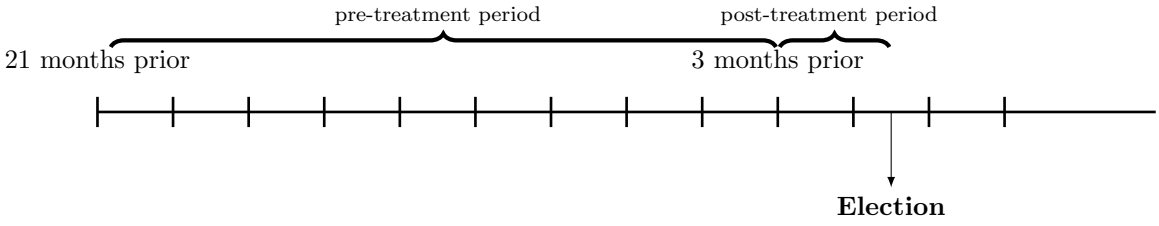
To identify market interventions across multiple countries, I collected monthly city-level food price data for staple foods (maize, sorghum, rice, and millet) from the Food and Agricultural Organization's (FAO) Global Information and Early Warning System (GIEWS) in Africa. I limited this data to the food crises in 2007/2008 and 2010/2011 in which food became a salient issue (as displayed in Figure 5).

Figure 5: Global Price of Sorghum (2010 = 100)



Source: IMF Commodity Prices

In total, I utilize urban price data from eleven countries and 61 cities and food type combinations that held executive and/or legislative elections during this period (see Table 1 of the appendix for all city and food prices used). In five of these countries (12 unique cities; 18 city-food combinations) central bank lending to the government was not allowed and in five countries (20 unique cities; 27 unique city-food combinations) central bank lending to governments was allowed [10]. I compare city-level price data in these cities to test the hypotheses outlined earlier using a novel method (Bayesian structural time series model) for identifying staple food price shocks on the eve of elections. I use price data between 21 months prior to the election and 3 months prior to the election as the pre-treatment data and use the food price data in the 3 months prior to the election as post-treatment. I choose this 3-month period as a default window, given that evidence from the field work suggests that clientelism usually begins about three months before an election (Wantchekeon 2003 ; Veenendaal 2019). I also control for the seasonality of prices (by month).



[10]Central bank lending policy is determined using past central bank charters

Results - Cross-Country Analysis

For the group of countries in which the central bank has been barred from lending to the government, this method identifies negative price shocks with over 95 % probability in 13 city-food combinations (7 unique cities located in 3 countries). The average effects of the pre-election period on food prices in these 7 unique cities are displayed below in Table 4[11] Figures displaying the predicted and counterfactual price of this staple food in the lead up to the election for all cities listed in Table 4 are available in the appendix.

Table 1: Cities and Countries with declining prices on the eve of the election

City	Country	Election Date	Food Food	Monthly Price Effect (USD/kg.)	Probability	Passed Sensitivity Checks
Tillaberri	Niger	01/2011	Sorghum	-0.1885	0.0002	✓
Agadez	Niger	01/2011	Millet	-0.1302	0.0002	✓
Zinder	Niger	01/2011	Millet	-0.0938	0.0002	✓
Dar Es Salaam	Tanzania	10/2010	Maize	-0.0936	0.0048	✓
Niamey	Niger	01/2011	Millet	-0.0705	0.0004	
Maradi	Niger	01/2011	Sorghum	-06433	0.0026	✓
Nairobi	Kenya	12/2007	Maize	-0.0347	0.0102	

In Tanzania, the negative price shock was likely caused by an increase in maize distribution and export bans on maize prior to the 2010 election (O'Gorman 2012). A table available in the appendix reports maize purchases and sales in Tanzania across the early 2000s. In fiscal years around the 2005 and 2010 elections, there are large increases in purchases and distribution of maize (Jesus Barreiro-Hurle 2012). In Kenya, the negative price shock was likely caused by an increase in maize distribution from food reserves on the eve of the election. This large scale food subsidization was possible due to the incumbent's control of food reserve distribution (Pinstrup-Andersen 2016). In Niger, this negative price shock was likely caused by the distribution of both food reserves and food aid allocated to the government for distribution on the eve of the election. This case is further investigated in a case study later in the manuscript.

All of the cities that witnessed negative price shocks were cities in which the incumbent maintained high levels of support. Cities where the incumbent had low levels of support (Eldoret, Kenya; Kisumu, Kenya; Dosso, Niger), no negative food price shocks were detected. This supports the second hypothesis presented by this manuscript.

For the group of countries in which the central bank is not barred from lending to the government, this method identifies positive price shocks with over 95 % probability in seven city-food combinations in seven

[11] I exclude cities in Niger that witnessed negative price shocks for two staple foods.

unique cities in three countries. The average effect of the pre-election period on food prices in these cities are displayed below[12]. Figures displaying the price of food in the lead up to the election for these cities are available in the appendix.

Table 2: Cities and Countries with declining prices on the eve of the election

City	Country	Election Date	Food	Monthly Price Effect (USD/kg.)	Probability
Kara	Togo	03/2010	Maize	0.1589	0.0004
Bamenda	Cameroon	10/2011	Maize	0.0872	0.0068
Karbongou	Togo	03/2010	Maize	0.0703	0.0422
Bamako	Mali	04/2007	Sorghum	0.0459	0.0104
Thies	Senegal	06/2007	Millet	0.03856	0.0016
Zguinchor	Senegal	06/2007	Millet	0.0262	0.021
Fatick	Senegal	06/2007	Millet	0.0213	0.048

In the next section I validate the negative price shocks I have identified with common sensitivity checks.

5 Sensitivity Tests

I validate the negative price shocks I identify by using one common sensitivity test for a Bayesian structural time-series model and three specific tests necessary for identifying food price interventions on the eve of elections.

The first common sensitivity check confirms that most of the negative price shocks that I identify are not dependent on specific variables used to generate the counter-factual. I re-estimate the baseline model for each city and food type to construct a synthetic food price. In each iteration, I omit one of the variables used to construct the synthetic control. This common test is used to understand the sensitivity of these results to the variables used to construct the synthetic control (Abadie, Diamond, and Hainmueller 2010). Although I expect slight changes with each iteration, the findings should not change for any city or food price combination. I do not find any changes from the results already discovered, except for the price of sorghum in Niamey on the eve of the 2011 election, but this is to be expected as only two variables were used to create the counterfactual sorghum prices in Niamey. Removing one of the two variables making up the synthetic control affects the synthetic control for this one individual city, food price, and election. This questions the robustness of this result for one individual city, food price, and election, but removing this from the analysis does not impact the conclusion.

It is possible that negative price fluctuations such as those witnessed on the eve of the election are common in these cities. If this were true, this approach has only identified common negative fluctuations

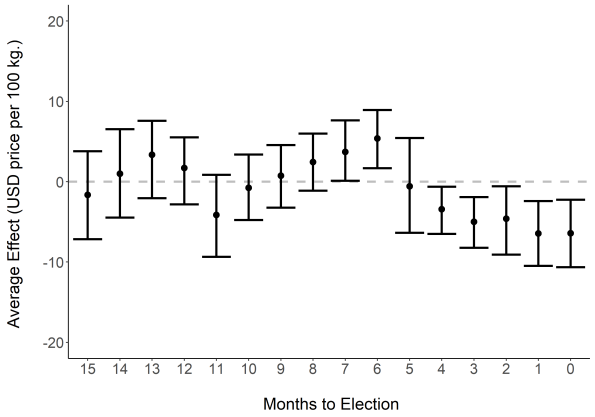
[12]if an effect is found one city more than once, I display the food price with the highest effect of the two

and nothing unique during the period leading up to an election. To test for this, I run a second sensitivity check that runs placebo tests during every possible consecutive three-month window in the two years after the election. This determines whether these cities witness similar negative price fluctuations as the election window in periods when there are no elections. Results from these placebo tests find only one negative price fluctuation of the same size in any of the cities and food prices in Niger and Tanzania (out of 168 placebo tests)[13]. In these countries the negative price fluctuations identified on the eve of the election appear to be rare. In the case of Nairobi, Kenya many placebo tests returned negative fluctuations of the same size or larger than those witnessed on the eve of the election. Therefore, negative fluctuations of this size appear common in Nairobi, Kenya.

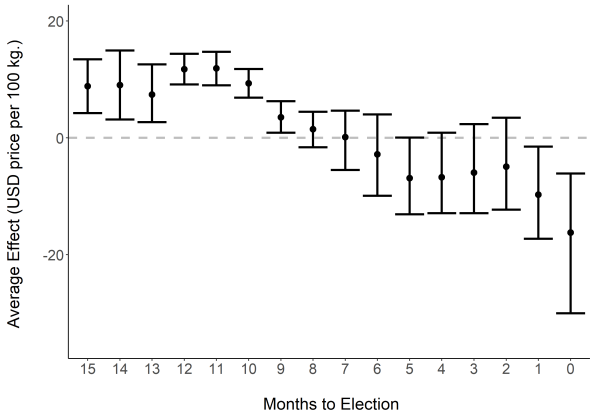
This approach does not capture whether negative food price fluctuations are most intensely concentrated on the eve of the election. The theory in this manuscript predicts that these policies are concentrated on the eve of the election. If that is the case, cities should witness a slowly increasing negative fluctuation as they approach an election. To determine if this is the case, I run this model using each consecutive 3-month window as a post-intervention period during the fifteen months before an election (essentially placebo tests). These placebo tests this theory. If correct, cities should witness stronger negative effect as a 3 month post-intervention window approaches the election. Figures 6a through 6f display average effect per 3-month window in the lead up to the election with 95 % credibility intervals. The y-axis displays the months to the election the 3 month post-election window lies. In Niger the election is in January, 2011, so a three month window for the period between August, 2010 and October, 2010 lies 3 months before the election (three months between October, 2010 and January, 2011). These figures confirm that in these cities the negative fluctuation increases in the lead-up to the election and the effect is largest in the 3-month window directly before the election

[13]This occurred for sorghum prices in Tillaberi, Niger

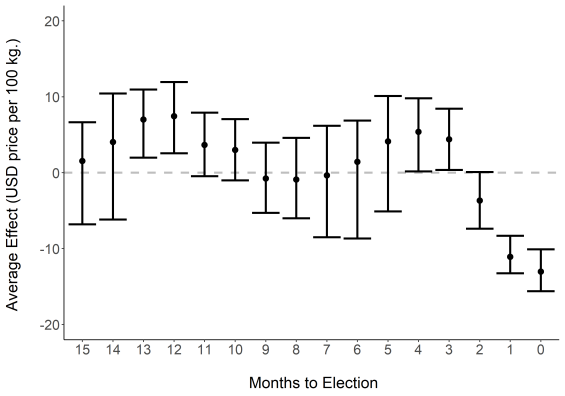
Figure 6: Price Fluctuations in 3-Month Windows Prior to Election



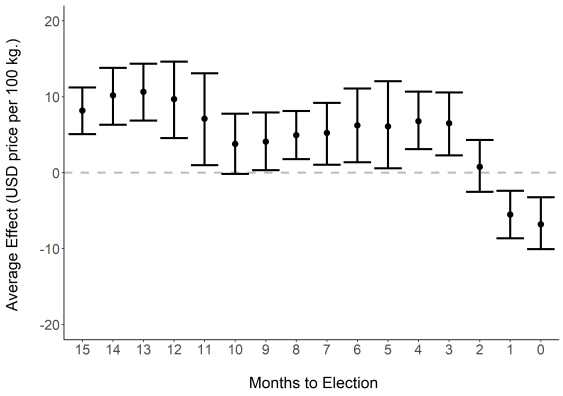
(a) Maradi, Niger ; Millet



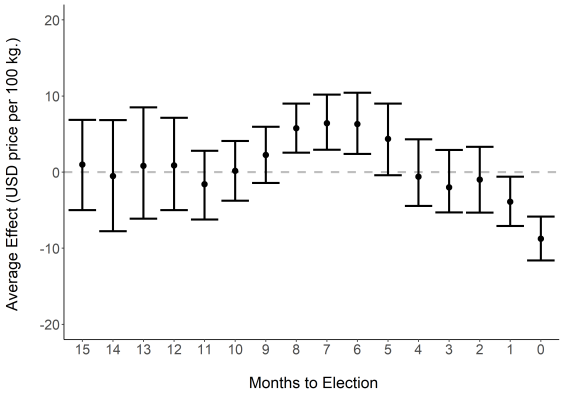
(b) Dar es Salaam, Tanzania ; Maize



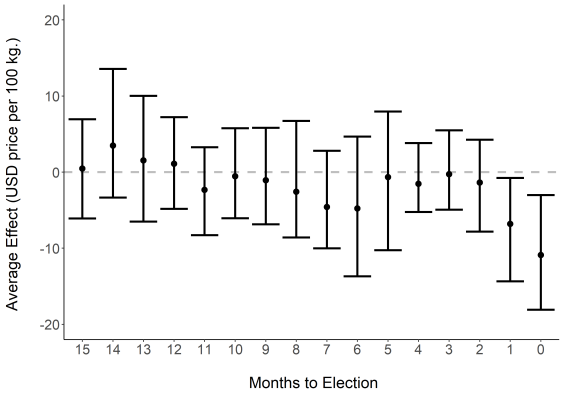
(c) Agadez, Niger ; Millet



(d) Agadez, Niger ; Sorghum



(e) Zinder, Niger ; Millet



(f) Tillaberi, Niger ; Millet

I would also like to determine if negative fluctuations in prices strengthen in the lead up to the election. Effectively I can run this model using every possible consecutive month window during the fifteen months before an election (essentially placebo tests). I would expect if my theory is correct, I should witness stronger negative effect in the lead up to the election. The x-axes of this figure present the average effect per 3-month window in the lead up to the election with 95 % credibility intervals. The y-axis displays months to election the 3 month post-election window lies. In Niger the election is in January, 2011, so a three month window for the months August, 2010 to October, 2010 lies 3 months before the election.

I also test whether these shocks are sensitive to the three-month post-intervention period. To test this, I change the length of the intervention period to determine if the results are sensitive to the period of the treatment. The effect does not change if we increase the post-intervention period to four or five months.

Overall, these sensitivity checks confirm that there are large and rare negative food price shocks on the eve of an election in five of the cities where the central bank is barred from lending to the government. Given that positive price shocks were only identified in cities where the central bank can lend to the government, a substantial difference exists in how food prices react on the eve of elections in these two groups of countries. Food prices are more likely to drop on the eve of elections in cities where the central bank is barred from lending to the government than in countries where it is allowed to lend. Also, negative price shocks only occur in cities where the incumbent holds high levels of support. This confirms the two hypotheses specified earlier in this paper.

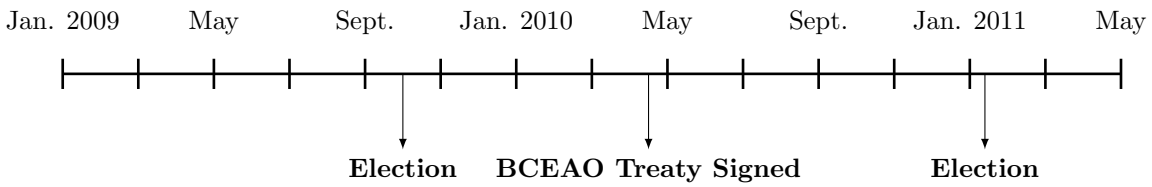
6 Case Study: Niger

To isolate the causal effect of limiting central bank lending to governments, I leverage a unique case in Niger, where an exogenous shock removed the central bank's capacity to lend to the government. Political pressure forced this change in policy between two national elections within two years of each other. This allows me to analyze the change in prices of food on the eve of the election when the government had access to central bank lending and directly after it was taken away.

Prior to 2010, the limit on central bank lending to national treasuries in Niger was 20 percent of their fiscal receipts in the previous year. This allowed central banks to fund a large portion of budget spending. On April 1, 2010 these statutory advances were finally eliminated when the new treaty of the Monetary Union of West Africa (UMOA) was signed (Diouf and Boutin-Dufresne 2012). The reform of the statutes of the West African States Central Bank (BCEAO) gave the central bank its independence from state influence. Rather than providing lending to governments, the central bank's main objective became price stability (Kireyev 2016). Niger had very little influence on this treaty and these reforms were forced on WAEMU countries by

France, the lender of last resort for the BCEAO, and the IMF in the aftermath of the Euro Crisis ("The institutional reform of the WAMU and the BCEAO introduces major innovations" April 3, 2010). The figure below displays the timeline of the 2009 election in Niger, the 2010 central bank reform, and the 2011 election in Niger.

Figure. Elections and BCEAO Treaty Timeline (2009-2011)

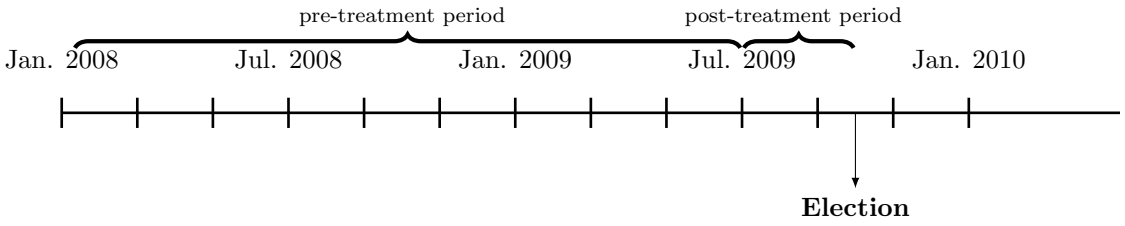


After central bank independence was implemented food policy appeared to change as food reserves became more widely used and food assistance become more widely utilized (Nossiter 2010, May 3, *Niger Food Security Brief - FEWS* 2014). Given the food crisis, USAID and the World Food Program acted in concert with the Nigerien government to distribute sorghum and millet throughout the country. In addition, the government facilitated imports from Nigeria that were essential in keeping prices low (Galtier et al. 2018). There is no comprehensive data about where this food was distributed (économiques 2016). I utilize the prices of food at the city-level to determine where food distribution likely occurred on the eve of the election.

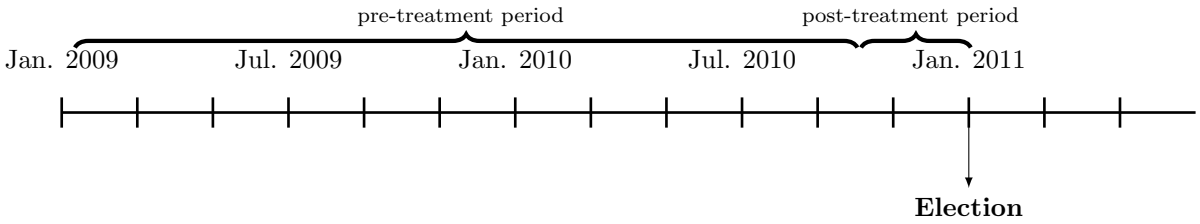
In the case of Niger, I investigate the price of sorghum and millet, the two staple goods in Niger. To create the counter-factual, I use sorghum or millet prices in cities in neighboring countries that correlate with that food price in that city over 0.3 (correlation produced during the pre-period, before the synthetic control is created). To produce the best counter-factual in comparative research there are clear gains to using combinations of variables from many countries and cities rather than a single variable and this has been shown to produce more predictive synthetic controls (Abadie, Diamond, and Hainmueller 2015). For example, to create the counter-factual for millet prices in the city Agadez, I use millet prices from 10 other cities[14]. In addition to these variables, I also control for the seasonality of prices (by month). I use price data between 21 months prior to the election and 3 months prior to the election as the pre-treatment data and use the food price data in the 3 months prior to the election as post-treatment.

[14]sorghum prices from these cities are used to create the synthetic control for Sorghum price in Agadez: Moussoro, Chad; Abeche, Chad; Sarh, Chad; Moundou, Chad; N'Djamena, Chad; Bamako, Chad; Gao, Mali; Segou, Mali; Ségou, Mali; Mopti, Mali; Sikasso, Mali

Election Before CBI Treatment



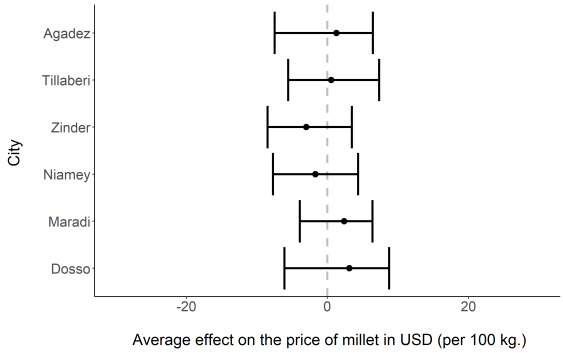
Election After CBI Treatment



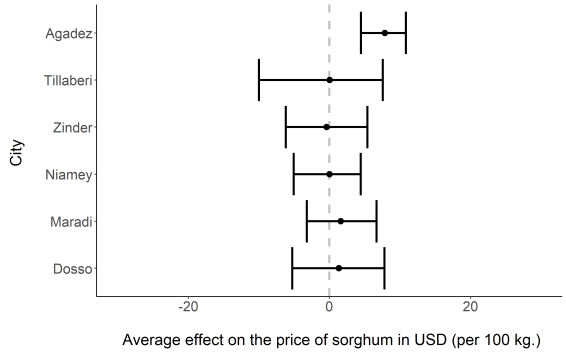
Niger Case Study Results

To evaluate changes in food prices of sorghum and millet on the eve of the election, I first performed a simple comparison of actual food prices and their counter-factual in the period before high levels of central bank independence imposed by the treaty of the UMOA. Figure 7 shows that millet prices did not significantly deviate from the counterfactual in the lead up to the 2009 election in any of the six cities. Sorghum prices deviated from the counterfactual in one city during this period and in both cities, prices increased relatively. In Agadez, the Sorghum price rose on average 8.16 US dollars per 100 kg. (95 % credibility interval (CI): $ 5.02 USD, $ 11.34 USD). Given that the counterfactual predicted the price of Sorghum to be $ 40.00, this was a 12.5 % decrease from the counterfactual. This evidence indicates very little if any effect of the election on prices of these staple foods (figures with actual prices and the counter-factual for all cities are located in the appendix).

Figure 7: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in election in October, 2009 (pre CBI intervention)



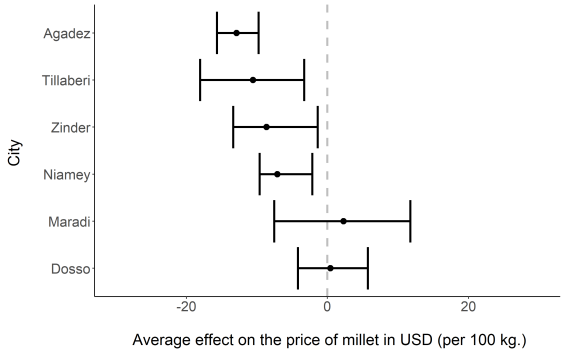
(a) Millet prices



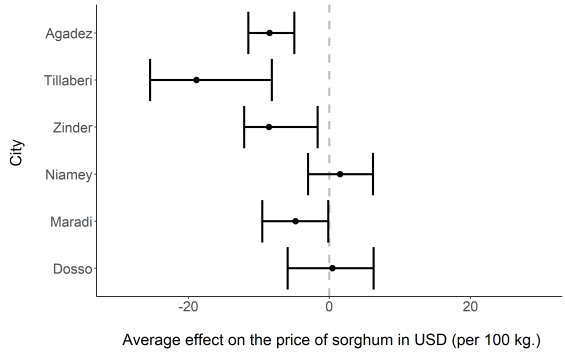
(b) Sorghum prices

Applying this same method to the election seven months after the removal of central bank lending to the government, a very different picture emerges. In contrast to the 2009 election, sorghum and millet prices dropped in four of the six cities. Three cities witnessed lower prices in both foods (full results are located in the appendix). In Agadez, a government stronghold, the price of millet decreased -13.02 US dollars per month (95 % credibility interval (CI): -10.09 USD, -15.6 USD) and the price of sorghum decreased -10.05 US dollars per month (95 % credibility interval (CI): -6.45 USD, -13.66 USD). Given that the average counter-factual price of 100 kg. millet over these three months was around 46.00 USD this intervention likely resulted in a 28.2 % decrease in the price of millet. Given that the average counter-factual price of 100 kg. sorghum over these three months was around 49.00 USD this intervention likely resulted in a 20.4 % decrease in the price of sorghum. This effect was the highest among all cities for millet, but not in terms of sorghum, where Tillaberi appeared to have the largest election effect. In Tillaberi, another government stronghold, the price of sorghum decreased on average -18.8 US dollars per month (95 % credibility interval (CI): -12.26 USD, -25.47 USD). The average counter-factual price of 100 kg. sorghum over these three months was around 48.00 USD, which means this intervention likely resulted in a 39.16 % decrease in the price of sorghum.

Figure 8: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in election in January, 2011 (post CBI intervention)



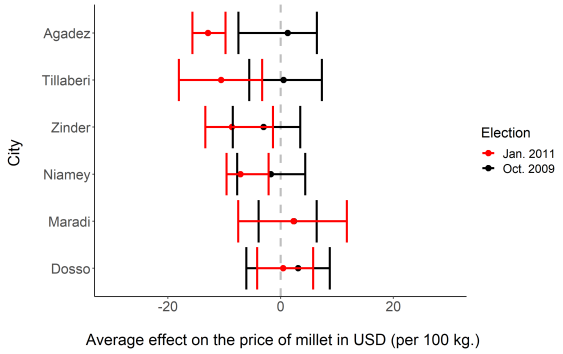
(a) Millet prices



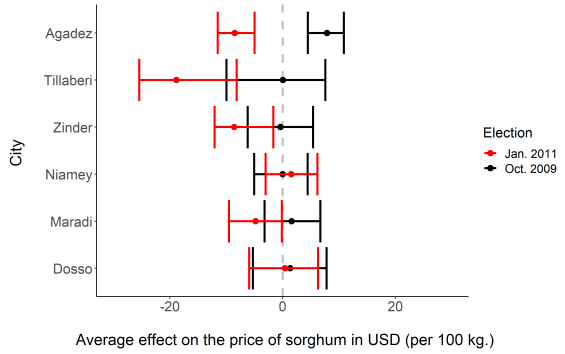
(b) Sorghum prices

The difference between the two elections is best represented by Figure 9, which compares the difference in the average effect of the pre-election period in the election in 2009 and the election in 2011. This shows a stark difference between the 2009 and 2011 elections in the election effect. This supports the first hypothesis posited by this manuscript that interventions are more likely to occur in a period of high central bank independence relative to low central bank independence.

Figure 9: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in elections in October, 2009 and January, 2011 (post CBI intervention)



(a) Millet prices



(b) Sorghum prices

These results also support the second hypothesis of this paper that posits that areas impacted by negative price interventions are more likely to be areas that the incumbent government has higher levels of support and less competition from other opposition parties. In the three cities (Agadez, Tillaberi, and Zinder) where the major opposition party received no delegates and the party most in line with the current government received over fifty percent of the delegates, prices of both sorghum and millet decreased[15] [16]. In more competitive districts (Niamey, Dosso, and Maradi) evidence of an intervention was weak or non-existent.

[15]Election results for Agadez Region: http://africanelections.tripod.com/ne.html

[16]Election results for whole Country: http://cour-constitutionnelle-niger.org/documents/arrets/matiere$_electorale$/2011/$arret_{n0}9_11_cct_me.pdf$; Le

This still may indicate that food policy is used in competitive areas, but staple food prices appear to be most impacted in areas where the political party supported by the government in control has the highest level of support. Therefore both hypotheses appear supported by these results.

For the Niger results, I test whether these shocks are sensitive to the three-month period before the election. To test this, I change the length of the intervention period to determine if the results are sensitive to the period of the treatment. The effect does not change if I increase the post-intervention period to four or five months (replications of Figures 7 through 8 are located in the supplementary for four and five-month intervention periods).

Conclusion

Rising and more volatile food prices throughout the developing world have made food policy an increasingly important area to study, but a lack of data makes it difficult to effectively measure how elections affect food policy. This manuscript contributes a novel method to measure food prices using available FAO data to identify possible food market interventions. I use a diffusion-regression state-space model to predict the counterfactual food price that we should witness on the eve of an election and compare it to the actual food price.

Using synthetic controls, a cross-country analysis, and leveraging an exogenous central bank independence increase, this manuscript finds that under monetary constraints (no central bank lending to the government) incumbents are more likely to utilize food-oriented vote-seeking strategies. Although central bank independence can stabilize monetary supplies and inflation rates around elections, it may have an unintended consequences. Given that negative price shocks are witnessed in areas where the incumbent has high levels of support, it is likely that these governments that cannot access central bank credit are engaging in food patronage.

Food policies may drive staple food prices low on the eve of elections, but with food reserves depleted and/or export bans already in place, policy options that can stabilize food prices post-election are depleted. This likely leads to higher food prices post-election, which is concerning. A combination of discontent over the election results coupled with higher food prices post-election is conducive to post-election violence.

Limiting access to central bank credit may also have repercussions for the financial market as it increases the amount of credit governments must pursue in the private market. To reduce interest rates that governments pay they may react and institute on ceilings to lending interest rates to allow political actors to access cheaper credit through the private market. In reaction to the exogenous shock of central bank independence in the WAEMU countries, all eight countries placed an interest rate caps were placed on banks and monetary

financial institutions (MFIs) in all eight eight Francophile countries countries in 2013. Similar policies were implemented in Kenya in reaction to limited lending from the central bank to government entities. Policies such as requiring higher levels of bank deposits as a percentage of total deposits also continue to rise as Nigeria, this year (2020) increased this level to 27.5%. This increases the potential for political rent extractions through government credit bureaus that become the gate-keepers to private credit. This allows the state to control access to private lending in the market and opportunities to extract political rent. Ultimately this produces numerous negative consequences such as suppressing economic growth.

This paper aims to encourage more political economy research on electoral strategies of food in food-insecure regions. Although the method used for this manuscript is not new, its application for identifying food price shocks across countries is novel. This method to identify price shocks should open up new research in food market interventions on the eve of elections and should be expanded to test for the effects of other institutional constraints on the creation of a political food cycle.

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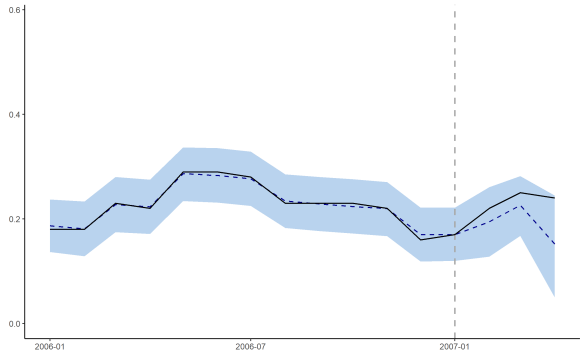
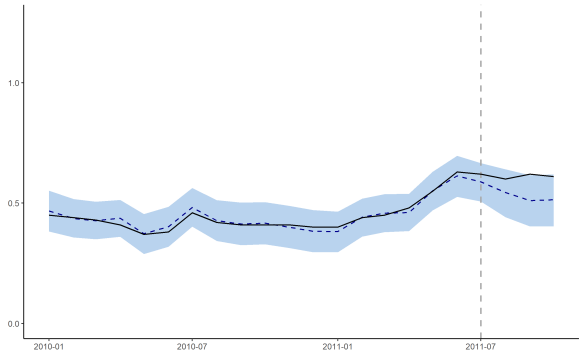
Appendix

Cross-Country Figures

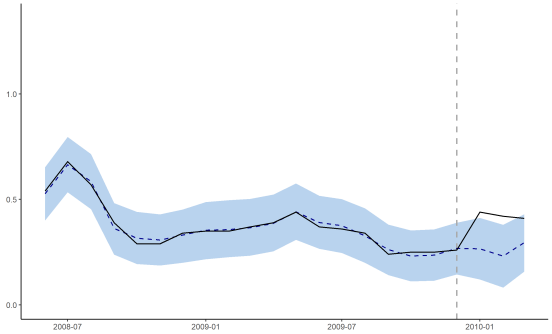
Figure 10: Cities with rising prices on the eve of the election



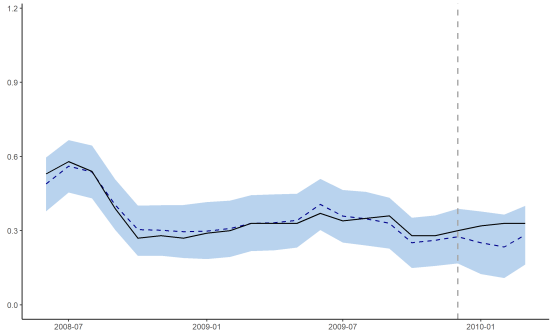
(a) Bamako, Mali ; Sorghum ; April, 2007



(b) Bamenda, Cameroon ; Maize ; October, 2010

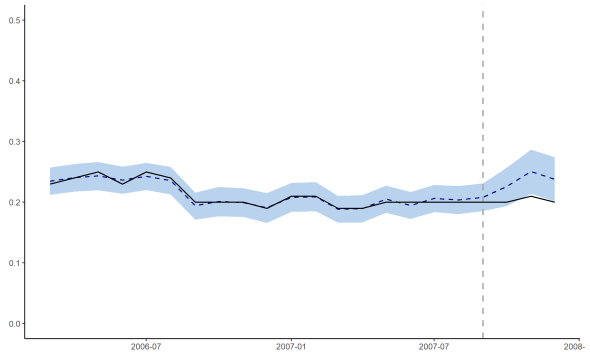


(c) Kara, Togo ; Maize ; March, 2010

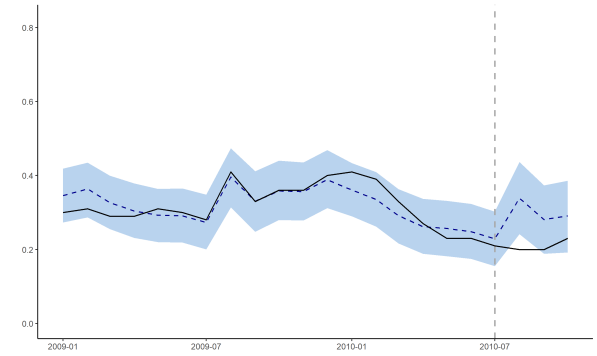


(d) Korbongou, Togo ; Maize ; March, 2010

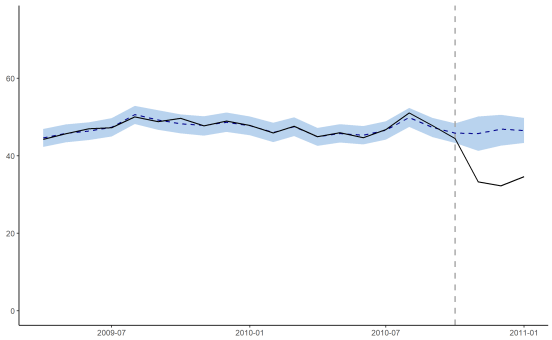
Figure 11: Cities with rising prices on the eve of the election



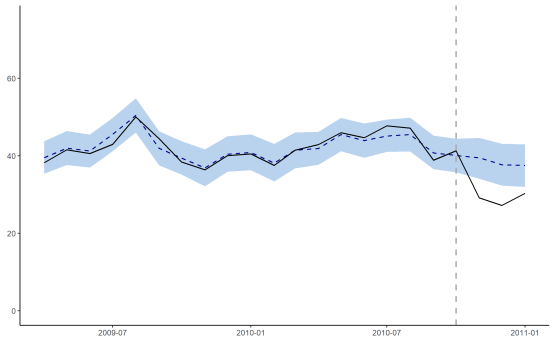
(a) Nairobi, Kenya ; Maize ; December, 2007



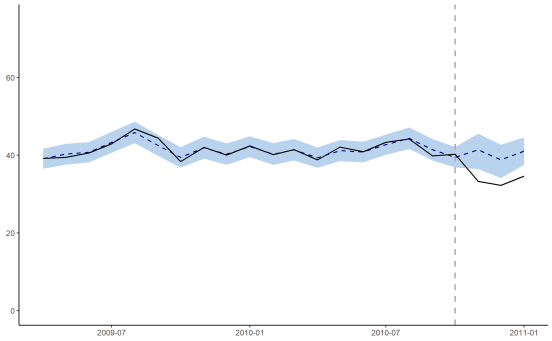
(b) Dar es Salaam, Tanzania ; Maize ; December, 2010



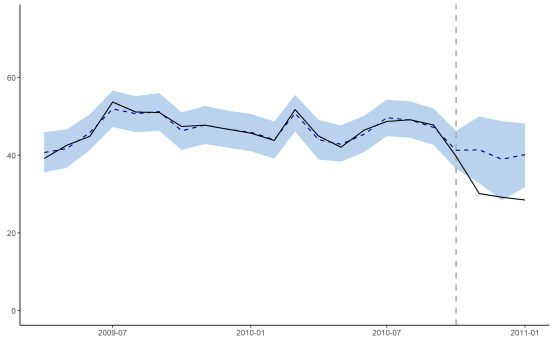
(c) Agadez, Niger ; Millet ; January, 2011



(d) Zinder, Niger ; Millet ; January, 2011

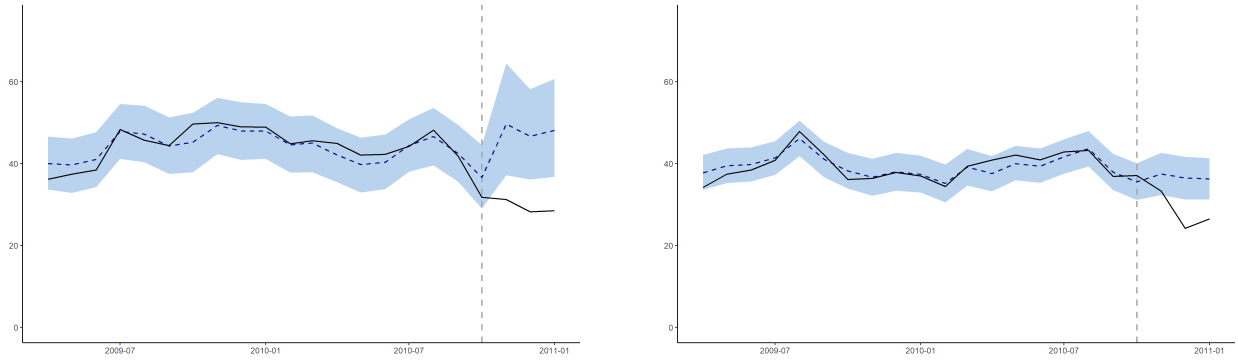


(e) Niamey, Niger ; Millet ; January, 2011



(f) Tillaberi, Niger ; Millet ; January, 2011

Figure 12: Cities with rising prices on the eve of the election

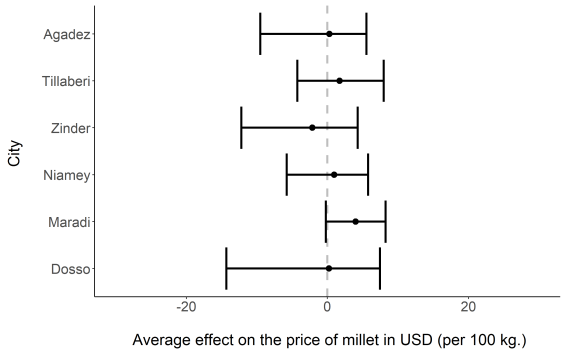


(a) Tillaberi, Niger ; Millet ; January, 2011

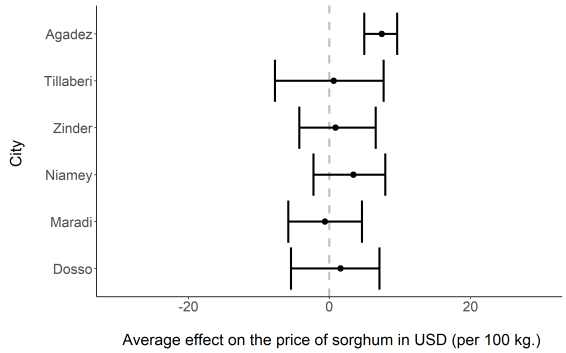
(b) Zinder, Niger ; Sorghum ; January, 2011

Post-treatment Period As 4 Months Prior To Election

Figure 13: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in election in October, 2009 (pre CBI intervention)- 4 month Post-Treatment Period

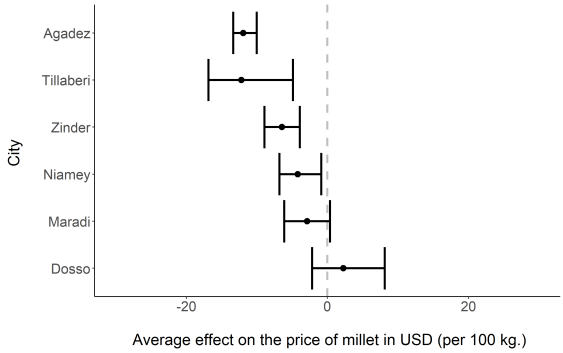


(a) Millet prices

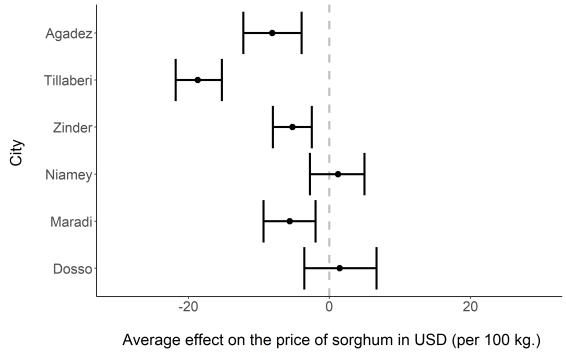


(b) Sorghum prices

Figure 14: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in election in January, 2011 (post CBI intervention)- 4 month Post-Treatment Period

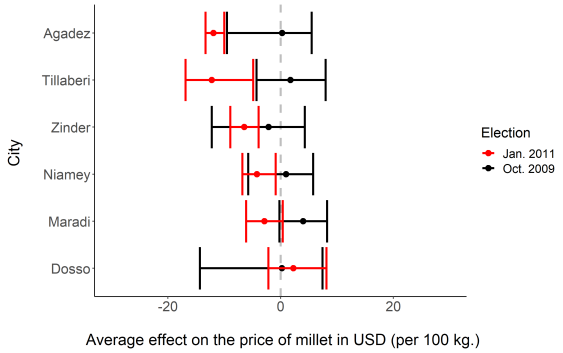


(a) Millet prices

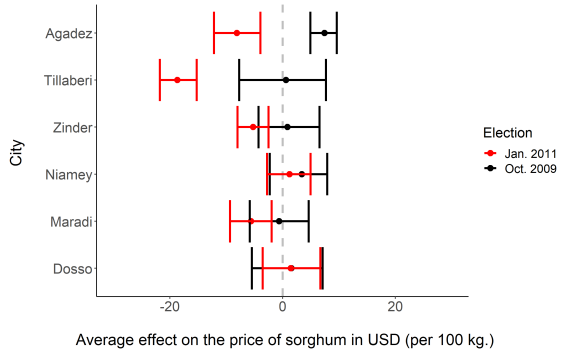


(b) Sorghum prices

Figure 15: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in elections in October, 2009 and January, 2011 (post CBI intervention) - 4 month Post-Treatment Period



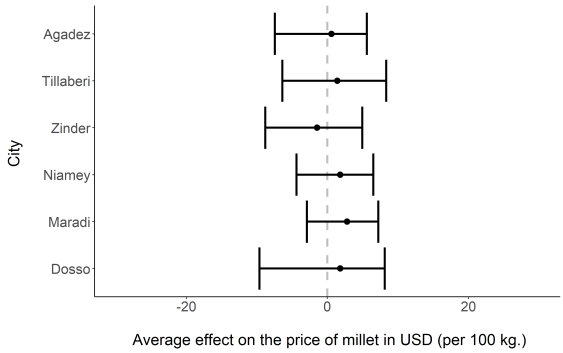
(a) Millet prices



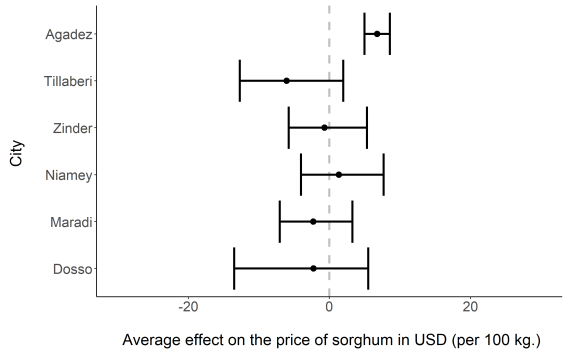
(b) Sorghum prices

Post-treatment Period As 5 Months Prior To Election

Figure 16: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in election in October, 2009 (pre CBI intervention)- 5 month Post-Treatment Period

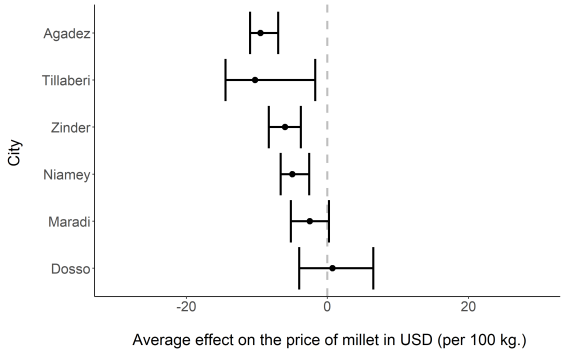


(a) Millet prices

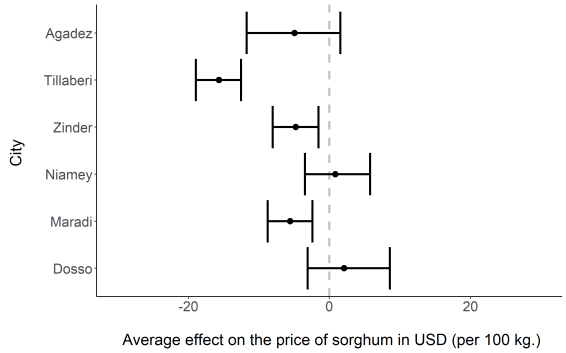


(b) Sorghum prices

Figure 17: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in election in January, 2011 (post CBI intervention)- 5 month Post-Treatment Period

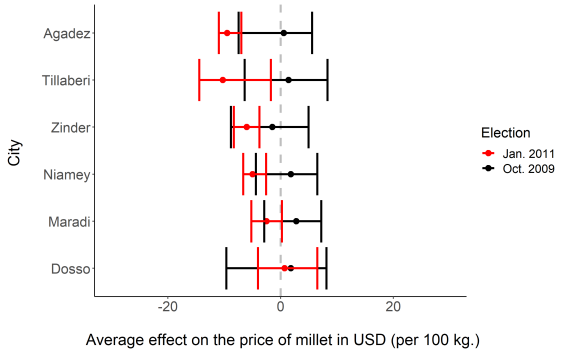


(a) Millet prices

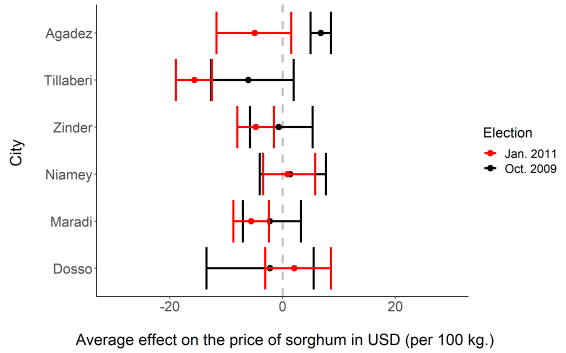


(b) Sorghum prices

Figure 18: Average Effect of Pre-Election Period on Millet and Sorghum Prices in Nigerien Cities in elections in October, 2009 and January, 2011 (post CBI intervention) - 5 month Post-Treatment Period



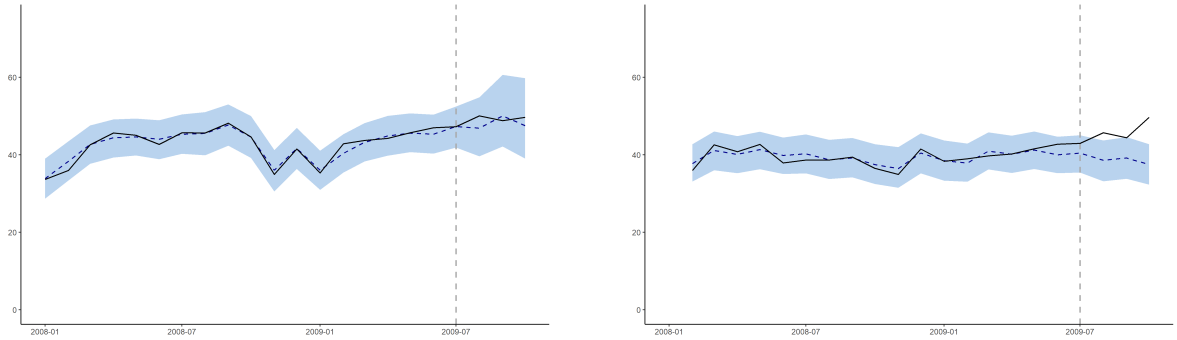
(a) Millet prices



(b) Sorghum prices

Individual City Figures of Sorghum and Millet Prices - 2009 election

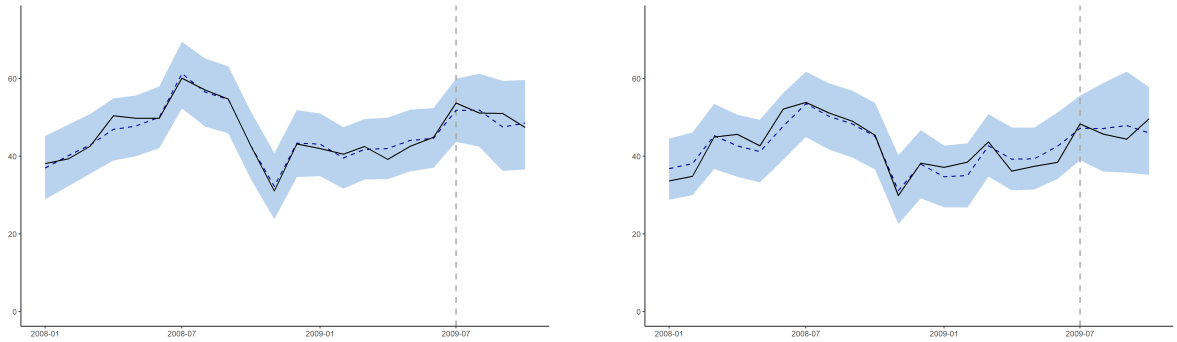
Figure 19: City of Agadez - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

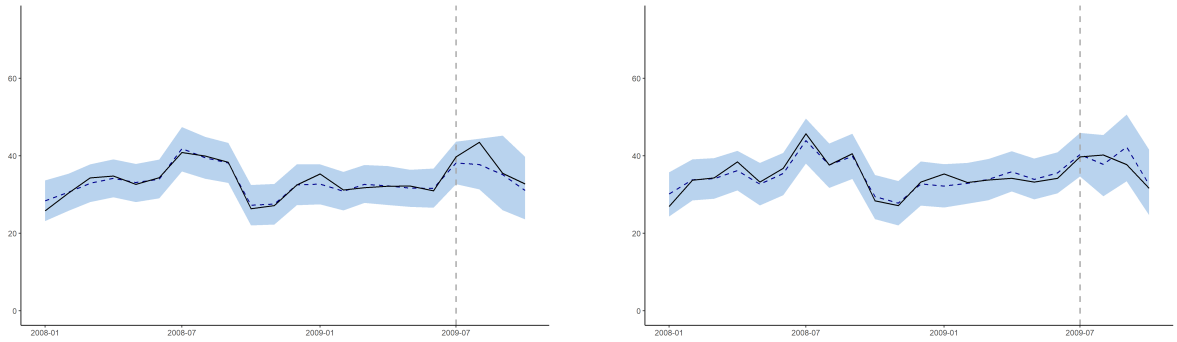
Figure 20: City of Tillaberi - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

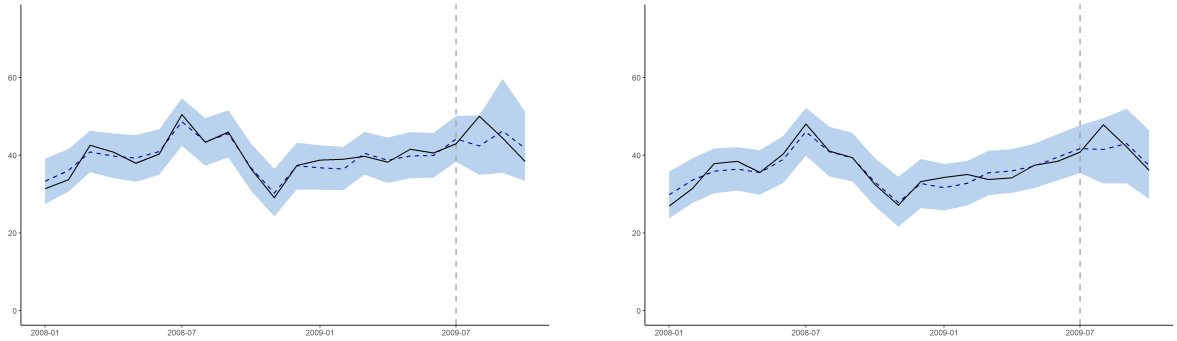
Figure 21: City of Maradi - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

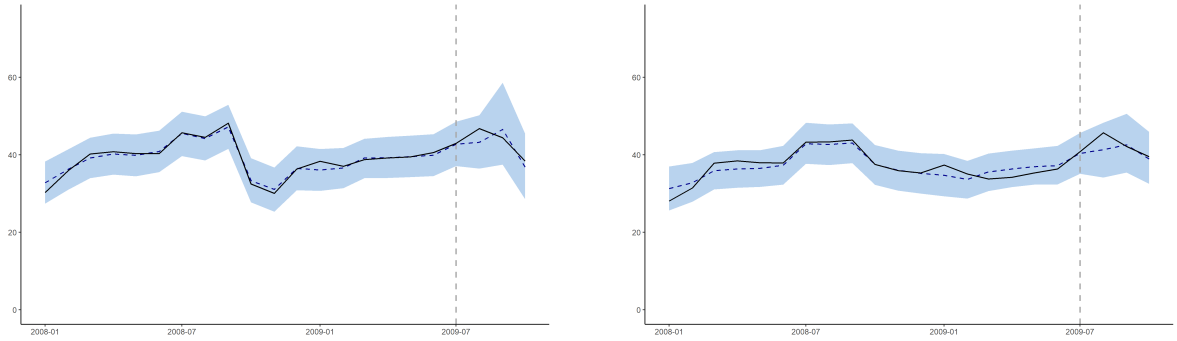
Figure 22: City of Zinder - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

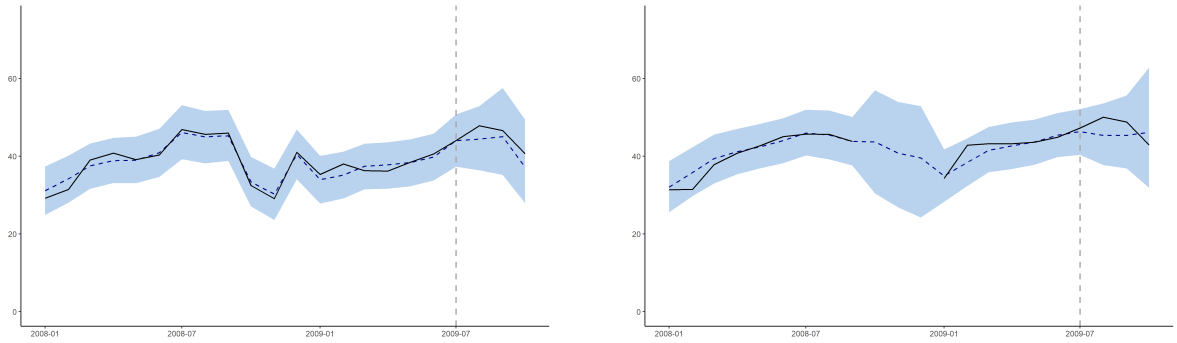
Figure 23: City of Niamey - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

Figure 24: City of Dosso - Real price and Synthetic Control

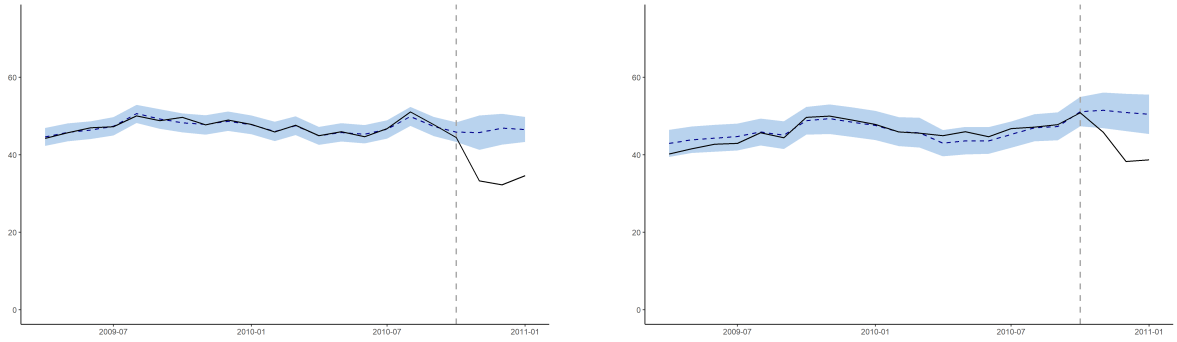


(a) Millet prices

(b) Sorghum prices

Individual City Figures of Sorghum and Millet Prices - 2011 election

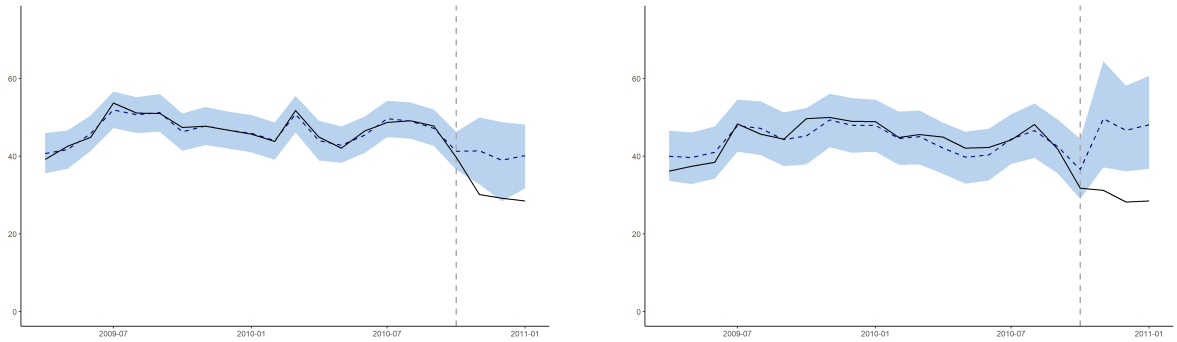
Figure 25: City of Agadez - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

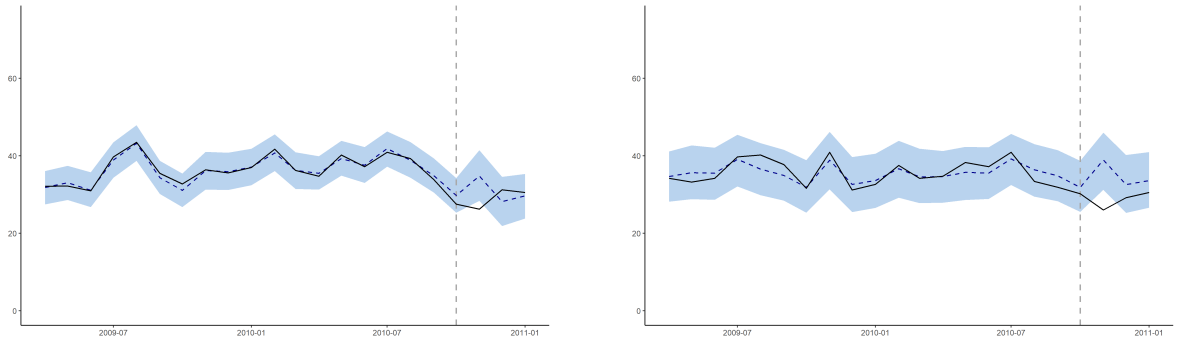
Figure 26: City of Tillaberi - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

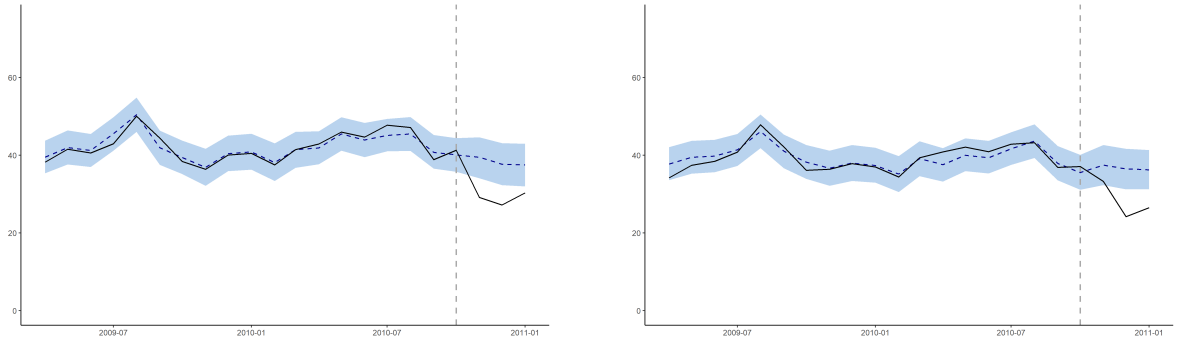
Figure 27: City of Maradi - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

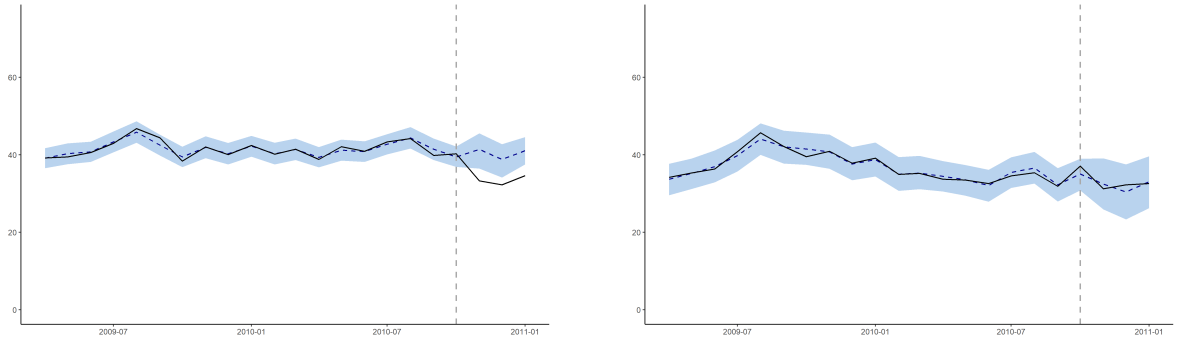
Figure 28: City of Zinder - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

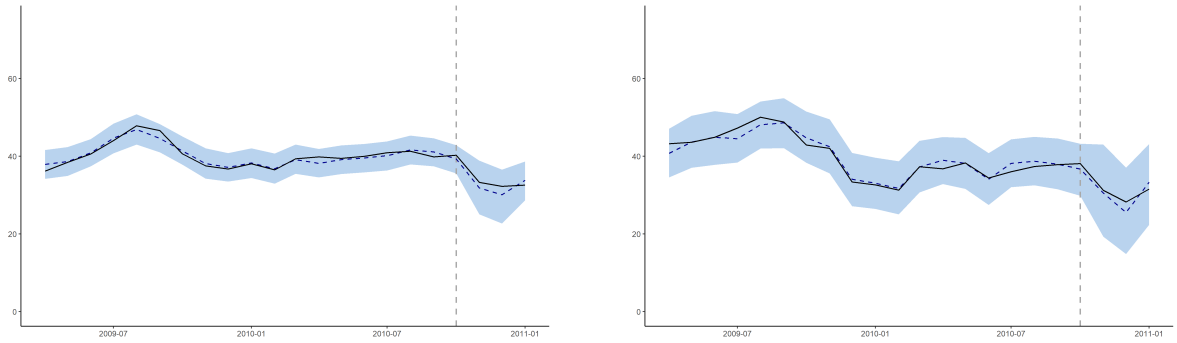
Figure 29: City of Niamey - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

Figure 30: City of Dosso - Real price and Synthetic Control



(a) Millet prices

(b) Sorghum prices

Table 3: Cities and Countries in Large Cross-Country Analysis

City	Country	Election (Month/Year)	Food
Bamenda	Cameroon	10/2011	Maize
Garoua	Cameroon	10/2011	Maize
Douala	Cameroon	10/2011	Maize
Yaund**a**	Cameroon	10/2011	Maize
Bafoussam	Cameroon	10/2011	Maize
Bol	Chad	04/2011	Maize
Moussoro	Chad	04/2011	Maize
N'Djamena	Chad	04/2011	Maize
Diredawa	Ethiopia	05/2010	Maize
Addia Ababa	Ethiopia	05/2010	Maize
Mekele	Ethiopia	05/2010	Maize
Bahirdir	Ethiopia	05/2010	Maize
Accra	Ghana	12/2008	Maize
Bolgatanga	Ghana	12/2008	Maize
Kumasi	Ghana	12/2008	Maize
Tamale	Ghana	12/2008	Maize
Techiman	Ghana	12/2008	Maize
Nairobi	Kenya	12/2007	Maize
Eldoret	Kenya	12/2007	Maize
Mombasa	Kenya	12/2007	Maize
Kisumu	Kenya	12/2007	Maize
Bamako	Mali	04/2007	Rice
Bamako	Mali	04/2007	Sorghum
Kayes	Mali	04/2007	Sorghum
Kayes	Mali	04/2007	Rice
Dosso	Niger	01/2011	Millet
Zinder	Niger	01/2011	Millet
Agadez	Niger	01/2011	Millet
Maradi	Niger	01/2011	Millet
Niamey	Niger	01/2011	Millet
Tillaberi	Niger	01/2011	Millet
Dosso	Niger	01/2011	Sorghum
Zinder	Niger	01/2011	Sorghum
Agadez	Niger	01/2011	Sorghum
Maradi	Niger	01/2011	Sorghum
Niamey	Niger	01/2011	Sorghum
Tillaberri	Niger	01/2011	Sorghum
Kigali	Rwanda	08/2010	Maize
Dar Es Salaam	Tanzania	10/2010	Maize
Amegnan	Togo	03/2010	Maize
Lom**a**	Togo	03/2010	Maize
Kara	Togo	03/2010	Maize
Karbongou	Togo	03/2010	Maize
Anie	Togo	03/2010	Maize
Cinkass**a**	Togo	03/2010	Maize
Lom**a**	Togo	03/2010	Sorghum
Kara	Togo	03/2010	Sorghum
Karbongou	Togo	03/2010	Sorghum
Anie	Togo	03/2010	Sorghum
Cinkass**a**	Togo	03/2010	Sorghum

Table 4: Cities and Countries in Large Cross-Country Analysis

City	Country	Election (Month/Year)	Food
Thies	Senegal	06/2007	Millet
Zguinchor	Senegal	06/2007	Millet
Fatick	Senegal	06/2007	Millet
Tambacounda	Senegal	06/2007	Millet
Diourbel	Senegal	06/2007	Millet
Louga	Senegal	06/2007	Millet
Kaolack	Senegal	06/2007	Millet
Saint-Louis	Senegal	06/2007	Millet
Dakar	Senegal	06/2007	Millet
Matam	Senegal	06/2007	Millet
Kolda	Senegal	06/2007	Millet

Tanzania Food Reserve Distribution

Table 5: Purchase and Sales of Maize

Fiscal Years	Purchase (tonnes)	Sales (tonnes)	Total Engagement
'02-'03 ; '03-'04	74,400	123,476	197,876
'04-'05 ; '05'-'06	**99,615**	**171,097**	**270,712**
'07-'08 '08-'09	78,002	110,720	188,722
'09-'10 ; '10-'11	**254,677**	**185,806**	**440,483**

Source: Jesus Barreiro-Hurle 2012

Snapshot of Data

Table

Cities, Food prices, and control variables

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
1	Yaunda	Cameroon	Maize	2011-10	0.0084	-0.0365	0.0531	0.355	Moussoro, Chad ; Kano, Nigeria ; N'Djamena, Chad ; Bol, Chad
2	Bafoussam	Cameroon	Maize	2011-10	0.0035	-0.0801	0.0859	0.4749	Moussoro, Chad ; Kano, Nigeria ; N'Djamena, Chad ; Bol, Chad
3	Bamenda	Cameroon	Maize	2011-10	0.0871	0.01913	0.1601	0.0060	Moussoro, Chad ; Kano, Nigeria ; N'Djamena, Chad ; Bol, Chad
4	Garoua	Cameroon	Maize	2011-10	-0.0288	-0.0850	0.0292	0.1630	Moussoro, Chad ; Kano, Nigeria ; N'Djamena, Chad ; Bol, Chad
5	Douala	Cameroon	Maize	2011-10	-0.0247	-0.1234	0.0752	0.3082	Moussoro, Chad ; Kano, Nigeria ; N'Djamena, Chad ; Bol, Chad
6	Moussoro	Chad	Maize	2011-04	0.0316	-0.06816	0.1284	0.2806	Kano, Nigeria ; Yaunda, Cameroon Bamenda, Cameroon ; Bafoussam, Cameroon Garoua, Cameroon ; Doualo, Cameroon Dosso, Niger ; Niamey, Niger Agadez, Niger ; Tillaberi, Niger Zinder, Niger ; Maradi, Niger
7	N.Djamena	Chad	Maize	2011-04	0.01599	-0.0967	0.1249	0.4118	Kano, Nigeria ; Yaunda, Cameroon Bamenda, Cameroon ; Bafoussam, Cameroon Garoua, Cameroon ; Doualo, Cameroon Dosso, Niger ; Niamey, Niger Agadez, Niger ; Tillaberi, Niger Zinder, Niger ; Maradi, Niger
8	Bol	Chad	Maize	2011-04	0.0374	-0.0398	0.1120	0.153	Kano, Nigeria ; Yaunda, Cameroon Bamenda, Cameroon ; Bafoussam, Cameroon Garoua, Cameroon ; Doualo, Cameroon Dosso, Niger ; Niamey, Niger Agadez, Niger ; Tillaberi, Niger Zinder, Niger ; Maradi, Niger

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
9	Accra	Ghana	Maize	2008-12	10.9346	-3.6712	22.0636	0.0651	Anie, Togo ; Kara, Togo Cinkassa, Togo ; Loma, Togo Amegnran, Togo
10	Techiman	Ghana	Maize	2008-12	1.5739	-10.9261	14.6661	0.4349	Anie, Togo ; Kara, Togo Cinkassa, Togo ; Loma, Togo Amegnran, Togo
11	Bolgatanga	Ghana	Maize	2008-12	3.8766	-11.5313	15.2745	0.2337	Anie, Togo ; Kara, Togo Cinkassa, Togo ; Loma, Togo Amegnran, Togo
12	Tamale	Ghana	Maize	2008-12	0.6596	-14.0322	12.2241	0.4036	Anie, Togo ; Kara, Togo Cinkassa, Togo ; Loma, Togo Amegnran, Togo
13	Kumasi	Ghana	Maize	2008-12	-3.0823	-21.4551	15.3352	0.3623	Anie, Togo ; Kara, Togo Cinkassa, Togo ; Loma, Togo Amegnran, Togo
14	Nairobi	Kenya	Maize	2007-12	-0.03471	-0.0625	-0.0073	0.0084	Addis Ababa, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
15	Mombasa	Kenya	Maize	2007-12	-0.03139	-0.08064	0.0259	0.0834	Addis Ababa, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
16	Kisumu	Kenya	Maize	2007-12	-0.008257	-0.04244	0.0272	0.3015	Addis Ababa, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
17	Eldoret	Kenya	Maize	2007-12	0.02266	-0.0129	0.05343	0.0734	Addis Ababa, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
18	Kayes	Mali	Sorghum	2007-04	-0.0013	-0.0646	0.0642	0.4864	Bahirdir, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
19	Bamako	Mali	Sorghum	2007-04	0.0459	0.00745	0.0864	0.0090	Bahirdir, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
20	Niamey	Niger	Sorghum	2011-01	0.02792	-5.1653	5.1369	0.4806	Gao, Mali ; Kaye, Mali ; Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kano, Nigeria
21	Dosso	Niger	Sorghum	2011-01	0.5434	-5.7093	6.3428	0.4116	Gao, Mali ; Kaye, Mali ; Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kano, Nigeria
22	Maradi	Niger	Sorghum	2011-01	-6.4339	-10.5784	-2.2351	0.0026	Gao, Mali ; Kaye, Mali ; Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kano, Nigeria

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
23 ,	Zinder	Niger	Sorghum	2011-01	-8.7518	-11.5832	-5.8623	0.0002	Gao, Mali ; Kaye, Mali ; Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kano, Nigeria
24	Agadez	Niger	Sorghum	2011-01	-6.8053	-10.1918	-3.2163	0.0008	Gao, Mali ; Kaye, Mali ; Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kano, Nigeria
25	Tillaberi	Niger	Sorghum	2011-01	-18.8502	-25.3921	-12.4041	0.0002	Gao, Mali ; Kaye, Mali ; Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kano, Nigeria
22	Agadez	Niger	Millet	2011-01	-13.0247	-15.6630	-10.0687	0.0002	Moundou, Mali ; N'Djamena, Chad Moussoro, Chad ; Sarh, Chad Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kayes, Mali Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ;
23	Niamey	Niger	Millet	2011-01	-7.0535	-9.4327	-3.7056	0.0004	Moundou, Mali ; N'Djamena, Chad Moussoro, Chad ; Sarh, Chad Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kayes, Mali Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ;

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
24	Tillaberi	Niger	Millet	2011-01	-10.8837	-18.0723	-2.8663	0.0038	Moundou, Mali ; N'Djamena, Chad Moussoro, Chad ; Sarh, Chad Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kayes, Mali Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ;
25	Zinder	Niger	Millet	2011-01	-9.3757	-12.23836	-6.48480	0.0002	Moundou, Mali ; N'Djamena, Chad Moussoro, Chad ; Sarh, Chad Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kayes, Mali Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ;
26	Maradi	Niger	Millet	2011-01	-1.5321	-5.960113	3.0226	0.2454	Moundou, Mali ; N'Djamena, Chad Moussoro, Chad ; Sarh, Chad Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kayes, Mali Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ;
27	Dosso	Niger	Millet	2011-01	0.7914	-3.703843	6.1883	0.4004	Moundou, Mali ; N'Djamena, Chad Moussoro, Chad ; Sarh, Chad Sikasso, Mali ; Bamako, Mali Segou, Mali ; Kayes, Mali Mopti, Mali ; Tombouctou, Mali Sikasso, Mali ; Bamako, Mali Segou, Mali ;

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
28	Kigali	Rwanda	Maize	2010-08	-0.0268	-0.0936	0.0425	0.2106	Kampala, Uganda ; Dar es Salaam, Tanzania Dar es Salaam, Tanzania ; Eldoret, Kenya Kisumu, Kenya ; Nairobi, Kenya Mombasa, Kenya
29	Dar es Salaam	Tanzania	Maize	2010-10	-0.0935	-0.1582	-0.0291	0.0022	Kigali, Rwanda ; Nairobi, Kenya Mombasa, Kenya ; Eldoret, Kenya Kisumu, Kenya ;
30	Korbongou	Togo	Maize	2010-03	0.07030	-0.00745	0.1451	0.0406	Accra, Ghana ; Techiman, Ghana Bolgatanga, Ghana ; Tamale, Ghana Kumasi, Ghana
31	Anie	Togo	Maize	2010-03	0.0461728	-0.0359	0.1299	0.1371	Accra, Ghana ; Techiman, Ghana Bolgatanga, Ghana ; Tamale, Ghana Kumasi, Ghana
32	Kara	Togo	Maize	2010-03	0.15887	0.0718	0.2489	0.0008	Accra, Ghana ; Techiman, Ghana Bolgatanga, Ghana ; Tamale, Ghana Kumasi, Ghana
33	CinkassÃ.	Togo	Maize	2010-03	0.01165	-0.0551	0.0774	0.368	Accra, Ghana ; Techiman, Ghana Bolgatanga, Ghana ; Tamale, Ghana Kumasi, Ghana
34	LomÃ.	Togo	Maize	2010-03	0.01345	-0.0875	0.1173	0.4006	Accra, Ghana ; Techiman, Ghana Bolgatanga, Ghana ; Tamale, Ghana Kumasi, Ghana
35	Amegnran	Togo	Maize	2010-03	0.0636	-0.128	0.2501	0.2554	Accra, Ghana ; Techiman, Ghana Bolgatanga, Ghana ; Tamale, Ghana Kumasi, Ghana

	City	Country	Food Price	Election Date	Average Effect Effect	Upper Bound Bayesian Dist. (95%)	Lower Bound of Bayesian Dist. (95%)	P-Value	City Food Prices That Served As Control Series
36	Mekele	Ethiopia	Maize	2010-05	-0.1243	-0.3051	0.0524	0.0788	Mombasa, Kenya ; Eldoret, Kenya Kisumu, Kenya ; Nairobi, Kenya
37	Diredawa	Ethiopia	Maize	2010-05	-0.1383	-0.3284	0.05093	0.0742	Mombasa, Kenya ; Eldoret, Kenya Kisumu, Kenya ; Nairobi, Kenya
38	Bahirdar	Ethiopia	Maize	2010-05	-0.10064	-0.2680	0.0668	0.110	Mombasa, Kenya ; Eldoret, Kenya Kisumu, Kenya ; Nairobi, Kenya
39	Addis.Ababa	Ethiopia	Maize	2010-05	-0.1280	-0.2963	0.0406	0.0650	Mombasa, Kenya ; Eldoret, Kenya Kisumu, Kenya ; Nairobi, Kenya
40	Bamako	Mali	Millet	2007-04	-2.4313	-13.8596	8.3289	0.3332	Bahirdir, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
41	Kayes	Mali	Rice	2007-04	3.6375	1.1750	5.9239	0.0028	Bahirdir, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;
42	Bamako	Mali	Rice	2007-04	7.3047	3.1487	10.6236	0.0020	Bahirdir, Ethiopia ; Dar es Salaam, Tanzania ; Busia, Uganda ; Bahirdir, Ethiopia ;

Table 6: Data Used to Predict Effect of the Pre-Election period on Dar Es Salaam, Tanzania Maize Prices

Month to Election	Date	**Maize Price in Dar Es Salaam, Tanzania**	Maize Price in Kigali, Rwanda	Maize Price in Nairobi, Kenya	Maize Price in Mombasa, Kenya	Maize Price in Kisumu,Kenya	Maize Price in Eldoret, Kenya	Pre or Post Treatment Period
21	2009-01	0.30	0.35	0.30	0.32	0.37	0.22	Pre
20	2009-02	0.31	0.31	0.33	0.37	0.38	0.30	Pre
19	2009-03	0.29	0.32	0.37	0.35	0.38	0.37	Pre
18	2009-04	0.29	0.34	0.38	0.33	0.36	0.36	Pre
17	2009-05	0.31	0.33	0.43	0.33	0.36	0.37	Pre
16	2009-06	0.30	0.34	0.38	0.32	0.33	0.37	Pre
15	2009-07	0.28	0.33	0.37	0.31	0.35	0.39	Pre
14	2009-08	0.41	0.36	0.36	0.31	0.42	0.44	Pre
13	2009-09	0.33	0.36	0.38	0.30	0.35	0.40	Pre
12	2009-10	0.36	0.42	0.34	0.33	0.35	0.36	Pre
11	2009-11	0.36	0.39	0.36	0.34	0.35	0.36	Pre
10	2009-12	0.40	0.39	0.39	0.33	0.35	0.32	Pre
9	2010-01	0.41	0.39	0.36	0.33	0.35	0.32	Pre
8	2010-02	0.39	0.21	0.31	0.30	0.34	0.29	Pre
7	2010-03	0.33	0.20	0.29	0.28	0.32	0.28	Pre
6	2010-04	0.27	0.20	0.29	0.24	0.33	0.31	Pre
5	2010-05	0.23	0.22	0.24	0.23	0.24	0.27	Pre
4	2010-06	0.23	0.20	0.23	0.21	0.23	0.26	Pre
3	2010-07	0.21	0.19	0.17	0.19	0.20	0.15	Pre
2	2010-08	0.20	0.17	0.19	0.19	0.21	0.15	Post
1	2010-09	0.20	0.20	0.21	0.18	0.22	0.15	Post
0	2010-10	0.23	0.20	0.21	0.16	0.22	0.16	Post