Lottery-Based Elections, Power Monopolization, and Urban Development: The Case of Swiss City-States, 1666–1794

JONAS M. GEWEKE AND KATJA ROST

Early modern urban parliaments suffered an increasing monopolization of political power that hampered urban development. To combat power monopolization, some Swiss city-states reformed their election systems by randomly selecting political representatives from a pre-elected pool of candidates. We implement a difference-in-differences design and find that lottery-based election systems improved the equality of distribution of political seats within parliaments. Lottery-based elections also had positive effects on trade tax revenues, trade volumes, and infrastructure expenditures. We explain this finding by showing that lottery-based election systems fostered the election of merchants to top political positions.

The effect of local parliaments on the economic development of medieval and early modern city-states has long been a topic of debate. Whereas scholars of the new institutional turn have argued that local parliaments secured the political representation of a diverse set of wealth-holders with an interest in guaranteeing property rights and fostering economic development (Bosker, Buringh, and van Zanden 2013; De Long and Shleifer 1993; de Pleijt and van Zanden 2016; North and Weingast 1989; van Zanden, Buringh, and Bosker 2012), other authors have claimed that autonomous parliaments were conducive to urban growth during the medieval period but that they became unfavorable to it in the early modern period because of an increasing monopolization of parliamentary power in the hands of a small circle of rentier families (Stasavage 2011, 2014; Wahl 2019).

Jonas M. Geweke is Ph.D. Student, University of Zurich, Department of Sociology, Andreasstr. 15, CH-8050 Zurich. E-mail: jonas.geweke@uzh.ch (corresponding author). Katja Rost is Professor, University of Zurich, Department of Sociology, Andreasstr. 15, CH-8050 Zurich. E-mail: katja.rost@uzh.ch.

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This thesis of a gradual decline in early modern city-states rests on the common conception that political power monopolization was irreversible. In this narrative, early modern city-states are often depicted as failing entities in which rentiers gradually replaced merchants in positions of power, substituting collective goals for the interests of an ever more concentrated elite group. These "rentier republics" were then superseded by emerging nation-states that more efficiently fostered trade, provided military and non-military public goods, and avoided permanent revolts and revolutions (De Vries 1984, p. 7; Stasavage 2011, p. 5). However, an increasing concentration of power in the hands of a few elite families also heightened the risks of popular uprisings and intra-elite conflicts. These internal conflicts could spark institutional innovations that fundamentally changed the rules of political participation, with potentially far-reaching effects on the distribution of political power, the economic background of elected politicians, and urban development. One of these institutional innovations was the implementation of lottery-based electoral procedures.

In response to reform movements targeting an increasing monopolization of political power, corruption, and the misappropriation of state funds, some early modern Swiss city-states, such as Basel, adopted lottery-based election systems, whereas others, such as Zurich, did not. Basel introduced a new system in 1688, wherein a randomly selected group comprising of one-third of the councilors was eliminated from the voting process. The idea was that this would raise the cost of vote buying as the information on who would be eliminated was not available in advance. When the system proved insufficient to curb electoral corruption, the final election of candidates was randomized. From 1718 onward, three candidates were elected to a shortlist, the *Ternarium*, from which the final candidate was selected by lot. In 1740, the shortlist was extended to six candidates, known as the *Senarium* (Burckhardt 1866, p. 96; Doehne, Geweke, and Rost 2023, pp. 651–52; Im Hof 1949, pp. 146–152; Ochs 1821, p. 464).

Political philosophers of the eighteenth century, such as Montesquieu and Jean-Jacques Rousseau, perceived selection by lot as the democratic election system par excellence that upheld principles of equality but was "defective in isolation" because it prohibited the election of people based on talent and merit (de Montesquieu 1758 [1748], p. 15; Manin 1997, pp. 71–79). Given the historical prevalence of power monopolization in early modern parliaments, the question arises whether and how lottery-based election procedures altered existing power relationships within city-states: Did such procedures change the distribution of political power

and affect the types of politicians elected to positions of power? And how and why did these changes influence urban development outcomes? This study aims to answer these questions.

In this paper, we study the effects of lottery-based election procedures on (1) the distribution of political power; (2) the occupational backgrounds of politicians; and (3) trade tax revenues, trade volumes, and infrastructure expenditures. To document the effects of the presence or absence of lottery-based election systems on urban development outcomes, we construct original panel datasets of all 1,202 politicians of the major representative institutions in the two early modern city-states of Basel and Zurich. We relate these micro datasets to the macro level by collecting information on various dimensions of urban development, including trade tax revenues, trade volumes, and infrastructure expenditures.

We implement difference-in-differences regression designs to compare the development of Basel, which implemented lotteries, with Zurich, which did not randomize its election procedures. We find that the introduction of lottery-based election procedures led to a more equitable distribution of political power. Lottery-based election procedures also reversed the trend of rentiers dominating political positions and propelled the election of merchants to positions of power. We find evidence that lottery-based election procedures were positively correlated with per capita trade tax revenues, trade volumes, and infrastructure expenditures. Finally, we provide evidence for the mechanism and show that lotteries correlated with the implementation of growth-enhancing policies.

The rest of the article is structured as follows. The second section discusses the literature on the role of local parliaments and political inequality in urban development. The third section introduces the historical context of the Swiss Confederacy, focusing on the city-states of Basel and Zurich. We begin our observation in 1666 and end in 1794, when Swiss city-states began to suffer under increasing inflationary pressure shortly before the French invasion of the Swiss Confederacy in 1798. The fourth section describes the data sources and variables and and the fifth section presents the empirical models and evidence. The sixth section discusses the results and limitations of the study. The seventh section concludes.

LITERATURE REVIEW

Early modern city-states were usually governed by representative institutions consisting of one larger council and a number of smaller governing councils. When urban parliaments were based on guild-based

regiments, only guild members were allowed to hold political office. With merchants, rentiers, and craftsmen all represented in guilds, local assemblies were controlled by the city's major wealth-holders (Stasavage 2014). Although all urban city-states tended to be governed by oligarchies that excluded noncitizens and non-guild members from political participation, the degree of power monopolization and the diversity of the ruling elite differed. Two competing interpretations explain the effects of parliamentary representation and power monopolization on urban development.

The new institutional turn in economic history has focused on constitutional representation to explain divergent growth rates (Bosker, Buringh, and van Zanden 2013; Cox 2017; de Pleijt and van Zanden 2016; van Zanden, Buringh, and Bosker 2012). This perspective provides at least three reasons to explain why parliamentary representation fosters urban growth. First, parliaments that included major wealth-holders such as merchants had an interest in guaranteeing property rights, in holding destructive tax burdens low, and thus in promoting the flow of commerce (De Long and Shleifer 1993; North and Weingast 1989). Second, more equal distribution of power guaranteed the political representation of a broader range of views, limited the ability of small elite groups to seek rents, and positively influenced the provision of public goods because diversified elites benefited relatively more from growth-enhancing public investments than from rent-seeking (Acemoglu, Johnson, and Robinson 2005, p. 395; Robinson 2012, p. 34). Third, cities with more equal representation, stronger protection of property rights, and better provision of public goods attracted upper-tail human capital migration, resulting in sustained urban population growth and higher industrial investments (Dittmar and Meisenzahl 2020; Doucette 2024).

In contrast, another line of research has claimed that parliamentary representation had inconsistent effects on urban development. In this perspective, urban parliaments did not necessarily contribute to a greater diversity of views among policymakers. Instead, small circles of elite families often captured guilds and councils and implemented quasi-hereditary political privileges that led to the political representation of a homogenous set of interests. To safeguard their political and economic power, these elites often erected barriers to entry into political institutions and professions, restricted migration to urban centers, and misappropriated societal wealth (Epstein 2000, pp. 29–34; Ogilvie and Carus 2014, pp. 419–26; Stasavage 2014). This contributed to a gradual decline in early modern city-states. Where merchants had once dominated political positions, they turned into rentiers as they began to shift

their investments to lower-risk assets and to pursue careers in the state's bureaucracy and military.[1] As the dominance of these rentiers in political positions and barriers to entry into politics and markets stifled trade, autonomous city-states turned from thriving merchant states into "rentier republics" (Adams 2005, p. 150; De Vries 1984, p. 7; Stasavage 2011, pp. 5, 37, 163–65; 2014).

Both lines of research agree that the distribution of political power affects the capacity of cities to foster trade through policymaking and the provision of public goods (Doucette 2024; Epstein 2000, p. 169; Robinson 2012, pp. 29–30). Research has shown that when political power is unequally distributed, ruling elites tend to engage in political clientelism. Instead of investing in non-exclusionary public goods, such as physical infrastructure, elites channel state income to family members for personal enrichment and to clients in exchange for political support (Fergusson, Larreguy, and Riaño 2022; Fergusson, Molina, and Robinson 2022; Ferraz, Finan, and Martinez-Bravo 2024). For this reason, a strong concentration of political power may have contributed to the economic decline of the early modern Dutch Republic (Adams 2005, pp. 145–52; Ogilvie and Carus 2014, pp. 422–23). In contrast, states like Britain remained on a growth path where self-governing merchant towns with a diverse elite resisted the establishment of government-friendly oligarchies in urban parliaments and effectively checked absolutist power in national parliaments (Angelucci, Meraglia, and Voigtländer 2022).

Furthermore, the occupational background of elites affects the size, structure, and distribution of state income for two reasons (Abramson 2024; Becker and Hornung 2020). First, conflicts between traditional and merchant elites typically arose over taxation, as the group in power sought to shift the tax burden onto the other group to advance their own sectoral interests (Beramendi, Dincecco, and Rogers 2019; Mares and Queralt 2020). Rentiers typically preferred to impose tariffs and tax traded goods rather than land and agricultural products. Merchant elites preferred to keep tariffs low but agreed to carry a higher tax burden to finance growth-enhancing public goods. Second, the occupational background of ruling elites determined how the state's financial revenues were invested. Rentiers tended to follow non-economic imperatives in public policies because they were likely to lose out from increases in public goods expenditures that accelerated the transition to an industrial society.

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[1] Max Weber first argued that in guild-based regiments where "guild membership became compulsory for every burgher … the importance of the really active merchants and tradesmen within the "crafts" continued to decline in favor of that of the rentiers" (Weber 1978 [1922], p. 1295).

Because rentiers were inclined to squander public resources on military ventures, merchants fought for greater political influence (Beramendi, Dincecco, and Rogers 2019; Dincecco, Federico, and Vindigni 2011; Dincecco and Katz 2014). Therefore, merchant-led urban governments were more likely to implement policies that aimed at expanding the flow of commerce (Cox 2017; De Long and Shleifer 1993), whereas cities where merchants turned into rentiers who steered policies away from trade faced the risk of urban decline (Merrington 1975, pp. 82–83; Postan 1987, p. 267; Stasavage 2011, pp. 163–65).

What policies are implemented and how state income is distributed therefore reflect the aims of those in power, and electoral institutions determine who can hold this power (Bogart 2022). Whereas previous literature has focused on the effects of suffrage extension on public goods expenditure generally (Aidt, Dutta, and Loukoianova 2006; Lindert 2004) and on infrastructure expenditures specifically (Bogart 2022; Chapman 2018; Nafziger 2011), we study the effects of an alternative electoral institution that disrupted political power relationships while leaving suffrage unchanged: lottery-based election procedures.

Previous literature has typically studied the effects of voting rights reforms on economic outcomes by relying on the median voter model. The median voter model posits that suffrage extension changes the characteristics of the median voter, thereby causing a shift in policy demands. To secure re-election, policymakers adjust their policies to satisfy the new electorate's demands. However, despite suffrage extension resulting in a more diverse electorate, political representation often remained concentrated among the elite, allowing them to continue prioritizing their own interests. Therefore, policy outcomes depended not only on the voters but also on the characteristics of elected politicians. To advance their interests, social groups still needed to attain political representation, and election procedures determined whether they could achieve this representation (Besley 2005; Corvalan, Querubín, and Vicente 2018; Hoffman 2015).

Political scientists and anthropologists have suggested that lottery-based election systems may help to prevent political elite capture and diversify political representation (Bagg 2024; McCormick 2006). Previous research has shown that lottery-based election systems ensured a rotation of political power among elite families in Florence before the Medici captured the institutional system in the mid-fifteenth century (Abramson 2024; Belloc et al. 2022), and in the late nineteenth and early twentieth centuries, lottery-based election systems prevented the institutional capture of early parliaments by self-interested political elites in France (Cirone and Van Coppenolle 2019).

We contribute to this literature. In 1718, the city-state of Basel adopted lottery-based election systems to elect all political representatives and civil servants. By implementing difference-in-differences regression designs, we compare whether the introduction of lotteries forestalled the monopolization of political power in Basel to states such as Zurich that did not reform their election systems. We expect that lottery-based election procedures had two direct effects and a third indirect effect. First, lotteries led to a more equal distribution of political power. Second, by weakening the power base of the rentier elite, we expect that this fostered the rise of merchants to positions of power. Third, we expect that merchants were more likely to implement policies that promoted trade, export and import tax revenues, and infrastructure spending.

We extend the existing literature in at least three respects. First, the existing literature assumes that the increasing monopolization of political power in urban parliaments is an irreversible trend leading to the dominance of rentiers in positions of power. Second, debates about lotteries often focus only on their theoretical potential to limit the abuse of power by elites. We add evidence to these studies, showing empirically that lottery-based election systems reversed extreme power monopolization. Third, previous research has studied the economic effects of suffrage extension by focusing on voters' demands for policy reforms. Our paper focuses on the supply of policy reforms by analyzing how lotteries altered the occupational composition of councils, affected the dynamics of policymaking, and thereby shaped urban development outcomes.

HISTORICAL CONTEXT

The Swiss Confederacy poses a challenge to traditional narratives of early modern Europe. It had the highest level of parliamentary activity in Europe, was never ruled by an absolutist monarch, and never participated in any major international war (van Zanden, Buringh, and Bosker 2012). As a result, the city-states of the Confederacy were likely the only entities within early modern Europe that had positive balance sheets from the mid-seventeenth century. While elsewhere public debt drove fiscal centralization, Swiss local assemblies retained their exclusive rights to levy taxes and to decide on their use (Körner 1999; Prak 2018, pp. 232–33). In this section, we first describe the political system and fiscal administration of Swiss city-states to explain how local councils were able to promote urban development. We then describe the monopolization of political power that led to reform movements and the introduction of lottery-based election procedures in Basel but not in Zurich.

THE POLITICAL SYSTEM AND FISCAL ADMINISTRATION, 1529–1798

The 13 member states of the Swiss Confederacy remained sovereign in matters of foreign and domestic policy, including tax and trade policies and public expenditures. Of these 13 states, 3 were ruled by guild-based regimes in which most guilds had a similar number of seats in parliamentary assemblies. In this paper, we focus on the guild-based political systems of Basel and Zurich (Körner 1999; Prak 2018, pp. 232–33).

Each political system comprised three councils: a great council, a small council, and a secret council. The great councils consisted of 282 members in Basel and 212 members in Zurich, but their members held limited power and convened only sporadically. The day-to-day political business was in the hands of the small councils, which comprised 64 members in Basel and 50 members in Zurich. Their members met frequently, usually multiple times per week, to perform executive, judicial, and legislative functions. The most powerful assemblies were the secret councils, consisting of 13 members in Basel and 12 members in Zurich. Their members formed the de facto governments of the city-states and were responsible for domestic and foreign policy decisions.

The political system had a nested structure: members of the secret councils also belonged to the small councils, and members of the small councils belonged to the great councils. It was also hierarchically structured: only members of the great councils could become members of the small councils, and only members of the small councils were eligible for election to the secret councils. The election of councilors was generally for life, and new council members were mostly elected by incumbent councilors by an open majority vote. Elections took place only if a councilor died or in the rare event of their resignation. Online Appendix Figure 1A visualizes and explains the political systems of Basel and Zurich in detail (Doehne, Geweke, and Rost 2023, p. 651; Im Hof 1949, pp. 143–46; Körner 1999, p. 329; Müller 1954, pp. 10–21; Peyer 1978, pp. 107–14; Weibel 1996, pp. 16–24).

Members of the small and secret councils comprised the majority of bureaucrats in the upper sections of the financial authorities and thus controlled the use of public resources. For this reason, positions in local financial authorities were often the targets of family intrigues and the abuse of office (Vettori 1984, pp. 118–19). Because frequent warfare was absent, Swiss city-states only levied indirect taxes. In merchant cities such as Zurich and Basel, a foreign trade tax, known as the *Pfundzoll*, constituted the largest proportion of the state's revenue (Körner 1999, p. 348; Vettori 1984, p. 341; Wehrli 1944, p. 42). Revenues were allocated

to administration, military and social spending, and infrastructure development. The decision-making authority for larger infrastructure projects, such as well works, road maintenance, and building construction, rested with the small council or the central financial authority (Sigg 1971, pp. 13–15; Wehrli 1944, p. 34). The account books of local building authorities reveal that they hardly spent revenues on prestige projects. Instead, building projects aimed at expanding markets, roads, and warehouses, according to the needs of the economic and social infrastructure defined by the council members in power (Körner 1999, pp. 349–53; Vettori 1984, pp. 393–95).

POWER MONOPOLIZATION IN BASEL AND ZURICH

These closed political systems allowed the political elite to recruit their members from an increasingly exclusive circle of elite families. Consequently, accusations of bribery and corruption became widespread in both cities from the mid-seventeenth century onward (Felder 1976, p. 350; Peyer 1978, p. 113; Röthlin 1986, pp. 131–32). For example, Zurich's council scribe, Johann Conrad Abegg, claimed in 1713 that individuals seeking office had to pay bribes ranging from 1,000 to 1,500 pounds to secure a seat on one of the councils (Saxer 1938, p. 37). In Basel, Jacob Henric-Petri, who was subsequently shunned from the city, likewise claimed that corruption had "increased to such an extent that it has become almost general … no one, not even the most capable, may enter the council without gifts and presents or other lazy intrigues" (Henric-Petri 1693, p. 9). In fact, public dissatisfaction in all Swiss city-states had reached such high levels that the British envoy to the Swiss Confederacy, Abraham Stanyan, concluded in 1714 that "seditious insurrections … are to be feared, unless care be taken to content the bulk of the citizens, by chusing a greater number of them into the administration" (Stanyan 1756, p. 95).

As corruption became pervasive, it fueled concerns about oligarchization. In Basel, the Burckhardt family held three of the four most important political positions by 1666, leading to recurrent "accusations of partisanship, concerns of oligarchy, and general displeasure" (Doehne, Geweke, and Rost 2023, p. 650; Ochs 1821, pp. 91–92). Similarly, in Zurich, an "entirely ordinary … citizen" lamented in September 1713 that "government positions, civil servant positions, and advocatus positions are entirely in the hands of a few families who make sure that no one else reaches the government" (Saxer 1938, p. 44). Restrictions on urban migration exacerbated the exclusivity of the system, making it almost

impossible for foreigners to gain citizenship, which was a precondition for guild and council membership (Peyer 1978, p. 113; Pfister 2003, p. 213; Portmann 1979, p. 64–65). The number of citizens eligible for election to political positions therefore remained relatively stable in both states (Pfister 2003, p. 212; Röthlin 1986, p. 90).

As political power became more concentrated, rentiers began to replace craftsmen and merchants in political positions in Basel and Zurich (Guyer 1943, pp. 124–26; Röthlin 1986, pp. 97–113). Contemporaries defined rentiers as individuals who derived their income from investments and property ownership. This group often also included military officers and professionals who were not tied to any specific guild, such as lawyers and doctors (Guyer 1952, p. 24). Rentiers began to dominate political positions in the seventeenth century for two reasons. First, merchants often turned into rentiers. Merchants ceased their entrepreneurial activities once they had achieved material saturation, shifted their assets into low-risk investments, and "turned to…civil service—or, more generally, to a junkerish existence as rentiers" (Guyer 1943, p. 133). Second, merchants faced mounting pressure from rentiers, the clergy, and craftsmen, who had substantially different policy interests. In Zurich, a group of rentiers and members of the clergy sought "to prevent too great a power of the merchants at the head of the state" (Pfister 1992, p. 178), and Basel's merchants faced pressure from two groups of rentiers, who "were usually in sharpest contrast to the merchants: the military officers … and the academics[2]" (Im Hof 1949, p. 158). Figures 1A and 1B illustrate the proportion of merchants and rentiers in the secret council during the seventeenth and eighteenth centuries.

Whether merchants or rentiers dominated political positions had significant policy implications. First, the politicians in power shaped a city's domestic and foreign policy. Rentiers were more inclined to follow bellicose foreign policy decisions, and whereas rentiers "regarded government service as a status-conforming way of life, a source of income and asset protection … the political activity of merchants is determined by other motivations and functions…their main focus—also in politics—is on business, trade, and industrial activities. Merchants are well-trained for the group- and family-specific protection of political interests, ranging from trade contracts … to questions of administration and the investment of public funds" (Braun 1984, p. 180). For these reasons, rentiers criticized merchants' foreign policy decisions for prioritizing economic

[2] The historical literature commonly defines academics as professional groups holding university degrees, such as lawyers and doctors. This category may also encompass professors, who were usually ineligible for local council elections (Im Hof 1949, pp. 159–60).
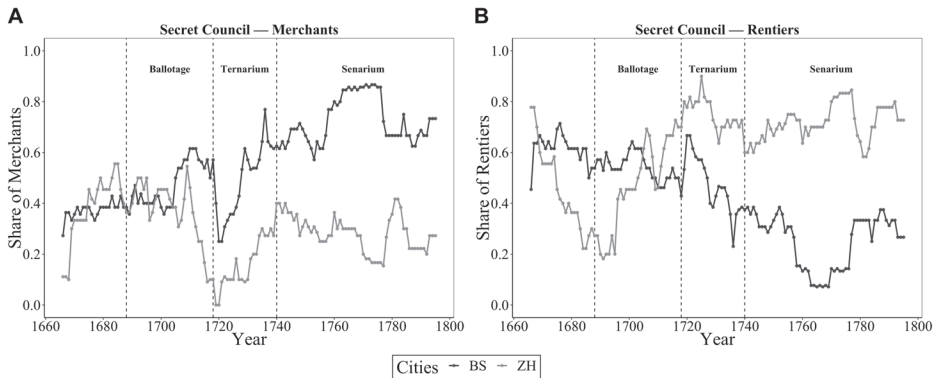
FIGURE 1
SHARE OF MERCHANTS AND RENTIERS IN THE SECRET COUNCIL
OF BASEL AND ZURICH, 1660–1798

Notes: Figures 1A and 1B illustrate the composition of the secret councils in Basel and Zurich. Dashed vertical lines indicate lottery-based election reforms in Basel in 1688, 1718, and 1740. Figure 1A displays the share of merchants in the secret council, and Figure 1B represents the share of rentiers in the secret council for Basel and Zurich.
Source: Authors' database.

motives over state interests (Pfister 1992, p. 178; Saxer 1938, p. 12) and "often lacked understanding for the purely commercial and, in foreign policy matters, lenient policies of the merchants' party" (Im Hof 1949, p. 159).

Second, whoever dominated urban politics tried to shift tax burdens onto the other group while allocating public resources to advance their own interests. Reform movements seeking to reduce power monopolization were often incited by the misappropriation of public finances and the inadequate provision of public goods (Burckhardt 1866, pp. 77–82; Hottinger 1851, p. 181; Vettori 1984, pp. 103–20). When discussions about declining financial revenues emerged in Basel's councils in 1716, heated debates followed, and "each class considered it the best [tax] system, if they paid little and the others paid all the more abundantly" (Ochs 1821, p. 458–59). Discussions focused on the level of taxation. Merchants contended that an exorbitant taxation of trade would hamper Basel's economic development, as "excessive taxation of foreign merchants would lead to Basel being avoided as a trading center" (Röthlin 1986, p. 346–47). Moreover, the composition of taxes was debated. In 1730, Basel's export-oriented textile merchants proposed shifting toward more extensive import tariffs and eliminating export tariffs. However, this proposal attracted opposition from a diverse group of citizens, including consumers, retailers, and craftsmen, who relied on imports and favored

maintaining the existing tariff structure. Consensus on tax reductions was easier to achieve. Consequently, as merchants began to dominate Basel's councils, trade taxes declined, but the tax structure underwent little overall change.[3]

REFORM ATTEMPTS AND REFORMS IN BASEL AND ZURICH

The oligarchization of the political systems and the misappropriation of public funds led to popular uprisings, intra-elite conflicts between rentiers and merchants, and movements in both states aimed at reforming the political system. In Zurich, excluded citizen families demanded greater political participation in an uprising in 1713, which had been triggered by corruption allegations and Zurich's involvement in the confessional Toggenburg War (Hottinger 1851, p. 174). In the course of the uprising, the citizenry, largely consisting of craftsmen, demanded a limit to the number of politicians belonging to one family (Guyer 1943, p. 20; Saxer 1938, pp. 38–42).

Despite the citizenry's wide-ranging demands, the uprising of 1713 failed to implement fundamental reforms for three reasons. First, in contrast to Basel, the clergy supported the sitting government after it had successfully waged the Toggenburg War and "began to lament from the pulpit about the dangerous and audacious spirit of innovation" of the reform movement (Hottinger 1851, pp. 184–86; Saxer 1938, p. 44). Second, the conflict in Zurich unfolded as a struggle between the citizenry and council members. The council members formed a relatively coherent interest group opposing the citizenry's demands, while the citizenry suffered diverging and conflicting interests. Third, the reigning council members deliberately prolonged the reform process, successfully fostering divisions among the citizenry's different interest groups, and obstructing far-reaching reforms (Guyer 1943, p. 20; Hottinger 1851, p. 187; Pfister 1992, p. 202; Saxer 1938, p. 79).

For these reasons, the reforms had little effect in breaking up power monopolization. Proposals to establish lottery-based election procedures were discussed but did not gain a majority within the great council (Guyer 1943, p. 22). Instead, a few policies aimed at restricting power monopolization were put in place, including election by secret ballot for some positions, and it became illegal for members of the small council to actively manage a trading business. These measures may have deterred

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[3] Staatsarchiv Basel [hereafter StABS], Älteres Hauptarchiv. Protokolle: Grosser Rat 4, pp. 342–344.
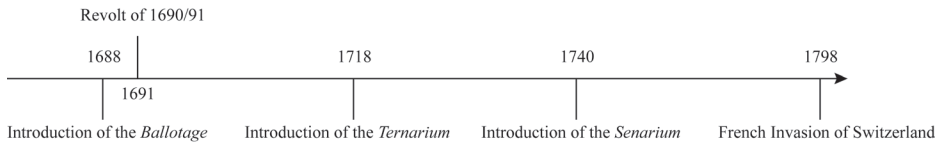
FIGURE 2

TIMELINE OF ELECTORAL REFORMS IN BASEL, 1660–1798

Source: Im Hof (1949).

merchants from seeking political positions, but in the opinion of contemporaries and historians, the reforms had little effect in halting corruption and the oligarchization of the political system (Guyer 1943, pp. 22, 65–67; Hottinger 1851, pp. 185–86; Pfister 1992, pp. 201–02; Saxer 1938, pp. 69–80).

In Basel, increasing oligarchization, corruption allegations, and factional struggles between families endangered the elite's internal stability from the mid-seventeenth century onward (Ochs 1821, pp. 82–103). To curb electoral corruption, Basel's small council implemented the *Ballotage* system in 1688. Votes were now cast in secret, and prior to an election, one-third of the electoral body were randomly excluded from casting their vote. The *Ballotage* system was intended to raise the costs of corruption by making it uncertain whether a person would have a vote in the election, but often, it simply made corruption more expensive (Burckhardt 1866, pp. 94–96; Doehne, Geweke, and Rost 2023, pp. 650–51; Müller 1954, pp. 26–27; Ochs 1821, p. 418; Schweizer 1931, p. 8). In Figure 2, we present a timeline of Basel's main reforms.

Concerns of oligarchization persisted, and when aggravated by rising food prices and French military pressure, they ignited a civil uprising in Basel in 1690/91. The uprising was backed by merchants of the great council. It aimed to curtail power monopolization, shift the balance of power from the small to the great council, and end the misappropriation of public funds. The uprising led to the removal of some incumbent small councilors and the election of new ones. However, old councilors were quickly reinstated alongside the new ones, causing a temporary increase in council size. Internal frictions within the reform movement prevented far-reaching reforms, but the small council conceded legislative authority to the great council, which now held similar power to that of Zurich's great council. Consequently, the uprising failed to dilute the concentration of political power, but it laid the groundwork for subsequent electoral changes (Armandola, Doehne, and Rost 2024, pp. 262–65; Burckhardt

1866, pp. 71–77; Doehne, Geweke, and Rost 2023, pp. 650–51; Müller 1954, pp. 42–58; Vettori 1984, pp. 111–130).

Intra-elite groups continued to demand far-reaching electoral reforms. In 1714, a group of priests petitioned the great council to randomize the final selection of candidates so as to prevent corruption from transforming the political system "into an almost unbearable oligarchy, thereby… destroying the old, free, well-ordered form of government that was once equally shared among many" (Burckhardt et al. 1720, p. 9). Having received the power to enact laws in 1691, the great council implemented lottery-based election procedures in 1718 after irregularities in the election of two civil servants had become public (Ochs 1821, p. 563; Röthlin 1986, p. 132). From 1718 onward, one-half to two-thirds of eligible voters were randomly excluded prior to each election. The remaining voters drew numbered ballots that randomly divided them into three voting groups. Each group elected one candidate to a shortlist of three, the *Ternarium*, from which the final candidate was selected by lot. In 1740, the number of voting groups and candidates was extended to six, the *Senarium.* These election systems remained in place until the French invasion of 1798 (Burckhardt 1866, p. 96; Doehne, Geweke, and Rost 2023, pp. 651–52; Im Hof 1949, pp. 146–152; Ochs 1821, p. 464).

Therefore, the decision to reform the election system was not random, and two endogenous factors led to the implementation of lottery-based election reforms in Basel but not in Zurich. First, Basel's clergy backed electoral reforms, whereas Zurich's clergy supported the existing government. Second, the revolt of 1690/91 highlighted the threat of social unrest and provoked legislative changes that enabled Basel's great council to implement electoral reforms. Even though we cannot completely eliminate endogeneity concerns, we describe how we address the issue in the following sections and discuss the question of endogeneity again when highlighting the limitations of the paper.

DATA

In what follows, we test three hypotheses: first, we anticipate that lottery-based election procedures led to a more equal distribution of political power. Second, lotteries facilitated the ascent of merchants to positions of power, displacing a rentier elite. Third, merchants were more inclined to implement policies that fostered trade tax revenues, trade volumes, and infrastructure spending. To test these hypotheses, we have collected two types of data. First, we assemble micro-level information on all politicians of the secret and small councils of Basel and Zurich.

Second, we gather macro-level information on the cities' *Pfundzoll* revenues, trade volumes, and infrastructure expenditures.

Among Swiss city-states, Basel and Zurich offer the most suitable basis for comparison. Both cities were Protestant and had a guild-based political system. This resulted in similar challenges of corruption, oligarchization, and the dominance of rentiers in positions of power. Additionally, they were similar in geographical location, total population size, and industrial structure as both cities were centers of the Confederacy's textile export economy (Braun 1984, pp. 122–125). Although Zurich had a more populous hinterland, the two cities were the largest within the Swiss Confederacy, with urban population numbers ranging from 10,000 to 15,000. To substantiate the comparability of the two cities, we provide a balance table comparing essential covariates (Table 1).

COUNCIL MEMBERSHIP

We transcribe data for each politician of the small and secret councils, including information on their names, surnames, guild memberships, political positions, the years in which they entered and exited the political system, and, in the case of secret councilors, their occupations. For Basel, we derive data for the small and secret councils from Linder (1748–1796). The small council consisted of 64 members and had four elections per year on average, providing 530 observations between 1666 and 1794. The secret council consisted of 13 members with one election per year on average, resulting in 142 observations. The number of elections per year varied as it depended on the number of councilors who had died or resigned that year (Müller 1954). We derive occupational information from Röthlin (1986, pp. 325–95) who provides biographies of all secret councilors (Geweke et al. 2022, pp. 35–37). We draw data for Zurich's small council from Schnyder (1962).[4] The small council consisted of 50 members, with three elections per year on average, providing 402 observations between 1666 and 1794. We compiled data on secret council members from Fabian (1974, pp. 290–341). The secret council comprised nine known members in Zurich, with an average of one election per year, providing 128 observations. We obtained information on their occupational backgrounds by consulting the Historical Dictionary of Switzerland (HLS) and genealogical books of Zurich's magistrate families (Keller-Escher 1885, 1899).

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[4] The state archive of Zurich provides a publicly available database based on Schnyder's (1962) work (https://www.zh.ch/de/politik-staat/recherche-im-staatsarchiv/zuercher-geschichte. html#1505839425, accessed 22 February 2023).

TABLE 1
BALANCE TABLE, 1666–1794

	Pre-*Ternarium* (1666–1717)			Post-*Ternarium* (1718–94)		
	Basel	Zurich	Difference	Basel	Zurich	Difference
HHI — Secret council	2026	1240	786	1060	1488	–428
HHI — Small council	247	399	–152	237	475	–238
Share of merchants — Secret council	0.43	0.38	0.05	0.66	0.25	0.41
Share of rentiers — Secret council	0.57	0.46	0.11	0.32	0.73	–0.41
Urban population (in thousands)	13.44	10.82	2.62	15.46	10.93	4.54
Rural population (in thousands)	17.60	114.77	–97.17	22.43	144.59	–122.16
Population share of merchants	0.16	0.07	0.09	0.20	0.11	0.09
Population share of rentiers	0.12	0.08	0.05	0.13	0.13	0.01
Internal conflict	0.04	0.02	0.02	0.05	0.18	–0.13
External conflict	0.00	0.31	–0.31	0.05	0.05	0.00
Epidemics	0.06	0.29	–0.23	0.00	0.09	–0.09
Famines	0.10	0.12	–0.02	0.03	0.03	0.00
Natural disasters	0.19	0.29	–0.10	0.31	0.10	0.21

Notes: The table shows averages for the pre-*Ternarium* (before treatment) and post-*Ternarium* (after treatment) periods. For details on the control variables, see Sections 2B and 2C of Online Appendix 2.
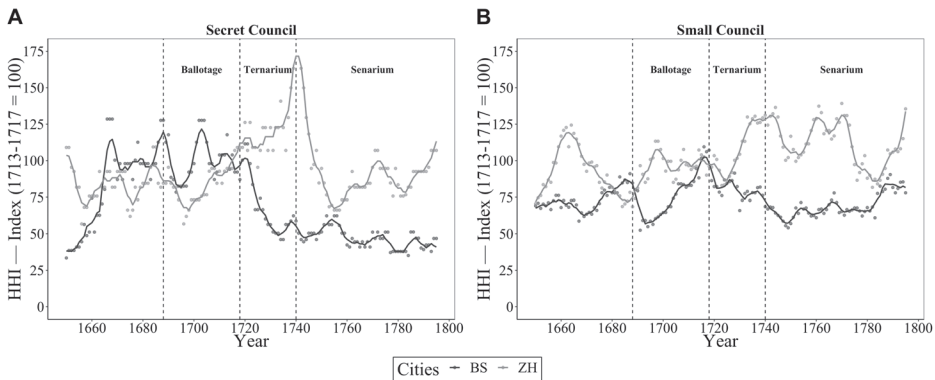*Source*: Authors' database.

FIGURE 3
DEVELOPMENT OF POWER CONCENTRATION IN BASEL AND ZURICH, 1660–1798

Notes: Figure 3 illustrates the development of the HHI for the secret (Fig. 3A) and small (Fig. 3B) council in Basel and Zurich. The index sets the average of the years 1713 to 1717 as 100. Dashed vertical lines indicate lottery-based reforms in Basel in 1688, 1718, and 1740. Points indicate annual values, whereas the line represents the five-year moving average of the index.
Source: Authors' database.

We construct panel datasets that detail the annual composition of each council in each city. The oligarchization of early modern parliaments is usually understood as the monopolization of political power in the hands of a few elite families. In line with previous literature, we define "family" as individuals sharing a common last name. This definition is closer to that of a clan than of a household (Padgett and Ansell 1993, pp. 1267), and it is consistent with both contemporaries' notions and historians' interpretations of Swiss elite family structures (Müller 1954, pp. 29–30). We calculate the degree of power held by each family based on the number of seats its members occupied in a council in a given year. In particular, we calculate an annual Herfindahl-Hirschman Index (HHI) for both councils. This results in four-time series of HHIs: one for the secret councils and one for the small councils of both Basel and Zurich. The HHI is a common measure of political concentration, typically ranging from 0 to 10,000, with greater values indicating higher concentrations of power. It is computed as the sum of the squared proportions of seats held by each family f in council j in a given year i (Ferraz, Finan, and Martinez-Bravo 2024, pp. 13–14). Figures 3A and 3B show the development of the HHI for the small and secret councils of Basel and Zurich.

To capture political economy conflicts of the time, we follow social differentiations suggested by contemporaries and historians. We define rentiers as individuals who derived their incomes from investments and

property ownership and include all professionals who were not tied to any specific guild. We classified industrialists and merchants as merchants (Guyer 1952, p. 24).

TRADE VOLUMES AND INFRASTRUCTURE EXPENDITURES

We collect three types of information to measure urban development. First, we focus on annual trade tax revenues (*Pfundzoll*). From these tax revenues, we secondly calculate annual trade volumes by dividing revenues by the tax rate in a current year. We explain how trade volumes are calculated in detail in Online Appendix 2A, pp. 4–5. Third, we concentrate on infrastructure expenditures.

Basel's *Pfundzoll* tax revenues for the period between 1688 and 1798 have been documented by Vettori (1984, pp. 334–40). Transfers to the local building authority are recorded in the state's annual ledgers (German, *Stadtrechnungen*) for the period 1724–1797.[5] For earlier years, we directly consult archival sources from the local building authority, which provide annual budgets for the years from 1688 to 1722.[6] We used linear interpolation to replace missing data on infrastructure expenditures for the years 1723 and 1791–95. Zurich's income and export tax revenues and transfers to the local building authorities are documented in the accounts of the central financial authority (German, *Seckelamtsrechnungen*).[7] We bridge one missing year, 1711, by linear interpolation. Because figures for the years between 1795 and 1798 are less reliable due to high inflationary pressures, we exclude these years from our analysis (Vettori 1984, pp. 349–50).

To make the data comparable, we record all values in grams of gold (Dincecco 2009). Swiss accounting systems usually relied on the pound as currency. We derive Swiss currency exchange rates from Körner, Furrer, and Bartlome (2001). First, we convert pounds into *(guter) batzen* and *(guter) batzen* into *Dukat*, a currency that was renowned for maintaining stable fineness between 1600 and 1799. Then, we convert the

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[5] In some instances, the central financial authority paid for the construction and maintenance of roads and buildings. We document these expenses to capture changes in infrastructure spending beyond the local building authorities' remit. In the case of Basel, such expenses cannot be obtained for the period before 1723. However, because these payments only reached noteworthy levels in the period after 1740, they do not pose an issue to data collection, StABS, Älteres Hauptarchiv. Finanz J2: Stadtrechnungen, 1723–1797.

[6] StABS, Älteres Hauptarchiv. Bau C1: Rechnungswesen des Bauamts, des Stadtbauamts, des Brunn- und Bauamts, 1666–1867.

[7] Staatsarchiv Zurich, Finanzarchiv: Rechnungen 1275–1820 (Fonds): F III 32 Seckelamt (1396–1798).

Dukat values into grams of gold by using the Marteau currency converter (Simons and Böhne 2023).

To make results comparable between the two city-states, we divide revenues and expenditures by the total population. Population figures for Basel have been derived from Portmann (1979) and Gschwind (1977). For Zurich, we rely on Mattmüller (1987) and Letsch (2017). We used linear interpolation to bridge population figures in missing years. We divide our estimates by the total population size because urban merchants depended on the rural population for the production of textiles, especially during the rise of the putting-out system. As the urban administration was responsible for providing infrastructure to its hinterlands, tax revenues, trade, and infrastructure expenditures depended on the sizes of both urban and rural populations (Körner 1999, p. 347).

CONTROL VARIABLES

We control for several underlying factors that might confound our analysis. We control for the occurrence of external conflicts, internal conflicts, natural disasters, famines, and epidemics, all of which may have affected trade, tax revenues, and non-military expenditures. Conflicts and catastrophic events may have also increased pressure on political elites to expand political participation. Additionally, we control for the merchant and rentier population shares, as these likely influenced the city's trade volumes and demand for infrastructure projects. In Online Appendix 2B, pp. 5–6, we explain in greater detail why each control variable is included and how it has been constructed. In addition, Online Appendix Table 2C provides a list of all control variables that describe in detail the occurrence of each event, the years in which it took place, a brief description of the type of event, and the original source.

EMPIRICAL ANALYSIS

In this section, we implement a difference-in-differences regression design to test our argument. We first compare changes in the distribution of political power in Basel with Zurich before and after Basel's implementation of lottery-based election procedures in 1718. We then compare how the professional composition of the secret councils changed in Basel with Zurich. Third, we estimate how the introduction of lottery-based election procedures affected key measures of early modern state development. Finally, we substantiate the proposed mechanism by examining Basel's policymaking.

CONCENTRATION OF POLITICAL POWER AND PROFESSIONAL COMPOSITION OF ASSEMBLIES

Political Equality

We first implement an event-study model that allows us to compare changes in power concentration in Basel, which enacted lottery-based election regimes, with changes in Zurich, which did not reform its election system, while controlling for city and time fixed effects. We estimate the following model:

$$HHI_{jit} = \sum_{y=-6}^{7} \beta_y (TreatedCity_{it} \times Decade_{it}^y) + \gamma_t + \delta_i + X_{it} + \varepsilon_{jit}, \quad (1)$$

where the dependent variable is the HHI, which denotes the level of inequality in council j in state i in decade t. We report robust standard errors.[8] X_{it} is a vector of control variables, γ_t are decade fixed effects, δ_i are city fixed effects, and ε_{jit} is the error term. The $TreatedCity_{it}$ variable equals 1 for each decade after 1718 in states that implemented lotteries and zero otherwise. We define decades from the introduction of lottery-based election procedures in 1718. Hence, the first decade under treatment spans from 1718 to 1727, and subsequent decades follow accordingly. The variable $Decade_{it}^y$ measures the time relative to the implementation decade of 1718–1727, and is equal to zero in all years in states that did not implement lotteries. The baseline is $y = -1$, indicating the decade before the implementation of lottery-based election procedures, 1708 to 1717. All periods are compared to this baseline reference category, which is omitted. Thus, each estimate of β_y provides the change in outcomes in Basel relative to Zurich during decade t, as measured from the decade prior to the implementation of the *Ternarium*. If developments between both states were comparable before the implementation of lotteries, we would expect that indicators with event times $y = -6$ to $y = -2$ would be statistically insignificant or slightly above zero, indicating no differences in inequality between the states or higher levels of inequality in Basel.

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[8] Because treatment occurs at the city-level, concern arises about intracluster correlation of standard errors. To address this concern, clustering standard errors at the city-level is warranted; however, this may bias standard errors downward if the number of clusters is too small. Although cluster bootstrap-*t* procedures can help circumvent the issue of a small number of clusters (Cameron, Gelbach, and Miller 2008), they may perform poorly when the number of clusters becomes too small. In such cases, the ordinary wild bootstrap typically provides more reliable results, with bootstrap error terms clustered at the finer city-year level (MacKinnon and Webb 2018). In the Online Appendix, we present *p*-values based on cluster-robust standard errors, the wild cluster bootstrap, and the ordinary wild bootstrap (Appendix 3C, Tables 3C.1–3C.6). The main coefficients tend to remain significant across all clustering approaches.
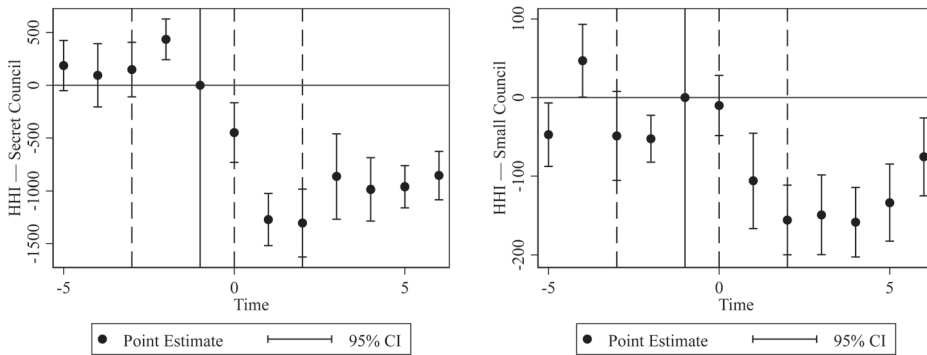
FIGURE 4
EVENT STUDY PLOTS—HHI OF SECRET (A) AND SMALL (B) COUNCILS

Notes: Figures 4A and 4B depict coefficients from Columns (1) (Fig. 4A) and 3 (Fig. 4B) of Online Appendix Table 3A.1, respectively. The coefficients represent the change in the HHI for two councils, the secret council and the small council. It compares Basel with Zurich in the five decades before and six decades after the implementation of the *Ternarium* in Basel, as compared to the decade immediately prior to the implementation of the *Ternarium* (1708–1717). Dashed vertical lines indicate in which decades the implementation of the *Ballotage* in 1688 (–3), the *Ternarium* in 1718 (0), and the *Senarium* in 1740 fall (+2).
Source: Authors' database.

We also report difference-in-differences estimates as a summary of the effect across election regimes using Equation (1) by merely replacing the event study coefficients with a term interacting the dummies of the various election regimes (*no randomness*, *Ballotage*, *Ternarium*, and *Senarium*) with the city variable.

Figure 4 and Columns (1) and (3) of Online Appendix Table 3A.1 present the main results of the event-time model. Figure 4A shows that in the decades before 1718, levels of inequality were either higher in Basel or not significantly different between the secret councils of Basel and Zurich. This pattern changes in the decades following 1718, with Basel showing significantly and consistently lower levels of inequality in its secret council. Figure 4B shows that in the small councils, levels of inequality were not consistently different from each other in the decades before the 1710s. This gradually changes after 1718, with levels of inequality being significantly and permanently lower in Basel from the decade of 1728 onward as the effect of lottery-based election procedures unfolded over time. The event-study analysis reveals that between 1688 and 1708, Basel's small council displayed a lower HHI than Zurich's. This was driven by the aftermath of the 1690/91 revolt, which temporarily increased the number of small councilors. However, the revolt did not affect the number of secret councilors. Consequently, throughout the pre-treatment period, Basel's secret council maintained HHI levels

comparable to or slightly higher than Zurich's (Geweke and Rost 2024).

The difference-in-differences estimates provide a similar picture. In Table 2, the interaction terms in Column (1) indicate that the HHI of the secret council in Basel tended to be lower than the equivalent HHI for Zurich under the *Ternarium* and *Senarium* regimes. In the case of the small council (Column (3)), effect sizes are smaller, and differences are already weakly significant under the *Ballotage* regime due to overlap with the 1691 revolt (Figures 3–4).

Professional Composition of Secret Councils

To test how the concentration of political power was associated with the election of merchants, we first provide motivational evidence for the association between levels of inequality and the professional composition of the secret councils. We summarize industrialists and merchants under the term "merchant" and bureaucrats, rentiers, and military officials under the term "rentier" (Guyer 1952, p. 24). Figure 5 illustrates the association between the HHI and the proportions of merchants and rentiers in the secret councils. The plots imply that high levels of inequality were associated with a lower proportion of merchants and a higher proportion of rentiers in secret council positions.

To substantiate these findings, we again estimate Equation (1) but this time the proportions of merchants and rentiers in the secret council are our dependent variables. Figure 6 and Columns (5) and (7) of Online Appendix Table 3A.1 document the results. The proportion of merchants in the secret council of Basel is lower or not significantly higher in the decades before 1718 than in Zurich. This changes from 1718 onward, however, and Basel tends to have a higher proportion of merchants on its secret council than Zurich. As can be expected, we observe similar changes in the opposite direction in the proportion of rentiers on the secret council.

Difference-in-differences estimates in Columns (5) and (7) of Table 2 support these findings. The interaction terms in Column (5) indicate that the proportion of merchants on the secret council in Basel was on average higher than that of merchants on Zurich's secret council during the *Ternarium* and *Senarium* election regimes. Slight differences are already significant under the *Ballotage* regime, resulting from Zurich's decline in merchant representation in the 1710s (Figure 1). For rentiers, we observe similar developments in the opposite direction. The interaction terms in Column (7) confirm that the proportion of rentiers on the

TABLE 2
DIFFERENCE-IN-DIFFERENCES ESTIMATES—EFFECT OF LOTTERY-BASED ELECTION SYSTEMS ON MEASURES OF POLITICAL EQUALITY AND THE SOCIOECONOMIC COMPOSITION OF COUNCILS

	(1) HHI – Secret Council	(2) SE	(3) HHI – Small Council	(4) SE	(5) Merchant Share in Secret Council	(6) SE	(7) Rentier Share in Secret Council	(8) SE
Ballotage	222.460	(143.233)	−1.332	(40.662)	−0.119***	(0.034)	0.001	(0.067)
Ternarium	846.944***	(202.505)	2.638	(48.480)	−0.385***	(0.069)	0.229***	(0.081)
Senarium	680.081***	(254.800)	−119.977**	(51.520)	0.001	(0.087)	0.055	(0.098)
Basel	1,883.784***	(277.171)	−397.780***	(51.478)	−0.044	(0.092)	0.059	(0.100)
Ballotage # Basel	−87.784	(89.735)	−44.627**	(20.025)	0.097***	(0.036)	−0.081*	(0.045)
Ternarium # Basel	−1,118.883***	(122.125)	−59.944***	(21.086)	0.340***	(0.034)	−0.430***	(0.037)
Senarium # Basel	−1,186.575***	(86.597)	−130.637***	(18.169)	0.440***	(0.028)	−0.621***	(0.036)
Controls	Yes		Yes		Yes		Yes	
Decade FE	Yes		Yes		Yes		Yes	
Observations	258		258		258		258	
R-squared	0.754		0.867		0.843		0.824	

Notes: Robust standard errors are in parentheses. *** p <0.01, ** p <0.05, * p <0.1. For coefficients of control variables, see Online Appendix Table 3B.1.
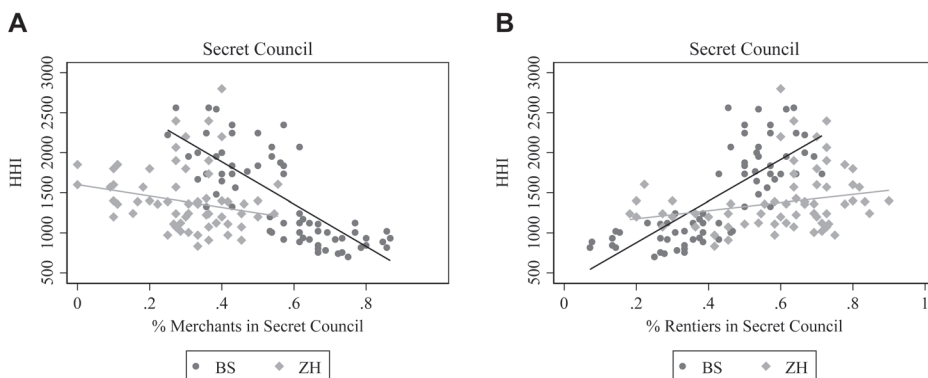*Source*: Authors' database.

FIGURE 5
PROPORTION OF MERCHANTS AND RENTIERS AND THE DEGREE OF POWER
CONCENTRATION IN THE SECRET COUNCILS OF ZURICH AND BASEL, 1666–1798

Notes: Fig. 5A and 5B illustrate the association between the HHI in the secret council and the share of merchants (Fig. 2A) and rentiers (Fig. 2B) in the secret council, respectively.
Source: Authors' database.

secret council in Basel was significantly lower under the *Ternarium* and *Senarium* regimes than in Zurich.

TRADE VOLUMES AND INFRASTRUCTURE EXPENDITURES

Third, we test whether Basel was able to sustain or increase its *Pfundzoll* tax revenues, trade volumes, and infrastructure expenditures under the various lottery regimes. We expect that lottery-based election procedures had positive effects on macro-level outcomes for at least two reasons: First, a higher proportion of merchants in positions of power might have improved the flow of commerce as merchants were more likely to keep trade barriers low and to implement outward-looking trade policies (De Long and Shleifer 1993). Second, historical evidence suggests that the election of merchants to positions of power fostered growth-enhancing public goods investments, such as expenditures on infrastructure (Braun 1984, p. 180).

Using Equation (1), we implement an event-study model and a difference-in-differences regression design to estimate the relative development of our dependent variables of interest, depending on the specific decade or lottery regime in place. Because our dataset only includes information on development outcomes for the period after 1688, we differentiate between three election regimes: *no randomness/Ballotage, Ternarium,* and *Senarium*. Online Appendix Table 3A.2 and Figure 7 document the results of the event-study model. The plots illustrate how
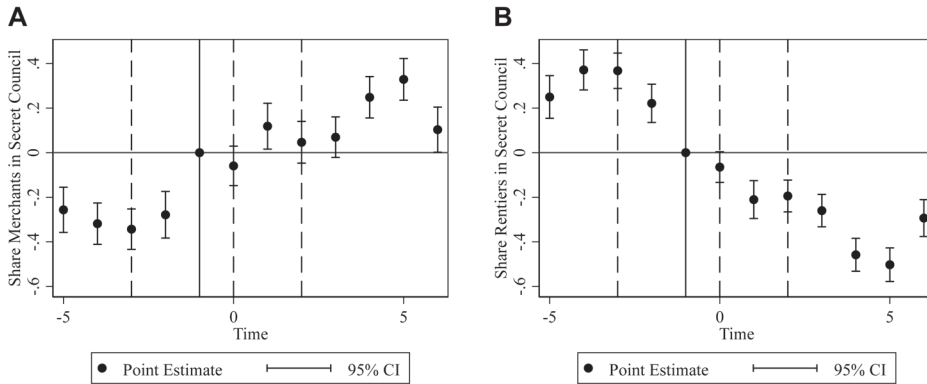
FIGURE 6
EVENT STUDY PLOTS—SHARE OF MERCHANTS AND RENTIERS
IN SECRET COUNCIL

Notes: Figures 6A and 6B report the coefficients from Columns (5) (Fig. 6A) and 7 (Fig. 6B) of Online Appendix Table 3A.1, respectively. The coefficients represent the change in the share of merchants and rentiers in the secret council comparing Basel with Zurich in the five decades before and six decades after the implementation of the *Ternarium*, as compared to the decade immediately prior to the implementation of the *Terrnarium* (1708–1717). Dashed vertical lines indicate in which decades the implementation of the *Ballotage* in 1688 (–3), the *Ternarium* in 1718 (0), and the *Senarium* in 1740 fall (+2).
Source: Authors' database.

per capita trade tax revenues and trade volumes did not differ significantly from those in Zurich in the years before the implementation of lotteries in Basel. Following the implementation of lotteries, per capita *Pfundzoll* revenues and trade volumes increased significantly in Basel compared to Zurich. We observe a similar but somewhat slower increase in per capita infrastructure expenditures. Infrastructure expenditures displayed a modest upswing before the introduction of lotteries, demonstrated no significant difference under the Ternarium regime, and only began to surpass those in Zurich significantly under the *Senarium* regime. In contrast to fiscal revenues, infrastructure expenditures likely depend on state revenues from previous years, which only later translate into increases in public expenditures and thus have a lagged effect on state development outcomes. Although the common trends assumptions are upheld for *Pfundzoll* revenues and trade volumes, they appear more doubtful for infrastructure expenditures. Therefore, we advise caution in interpreting these latter findings with the same degree of confidence.[9]

[9] In addition, bootstrapped *p*-values for infrastructure expenditures are not consistently significant, which reinforces the need for caution in interpreting these results (Online Appendix 3C, Tables 3C.4–3C.6).
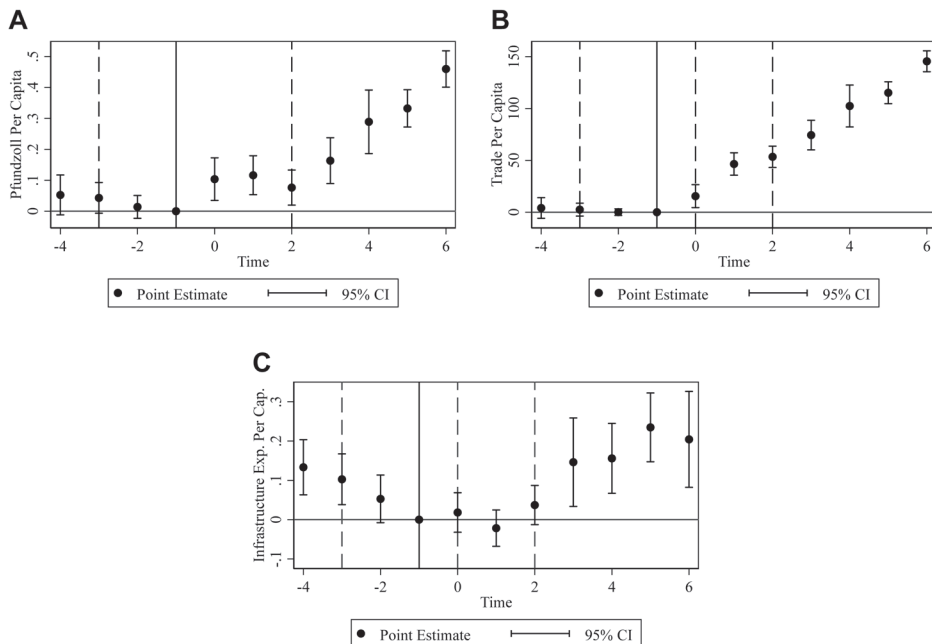
FIGURE 7

EVENT STUDY PLOTS TO REGRESSION—EFFECTS OF LOTTERY-BASED ELECTION
SYSTEMS ON URBAN DEVELOPMENT OUTCOMES

Notes: Figures 7A to 7C report coefficients from Columns (1), (3), and (5) of Online Appendix
Table 3A.2. The coefficients represent the change in the per capita values of *Pfundzoll* revenues
(Fig. 7A), trade volumes (Fig. 7B), and infrastructure expenditures (Fig. 7C) comparing Basel
with Zurich in the four decades before and six decades after the implementation of the *Ternarium*,
as compared to the decade immediately prior to the implementation of the *Ternarium* (1708–
1717). Dashed vertical lines indicate in which decades the implementation of the *Ballotage* in
1688 (–3), the *Ternarium* in 1718 (0), and the *Senarium* in 1740 (+2) fall.
Source: Authors' database.

Table 3 presents the estimates of the difference-in-differences analysis.
Except for per capita infrastructure expenditures under the *Ternarium*
regime, regression results are highly significant and show a positive asso-
ciation between lottery-based election regimes in Basel and measures of
state development. In the Online Appendix, we offer supporting descrip-
tive evidence demonstrating how levels of trade tax revenue, trade
volumes, and infrastructure expenditures diverge between the city-states
after 1718 (Appendix 2D, Figure 2D). We also include supplementary
analyses on logged gross and per capita trade tax revenues, trade volumes,
and infrastructure expenditures that corroborate our findings (Appendix
3, Tables 3D.1–3D.2, Figure 3G).

These analyses suggest that political changes affected trade volumes,
fiscal revenues, and public goods expenditures. However, the issue of

TABLE 3
DIFFERENCE-IN-DIFFERENCES ESTIMATES—EFFECT OF LOTTERY-BASED
ELECTION SYSTEMS ON STATE DEVELOPMENT OUTCOMES (IN GRAMS OF GOLD)

	(1) *Pfundzoll* per Capita	(2) SE	(3) Trade Volume per Capita	(4) SE	(5) Infrastructure Exp. per Capita	(6) SE
Ternarium	−0.045	(0.038)	−18.353*	(10.687)	0.056***	(0.020)
Senarium	−0.293***	(0.086)	−73.291***	(16.525)	0.034	(0.088)
Basel	−0.613***	(0.129)	−167.279***	(25.805)	0.193*	(0.109)
Ternarium # Basel	0.114***	(0.024)	35.010***	(4.797)	−0.043**	(0.021)
Senarium # Basel	0.298***	(0.021)	109.461***	(4.263)	0.144***	(0.025)
Controls	Yes		Yes		Yes	
Decade FE	Yes		Yes		Yes	
Observations	214		214		214	
R-squared	0.925		0.940		0.873	

Notes: Robust standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For coefficients of control variables, see Online Appendix Table 3B.2.
Source: Authors' database.

reverse causality arises: trade growth may have increased the likelihood of merchants joining the secret council. To address the reverse causality issue, we implement a placebo test method that has been used in previous studies (Fochesato 2021; Stasavage 2014). We create placebo variables that anticipate the introduction of various lottery regimes and substitute these for the original ones when estimating the regression Equation (1). Given the differing durations of the lottery regimes, we create placebo variables of different lengths that differ enough from the original variables. We differentiate between election regimes that were in place for 30 years or less, the *Ternarium*, and an election regime in place for longer, the *Senarium*. We assume that the regimes in the first group occurred 20 years before their actual implementation and that the regimes in the second group occurred 30 years before. If general time trends anticipate political changes, then the placebo variables should have coefficients that are larger than or of the same magnitude as the coefficients estimated in Table 3. However, if the coefficients are insignificant or of a smaller magnitude, then the changes in tax revenues, trade volumes, and infrastructure spending do not anticipate the introduction of lottery-based election regimes (Fochesato 2021). From our specification, we expect that the interaction effects under the *Ternarium (t+20)* regime and *Senarium (t+30)* regime are nonsignificant or of smaller magnitude than the coefficients estimated for the original variables. Online Appendix Table 3E.1

offers the results of the placebo tests, confirming our expectations. The table shows that for both *Ternarium (t+20)* and *Senarium (t+30)*, the coefficients in question are either negative, nonsignificant, or smaller in magnitude. Our supplementary analyses similarly withstand the placebo test (Online Appendix Table 3E.2).

EVIDENCE FOR THE MECHANISM: POLICYMAKING IN BASEL

Basel exhibited relatively higher levels of per capita income and export tax revenues, trade volumes, and infrastructure expenditure than Zurich after the introduction of lottery-based election procedures in 1718. We argue that lottery-based election procedures propelled to positions of power merchants who were more inclined to implement policies fostering economic growth. Thus far, however, we have yet to present evidence indicating that the adoption of lottery-based election procedures had a discernible impact on policymaking.

To test the potential effect of introducing lottery-based election procedures on policy outcomes, we leverage an additional data source. We draw on the *Urkundenbuch* of the city of Basel which offers a comprehensive compilation of documents pertaining to Basel's administration and politics (Huber 1910). Unfortunately, a comparable data source for Zurich for the seventeenth and eighteenth centuries is unavailable, restricting this analysis to the city-state of Basel. These documents were predominantly signed and enacted by Basel's secret councilors and therefore provide a window into the policy priorities of Basel's top political level. In the Online Appendix 4A, p. 23, we describe our coding scheme and provide a comprehensive table that includes a short description of each document and its corresponding coding (Online Appendix Table 4B). Our analysis focuses on the absolute frequency of the number of growth-enhancing policies involving trade treaties and public goods expenditures, such as investments in water use and land. Examples of such documents include a trade treaty between Austria and Basel in 1724 and the acquisition of real estate by the city administration to expand urban infrastructure in 1784.

To examine whether the implementation of documents correlated with the electoral regime in place, we construct a dependent variable of the number of growth-enhancing policies per decade and implement a fixed effects regression design. We include all control variables to account for any events that may have influenced the nature of implemented documents. To account for the lower number of observations, we first differentiate between two periods: a pre-*Ternarium* period and a post-*Ternarium*

period. Second, we differentiate between four lottery regimes: *no randomness, Ballotage, Ternarium,* and *Senarium*. Online Appendix Table 4C documents the results, revealing strong positive effects of the post-*Ternarium* period on the number of growth-enhancing documents compared to the pre-*Ternarium* period (Column (1)). Third, we find positive effects of the *Ternarium* regime on the number of growth-enhancing documents. The *Senarium* regime shows even larger effects, but without consistent significance (Column (5)). The analyses withstand the placebo test (Online Appendix Table 4D) (Geweke and Rost 2024).

DISCUSSION

Research has assumed that the oligarchization of early modern parliaments was an irreversible trend. Rentiers replaced merchants in positions of power, invested in nonproductive assets, and thus contributed to the gradual decline of early modern city-states (Stasavage 2011, 2014). However, our findings show that oligarchization was reversible (Doehne, Geweke, and Rost 2023; Geweke et al. 2022). Lottery-based election regimes reversed the trend of increasing power monopolization in Basel's councils and increased the number of merchants elected to top political positions on the secret council. The partially randomized election of candidates did not provoke the city's economic decline. Instead, we find that the introduction of lottery-based election regimes correlated with higher trade tax revenues, greater trade volumes, and larger infrastructure expenditures in Basel when compared to Zurich.

A relatively broad distribution of political power may have been central to securing Basel's state capacity and internal stability. Contemporary judgments underscore this interpretation of events. Peter Ochs, a politician in Basel in the 1790s, claimed that lottery-based election systems had been "a dam against obvious bribery," protecting the political system from turning into a "hereditary aristocracy and against the exclusionary aristocracy of a single class" (Ochs 1821, pp. 466–67). Shortly after lottery-based election procedures had been introduced, mathematician Johann Bernoulli I. rejoiced at "how much joy this new constitution caused among the bourgeoisie and all honest people, who could only look with horror at … the enormous abuses that were committed before the elections, and even in the elections." The improvement of the electoral system, Bernoulli hoped, would also have a positive effect on the handling of the state income "since the revenues and public goods had been handled with the utmost infidelity" (Bernoulli 1718). Nineteenth-century historians assumed that for contemporaries in Basel "there was

no reason to complain about the exclusive management of the state by a few as had been the case in Zurich" (Wieland 1890, pp. 173–74). And rentiers of the time, such as Colonel Isaak Burckhardt, expressed their discontent with an election system that resulted in a scenario where "neither the honest man nor the scholar has any advantage over all those miserable merchants who are our Kings" (Iselin 1919, p. 217).

However, lottery-based election mechanisms did not equalize access to political positions for a broader range of the population for two reasons (Doehne, Geweke, and Rost 2023, p. 660). First, the election of a growing proportion of merchants to government positions was not solely due to the effect of lottery-based election procedures breaking up power monopolization. Because lottery-based election regimes made it uncertain whether individuals would attain coveted positions, the number of bureaucrats pursuing a career in state institutions dwindled. This came at the benefit of merchants, whose proportion on the small council did not significantly increase but who rose disproportionately from the small council to the secret council. The chances of craftsmen reaching top political positions did not improve (Röthlin 1986, pp. 91–113).

Second, the implementation of lottery-based election procedures coincided with the implementation of restrictive migration laws. The great council of Basel, which continued to be dominated by craftsmen, put increasingly severe restrictions on urban migration and thus on the ability of outsiders to achieve political representation (Portmann 1979, p. 67). These policies largely decoupled urban population figures from trade growth, and the lack of urban immigration is likely to have had negative effects on the city's economic growth. However, this trend was not unique to Basel. Zurich admitted only two new citizens to its city in the entire eighteenth century (von Moos 1995, p. 97), whereas Basel allowed 1,643 individuals to gain citizenship rights between 1696 and 1798 (Portmann 1979, p. 55).

Even though urban growth is traditionally used in economic history to proxy for economic growth (Stasavage 2014; Wahl 2019), it is a somewhat misleading measure for Swiss cities because of these tight restrictions on urban migration. In fact, recent research has found no significant correlations between historical self-governance and population density or population growth in the Swiss Confederacy of the eighteenth century (Rustagi 2022, p. 17). We test the relationship between lottery-based election procedures and urban population growth in the Online Appendix. We again run a difference-in-differences analysis using urban population figures as a dependent variable (Online Appendix Table 3F). We observe a significant relationship between lottery-based election regimes

and urban population growth. However, as we lack high-frequency urban population data for the early modern period, we caution against over-interpreting these results.

Even though our analyses show that Basel experienced stronger urban population growth than Zurich, absolute increases in urban population were relatively small. Basel's population increased by about 2,000 to 3,000 inhabitants in the eighteenth century, whereas Zurich's population size stagnated. However, merchants experienced a boost in their earnings, as is evident from an upswing in individually paid taxes. Whereas the average individual paying more than 10 *gulden* of *Pfundzoll* tax had paid 27.10 grams of gold in 1650, this had risen to 56.86 grams of gold in 1725 and 74.52 grams of gold in 1759.[10] Using their newfound wealth, merchants contributed to a notable increase in private building activities during the mid-eighteenth century (Stolz 1977, pp. 32–38). Rising trade volumes are also likely to have spurred population growth on the outskirts of the cities, as evidenced by a 50 percent increase in Basel's rural population between 1688 and 1798 to over 25,000 inhabitants. Despite the lack of strong urban population growth, which undoubtedly had negative economic consequences, Swiss city-states were able to facilitate increases in trade, fiscal revenues, and public goods expenditures. This fact cautions against an overly pessimistic interpretation of the fate of autonomous city-states.

Instead of seeing lotteries as great levelers of political participation, we interpret lottery-based election procedures as institutional innovations that secured a balance of power among elite families. Restrictive migration regimes helped to limit intra-elite competition by easing demographic pressure on elites. By pacifying intra-elite conflicts, the implementation of lottery-based election regimes seems to have had a calming effect. With the exception of a small workmen's strike in 1794, Basel did not experience any major uprisings after 1691—unlike Zurich, which underwent revolts in 1713 and 1777 (Guyer 1943, p. 22).

Despite the potentially calming effects of lottery-based election procedures, the question remains why Basel's elite reformed its election system, but Zurich's did not. Prior studies have proposed two key explanations for why an elite opts to change election systems, despite the potential risks to their hold on power: to prevent social unrest and revolts (Acemoglu and Robinson 2000; Aidt and Franck 2019, p. 804), or due to the waning effectiveness of vote buying caused by income growth and urbanization (Aidt and Jensen 2017; Stokes et al. 2013, pp. 201–42). In the case

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[10] StABS, Älteres Hauptarchiv. Kaufhaus H2: Kaufhausrechnungen, 1646–1864.

of Basel, the introduction of lottery-based election procedures can be attributed to the indirect result of social unrest. Even though Zurich and Basel implemented secret ballots for the election of some positions, vote markets still operated efficiently in these small entities, where high levels of economic and social intertwinement ensured effective social control mechanisms. For this reason, the *Ballotage* system proved insufficient in stalling power monopolization, instead incentivizing politicians to bribe a broader range of individuals and exert tighter control over voting behavior (Ochs 1821, p. 418; Schweizer 1931, p. 8). The effectiveness of vote buying may have decreased as merchants accumulated wealth, but the expansion of trade took place subsequently to the adoption of lottery-based election procedures and thus could not have been its cause. Instead, it was the revolt of 1690/91 that compelled the small council to grant the great council legislative rights to inhibit further social unrest. While not diminishing power monopolization, these legislative changes paved the way for the introduction of lottery-based election procedures in 1718.

LIMITATIONS

Our study is subject to a number of limitations. First, tax rates were not consistent throughout the eighteenth century, and trade may have been sensitive to changes in tax rates. In the case of Basel, we observe a slight upward bump in trade volumes in the years 1723 and 1730 due to tax rate changes. However, most of the increase in tax revenues and trade expansion took place after 1740, when tax rates remained constant and at a similar level, between 0.5 and 1 percent, in both states. For these reasons, we do not suspect that tax rates had a significant causal effect on trade volumes and tax revenues in the long run. However, even if tax rates did have a causal effect on trade and tax revenues, we believe such an effect supports our argument rather than contradicts it. The decrease in tax rates coincided with an increase in the representation of merchants in the government, which reinforces our argument that government representation influenced taxation and trade outcomes.

Second, when seeking to ensure data comparability across small early modern political entities over an extended time period, inaccuracies may arise, particularly in relation to the conversion of currencies. To mitigate this concern, our approach aimed to minimize the need for interpolations by utilizing exchange rate data with near-annual frequency and reducing the number of transformations required to convert currencies. Despite these efforts, minor inconsistencies may still exist and bias results. To further enhance the credibility of our findings, we provide a line graph

(Online Appendix Figure 2D), illustrating the per capita tax revenues, trade volumes, and infrastructure expenditures. This graph employs indexes, with 1713–1717 serving as the base set to 100, to demonstrate the divergence of time series after 1718 between Zurich and Basel.

Third, when analyzing the effects of lottery-based election procedures, we face endogeneity issues as the choice of reforming the election system is not random. Although instrumental variable approaches are commonly employed to address endogeneity concerns, the availability and reliability of instrumental variables from this period for these two states pose significant challenges. Despite these limitations, we believe that the comparison between Basel and Zurich, which faced the same challenges of corruption and power monopolization in very similar political systems, can provide valuable insights. By compiling control variables, employing two-way fixed effects regression techniques, and conducting placebo analyses, we can account for a number of confounding factors and establish a plausible relationship between the introduction of lottery-based election procedures and the observed outcomes. Nevertheless, we emphasize that further research is necessary to examine the precise mechanisms in which local parliaments foster urban growth.

Finally, historical data on two small premodern political entities provide challenges to the common trend assumption. Deviations from the common trend assumption can usually be attributed to specific historical events and circumstances. For example, Zurich's decline in merchant representation during the late 1700s and early 1710s, potentially influenced by formal restrictions imposed on their political representation in 1713, explains the small but statistically significant effect of the Ballotage regime on the proportion of power positions occupied by merchants (Figures 1 and 5). While we acknowledge these methodological limitations, our data demonstrate that Basel halted the monopolization of political power and did not undergo an economic decline compared to similar cities when the election of politicians was partially randomized.

CONCLUSION

Our analyses suggest that lotteries halted and reversed the trend of increasing power monopolization in early modern urban parliaments. After the introduction of lotteries, political power was more evenly distributed among families in the city-state of Basel, which had implemented lottery-based election procedures, than in the city-state of Zurich, which had not. The introduction of lotteries halted the replacement of merchants by rentiers. Our research indicates that Basel did not suffer an economic

decline. Instead, we find that Basel fared relatively better than Zurich in *Pfundzoll* tax revenues, trade volumes, and infrastructure expenditures after the introduction of lottery-based election procedures. However, the case of Swiss city-states cautions against an overly optimistic interpretation of historical lotteries as a tool of political enfranchisement. Lotteries did not extend the chances of obtaining political positions to previously excluded population groups but secured the internal stability of the elite.

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