Splitting up or dancing together?

Local institutional structure and the performance of urban areas

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Abstract

This paper analyses institutional changes in local governance structures as determinants of wage premia and innovation capacity of urban areas. By combining individual and metropolitan area data for the US, we study the role of institutional *fragmentation*related to the number of local governments operating in an area, and institutional coordination, stemming from the creation of authorities fostering the collaboration of local governments. Our findings suggest that more fragmented institutional landmarks do not benefit the wage competitiveness and innovativeness of urban areas. If anything, they harm them. Conversely, stronger coordination among local governments boosts the productivity of functional regions by increasing their wage premia and improving their capacity to innovate. Coordination agreements between different counties or municipalities are especially relevant in the case of urban areas modifying their functional borders over time. These findings provide key insights into the economic effects of reforming the governance structure of metropolitan areas.

Keywords: local governance, US MSAs, fragmentation, coordination, wage premium, innovation.
JEL Codes: H70, R12, R23, J3.

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1 Introduction

Local government institutions may affect all aspects of the socio-economic development of regions and urban areas (North, 1990; Acemoglu and Dell, 2010; Rodríguez-Pose, 2020). Two fundamental and related aspects of local governance whose changes can potentially influence the performance of urban spaces concern the number of local governments operating in an area - institutional *fragmentation* - and the extent to which jurisdictional units are prone to collaborate among each other - institutional *coordination* (Ostrom et al., 1961; Wolman et al., 2011; Ahrend et al., 2017). Interventions on these structures of local governance, in the former or the latter direction, are made in the attempt of optimising the policy-making process, providing better public services to citizens, and, consequently, improving the local economy and labour market. Reforms modifying the number and the functions of institutional actors at the local level have been frequent throughout the world in recent years (Bel and Sebő, 2021). Yet, their capacity to foster the economic efficiency of urban areas remains debated (e.g. Grassmueck and Shields, 2010; Bel and Warner, 2015).

This paper aims to contribute to understanding the effect of institutional fragmentation and coordination, by examining their role for the wage premia and innovation capabilities of urban areas. It does so by focusing on the case of US Metropolitan Statistical Areas (MSAs). MSAs are functional areas that are characterised by high heterogeneity in terms of wages and capacity to innovate[1]. They differ markedly in terms of number of administrative units composing them, and they have been characterised by frequent changes in the configuration of their local governments over the last decades. An interesting feature of MSAs is the possibility for them to form voluntary agreements involving members of different jurisdictions - Councils of local Governments (COGs) - with the goal of coordinating urban policies of the whole functional area.

Both institutional fragmentation and coordination may affect the labour market produc-

[1] To make some examples, a worker may experience an increase in the earned nominal wage of about 40% by moving from the MSA of Abilene, TX, to San Jose, CA. In terms of innovation, MSAs such as San Jose, CA, or New York, NY, produce over 1,000 patents per year while many other metropolitan areas produce very few or no patents at all (e.g. Laredo, TX)

tivity and the innovation capacity of metropolitan areas. On the one hand, a more fragmented governance with a higher number of jurisdictions can have an impact on the transaction costs for households and firms, either positively or negatively, with subsequent effects on the competitiveness of administrative units (Tiebout, 1956; Parks and Oakerson, 1989; Ostrom, 2010; Djankov et al., 2006; Wolman et al., 2011). On the other hand, the cooperation between local governments in close geographical proximity is expected to allow the promotion of comprehensive investment policies in key areas (e.g. transports, urban planning), thus potentially triggering localised increasing returns (Cheshire and Gordon, 1996; Puga, 2010) and influence the labour market and innovation potential of the territory.

On the empirical side, while a relatively developed literature exists on the role of subnational institutions[2], fewer studies have tried to assess the structures of local governance we focus on. The results of these studies are mixed, both when they focus on a variety of countries (e.g. Cheshire and Magrini, 2009; Ahrend et al., 2017; Bel and Sebő, 2021) as well as when they look specifically at the US context (e.g. Stansel, 2005; Paytas, 2001; Hammond and Tosun, 2011; Aldag et al., 2020).

To this literature, we provide a number of original contributions. First, when looking at the role of governance features, we explore the role of both fragmentation and coordination, not just one of the two. Second, while limited evidence exists on local governance and productivity (Ahrend et al., 2017), no study has looked at its relationship with innovation. The innovative capacity of metropolitan areas may be crucially affected by governance structures, especially if the way in which local governments cooperate has an effect on the interactions between members of the same innovation system (Chaminade and Edquist, 2006). Third, we exploit decade-to-decade Census data to analyse a dataset spanning from 1950 to 2010, covering MSAs from across the USA. Individual wages are examined following Combes et al. (2008) and performing a two-step procedure where MSA-specific wage

[2] A growing number of contributions have examined the importance of the quality of regional governments, intended as the effectiveness and accountability of local administrations, lack of corruption, and rule of law. Key elements influenced by regional government quality include the economic effectiveness of public policies (Crescenzi et al., 2016), the capacity to innovate (Rodríguez-Pose and Di Cataldo, 2015), and the inclusiveness of economic and labour market strategies (Iammarino et al., 2019).

premia are estimated in a first-step by using micro-data. The second-step model at the level of MSA analyses the impact of institutional fragmentation and coordination. Detailed information on the date of creation of Councils of Governments allow us to develop a staggered difference-in-differences model, exploring the time dynamics of the effect of coordination institutions also by means of event studies.

Our findings provide a clear picture on the long-term effect of the two institutional arrangements analysed. To begin with, an increase in the degree of local government fragmentation, through the sub-division of functional areas into a larger number of counties or municipalities, appear to bear no benefits in terms of wage premia and innovation capacity. On the contrary, under some circumstances a more fragmented institutional landmark is associated with a worse performance of urban areas, especially in terms of productivity.

Conversely, the establishment of coordination agreements in the form of Councils of local Governments (COGs) appears to have significant and long-lasting effects on MSAs' performance. Relative to MSAs without COGs, the establishment of coordination institutions leads to higher wage premia and to a stronger capacity to innovate. When investigating the conditions under which coordination institutions matter the most, we unveil that wage premia are affected particularly by COGs covering single functional areas. Differently, cooperation among jurisdictions located both within and across functional areas appear to be beneficial for innovation. Finally, the collaboration of local governments becomes relevant especially for functional areas whose borders are fast-changing due to modifications in the commuting patterns of their citizens.

2 The Role of Urban Governance

The structure and evolution of urban institutions are commonly regarded as a key factor behind the performance of regions and cities (Storper, 2013). The creation of new institutional arrangements at the regional or local level is intended to improve the efficiency of local administrative processes. In turn, more effective policy-making structures are expected to give rise to public interventions that are capable of improving the competitiveness of sub-national areas and the distribution of economic opportunities within them (Rodríguez-Pose and Storper, 2006). In order to analyse the effectiveness of institutional arrangements on local economic and social dynamics, it is necessary to work with a level of decision-making that involves all recognisable actors of locally-integrated economic systems, that is, all components of a *functional* region (Cheshire and Gordon, 1996). This implies focusing on urban governance structures and look not only at individual local governments but rather at all local governments within functional areas, observing the way in which they interact among each other (Hamilton et al., 2004).

This paper focuses on two opposing ways of reforming urban governance, namely (1) increasing the *fragmentation* of urban areas into a larger number of smaller jurisdictions through the creation of new local governments, and (2) creating new institutional bodies covering metropolitan systems and intended to foster the *coordination* of its local governments. Our analysis aims to investigate whether these two institutional arrangements are capable to spur productivity[3] and foster innovation at the level of functional urban areas[4].

In what follows, we discuss each of these two governance features in turn.

2.1 Institutional fragmentation

A key aspect of governance of urban systems is their degree of *fragmentation*, namely the number of administratively-defined units (local governments) that insist on a metropolitan area (Ostrom et al., 1961; Epple and Romer, 1989; Foster, 1993; Nelson and Foster, 1999). Functional urban areas featuring fewer local governments are considered as less fragmented than those characterised by many local governments.

[3] We adopt wage premia to describe productivity. Wages are usually proportional to (and not equal to) labour productivity by a factor that depends on the local monopsony power of the firm.

[4] Our focus is on the *effect* these governance features have on metropolitan outcomes, but a developed literature exist also on the *root* of metropolitan areas' institutional changes. While a detailed discussion of it is beyond the scope of this paper, it is worth mentioning that some authors claim that metropolitan governance is systematically prone to red tape (Trounstine, 2009), or to being manipulated by powerful interests (Logan and Molotch, 1987), inevitably leading to overlapping and fragmented local structures. Storper (2014) proposes interpreting the process of metropolitan governance as a large-scale principal-agent problem.

Whether modifying the number of local governments within functional areas benefits productivity is an open question. Proponents of public choice theory defend polycentric or fragmented governance arrangements (Tiebout, 1956; Ostrom et al., 1961; Parks and Oakerson, 1989). According to Ostrom (2010), smaller jurisdictions are more effective in monitoring the performance of their citizens and the costs of service provisions. In addition, a multiplicity of local governments may enable citizens to choose the jurisdiction in which the mix and cost of public services is closer to their preferences (Ostrom, 2010), and makes them have a stronger say in the process of decision-making (Besley, 2006). In this view, the higher the number of jurisdictions, the lower the transaction costs for households and firms because of reduced heterogeneity of public policy preferences inside each administrative unit.

A contrasting view regards an excessive fragmentation of institutional structures as a constraint for the development of economies of scale and scope (Alesina et al., 2004). Local government fragmentation may prevent an efficient provision of local public policies and services (Ahrend et al., 2017). For instance, an increase in municipal fragmentation may lead to additional congestion costs due to the increased difficulty in coordinating decisions on transport infrastructure investments or land use planning (Ahrend et al., 2014). Furthermore, businesses operating in multiple jurisdictions within the same functional economic area bear a productivity loss due to higher administrative and regulatory costs imposed by the multiplicity of laws and regulations (Wolman et al., 2011; Djankov et al., 2006). In general, the main issues faced by more fragmented local government systems consist in providing services efficiently and in addressing the problems of service spillovers and tax exporting (Lago-Peñas and Martinez-Vazquez, 2013). All this reflects on the effectiveness of strategies aiming at promoting growth and innovation. Conversely, a smaller number of local agencies - i.e. lower fragmentation - may positively affect the probability that a cross-jurisdictional clubs are created and maintained at low costs, hence spurring local productivity (Cheshire and Gordon, 1996). Related to these views is the idea that, if the best model of governance at the metropolitan level involves creating effective and coherent political structures, political fragmentation may lead to territorial conflict and frustrate development (Horan and Jonas, 1998).

As far as the empirical evidence is concerned, few studies have tried to assess the impact of policy measures increasing local government fragmentation on regional performance, and these have produced rather mixed results. Stansel (2005) and Hammond and Tosun (2011) find that metropolitan growth is favoured by the presence of a multiplicity of local governments; analogously, Grassmueck and Shields (2010) argue that higher fragmentation is associated with increased employment and per capita income growth. In contrast, Dolan (1990) finds that fragmentation significantly drives up the costs of government, while Paytas (2001) and Hamilton et al. (2004) report that the level of fragmentation and state centralisation are negatively related to metropolitan economic competitiveness. Ahrend et al. (2017) focus on urban areas of five OECD countries and conclude that cities with more fragmented structures have significantly lower wage premia.

These studies focus on relatively short time spans and, with the exception of Ahrend et al. (2017), they do not adopt individual-level data to analyse the determinants of productivity and wage premia. None of them examines the extent to which a variation in the number of local governments affects the innovation capacity of functional areas.

2.2 Institutional coordination

Another component of the governance of functional areas concerns the degree of *coordination* among the local governments composing them. Local governments can decide to cooperate among each other in order to provide public goods and services. This type of agreements, such as inter-municipal cooperation (IMC), are nowadays widespread both in the USA and in Europe (Bel and Warner, 2015; Allers and De Greef, 2018).

A consolidated body of literature has discussed the rationale behind institutional arrangements of cooperation between local governments. The potential benefits of this kind of operation was first theorised by Ostrom et al. (1961), suggesting that small municipalities can act jointly to provide services when the local government boundary is suboptimal. The general belief is that local government cooperation affects the overall economic performance of the area, as the implementation of sharing facilities among local communities is expected to cut aggregate costs and help too small local governments in performing tasks they would otherwise do independently (Kwon and Feiock, 2010; Bel and Warner, 2016). If the production of public services is characterised by economies of size, collaborations should generate localised increasing returns (Puga, 2010). Furthermore, it is argued that the formation of cooperation agreements among municipalities allows to internalise inter-jurisdictional externalities and can be a solution to the problem of freeriding (Frère et al., 2014). For all these reasons, multi-purpose governance structures with complete regional systems that integrate land use, transportation, and housing at the metropolitan scale, have been indicated as the more efficient option to deal with metropolitan governance (Orfield and Gumus-Dawes, 2009; Wolman et al., 2011). Agreements between administrative units belonging to the same local economic system are regarded as desirable in order to implement effective growth-promotion policies particularly if these are made among all members of *functional* regions (Cheshire and Gordon, 1996). On the other hand, corporate governance theory argues that key risks associated with cooperation between local governments may be an increase in transaction costs and a lower capacity to monitor the activity of public servants (Allers and Geertsema, 2016; Allers and De Greef, 2018). In particular, Voorn et al. (2019) focus on the emergence of the multiple principal problem and how it can negatively affect service delivery.

All this evidence suggests that local government cooperation can affect the productivity and economic efficiency of the area in which jurisdictions operate. However, the creation of a new tier of governance responsible for territorial cooperation may affect other outcomes as well. One of these is the promotion of innovation. The institutional structure of urban areas, and especially the degree of coordination among local economic actors, is crucial for well-functioning innovation systems (Cooke et al., 1997; Fagerberg et al., 2005; Rodríguez-Pose and Crescenzi, 2008), above and beyond other key determinants of innovation quality such as the size of metropolitan areas (Mewes, 2019). In this view, due to the interactive nature of learning processes, innovation is the result of constant exchanges among firms and organisations operating in proximity among them. Institutions fostering the collaboration between connected local areas and their components - e.g. firms, universities, research institutes - are essential (Chaminade and Edquist, 2006). Hence, the creation of institutions that contribute to govern the relationship between organisations (and the local governments in which they are located) represents a key policy initiative to facilitate innovation at the local level (Edler and Fagerberg, 2017).

Empirical research studying the effectiveness of coordination institutions has grown rapidly in recent years[5]. This literature has mainly focused on the effects of inter-municipal cooperation, with results varying depending on the chosen context. Most studies argue that cooperation is capable of reducing costs for involved local governments (Dijkgraaf and Gradus, 2013; Bel and Warner, 2015; Allers and De Greef, 2018), particularly if municipalities enforcing them are of smaller size (Bel and Sebő, 2021). Other works demonstrate that cooperation can significantly influence tax rates and reduce fiscal competition (Charlot et al., 2015; Breuillé et al., 2018), but this arrangement may have no effect on the total amount of public expenditures made by the new institutional tier (Frère et al., 2014). Di Porto et al. (2017) study the conditions making collaborations more likely and argue that the decision to set up cooperative agreements is deeply influenced by the political, economic and socio-demographic environment.

Much of this evidence has been obtained on European countries, while evidence on the USA is more limited. The effects of cooperation in the United States have been studied by Aldag et al. (2020), by looking at the cost-effectiveness of sharing service provision among municipalities in the New York State. The analysis concludes that the cost-saving potential of cooperation depends on the characteristics of each service. Finally, according to Ahrend et al. (2017) who focus on a group of countries including the USA, cooperation mechanisms across municipalities may mitigate problems introduced by highly fragmented institutional landmarks. The empirical literature is silent on the effects of voluntary collaborations among local jurisdictions on productivity and innovation.

[5] A different, yet related, literature has focused on the issue of mergers of municipalities. This is an operation involving the creation of new, larger local governments, replacing the smaller ones. The literature evaluating the impact of such institutional transformation reports mixed evidence (e.g. Allers and Geertsema, 2016; Luca and Modrego, 2020).

3 Urban governance of USA metropolitan areas

In order to study the role of the urban governance structures of *fragmentation* and *coordination* we focus on the US case, exploiting Metropolitan Statistical Areas (MSAs) as units of analysis. This represents an interesting case for many reasons. Relative to many European countries, the USA is characterised by a high level of fiscal autonomy and service responsibilities. On the one hand, the local level holds responsibilities in some key areas such as transports and law enforcement, making cooperation potentially more profitable but also providing more incentives for the creation of new local jurisdictions with autonomous powers (Bel and Warner, 2015). On the other hand, the distribution of power is heterogeneous by State and many local services (solid waste, water, etc.) are not compulsory, making joint cooperation among local governments more complicated than in European countries (Bel and Warner, 2015).

MSAs appear the ideal units to adopt for our study. To begin with, MSAs are defined on the basis of functional, not administrative, borders. This means that they represent local autonomous economic systems as self-contained as possible in terms of commuting patterns. Due to ongoing processes of decentralisation or recentralisation of residences relative to workplaces, their geographical extension can change over time. Changes in the delineations of these areas since the 1950s have been realised through the addition of local governments - counties and municipalities - to existing areas, when new commuting data showed these local jurisdictions belong to functional areas[6].

Therefore, MSAs have undergone changes in their physical extension over the last decades, with the number of counties and municipalities within them changing accordingly. In addition, the borders of counties and municipalities have also changed, as some larger counties

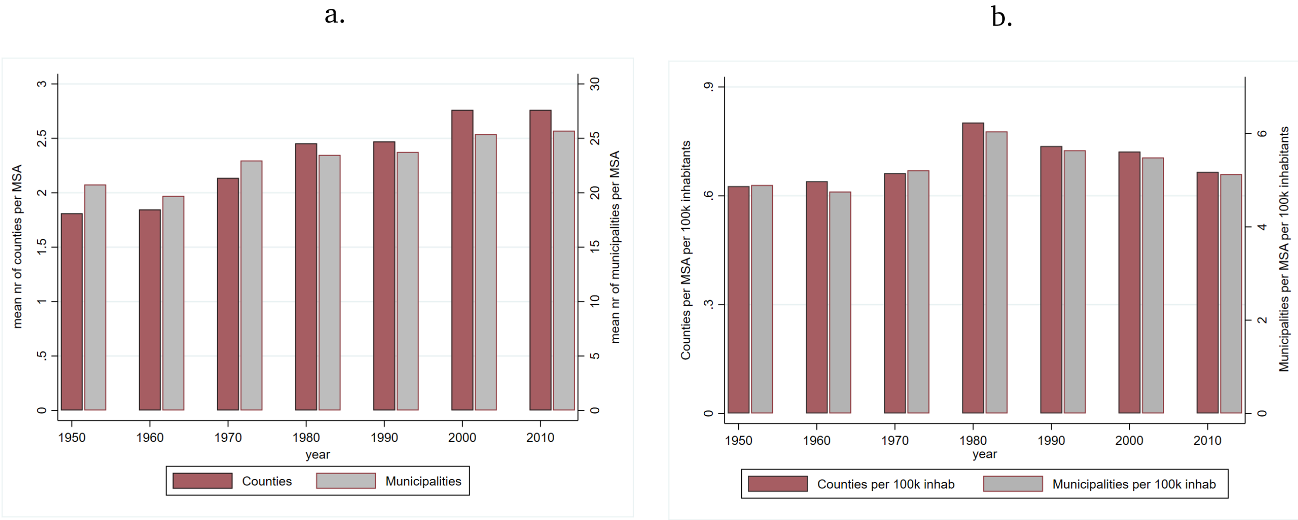
[6] In more details, changes in the shapes of MSAs depend primarily on the evolution of spatial patterns of urbanisation. During the second half of the last century, MSA expansions were generally linked to urban sprawl to low-density residential areas (Lopez, 2014). This has not necessarily implied the incorporation of poorer economic areas as it has often been the result of selective migration of better-off people to the suburbs combined with a deterioration of economic conditions of low-income groups who remain in the city core. More recently the picture has become more blurred, as in some metropolitan areas the continued exurban expansion has been coupled with a move back to the city (Hanlon et al., 2009)

have been split into smaller ones. New local governments are formed if local communities reach the minimum required size or city population to be converted into a municipality. For instance, the MSA of Atlanta, Georgia, is a distinctive case of a metropolitan area that, while modifying its shape in line with commuting patterns, has also experienced multiple variations in terms of local government structure, with the number of municipalities evolving from 24 in 1950 to 110 in 2010. These variations have been witnessed also by MSAs that have kept their shape unchanged over time, such as Sacramento, California, which has tripled its municipalities during the 1950-2010 period from 5 to 15.

Figure 1 reports the average number of within-MSAs counties and municipalities over time. As can be seen, the number has increased progressively (Figure 1a). However, given that MSAs have changed in shape too, in order to accurately examine whether the proportion of local units has increased or decreased over time it is essential to standardise the value of counties/municipalities by MSA population. Once we do that, we note that the average number of these local units per MSA per inhabitant has actually been declining over time since the 1980s[7] (Figure 1b).

[7] The upward jump from 1970 to 1980 can be explained, among other things, by the fact that several new MSAs have been created in the 1970s and only appear in our sample from 1980. These 'new' MSAs have a smaller population on average. To be precise, the sample of MSAs increases from 227 in 1970 to 297 in 1980. On average, the 227 MSAs existing in 1970 have a population of 633,240 inhabitants, while the new 70 MSAs appearing in the dataset in 1980 have an average population of 145,649 inhabitants (the average in the 297 MSAs of 1980 is 586,995). This jump is accounted for in our analysis as we exploit within-MSA variability.

Figure 1: Counties and municipalities within metropolitan areas



The other type of governance feature we aim to evaluate concerns the degree of institutional cooperation among local governments. Again, US MSAs appear particularly suitable for our purpose. A relatively common institutional feature are the so-called 'voluntary agreements' of counties within MSAs, intended to deal with policy *coordination* issues at a metropolitan scale. These are the Councils of Governments (COGs), also called regional councils or regional planning commissions, which have been implemented in a variety of forms (McDowell and Edner, 2002).

Councils of Governments are voluntary associations of local governments providing a variety of services ranging from public safety to community development (including both workforce and economic development) and covering also environmental and transportation issues. The primary role of COGs is to promote coordination and planning for local governments on issues of mutual concern that cross jurisdictional lines, with the aim of eliminating duplication and promoting efficiency. Therefore, effective policies, i.e. policies that have the ability to affect the economic performance of the metropolitan area, may not necessarily involve a direct disbursement of large quantities of money, even on infrastructure, but rather implicate competent public administration, rapid public decision-making, clearly defined land use policies and infrastructure planning. An example of this is the Atlanta Regional

Commission, the COG of Atlanta's MSA, the first modern US COG established in 1947. This has developed regional plans that led to the construction of the parallel runway system, contributed to environmental protection, and improved regional public services e.g. through new healthcare infrastructure. Another example is the East Texas Council of Governments (ETCOG), created in 1970 and providing environmental grant funding, rural transportation services, and business finance programmes to seniors, jobseekers and employers within its counties. A third example is the Metropolitan Council of the Twin Cities Area in Minneapolis/St Paul, created in 1967 to make sure that the services previously provided by a patchwork of special purpose districts were consolidated to one.

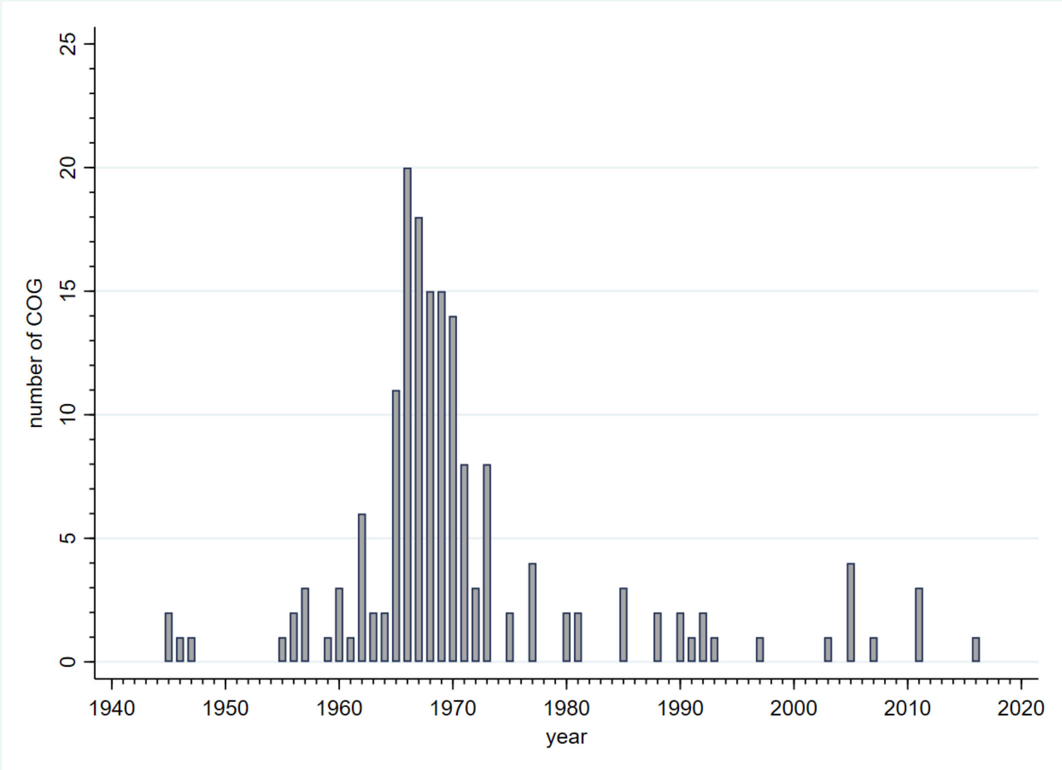
The duties and responsibilities of Councils are meant to complement, not duplicate, those of local jurisdictions. The work of COGs consists in assisting local governments in handling tasks set by State regulations, providing a flexible network for effective action at the regional level. This cooperation among local governments is expected to help taking advantage of economies of scale and scope (Vlassis, 2007). COGs only exist in some, not all, MSAs.

Many COGs have a relatively long history and have evolved over time, generally increasing the role and responsibilities as coordinating platforms within metropolitan areas. As visible in Figure 2, the first COGs have been introduced in the post-WWII period. Their number increased significantly during the 1960s and 1970s, as States began to foster area-wide planning with substantial funding support[8], but there have been several cases of COGs established also in the 1980s, 1990s, 2000s, and 2010s.

More details about the definition and functions of MSAs, counties, municipalities, and COGs can be found in Appendix A.

[8] The number of COGs soared in the 1960s and 1970s as a result of federal requirements and massive increases in federal aid to state and local governments between 1957 and 1977. Most regional planning commissions were converted to COGs during this period (Vlassis, 2007).

Figure 2: Establishment of Councils of Governments over time



4 Data and Empirical Framework

4.1 Dataset description

In order to conduct our analysis, we have collected information from a variety of sources. Our first outcome of interest, wage premium, derives from the Integrated Public Use Microdata Series (IPUMS) dataset (Ruggles et al., 2020). This reports individual-level information on demographic and socio-economic indicators, including data on wage received, sector of employment, level of qualification. IPUMS reports Census information for each decade between 1950 and 2010, which is the time period we use in our analysis. IPUMS also reports the metropolitan area of residence of each individual, which we use to geolocalise each of them. All workers in the Public Administration sector and in the military are excluded from sample[9].

Our dataset is therefore composed of all Metropolitan Statistical Areas appearing in the IPUMS dataset in the period 1950-2010. Alaska, Hawaii and Puerto Rico are excluded from sample. This implies working with 330 MSAs in total, corresponding to the universe of metropolitan areas containing either a city with a minimum population of 50,000 or an urbanized area and a total population of at least 100,000 inhabitants[10]. MSAs have been established in different moments in time, and some of them did not exist in 1950. Our MSA-level dataset is based on observations from the moment in which each MSA is created.

We exploit IPUMS Census information at the individual-level to construct MSA-level wage premia. It may be possible that, for some MSA-decades, no individuals are reported in the IPUMS dataset. Clearly, those observations are missing in our MSA-level dataset when we look at the determinants of wage premia.

The second outcome variable we employ is innovation capacity. Our proxy for innovation capacity is the total number of patent applications per ten thousand inhabitants in MSA per decade. Data on applications to the US Patent and Trademark Office (USPTO) after 1975 is publicly available, while pre-1975 information has been obtained from the dataset compiled by Petralia et al. (2016) and constructed using digitalized records of original patent documents.

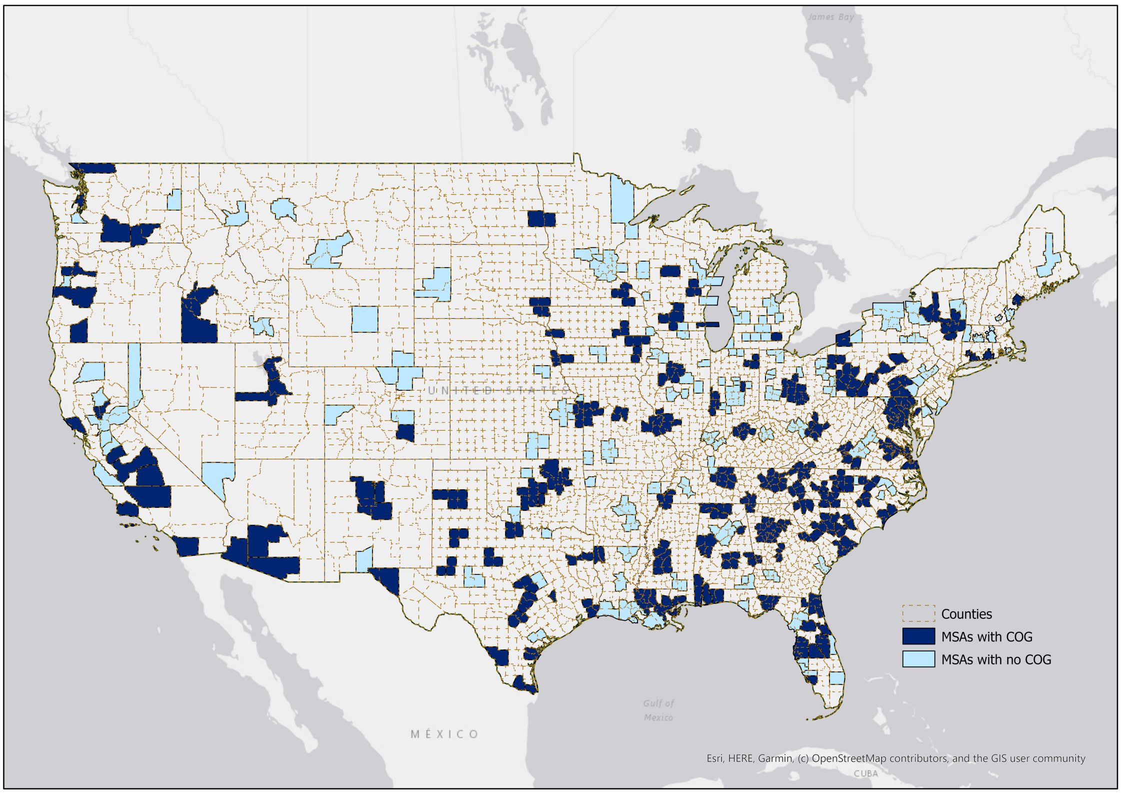
In order to measure the two elements of urban governance we aim to evaluate we rely on different sources. Information on institutional *fragmentation* is obtained from the US Census of Governments. From there, we have extracted the total number of counties and municipalities in each MSA over the period of analysis (1950-2010). Data on institutional *coordination* is obtained from the National Association of Regional Council, reporting the list

[9] We exclude workers in Public Administration in order to reduce endogeneity issues. As a robustness test, we replicate the analysis by excluding all occupational sectors in which there may be public employees (see results section).

[10] The extent of these metropolitan areas vary with decennial MSAs definitions, except for 2010 for which metropolitan designations are based on 1999 OMB delineations rather than on later ones. The choice derives from the fact that more recent delineations use significantly revised standards that impair comparability with earlier ones (Ruggles et al., 2020).

of Councils of Governments (COGs) and similar authorities operating within (and in some cases across) MSAs. Thanks to that, we have been able to identify MSAs with and without a coordinating authority. As shown in Figure 3, as of today the majority of MSAs in our sample have an active COG in their area[11].

Figure 3: MSAs in sample with/without Council of Governments



In order to analyse the role of coordinating authorities, we have compiled a unique dataset combining information on COGs' activity and on their precise year of establishment. This has been obtained partly from an OECD survey (Ahrend et al., 2014), partly from manual search on the COGs' websites and other online sources. By doing that, we have been able to obtain an accurate representation of the geographical distribution and the temporal

[11] A list of metropolitan coordination bodies used in the analysis is available from the authors upon request.

evolution of this type of institution (Figures 3 and 2). We exploit this elaboration for our empirical analysis.

Table A3 in the Appendix provides a list of all the variables adopted at the MSA-level with corresponding descriptive statistics.

4.2 Empirical setting

We adopt different empirical approaches depending on the outcome we aim to investigate. By exploiting the fact that wage-level data are available at the individual level, we can assess the role of urban governance on wage premia on the basis of a two-step approach, drawing from the empirical framework adopted, among others, by Monastiriotis (2002), Moretti (2004), and Combes et al. (2008). The first-step is implemented at the individual level and is interpreted as the part of nominal wages that remains after having considered the effect of the local industrial composition and workers' characteristics. Unfortunately, as IPUMS does not follow individuals over time, we cannot include worker fixed effects[12]. The second step of the analysis assess the sources of variation of wage premia. The empirical model for the analysis is derived from a theoretical framework presented in Appendix B; the first-step estimating equation and empirical results are shown in Appendix C.

In the second step, MSAs become the observational units of analysis and the specification includes our main variables reflecting the structure of metropolitan governance. MSAs are observed over the 1950-2010 period. Given that the key variables are obtained from Census data in the first-step estimates, we rely on decade-to-decade panel data. We therefore have seven time periods. The location-specific wage premia $\hat{\pi}_{a,t}$ estimated through Equation (A4) are regressed on a set of explanatory variables of interest according to:

$$\hat{\pi}_{\mathbf{a,t}} = \beta_1 \, Gf_{a,t} + \beta_2 \, Gc_{a,t} + \beta_3 X_{a,t} + \phi_a + \tau_t + u_{a,t} \tag{1}$$

[12] Given that we cannot control for individuals' unobservable characteristics, such as ability, endogeneity may be an issue. As our main estimates are performed at the MSA-level, we produce statistical checks to verify how serious this issue is in our data. The estimation of event studies (section 5.2) is made also for this purpose. We discuss this caveat further in the conclusions of the paper.

where the variables capturing urban governance structure are $Gf_{a,t}$, for *fragmentation*, and $Gc_{a,t}$, for *coordination*, reflecting the local governance changes in MSA a. $X_{a,t}$ is a matrix of MSA-specific explanatory variables controlling for agglomeration economies (land area in squared km; MSA's density, both entering in log). We follow Moretti (2004) and add area (ϕ_a) and time (τ_t) fixed-effects, to control for any time-invariant MSA-specific element and time shocks. $u_{a,t}$ is the usual error term. Standard errors are clustered at the metropolitan area level.

We also estimate this model as a single-step, using as dependent variable the log of wages aggregated at the MSA-decade level from individual data rather than the wage premium obtained from first-step estimates. While this model is more likely to suffer from OV bias, it offers an interesting comparison to two-step estimates (Combes et al., 2008)[13].

The model with innovation as outcome variable is also estimated at the MSA-level and the two main explanatory variables represent the two features of urban governance we aim to evaluate:

$$log\, patents_{a,t} = \delta_1\, Gf_{a,t} + \delta_2\, Gc_{a,t} + \delta_3 X_{a,t} + \phi_a + \tau_t + u_{a,t} \tag{2}$$

where $log\, patents_{a,t}$ is the log of patent applications to the USPTO per ten thousand inhabitants in MSA a in period t. Different from equation (1), in this case the vector $X_{a,t}$ includes a broader set of controls, given that it is not possible to perform individual-level estimates and 'clean up' for potentially confounding individual characteristics. Therefore, besides controlling for agglomeration economies (land and density), equation (2) also includes variables accounting for a number of employment characteristics: sectorial shares, share of tertiary educated, ethnic minorities (proxied by the share of white people in the workforce).

Concerning our main variables of interest, our goal is to study the role of governance features as determinants of wage premia and innovation. We focus on the fragmentation of local governance ($Gf_{a,t}$) and the presence of institutions responsible to coordinate policy-

[13] The model is: $log\, wages_{a,t} = \delta_1\, Gf_{a,t} + \delta_2\, Gc_{a,t} + \delta_3 X_{a,t} + \phi_a + \tau_t + u_{a,t}$. The matrix $X_{a,t}$ includes a broader set of controls as compared to the second step of two-step estimates.

making among local governments ($Gc_{a,t}$).

To compute the former, as our main intention is to evaluate how a variation in the number of local governments affects urban areas' performance, we use the change in the log of counties in a metropolitan area per 100 thousand inhabitants. With this variable we aim to examine the effect of modifying the number of local governments within MSAs. As an alternative indicator, instead of using counties, we measure $Gf_{a,t}$ through the variation of log municipalities per 100 thousand inhabitants. While our intention is to capture the effect of a 'proliferation' of local government on our set of outcomes, it is worth recalling that many MSAs have changed in land size over the period of analysis. This is the reason why we normalise these variables by MSA population.

In order to capture the attempts to strengthen policy coordination, we construct a dummy variable that identifies the creation of a Council of local Governments (COG) in MSA a in period t. Crucially, in almost all MSAs, the COGs have been created during our time-period of analysis (Figure 2). Because of that, and the inclusion of time and area fixed effects, the analysis takes the form of a difference-in-differences model with multiple time periods or Two-Way-Fixed Effects (TWFE) (Goodman-Bacon, 2021; Callaway and Sant'Anna, 2021) where we estimate the extent to which a Council's establishment has contributed to wage premia and innovation capacity of the respective metropolitan area. Our assumption is that COGs require some time to produce visible effects on the trajectory of metropolitan areas. In addition, the decision on whether to create a COG may be endogenous to existing local conditions (Di Porto et al., 2017). In order to deal with the possibility of a lagged effect and to minimise endogeneity, we exploit the detailed information on the exact inception year of each COG and assign value 1 to the dummy variable if a COG has been created five years (or more) before the beginning of each decade, and zero otherwise[14]. We analyse in depth the temporal dynamics of the effect produced by COGs in section 5.3.

[14] This implies that, for instance, if a COG has been created in 1969, the dummy variable will take value 1 from 1980 onwards, not from 1970, assuming that the effect takes more than one year to materialise. Conversely, if the COG has been created in 1965, the dummy takes value 1 in 1970 until the end of the period. Adopting different time lags does not significantly alter the main results, as shown in Table A7.

5 Empirical Analysis

5.1 Governance Structure and Wage Premia

We begin by presenting the results of equation (1), estimating the role of urban governance on wage premia. The results are reported in Table 1. The first two specifications (columns (1)-(2)) only consider the relationship between fragmentation and MSA wage premium, the following two columns ((3)-(4)) look at the role of coordination, while the complete model is shown in column (5).

The fragmentation variable returns a negative and marginally significant coefficient in column (1), a specification without MSA controls, and column (2), as control variables are included. This suggests that when metropolitan areas increase the number of their local governments, this tends to reflect into a decrease of the average wage premium in the entire area, i.e. a reduction in local wage productivity. This result is obtained by using counties as an indicator of local governments. We test the robustness of this finding by adopting a different indicator of local governments, i.e. municipalities, proxying fragmentation with the change in the number of municipalities per capita. The results, shown in Table A4 in the Appendix, are in line with those of Table 1. Hence, evolving from a less, to a more institutionally-fragmented urban area entails negative wage returns. This is in line with the idea that a larger number of local administrative units tends to complicate rather than ease the overall decision-making process for regional communities, something that is reflected on the economic capacity of regions and cities (Ahrend et al., 2017).

Next, we evaluate the solutions implemented in some metropolitan areas in response to policy coordination problems. The 'Coordination' dummy variable included in columns (3)-(5) indicates whether, in each decade, a coordination authority acts over a significant part of the metropolitan area. The estimated coefficients are consistently positive and statistically significant. This suggests that the activity of a new coordination authority bears clear benefits in terms of wage premia - and hence productivity - for the metropolitan area adopting it. The benefits related to the implementation of governance bodies based on voluntary agreements between local jurisdictions seem to outweigh the costs. This result is confirmed also when controlling for agglomeration economies and institutional fragmentation. Looking at controls, both variables proxying for agglomeration economies display positive and significant coefficients, in line with the literature (Combes et al., 2008).

Table 1: Second Step Estimation - Urban Governance and Wage Premium

Dep. var.: Wage Premium	(1)	(2)	(3)	(4)	(5)
Fragmentation	-0.0267*	-0.0305*			-0.0296*
	(0.0160)	(0.0174)			(0.0166)
Coordination			0.0193***	0.0133**	0.0206***
			(0.00625)	(0.00613)	(0.00778)
Land		0.0740***		0.0542***	0.0702***
		(0.0116)		(0.00750)	(0.0116)
Density		0.0866***		0.0637***	0.0838***
		(0.0136)		(0.00849)	(0.0136)
Time dummies	Yes	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,215	1,215	1,481	1,481	1,211
R-squared	0.872	0.888	0.930	0.936	0.889

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: MSA-specific wage premium obtained from individual wages within MSA; Fragmentation = Δ log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG operates in MSA; Land = log of squared km of land; Density = log nr of inhabitants per squared km of land.

The dependent variable for these estimates is the locational wage premium of working in a given MSA in any kind of job, excluding Public Administration and military occupations. A possible issue with these estimates may arise if interlocal coordination mechanisms (i.e. the creation of COGs) bring about equalization of salaries in the local public sector. In this case, changes in urban governance may mechanically affect the wages of public sector workers. As a robustness test, we have replicated two-step estimates by excluding from the first-step IPUMS sample all occupational sectors possibly employing public sector workers. The results, shown in Table A5 in the Appendix, are not qualitatively different from those of Table 1, suggesting that this dynamic is not a major concern in our setting.

To conclude this section, we estimate the model as a single-step. Instead of using as dependent variable wage premia obtained from the first-step, we aggregate log wages at the MSA-decade level and adopt that as an outcome. As this model does not control for individual characteristics, it is more likely to suffer from omitted variable bias. However, it offers an interesting comparison to Table 1's estimates. The results are in Appendix Table A6. The specifications in columns (1)-(5) resemble those of columns (1)-(5), Table 1. The findings are similar, although the coefficients of all variables appear much larger in absolute value, in line with the results of a comparable exercise performed by Combes et al. (2008). Column (6) includes a broader set of controls in the regression, making it a similar model to that of equation 2 using innovation as outcome. The coefficient of fragmentation becomes insignificant, while the coefficient of Coordination remains significant and larger than that of Table 1.

5.2 Governance Structure and Innovation

In this sub-section we report the estimation results of equation (2), studying the relationship between urban governance and innovation at the metropolitan level. The results are shown in Table 2, reporting specifications similar to those displayed in Table 1. The main difference is that now the full model includes a larger number of control variables given that the outcome (patents per capita) is not resulting from individual-level data, and hence individual characteristics are not already controlled for.

Columns (1), (2) and (5) of Table 2 analyse the link between local government fragmentation and innovation. The coefficients of the proxy for fragmentation are negative and statistically insignificant. This suggests that, ceteris paribus, a territory becoming more fragmented is neither more nor less innovative than a less fragmented functional urban area. When replacing counties with municipalities as proxy for fragmentation (Table A4), we obtain that the variation in the number of municipalities per capita is negatively and mildly significantly correlated with innovation. We conclude that increasing the number of local administrative units within urban areas is not beneficial for innovation. Either it has no impact or it is even harmful. Possibly, this may be due to the fact that splitting local communities through the creation of new administrative entities tends to weaken the linkages among the components of broader regional innovation systems. To the extent that innovation occurs also via the strengthening of collaborative networks across communities within the same regional system, a more fragmented institutional landmark within regions may negatively influence the innovative capability of its members.

Table 2: Urban Governance and Innovation

Dep. Var.: ln Patents per capita	(1)	(2)	(3)	(4)	(5)
Fragmentation	-0.00923	-0.0350			-0.0299
	(0.0689)	(0.0842)			(0.0858)
Coordination			0.0819*	0.0989**	0.0884**
			(0.0437)	(0.0457)	(0.0412)
Land		0.0174		0.0433	0.00318
		(0.0580)		(0.0534)	(0.0575)
Density		-0.00891		0.0527	-0.0176
		(0.0666)		(0.0583)	(0.0659)
Human capital		0.0326		0.0588**	0.0311
		(0.0281)		(0.0275)	(0.0282)
Ethnicity: white		0.0329***		0.0252***	0.0353***
		(0.00867)		(0.00917)	(0.00859)
Occupational category controls	No	Yes	No	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,447	1,217	1,797	1,482	1,213
R-squared	0.926	0.937	0.901	0.913	0.937

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: log of patent applications per 10,000 inhabitants; Fragmentation = Δ log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG/MPO operates in MSA; Land = log of squared km of land; Density = log nr of inhabitants per squared km of land; Occupations controls are 6 variables referring to: share of workers in managerial and professional specialty (excluded category); share of workers in technical, sales and administrative support; share of workers in service; share of workers in farming, forestry and fishing; share of workers in precision production, craft and repair; share of workers as operators, fabricators and labourers.

For the same reason, we should expect that institutions fostering cooperation over economic development planning in a number of strategic sectors, including research and technology, positively influences the innovative potential of metropolitan areas (Chaminade and Edquist, 2006). Indeed, this is what we observe. The proportion of patent applications in each MSA increases significantly after the creation of Councils of Governments (columns

(3)-(5), Table 2; column(3), Table A4). The coefficient of institutional coordination is positive and strongly significant, also after including the full set of controls and accounting for local government fragmentation in the model. This finding complements the evidence produced above on the role of institutional coordination, suggesting that one way in which it contributes to foster the economic dynamism of local areas is by facilitating innovation.

5.3 Institutional Coordination Dynamics: Event Studies

In this section, we further analyse the key result of a positive role of coordination authorities for boosting productivity and innovation by investigating the temporal dynamics of the estimated effect. Said differently, we analyse the decade-by-decade evolution of how establishing a COG affects the wage premium/innovation capacity of metropolitan areas. To do so, we exploit the properties of our staggered difference-in-differences model and the information on the exact year of establishment of COGs and estimate a set of event studies, which are standard in the literature for this kind of empirical framework (Angrist and Pischke, 2008). Our main aim is to look at post-COG outcomes and to test the assumption of parallel trends, which is fundamental to validate the difference-in-differences setting. We do so by looking at the pre-COG differences among MSAs in terms of our outcome variables.

Event studies are estimated by including in the models a set of leads and lags dummy variables referring to each period before and after the establishment of COGs in MSAs. The estimated model is:

$$y_{a,t} = \lambda_1 \, Gf_{a,t} + \sum_{\tau=2}^{q} \lambda_{-\tau} \, D_{a,t-\tau} + \sum_{\tau=2}^{q} \lambda_{+\tau} \, D_{a,t+\tau} + \lambda_3 X_{a,t} + \phi_a + \tau_t + \epsilon_{a,t} \quad (3)$$

where $y_{a,t}$ is one of our dependent variables: wage premium or patents per capita. q lags dummy variables ($D_{a,t-2}$, $D_{a,t-3}$, ..., $D_{a,t-q}$) and leads dummy variables ($D_{a,t+0}$, $D_{a,t+1}$, $D_{a,t+2}$, ..., $D_{a,t+q}$) are included in the model to check for a significant difference in terms of the outcome variables in the period immediately before the establishment of COGs. We include the full set of dummies for pre-treatment and treatment periods with the exclusion of the first-decade lag, used as reference category. If, as hypothesised, COGs determine changes in the outcome variables, and not the other way around, we should expect the lags dummy variables to return insignificant coefficients.

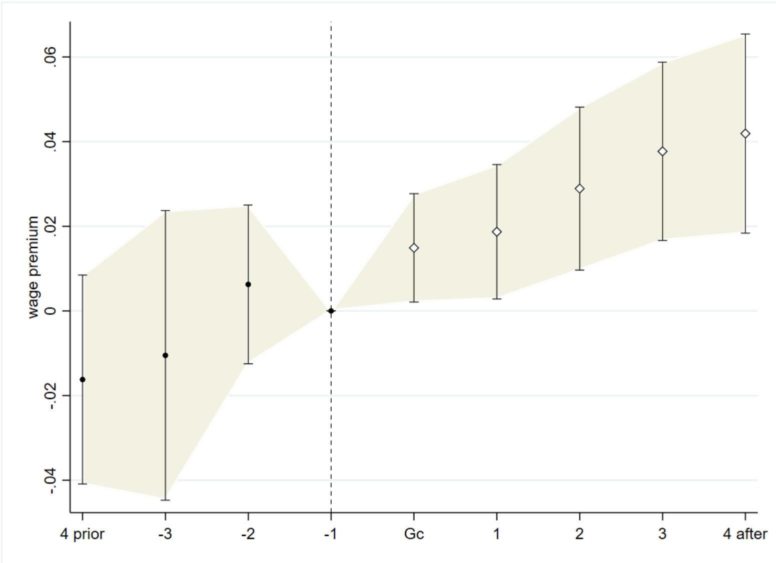
While in equations (1) and (2) $Gc_{a,t}$ was entering with a decade-lag in case the creation of the COG was preceding a Census by up to five years, in this case it would be inaccurate to lag the dummies. Therefore, we assign them their exact time value, assuming that the COGs may have an effect from the first year after their creation[15].

The results of the event studies are shown in Figure A1. All coefficients are obtained using the decade prior to the establishment of the Council of Governments as reference category. First and foremost, it can be noted that in the period preceding the establishment of the Councils there is no significant difference in terms of wage premia and innovation capacity between MSAs that will create a coordination authority (treatment group) and those that will not (control group). This is reassuring concerning the validity of the difference-in-differences empirical framework. In panel (a.), referring to wage premium, we note that a significant difference between MSAs with and without COGs emerges already in the first observable period after the establishment of a COG. This moment is indicated with 'Gc' in the graph. For the way in which the variables are computed, the moment 'Gc' may in some cases represent an MSA observed up to 9 years after the COG if, for instance, the COG was created in 1961, 1971, 1981, etc. It is therefore not surprising to observe an effect already in the first observable decade. The effect of coordination authorities on innovation, instead, takes slightly longer to materialise (Figure A1, panel (b.)). The coefficient of 'Gc', corresponding to the first observable period after the establishment of the COG, is larger than the pre-COG period, yet the significant difference is only visible in the following period.

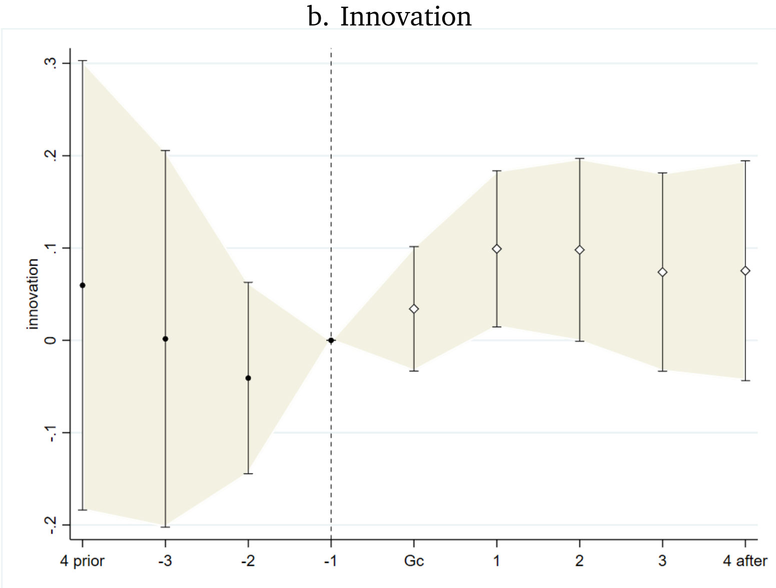
[15] This implies that if, for instance, COG 'X' has been created in 1979, the dummy variable $D_{X,t-1}$ takes value 1 in 1970 and 0 otherwise; $D_{X,t-2}$ takes value 1 in 1960 and 0 otherwise; $D_{X,t-1}$ takes value 1 in 1970 and 0 otherwise; the dummy $D_{X,t+0}$ (Gc in the graphs) takes value 1 in 1980 and 0 otherwise; the dummy $D_{X,t+1}$ takes value 1 in 1990 and 0 otherwise, and so on. In other words, here we assume the possibility of an immediate effect.

Figure 4: Event Studies

a. Wage Premium



b. Innovation



Event studies using t-1 (time period prior to COG inception) as reference category. Caps refer to 90% confidence intervals. Black dots: estimated coefficients of pre-treatment dummy variables. White diamonds: estimated coefficients of leads dummy variables. Dependent variables: a. Wage premium; b.log patents per 100 thousand inhabitants.

While the effects are visible already in the first periods in panels a. and b., we would still expect that it takes some years for COGs to influence MSAs' performance. To test for this, we have reproduced the analysis of models 1 and 2 by coding the coordination dummy with different year lags, exploiting the information on COG inception years. Rather than lagging the COG dummy by five years, as for the estimates reported in section 4.3, the analysis is now performed with COG dummies lagged by one, two, three, four, and ten years[16]. The results, reported in Table A7, illustrate higher magnitudes of the 'Coordination' dummy coefficients when the variables are lagged by two or three years. This confirms that the effect of local government coordination for economic effectiveness and innovativeness materialises relatively quickly, already a few years after the establishment of coordination institutions.

Recent advances on TWFE models and event studies highlight that, when there is variation in treatment timing and the treatment is dynamic, it is important to consider the possibility that treatment effects are heterogeneous across cohorts (Goodman-Bacon, 2021). Estimates that do not account for this may be biased, depending on the relative weight of different cohort sizes. As a test for heterogeneous treatment effects, we have re-computed the event study using Sun and Abraham's (2021) estimator[17]. Heterogeneous treatment effects do not seem a major issue in our setting, as these estimates (Figure A1 in the Appendix) are not significantly different from those shown in Figure A1.

5.4 Heterogeneity of Urban Governance

In the previous sections we have provided evidence that an increase in the number of local governments within functional areas is either insignificant or may be even detrimental for the performance of metropolitan areas. At the same time, however, our analysis has revealed a strong relationship linking the creation of authorities fostering local government coordination with efficiency outcomes. These results were obtained by looking at the full sample of MSAs. In this section, we dig deeper into these findings to test under which

[16] In the case of one lag, the dummy e.g. takes value one from 1970 if the COG has been created in 1969 or any other year in the 1960s; with two lags it takes value one from 1970 if the COG has been created in 1968 or any other year in the 1960s; with ten lags it takes value one from 1970 if the COG has been created in 1960, but it takes value 1 from 1980 if it has been created any other year of the 1960s.

[17] The command was implemented by considering only the 'never-treated' units in the control group, as suggested by Sun and Abraham (2021).

conditions they are more likely to hold.

One of the elements that may influence the impact of governance structures, and in particular the role of coordination authorities, concerns the shape of metropolitan areas. As discussed in section 2, the borders of US MSAs can change over time according to the variation of commuting patterns. We may expect that the presence of institutions fostering the participation of different community members into the decision-making process may be particularly useful when the extension of MSAs frequently varies by incorporating or losing local governments. This is what we test next. As we split our sample on the basis of whether an MSA has kept its shape constant ('Constant Shape') or changed it at any point throughout the 1950-2010 period ('Changed Shape') in Table 3, we study whether the positive effect of COGs on wage premia and innovation is visible particularly for the sub-sample of MSAs that have modified their shape. In column (1) we focus on the sample of MSAs keeping their shape constant, while in column (2) we restrict the sample to MSAs changing their shape. In panel A of Table 3, referring to wage premia as dependent variable, 'Coordination' returns a positive and significant coefficient in columns (2)-(4), but not in column (1). Hence, the positive effect of COGs on wage premia only applies to shape-changing MSAs. The same can be said for innovation (panel B). The coefficient of 'Coordination' is significant in columns (2)-(4).

The empirical link between shape-changing coordination institutions and wage premia reported in Table 3 may be driven by endogeneity if the establishment of Councils of Government is the result, not the determinant, of improvements in the labour market of MSAs. Said differently, if the metropolitan areas' expansions in size are triggered by better economic and labour conditions, and these expansions in turn induce the creation of coordination institutions, then our estimates would be biased and the significant coefficient of column (2), panel A would be driven by reverse causality. To minimise this empirical issue and make sure that COG creation precedes in time rater than follows the change of size of MSAs, we perform two additional tests. In the first, we exclude any MSA-expansion - i.e. increase in size of MSAs - coinciding in decade with the creation of COGs. Results obtained with this sample are shown in column (3), Table 3. In the second test, we remove from sample MSAs experiencing expansions in the decades preceding COG establishments, reporting the results in column (4), Table 3. The coefficient of 'Coordination' retains statistical significance in both columns and for both outcomes, suggesting that our main results are not driven by reverse causality. Furthermore, because the focus of these tests is on MSAs expanding *after* the creation of COGs, we can conclude that MSAs having a COG in operation when they increase in size are more likely to experience wage premia and innovation boosts. Hence, MSAs with COGs appear more 'prepared' for future changes in shape, as the existence of coordination institutions may help metropolitan areas to bear economic fruits from their enlargements.

Finally, the effect of creating new local governments remains far from positive in both samples, as indicated by the coefficients of 'Fragmentation'. When significant, this is indicating a negative effect of fragmentation on wage premia in MSAs keeping their shape constant over time (panel A, column (1)). As COG creation, the establishment of new local jurisdictions might also be endogenous to changes in shape of MSAs. Unfortunately, information on the exact date of fragmentation episodes is unavailable. However, the fact that fragmentation displays the stronger effects on wage premia when MSA shape does not change suggests that, when the creation of new local jurisdictions cannot be driven by economic factors influencing MSA shape changes, and they may instead be driven by purely political considerations, this type of reform is detrimental for the productivity of local areas.

The role of COGs may depend not only on the extension of MSAs, but also on the shape of COGs themselves. In particular, one element that may mediate the effectiveness of coordination agreements is the extent to which Councils of Governments involve exclusively members of a single functional area, or whether, instead, they are created to include components of local governments spanning across multiple areas. This can be tested by exploiting the fact that a minority of COGs are spread across more than one MSA. To be precise, 17 COGs in our sample have this property. To test for this, we re-compute two new versions of the 'Coordination' dummy variable. In one case, it takes value one if a COG exists and

Table 3: Results by MSA Shape

MSAs:	Constant Shape	Changed Shape		
	(1)	(2)	(3)	(4)
Panel A: Wage Premium				
Fragmentation	-0.331***	0.00957	0.0201	-0.00205
	(0.112)	(0.0222)	(0.0266)	(0.0251)
Coordination	0.00108	0.0286***	0.0314**	0.0243*
	(0.0115)	(0.00945)	(0.0140)	(0.0124)
Observations	472	739	519	587
R-squared	0.921	0.880	0.866	0.868
Panel B: Innovation				
Fragmentation	0.361	-0.0416	-0.0362	-0.0427
	(0.407)	(0.0958)	(0.112)	(0.101)
Coordination	0.108	0.0790*	0.135**	0.120**
	(0.0696)	(0.0428)	(0.0675)	(0.0594)
Observations	474	739	505	571
R-squared	0.952	0.927	0.925	0.932
Controls	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Fragmentation = Δ log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG/MPO operates in MSA. Dependent variables: Panel A: Wage premium; Panel B: log patents per 10,000 inhabitants. Samples: column (1): MSAs keeping their land size constant over 1950-2010; column(2): MSAs modifying their land size during 1950-2010; column (3): MSAs modifying their land size during 1950-2010, excluding MSAs expansions taking place in the same decade of COG creation; column (4): MSAs modifying their land size during 1950-2010, excluding MSAs expansions taking place in decades preceding COG creation.

it is only in one MSA (Single MSA) and zero otherwise, while in the second case it takes value one if a COG exists and it spans across multiple MSAs (Multiple MSAs) and zero otherwise. The results obtained with full specifications and including a control for institutional fragmentation (counties per capita) are displayed in Table 4.

If the geographical contours of functional areas are drawn correctly, we might expect that involving local governments outside of metropolitan areas would be a sub-optimal choice. The estimates show that this seems indeed to be the case in terms of productivity promotion. For wage premia the only effective type of COGs seems to be the one covering a single functional area (columns(1)-(4), Table 4). Interestingly, both types of COGs seem to have the capacity of boosting innovation (columns(5)-(6), Table 4), a result which may be related to the importance of fostering the creation of 'pipelines' and connections with as many innovation actors as possible, including those located outside of urban economic areas.

Table 4: Results by COGs' Shape

Dep. variable:	Wage premium		Innovation	
	(1)	(2)	(3)	(4)
Fragmentation	-0.0296*	-0.0270	-0.0399	-0.0260
	(0.0177)	(0.0170)	(0.0842)	(0.0857)
Coordination - COG single MSA	0.0242***	0.0241***	0.0760*	0.0761*
	(0.00865)	(0.00747)	(0.0452)	(0.0454)
Coordination - COG multiple MSAs	0.00978	0.00921	0.190**	0.187**
	(0.0142)	(0.0130)	(0.0820)	(0.0822)
Consolidated counties		0.00637		0.0198
		(0.0156)		(0.0684)
Controls	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes
Observations	1,211	1,211	1,213	1,213
R-squared	0.890	0.890	0.937	0.937

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coordination - Single MSA = 1 if COG operates in single MSA; Coordination - Multiple MSA = 1 if COG operates in many MSAs; Consolidated counties = 1 if a consolidated city-county operates in MSA.. Dependent variables: columns (1)-(2): Wage premium; columns (3)-(4): log patents per 10,000 inhabitants; Fragmentation: Δ log number of counties per 100k inhabitants.

Finally, it may be that the observed effect of coordinating authorities is confounded by other institutional changes taking place at the same time in MSAs. One possible omitted factor in our model, on the institutional structure of MSAs, regards the creation of 'consolidated city-counties'. This is a form of institutional re-organisation through which cities join with a surrounding county, and the resulting body assumes the legislative responsibilities of both the city and the county. We test for the role of consolidated city-counties in columns (2) and (4) of Table 4, by introducing in the model a variable taking value 1 from the moment in which a consolidated city-county is created in an MSA[18]. The results obtained for COGs

[18] In order to construct this variable, we exploit the exact year of establishment of Consolidated city-counties.

remain unaffected by this new variable, while the role of consolidated counties appear negligible if measured at the level of MSA, as all coefficients of this variable are insignificant[19].

6 Conclusions

This paper explores the role played by two fundamental aspects of urban governance, institutional *fragmentation* and institutional *coordination*. It contributes to the existing literature on the role of institutional changes for urban development by evaluating how fragmentation and coordination affect the productivity of functional areas and their innovativeness, focusing on US Metropolitan Areas (MSAs). We study institutional fragmentation by looking at the effect produced by an increase in the number local governments (counties or municipalities) within metropolitan areas. Institutional coordination is measured with the presence of Councils of Government (COGs) within MSAs, i.e. voluntary associations among local governments of metropolitan areas, contributing to community development through cooperative planning on issues of mutual concern.

The results provide an interesting picture concerning the diverse effect of the two institutional dimensions examined. On the one hand, it appears that evolving from a less to a more institutionally fragmented territory does not contribute to increase the labour market competitiveness of urban areas. Rather, we unveiled conditions under which a higher degree of fragmentation appears to be harmful in terms of productivity. These dynamics seem to occur when the number of local jurisdictions increases, in spite of the fact that functional areas keep their shape constant over time. This may be the case in which the creation of new jurisdictions is purely driven by political considerations, with little or no economic rationale. In addition, a more fragmented institutional landscape seems to leave urban areas' capacity to innovate unaffected.

Lagging this variable by five years, as done for COGs, leaves the results unchanged.

[19] It may as well be that Consolidated city-counties have an impact within the territory for which they are responsible, but that this effect is not visible when looking at the aggregate of metropolitan areas. Testing for this goes beyond the scope of this article.

On the other hand, the establishment of institutional bodies intended to coordinate local governments in their decision-making process appear to have positive consequences for the development prospects of functional areas. The activity of coordinating institutions is capable of increasing significantly the wage premia of MSAs. However, this is true only if these institutions are composed of representatives of local governments that make part of the same functional economic area. In this case, metropolitan areas establishing a COG, relative to areas with no COGs, experience wage premia that are 2.4% higher. At the same time, the establishment of this kind of institutional arrangement is related with a stronger capacity to innovate of metropolitan areas. Interestingly, this result applies both to COGs that only include local government members of the same functional region and to COGs that span across multiple metropolitan areas. In the former case, COGs lead to an increase in patenting capacity by 7.6%, while in the latter the effect is even stronger, with an increase by 19%. Coordination agreements among local governments seem to have structural effects on the performance of MSAs, as these dynamics appear strongly persistent over time. In addition, these magnitudes should be seen as lower bound estimates if we consider the possibility of inefficacies in the delivery of joint services stemming from coordination problems. In other words, if major coordination problems were present, they would decrease the effects of COGs (Voorn et al., 2019). COGs are voluntary agreements and this element of voluntariness in the participation possibly mitigates the extent of the concern.

When commenting on these results and their policy implications, it is important to bear in mind some caveats. Our empirical strategy does a lot to limit potential endogeneity issues, by accounting for individual characteristics before moving to region-level data, and by testing for the pre-treatment dynamics and the evolution of the estimated effects through event studies. Nevertheless, it must be acknowledged that some limitations remain. For instance, data constraints prevent us from controlling for individual time-invariant characteristics. Moreover, while our MSA-level analysis includes fixed effects and controls for any factors that remain constant over time, the number of time-varying covariates over such a long time span (1950-2010) is relatively limited. Furthermore, a key feature of our study consists in the context we have chosen. Differently from previous works (Frère et al., 2014; Breuillé et al., 2018; Allers and De Greef, 2018; Bel and Sebő, 2021), we have focused on a peculiar type of cooperative agreement in the United States, Councils of Governments. Clearly, the results we have obtained do not necessarily apply to all sorts of institutions fostering the collaboration among local governments developed across the world.

Having acknowledged these specificities and empirical limitations, our findings still offer important insights on the role of institutional structures for the socio-economic development of functional regions. Reforming the structure of urban governance towards a 'proliferation' of local governments does not seem to have positive consequences on the performance of functional regions, a result which is in line with some recent evidence (Ahrend et al., 2017). If anything, the overall conditions of regions are penalised by the creation of new institutional entities. This appears to be particularly the case when the creation of new local jurisdictions completely abstracts from the commuting patterns of citizens of metropolitan areas.

Arguably, the strongest finding of our analysis concerns the positive implications of strengthening coordination mechanisms among local governments belonging to the same functional system. This seems to empirically confirm the potentials, in terms of developing scale economies, produced by this type of institutional arrangement (Ostrom et al., 1961; Puga, 2010). Adding to that, the strong role that local government coordination seems to play for innovation also has crucial implications. First, it confirms the relevance of local institutions - and particularly the creation of mechanisms stimulating the interaction of innovation agents - for well-functioning innovation systems (Cooke et al., 1997). Second, due to the importance of innovation for economic growth, it suggests that fostering local government cooperation on matters of mutual policy concern may represent a fundamental tool to boost the overall economic competitiveness and dynamism of functional urban territories.

These results are ever more relevant in light of the popularity this kind of institutional reforms have acquired in recent years (Bel and Sebő, 2021). Systems of cooperation among local authorities have been established in many countries, mainly as a means of improving public service delivery. In particular, aside of the US, cooperation agreements among municipalities are a common feature of many European countries. Local policy-makers should be aware that, if well-conceived, these institutions can produce effects going well beyond public service facilitation for citizens. Our study demonstrates that this form of arrangement can also produce benefits for the labour market and economy of functional areas at large. However, not all municipal cooperations have this capacity. US Councils of Governments exist in a variety of types, and our analysis has partly explored this diversity. The larger impacts seem to accrue when cooperation agreements precede modifications of functional areas' borders, hence making metropolitan areas more prepared for such changes. However, there may be other aspects of local governments' collaborations acting as drivers of their success. We reserve to investigate them in future works.

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Appendix

A Definitions: US local institutions

Metropolitan Statistical Areas (MSAs). Functional local areas whose borders are based on commuting and economic patters. The shape of MSAs are regularly reviewed by the United States Office of Management and Budget (OMB). Metropolitan Areas were introduced in 1949 under the designation 'standard metropolitan area' (SMA). In 1959 the term was changed to 'standard metropolitan statistical area' (SMSA), while in 1983 they acquired the current name of 'metropolitan statistical area' (MSA). The geographic extension of metropolitan statistical areas changes over time following processes of decentralization or recentralization of residences and workplaces. Therefore, changes in the original shapes of metropolitan areas – which greatly differ across US regions – depend primarily on the evolution of spatial patterns of urbanization. The complete list of MSAs with their relative county composition is available at https://usa.ipums.org/usa/volii/county_comp2b.shtml, while more details on the way in which MSAs are defined and on their evolution can be found at: https://www.census.gov/programs-surveys/metro-micro/about.html.

Counties & municipalities. 'General purpose' local governments consist of two tiers: counties and municipalities. Counties and county equivalents such as parishes in Louisiana, the Washington D.C. and independent cities, are elected bodies representing legal subdivisions of States. Originally, they were created to perform State-mandated duties such as assessment of property, record keeping (i.e. property and vital statistics), maintenance of rural roads, administration of election and judicial functions. Over time, States have devolved greater autonomy to counties, with varying governmental powers. Counties have generally broad responsibilities in Southern States, where they provide many services to the community such as courts, public utilities, libraries, public health services, law enforcement but also airports, public housing, welfare services and public school. Municipalities - the second tier of local governments - are political subdivisions, generally subordinated to a county governments, that serve a specific population concentration in a defined area, like cities. In general they deal with recreation services, police and fire departments, housing services, emergency medical services, municipal courts, transportation services (including public transportation), and public works.

Councils of Governments (COGs). Councils of Governments are voluntary associations of local governments, which may provide a variety of services ranging from public safety to community development (including both workforce and economic development) and covering also environmental and transportation issues. The idea is to provide cooperative planning, coordination, and technical assistance on issues of mutual concern that cross jurisdictional lines. The COGs' purpose is to establish a consensus about the needs of a regional context, and to provide widely acceptable solutions. The duties and responsibilities of Councils are meant to complement, not duplicate, those of local jurisdictions. They aim to unify agencies and jurisdictions and act independently of the responsibilities traditionally exercised by the individual members within their own communities. The work of COGs consists in assisting local governments in handling tasks set by State regulations, providing a flexible network for effective action at the regional level. This cooperation among local governments is expected to help taking advantage of economies of scale and scope (Vlassis, 2007). COGs exist not just in metropolitan but also in more rural areas, where they constitute a public attempt of local or regional governance (Vlassis, 2007). A similar arrangement to COGs are Metropolitan Planning Organizations (MPOs), federally-funded policy organisations made up of representatives from local governments and governmental transportation authorities, that arose out of the requirements of the Federal-Aid Highway Act of 1962. While initially their areas of competence was limited to transportation, progressively greater responsibilities have been devolved to them, both on planning and on implementations (McDowell and Edner, 2002).

B Theoretical Framework: Modelling Individual Wages

The two-step analysis is based on a simple theoretical framework in the spirit of Combes et al. (2008) and Combes and Gobillon (2015), modelling the role of urban governance structure for individual wages.

Assume a representative firm located in MSA a and operating in industry k at time t produces output $y_{a,k,t}$ using a Cobb-Douglas production function expressed in terms of effective labour and other factors of production as in Equation A1:

$$y_{a,k,t} = A_{a,k,t} \left[\sum_{i \in (a,k,t)} s_{i,t} l_{i,t} \right]^{b} (z_{a,k,t})^{1-b} \tag{A1}$$

where $0 < b \leq 1$, $A_{a,k,t}$ is Total Factor Productivity, $s_{i,t}$ represents skills of worker i at time t, $l_{i,t}$ is the number of working days for worker i and $z_{a,k,t}$ are the other factors of production. The competitive firm maximizes profits according to Equation A2:

$$\pi_{a,k,t} = p_{a,k,t} y_{a,k,t} - \sum_{i \in (a,k,t)} w_{i,t} l_{i,t} - (r_{a,k,t} - \theta_{a,k,t} G_{a,t})\, z_{a,k,t} \tag{A2}$$

with $p_{a,k,t}$ representing the price of output $y_{a,k,t}$, $w_{i,t}$ the daily wage for any worker i employed in the firm and $r_{a,k,t}$ the price of all other inputs of production. The representative firm may experience a variation in the cost of the other factors of production if effective policies to influence entrepreneurs location decisions are implemented. Hence, $\theta_{a,k,t} g_{a,t}$ captures the effect of these policies on profits: $G_{a,t}$ is the level of policy effectiveness in MSA a at time t while $\theta_{a,k,t}$ is a strictly positive parameter reflecting the importance of institutional quality for the representative firm. This formulation, which draws on Zissimos and Wooders (2008), assumes that providing effective policies aimed at spurring local economic growth (e.g. a well functioning bureaucracy, effective protection of property rights, etc.) is equivalent to granting a subsidy. At the opposite, ineffective policies increase the cost of doing business with respect to firms operating in high quality business environment.

At the competitive equilibrium, worker i in area a, industry k in year t, gets the following wage (Equation A3):

$$
\begin{aligned}
w_{i,t} &= b\,(1-b)^{\frac{1-b}{b}} \left[\frac{p_{a(i,t),k(i,t),t}\, A_{a(i,t),k(i,t),t}}{(r_{a(i,t),k(i,t),t} - \theta_{a(i,t),k(i,t),t}\, G_{a(i,t),t})^{1-b}} \right]^{1/b} s_{i,t} \\
&= B_{a(i,t),k(i,t),t}\, s_{i,t} \qquad \text{(A3)}
\end{aligned}
$$

Wages are hence a function of individual skills ($s_{i,t}$) and local productivity ($B_{a(i,t),k(i,t),t}$). Local productivity differences may be the result of specific local endowments, local interactions that act through total factor productivity ($A_{a,k,t}$), price of outputs ($p_{a,k,t}$) or the price of non-labour inputs ($r_{a,k,t}$). Moreover, the structure of urban governance may cause productivity advantages by enhancing the level of policy effectiveness ($G_{a,t}$).

C First-Step Analysis

On the basis of the theoretical framework discussed above, and by exploiting individual-level data on wages, following the approach proposed by Monastiriotis (2002) and Combes et al. (2008) we calculate the part of nominal wages that remains after having considered the effect of the local industrial composition, workers' characteristics and skill sorting across cities (Combes et al., 2008; De la Roca and Puga, 2017). We exploit these first-step estimates to isolate the sources of variation of wage premia due to individual characteristics. In the second step, presented in sections 4 and 5 of the paper, MSAs become the observational units and the specification includes our main variables reflecting the structure of metropolitan governance.

In the first-step, individual-level wages are estimated by log-linearising Equation A3 and assuming that local productivity $B_{a(i,t),k(i,t),t}$ depends on industrial composition, within-industry interaction variables and a core-based city-region effect, while individual skills $s_{i,t}$ are a function of worker characteristics. Unfortunately, as IPUMS does not follow individuals over time, we cannot include worker fixed-effects in our model. The estimating equation is:

$$log\ w_{i,a,j,o,t} = \alpha_1 Z_{i,a,j,o,t} + \alpha_2 I_{a,j,o,t} + i_j + o_o + \boldsymbol{\pi_{a,t}} + \varepsilon_{i,a,j,o,t} \tag{A4}$$

where $w_{i,a,j,o,t}$, the nominal wage of individual i who works in MSA a, industry j, occupational category o, at time (decade) t, is a function of a number of variables. $Z_{i,a,j,o,t}$, capturing worker effects, is a vector of individual characteristics: age, age squared, education, gender, ethnicity and occupation. $I_{a,j,o,t}$ is the log share of employment and the share of workers in professional occupations in each MSA. Following Combes et al. (2008), we centre $I_{a,j,o,t}$ and $Z_{i,a,j,o,t}$ around their industry mean. i_j is a vector of industry dummies, o_o is a vector of occupational category dummies.

$\boldsymbol{\pi_{a,t}}$ in Equation (A4) is the main parameter of interest in this step of the analysis. It is vector of dummy variables that take value 1 if the individual resided in MSA a a time t and it represents the wage premium associated to the metropolitan area a at time t, net of the local industrial mix and local workforce characteristics. The estimated coefficients $\hat{\pi}_{a,t}$ represent MSA-specific wage premia, i.e. the part of wages variability within a metropolitan area that is not explained by workforce or industrial composition. In order to catch the location specific effect, we hypothesize that the respondents used to live and work in the same place. While the assumption would be barely defensible in other contexts, it turns out to be quite reasonable when the unit of analysis is the MSA, i.e. a functionally refined area that represents a local economic system as self-contained as possible in terms of commuting patterns.

Table A1: First Step Specification

Dep.Var.: Log wage	
Age	0.0489***
	(0.000387)
Age^2	-0.000478***
	(4.21e-06)
Ethnicity: white	0.0762***
	(0.00414)
Gender: male	0.210***
	(0.00426)
Education level:	
Medium education	0.0791***
	(0.00334)
High education	0.130***
	(0.00491)
Very high education	0.298***
	(0.00270)
Share of workers in:	
Mining	0.306
	(0.290)
Construction	-1.572***
	(0.490)
Manufacturing	0.441***
	(0.0783)
Transportation	-0.258**
	(0.116)
Wholesale trade	-0.667**
	(0.292)
Retail trade	0.477***
	(0.0869)
Finance	-0.521
	(0.346)
Business	-1.692***
	(0.382)
Personal services	-3.401***
	(0.610)
Entertainment	-2.371***
	(0.833)
Professional	0.705***
	(0.127)
(330 MSA)×(period) dummies	Yes
384 Occupation category dummies	Yes
221 Industry category dummies	Yes
Within-Industry interactions	Yes
Observations	13,602,378
R-squared	0.399

MSA-clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Reference categories for Education: Low education; for Gender: female; for Ethnicity: not white; for Industry shares: Agriculture.

The results of fist-step, individual-level estimates of equation A4 are show in Table A1. These are meant to calculate the role of metropolitan area-specific conditions on individual wages, net of individual characteristics. For that, we include and extrapolate post-estimation coefficients of MSA×period fixed effects, which are then used as dependent variable for wage premium estimates in the second-step. The first-step results are in line with expectations. Experience, as proxied by age and its squared values, has a positive effect on wages but with a declining rate; Caucasian males are likely to earn higher wages and there is evidence of positive returns to education.

It is interesting to look at the relative importance of area fixed-effect compared to either worker characteristics or industry fixed effect. For that, we follow Abowd et al. (1999) and Combes et al. (2008) and conduct a variance decomposition analysis. The effect of each variable is calculated by multiplying its estimated coefficient by the observed values; in case of a group of variable, their effect is simply the sum of the single effects. The results are in Table A2. For each variable or group of variables, we report their standard deviation and their correlation with wages and with other explanatory variables. A variable (or group of variables) has a larger explanatory power the stronger its correlation with wages and the higher its standard deviation relative to that of wages.

Table A2: First-step variance decomposition

		Simple correlation with:				
Explanatory Power of	**Std.Dev.**	log of wages	worker effects	industry fixed effects	area fixed effects	within-industry interactions
log of wages	0.661	1.000				
worker effects	0.341	0.554	1.000			
industry fixed effects	0.116	0.217	0.155	1.000		
area fixed effects	0.106	0.173	0.023	0.026	1.000	
within-industry interactions	0.059	0.045	0.031	0.388	0.039	1.000

Notes: The total number of observations is 13,602,378 and all correlations between effects are significant at 1% level.

The results show that, while workers' observable characteristics (age and its square, gender, ethnicity, education and occupation) display the largest explanatory power - high standard deviation (0.341) with respect to wages' variability (0.661), high correlation with wages (0.554) - *area fixed effects* have a substantial power in explaining wages' variability. The correlation of MSA fixed effects with wages is 0.173 while the standard deviation is 0.106. All in all, these results appear in line with previous studies. In particular, Combes et al. (2008) estimate a model of wage determination across French local labour markets and find that the set of variables with the strongest explanatory power is workers' fixed effects, followed by area-year fixed effects.

D Appendix Tables and Figures

Table A3: Descriptive statistics

Variable	Obs	Mean	Std. Dev.
Wage premium	1,499	0.048	0.165
Log wages	1,500	2.458	0.189
Log patents per capita (innovation)	1,809	1.893	0.785
Fragmentation (counties)	1,475	-0.023	0.089
Fragmentation (municipalities)	1,475	-0.029	0.183
Coordination (COG 5 yr lag)	1,802	0.348	0.476
Log land	1,809	22.01	0.784
Log density	1,809	4.526	0.903
Human capital	1,500	0.201	0.951
Ethnicity: white	1,500	0.867	0.101
Workers in managerial and professional specialty	1,500	0.241	0.071
Workers in technical, sales and administrative support	1,500	0.302	0.042
Workers in service	1,500	0.126	0.034
Workers in farming, forestry and fishing	1,500	0.005	0.004
Workers in precision production, craft and repair	1,500	0.127	0.037
Workers as operators, fabricators and laborers	1,500	0.196	0.084
COG single MSA	1,802	0.292	0.455
COG multiple MSAs	1,802	0.077	0.266
Fragmentation - level (counties)	1,809	0.496	0.264
Fragmentation - level (municipalities)	1,809	1.638	0.652
Coordination (COG 2 yr lag)	1,802	0.376	0.484
Coordination (COG 3 yr lag)	1,802	0.369	0.482
Coordination (COG 4 yr lag)	1,802	0.357	0.479
Coordination (COG 10 yr lag)	1,802	0.322	0.467

Table A4: Municipalities as proxy for Fragmentation

	(1)	(2)	(3)
Panel A: Wage Premium			
Fragmentation	-0.0160*	-0.0163*	-0.0150
	(0.00906)	(0.00953)	(0.00943)
Coordination			0.0195***
			(0.00734)
Observations	1,215	1,215	1,211
R-squared	0.872	0.888	0.889
Panel B: Innovation			
Fragmentation	-0.0414	-0.0927*	-0.0864*
	(0.0390)	(0.0491)	(0.0481)
Coordination			0.0888**
			(0.0398)
Observations	1,447	1,217	1,213
R-squared	0.926	0.937	0.937
Controls	No	Yes	Yes
Time dummies	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes

Notes: Clustered standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Fragmentation = Δ log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG/MPO operates in MSA.

Table A5: Urban Governance and Wage Premium, Excluding Public Sector Workers

Dep. var.: Wage Premium	(1)	(2)	(3)	(4)	(5)
Fragmentation	-0.0283	-0.0355*			-0.0339*
	(0.0173)	(0.0187)			(0.0190)
Coordination			0.0326***	0.0243***	0.0291***
			(0.00672)	(0.00644)	(0.00865)
Land		0.0973***		0.0747***	0.0920***
		(0.0133)		(0.00838)	(0.0132)
Density		0.111***		0.0813***	0.107***
		(0.0154)		(0.00999)	(0.0153)
Time dummies	Yes	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,215	1,215	1,481	1,481	1,211
R-squared	0.893	0.910	0.879	0.894	0.912

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: MSA-specific wage premium obtained from individual wages within MSA, excluding workers in the following sectors: Bus service and urban transit, Nursing and personal care facilities, U.S. Postal Service, Health services, n.e.c., Telegraph and miscellaneous communication, Elementary and secondary schools, Offices and clinics of physicians, Colleges and universities, Offices and clinics of dentists, Vocational schools, Offices and clinics of chiropractors, Libraries, Offices and clinics of optometrists, Educational services, n.e.c., Offices and clinics of health practitioners, Job training and vocational rehabilitation, Hospitals, Child day care services, Social services, n.e.c., Family child care homes, Museums, art galleries, and zoos, Residential care facilities, Labor unions. Fragmentation = Δ log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG operates in MSA; Land = log of squared km of land; Density = log nr of inhabitants per squared km of land.

Table A6: Single-step Estimation - Urban Governance and Log Wages

Dep. var.: log wages	(1)	(2)	(3)	(4)	(5)	(6)
Fragmentation	-0.0401*	-0.0622**			-0.0600**	0.00188
	(0.0230)	(0.0245)			(0.0243)	(0.0195)
Coordination			0.0500***	0.0380***	0.0401***	0.0247***
			(0.0136)	(0.0126)	(0.0117)	(0.00914)
Land		0.137***		0.108***	0.129***	0.0795***
		(0.0188)		(0.0170)	(0.0188)	(0.0138)
Density		0.137***		0.0995***	0.132***	0.110***
		(0.0207)		(0.0184)	(0.0206)	(0.0159)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	No	No	No	No	No	Yes
Observations	1,213	1,213	1,482	1,482	1,213	1,178
R-squared	0.837	0.867	0.893	0.907	0.870	0.925

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: log wages averaged from IPUMS individual data; Fragmentation = log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG operates in MSA; Land = log of squared km of land; Density = log nr of inhabitants per squared km of land; Other controls: human capital, share of white workers, occupations controls (6 variables referring to: share of workers in managerial and professional specialty (excluded category); share of workers in technical, sales and administrative support; share of workers in service; share of workers in farming, forestry and fishing; share of workers in precision production, craft and repair; share of workers as operators, fabricators and laborers).

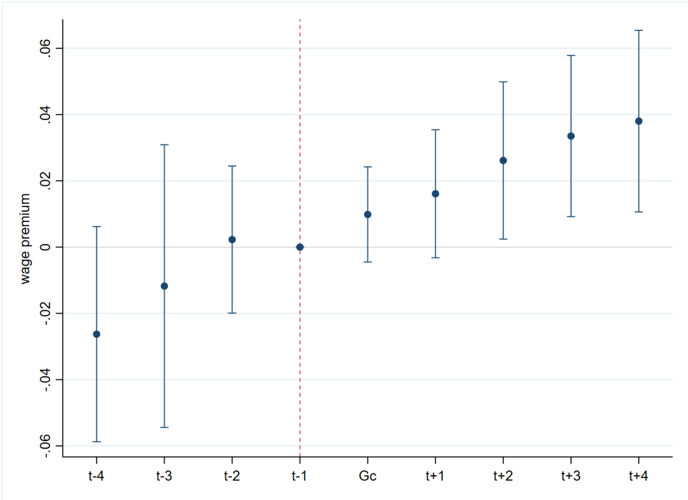
Table A7: Results by year lags of COG establishment

Year lags:	1	2	3	4	10
	(1)	(2)	(3)	(4)	(5)
Panel A: Wage Premium					
Fragmentation	-0.0319*	-0.0320*	-0.0304*	-0.0309*	-0.0303*
	(0.0179)	(0.0179)	(0.0178)	(0.0177)	(0.0177)
Coordination	0.0182**	0.0211**	0.0217***	0.0208***	0.0161**
	(0.00834)	(0.00816)	(0.00801)	(0.00771)	(0.00742)
Observations	1,211	1,211	1,211	1,211	1,211
R-squared	0.889	0.889	0.890	0.890	0.889
Panel B: Wage Inequality					
Fragmentation	0.00198	0.00198	0.00167	0.00175	0.00163
	(0.00155)	(0.00156)	(0.00155)	(0.00156)	(0.00149)
Coordination	-0.00396***	-0.00402***	-0.00398***	-0.00375***	-0.00333***
	(0.000907)	(0.000886)	(0.000861)	(0.000828)	(0.000760)
Observations	1,213	1,213	1,213	1,213	1,213
R-squared	0.836	0.837	0.837	0.836	0.835
Panel C: Innovation					
Fragmentation	-0.0406	-0.0407	-0.0333	-0.0362	-0.0321
	(0.0855)	(0.0855)	(0.0852)	(0.0845)	(0.0851)
Coordination	0.0747	0.0867**	0.0960**	0.0853**	0.0728*
	(0.0460)	(0.0438)	(0.0420)	(0.0407)	(0.0377)
Observations	1,213	1,213	1,213	1,213	1,213
R-squared	0.937	0.937	0.937	0.937	0.937
Controls	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
MSA dummies	Yes	Yes	Yes	Yes	Yes

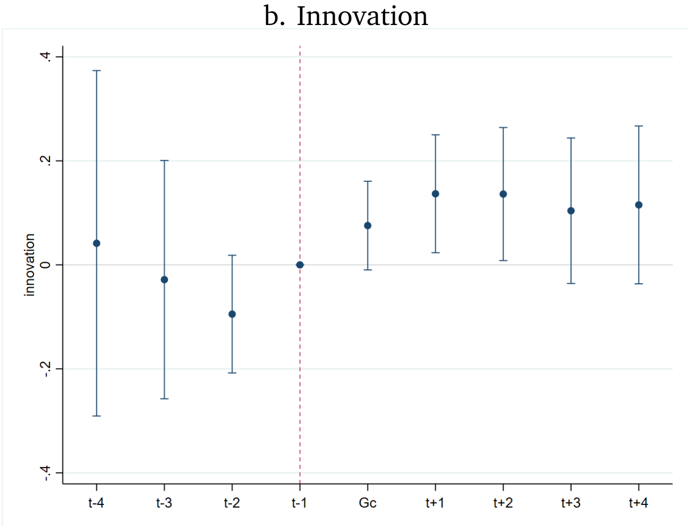
Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Fragmentation = Δ log nr of municipalities per 100,000 inhabitants within MSA; Coordination = 1 if COG/MPO operates in MSA. Dependent variables: Panel A: Wage premium; Panel B: Gini Index; Panel C: log patents per 100 thousand inhabitants. Year lags: 1 implies that variable Gc takes value 1 if a COG has been created one year (or more) before the beginning of a decade; 2 implies that variable Gc takes value 1 if a COG has been created two years (or more) before the beginning of a decade; 3 implies that variable Gc takes value 1 if a COG has been created three years (or more) before the beginning of a decade; 4 implies that variable Gc takes value 1 if a COG has been created four years (or more) before the beginning of a decade; 10 implies that variable Gc takes value 1 if a COG has been created ten years (or more) before the beginning of a decade.

Figure A1: Event Studies using Abraham and Sun's (2021) estimator

a. Wage Premium



b. Innovation



Event studies estimated using *eventstudyinteract* STATA command, implementing the interaction weighted (IW) estimator and constructing pointwise confidence interval for the estimation of dynamic treatment effects in TWFE models. The event study uses t-1 (decade prior to COG inception) as reference category. Caps refer to 95% confidence intervals. Gc = decade of COG creation. Dependent variables: a. wage premium; b.log patents per 100 thousand inhabitants.