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"Phantom of the Opera" or "Sex and the City"? – Historical Amenities as Sources of Exogenous Variation

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RUHR
ECONOMIC PAPERS

Thomas K. Bauer
Philipp Breidenbach
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Thomas K. Bauer, Philipp Breidenbach, and
Christoph M. Schmidt[1]

"Phantom of the Opera" or "Sex and the City"? – Historical Amenities as Sources of Exogenous Variation

Abstract

Using the location of baroque opera houses as a natural experiment, Falck et al. (2011) claim to document a positive causal effect of the supply of cultural goods on today's regional distribution of talents. This paper raises serious doubts on the validity of the identification strategy underlying these estimates, though. While we are able to replicate the original results, we proceed to show that the same empirical strategy also assigns positive causal effects to the location of historical brothels and breweries. These estimated effects are similar in size and significance to those of historical opera houses. We document that all these estimates reflect the importance of institutions for long-run economic growth, and that the effect of historical amenities on the contemporary local share of high skilled workers disappears upon controlling for regions' historical importance.

JEL Classification: R11, H42, J24

Keywords: Human capital; historical amenities; regional competiveness

July 2014

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1. Introduction

One of the most prominent candidates for explaining the high degree of variation in regional prosperity is the heterogeneous prevalence of skilled labor (e.g. Jacobs 1961, Romer 1990). Attracting mobile high potentials has therefore become an important facet of any ambitious regional policy. Yet, our knowledge is still limited, when it comes to the question what makes regions highly attractive in the interregional competition for talents. Correspondingly, factors that are potentially drawing high skilled workers to cities and regions are the subject of numerous empirical studies. A particularly contentious issue is the subsidization of regional amenities, such as cultural facilities and events, vis-à-vis more sober policies, such as ascertaining of solid local public finances.

In his book "The rise of the creative class", Florida (2002) suggests two controversially discussed hypotheses. First, he maintains that it is a high share of workers exhibiting a high level of creativity, which is the fundamental prerequisite for prosperity, not the prevalence of high-skilled workers. Thus, different to other authors[2] he disentangles creativity from the usual notion of human capital that finds its expression in measures of formal education. According to his creative class theory, prosperity is therefore a process predominantly generated by new ideas and their spillovers.

As a second hypothesis, he suggests that factors shaping the regional quality of life are decisive for attracting and retaining those talents. He views, in particular, a high variety in cultural supply as one essential ingredient of attractive regions. He claims to find corroborative evidence for this hypothesis in American cities, since those cities with a large Bohemian index[3] highly correlate with the cities' endow-

[2] Romer (1990) as well as Jacob (1961) and Mokyr (1990) point out the importance of creativity for growth which they treat as equivalent to human capital. Rauch (1993) and Simon (1998) point out the importance of human capital on regional and urban level. Glaeser (1994, 2003) also stresses the human capital hypothesis and Glaeser (2005) shows that standard human capital measures wipe out creative class employment.

[3] The Bohemian index is defined as the fraction of artistically creative people (authors, designers, musicians, composers, actors, directors, painters, sculptors, artist printmakers, photographers,

ment with talents. This result would suggest that regional policy makers should place a high priority on fostering creativity, over and above other local traits.

As Falck et al. (2011) and Möller and Tubadji (2009) among others point out, this correlation is plagued by the recurrent problem of reverse causality. Since cities with a large fraction of high-skilled and high-earning people tend to display a higher willingness to pay for cultural goods, the chain of causality might rather go from the rich cities attracting the bohemians. Therefore, isolating the genuine causal link with standard econometric methods is a daunting task. One might hope, though, that this complex problem could be resolved by resorting to economic history.

Specifically, Falck et al. (2011) use historical data to explain contemporaneous observations. This empirical strategy has a long history in economics. To our knowledge, the earliest example is Weber (1904), who postulates an effect to emerge from Protestant Ethic on output in capitalist economies. Recent studies building on the assumption that historical amenities are exogenously given are Acemoglu et al. (2002), who evaluate historical institutions in colonial states and their long run effects on growth, and Becker & Woessmann (2010), who find evidence for significant differences in literacy in former Prussian regions based on the share of Protestants in each region. In a similar vein, Sachs (2003) and Rodrik (2002) discuss whether geography or institutions are the main prerequisite for prosperity. A concise overview on the state of the literature in this research field is provided by Nunn (2009).

In the same spirit, Falck et al (2011) take advantage of the multi-faceted historical development of German regions. These regions have varied substantially in geographic and socio-economic factors, such as their proximity to the major European trade lines, their involvement in wars and more generally in their institutional arrangements, reflecting the high fragmentation of historical Germany in sovereign principalities. These differences in historical circumstances may exert an in-

dancers, artist, and performers) who live in a giver region divided by the fraction of the total population of a country who live in that area (Florida, 2002, p. 333).

fluence on the observable differences of today's prosperity. Falck et al. (2011) claim indeed to find that today's regional endowment with human capital is driven by the exogenous endowment with cultural supply, using German Opera Houses from the baroque era as their measure of exogenous cultural amenities. Their location is taken as the outcome of a natural experiment which, through its influence on today's cultural life, exerts an effect on human capital today.

Taking their results (Falck et al. 2011) as a starting point, this paper explores the empirical side of this issue more deeply. Most importantly, we seriously doubt the interpretation of the location of baroque opera houses as the outcome of a natural experiment. While we are able to replicate the correlation between the presence of historical opera houses and the current regional endowment with human capital on the basis of our dataset, we proceed to document very similar correlations for quite different historical amenities, which certainly have no tight connection to fostering the fine arts. Specifically, in our estimations we replace opera houses with historically documented brothels and breweries and derive similar results, indicating a higher degree of high-skilled workforce today in the proximity of historical brothels and breweries.

This finding illustrates a deeper conceptual point: The historical location of amenities was the reflection of the same underlying local traits which make the same regions prosperous today, such as the presence of administrative centers or natural advantages for serving as hubs in the transport of goods and services. Specifically, opera houses were likely to be built in the important cities close to the ruler's residence. These cities typically draw their prominent role for their respective region from their natural setting or from the institutions which had been implemented there first. Just as today, quite obviously erecting a meeting place for connoisseurs of the fine arts is a consequence rather than a prerequisite of prosperity. Interpreting the location of historical opera houses as a natural experiment confuses cause and consequence.

The paper is organized as follows. Section 2 provides a brief overview of the empirical literature regarding the link between cultural amenities and the location

choice of skilled labor. Section 3 replicates the results of Falck et al. (2011), while section 4 explores the questions whether the correlation between the distance to historical opera houses and the current regional share of skilled workers warrants a causal interpretation, raising serious doubts regarding the causal nature of this link. Section 5 concludes with a discussion of the implementation of our results for regional policy.

2. Cultural amenities and human capital: Conceptual issues

In the quest for a convincing estimate of the causal effect of the presence of creative people on regional prosperity, reverse causality is potentially the most important obstacle. One approach to alleviating the reverse causality problem is the use of panel data, since it enables the researcher to account for changes over time and the lagged influences of explanatory variables, such as the effect of the lagged share of creative people on current regional economic performance. Möller and Tubadji (2008) choose such a design with panel data for Germany covering the period from 1974 to 2004. Using a GMM approach suggested by Blundell and Bond (1998), they indeed document the importance of creative people for regional growth. However, they find no evidence that members of the creative class feel attracted by a bohemian milieu. Their results rather indicate a causal link running from a talented workforce to bohemians.

More recently, Falck et al. (2011) try to overcome the endogeneity problem by interpreting the presence of historical cultural amenities, namely of baroque opera houses, as a natural experiment. The baroque era is defined as the time between the end of the Thirty Years War in 1648 until the early 19th century. During this time, the Holy Roman Empire of German Nations, roughly the territory of today's Germany, was characterized by a highly fragmented institutional system with small absolutistic principalities. This era was arguably marked by a high regard for cultural life in the absolutistic courts. At these courts, an exceptionally high de-

mand for music composers developed, congruent with a boom in building opera houses all over the terrain of today's Germany.

Falck et al. (2011) argue that the erection of these opera houses did not reflect above-average economic welfare or local traits which would also be conducive to economic activity, but rather exclusively the rulers' admiration for art and music. Based on this argument, Falck et al. (2011) use the distance of a region to the next baroque opera house as key variable to explain the variation in the regional distribution of today's human capital. This first-stage regression is utilized to instrument human capital in a traditional GDP growth regression. It is the first-stage regression which is at issue here, since in their contribution Falck et al. (2011) assign a causal interpretation to it. In our assessment this interpretation cannot be sustained.

This first stage regression successfully pins down a significant correlation between the distance variable on the right-hand side and the skill variable on the left-hand side, since it rests on a wide distribution of baroque opera houses across German cities. This would hardly be possible using the corresponding distribution in former centralistic regimes, e.g. in France. Thus, for the search for a successful instrument operating in the structural equation, the regression attributing regional growth performance to the share of skilled workers in the region, Falck et al. (2011) have to be applauded. But while the persistence of the opera houses – all the baroque amenities still exist today – leads to a high correlation with current cultural activities in Germany, Falck et al. (2011) err seriously when they go on to argue that the location of baroque opera houses can be interpreted as a quasi-natural experiment. The mutation from an econometric instrument satisfying an exclusion restriction to a genuine treatment variable which causally influences the variable of interest in this first-stage regression can simply not be sustained by convincing arguments.

Falck et al. (2011) are right that the problem of reverse causality, their principal focus, cannot arise because today's prosperity cannot influence baroque opera house buildings. Correctly so, but due to the nearly ubiquitous problem of unob-

served heterogeneity, there are serious doubts concerning the causal interpretation of their first-stage regression. After all, the distance to historical opera houses is merely one variable of its kind which could serve as a regressor in the first-stage regression and, thus, as an instrument in the growth regression. All that an instrumental variable must satisfy is orthogonality to the residual in the second-stage regression of interest and a sufficiently high correlation with the variable to be instrumented, i.e. the regional share of high-skilled. Before one would be able to assign this variable a causal interpretation in the first-stage regression, though, much more would be needed. Most importantly, one would have to demonstrate that no other candidate variable of the same kind could be used as an economically more sensible variable instead.

For this purpose, it is very helpful to imagine the structure of a perfect experiment to study the impact of baroque opera houses – or any other historical cultural amenity – on the contemporary human capital in a region. In such an experiment, baroque opera houses would have been allocated randomly over the German territory – like a helicopter flying over Germany and randomly dropping opera houses. Indeed, opera houses in the baroque era have been built widely over German territory reflecting the administrative conditions of this era. By no means, however, the location of baroque opera houses can be regarded as being random.

These facilities were typically built in cities that had emerged as the administrative centers of this era. And these locations became administrative centers not by mere chance but rather because of other reasons, such as the proximity to an important trade line, to a river, the sea or because of the availability of natural resources. As German cities tended to retain their regional importance over time, the described first-stage regression therefore suffers from an omitted variable bias as soon as a causal interpretation is endeavored. To corroborate this argument, we run alternative regressions where we use undoubtedly meaningless historical amenities as explanatory factors for today's human capital and show that these alternative amenities also display significant effects which are similar to those of baroque opera houses.

But even if the location of baroque opera houses could be regarded as the result of a quasi-natural experiment and, correspondingly, even if historical cultural amenities would display persistent positive effects on the regional share of human capital, one would have to be very careful from the viewpoint of its external validity, to extrapolate this effect to the circumstances of today. Most specifically, such results would hardly justify the subsidization of today's opera houses as a preferred means of attracting high-skilled workers. After all, most regions in Germany are already subsidizing cultural amenities at a large scale. Whether additional cultural subsidies could really be able to attract additional skilled workers and, thereby, significantly affect regional economic growth is already very unlikely from the vantage point of any individual region. Moreover, one would have to take into account general equilibrium effects: If all regions invest in their cultural amenities intensely, it remains unclear, whether cultural amenities are able to attract more skilled workers to specific locations.

3. Replicating Falck et al. (2011)

In a first step, we replicate the results of Falck et al. (2011) by estimating the following regression equation:

$$h_{it} = X_i \beta_1 + \gamma dist_{ij} + \varepsilon_{it}, \qquad (1)$$

where h_{it} denotes the share of employed workers with tertiary education in county i at year t. The variable ε_{it} denotes the usual error term with $\varepsilon_{it} \sim N(0,\sigma^2)$. The explanatory variable of main interest, $dist_{ij}$, measures the distance from county i to the closest county j with a baroque opera house. If today's highly talented workforce were indeed drawn towards locations in the proximity of historical cultural supply, the estimated coefficient γ should be significantly negative.

The matrix X_i subsumes variables at the county level to control for other factors that might affect the regional share of high-skilled workers. Note, however, that these covariates might themselves be influenced by historical circumstances, and that their coefficients might absorb part of the genuine effect of baroque opera

houses (Becker et al. 2011). Nevertheless, we subsequently add to our specification a dummy variable indicating whether a county is located in West-Germany, the logarithm of regional per worker GDP at the beginning of our sample period, and a set of county-type dummies reflecting their urban or peripheral environment as well as their population density and spatial position. The latter specification corresponds to the specification employed by Falck et al. (2011).

We estimate this model via pooled OLS, since a standard fixed-effects model would wipe out the variable of interest, the time-constant distance to the historical opera houses. Standard errors are clustered at the regional level. We utilize annual data from 1999 to 2004 for 413 German counties (Kreise) obtained from the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR 2011) and the Federal Statistical Office (Destatis 2013).

Table 1 provides descriptive statistics on the variables utilized in our regressions. The share of employed workers with a tertiary education varies from 2 to 25% with a mean of 7.1%. On average, the counties in our sample are located 50 km away from the next baroque opera house. Note that these figures are very much in line with Falck et al. (2011). In their data set the average regional share of skilled workers is also 7.1% and the average distance to the next baroque opera house is 51 km. The average initial GDP per worker in 1998 is 47.990€ and 79% of the included counties are located in West Germany.

The first column of Table 2 reports the results of the bivariate regression of today's share of human capital on the distance to the closest baroque opera house. On average, a county located ten kilometers closer to a historical opera house displays a significantly higher share of human capital, by some 0.26 percentage points. This result does not change noticeably when the indicator for location in West Germany is included as additional regressor, although the coefficient of the dummy itself is highly significant. Its coefficient estimate suggests that former Western-German regions tend to have a lower human capital by some 2.6 percentage points. Including the county-type dummies and the initial GDP as additional regressors (column (3)) diminishes the estimated effect of the distance

to a historical opera house, implying that human capital is typically only 0.07 percentage points lower with every ten kilometers further away from an baroque opera location. However, the coefficient is still statistically significant at the 5%-level. Note that these results are almost identical to those obtained by Falck et al. (2011).

4. Exploring genuine causality

In the spirit of DiNardo and Pischke (1997), we probe the causal nature of the correlation between the distance to baroque opera houses and the share of skilled workers in a region by replacing the key regressor by alternative historical regional amenities. These amenities are selected in such a way as to justify a similar story about the nexus between historical circumstances and today's human capital endowment. If the estimated effects of these alternative amenities turn out to be of similar importance as the distance to a historical opera house, this would cast serious doubts on the identification strategy of Falck et al. (2011).

In columns (4) to (6) we consider the distance to the next historical brothel which existed before 1600 rather than the distance to the next baroque opera house. The data on historical brothels have been obtained from Schuster (1992). The results indicate that an increasing distance to the next brothel has a significant negative effect on the region's human capital accumulation, with the point estimates being surprisingly similar to the respective estimates for the distance to the next opera house.

The estimation results are also quite similar when we alternatively consider the distance to historical breweries (see columns (7) to (9)), which we calculate from a list of historical breweries provided by Ehm (2013). Compared to the effect of the distance to historical opera houses and brothels, however, the effect of the distance to historical breweries on the contemporary share of high-skilled workers is somewhat smaller and only statistically significant in the multivariate specifica-

tions. Note further that the estimated effects of the other covariates do not change significantly when using the alternative measures of historical amenities.

Clearly, there is no convincing argument that would tie the contemporary human capital endowment of a region to its historical supply of beer or sexual services. Brothels and breweries, especially those which have been big enough to be listed in historical archives, were very likely built in the most important cities in the respective area, as were opera houses. Thus historic location decisions were, at least on average, conscious choices, reflecting local traits which also tend to shape the local human capital endowment today.

In the next step, we try to operationalize the historical importance of cities by defining cities with a high legal power as the capital cities of the members of the German Federation[4] (Deutscher Bund), which was founded in the very beginning of the 19th century.[5] We call those powerful cities "ruling cities" since we define them by their political importance. These ruling cities are broadly distributed over the ancient territory of the Holy Roman Empire of German Nations. We also distinguish large cities by identifying the 20 largest cities of the German territory in 1650. Of course there is a strong link between these characteristics of cities, since powerful cities may attract more people and therefore provide the base for the large cities.

In a similar vein to the previous estimations, we present the results of estimating equation (1) when using the distance to ruling cities and large cities, respectively, rather than distances to historical amenities in Table 3. The estimated coefficients of these two alternative measures of the distance of cities to historically

[4] We include the capital cities and the provincial capital cities of the kingdoms (Prussia, Bavaria, Saxonia, Hannover and Wurttemberg), the Electorate (Hessen-Kassel), the Duchies and Grand Duchies (Holstein, Lauenburg, Nassau, Braunschweig, Sachsen-Gotha, Sachsen-Coburg, Sachsen-Meiningen, Anhalt-Dessau, Anhalt-Köthen, Anhalt-Bernburg, Hessen-Darmstadt, Mecklenburg-Schwerin, Mecklenburg-Strelitz, Sachsen-Weimar-Eisenach, Oldenburg and Baden), and the Free Cities (Bremen, Frankfurt, Hamburg, Lübeck). Due to their small size we exclude the princedoms, since they stand for a less powerful ruling entity.

[5] The functions of the cities in the member states existed already before, since the creation of the Federation did not create new entities.

important centers are statistically significant throughout. The bivariate regression implies that a county which is placed 10 kilometers closer to the next historical ruling city increases the contemporary share of high skilled workers by 0.41 percentage points. This value shrinks with the implementation of controls (column 3) to 0.17 percentage points. The estimated coefficients of the large cities indicator are somewhat smaller.

Closer inspection reveals that the ruling cities also displayed a high probability to host operas, since opera houses that were built on the rulers' initiative were very likely located in the very proximity of their residential cities: Nearly all locations of opera houses are a ruling center at the same time, yet not all ruling cities hosted an opera house. Overall, these results also argue against the interpretation that the location of baroque opera houses could be treated as being exogenous.

In yet another alternative approach, we run a series of placebo regressions with artificial opera house locations as additional key regressors. We define the artificial locations as those 39 ruling cities which have no real opera house. If these artificial opera houses were to display a similar effect as real opera-house locations, this would weaken the argument that historic opera houses are a driving force of today's human capital endowments further. This approach is similar to the strategy of Falck et al. (2011), who employed a propensity score matching approach based on geological and geographical characteristics of the regions in order to defined "counterfactual opera houses".[6]

When we consider the distance to these artificial opera houses, the respective coefficients still stay significant and similar in size to the estimates obtained for the real baroque opera houses (see Table 4, column (1)-(3)). Note that the number of observations in this setup decreases substantially, since we had to exclude all those regions from our sample which are linked to a ruling city with an opera. Otherwise, regions closely located to a ruling city (with a real opera house) would ob-

[6] Falck et al (2011) matched different regions based on geological and geographical factors, religion, Hanseatic League membership and on hosting a historical university.

tain a higher distance to the closest remaining ruling city without an opera house. This would inevitably lead to biased results.

In a final set of regressions we jointly consider three distance variables: the distance to a baroque opera house, the distance to a ruling city and the distance to a large city (see columns (4) to (6) of Table 4). According to our presumption that opera houses are hardly the predominant force which drives the attractiveness of a region for high-skilled workers, we expect the coefficient of the distance to the next opera house to become insignificant in this specification. The estimation results confirm this expectation, at least if further factors that may affect the attractiveness of a region are controlled for.

In columns (4) to (6) of Table 4 only the distance to the next ruling city appears to be of importance for the contemporary share of skilled workers. Institutionalists may see their hypothesis to be strengthened by these results, since they suggest that a satisfactory supply of institutions can explain economic development in endogenous growth theory context (e.g. Hall and Jones 1999, Rodrik et. al 2004). Those cities, which we define as ruling cities, are very likely to host the heads of legislative, political and economic institution setters. Therefore, institutional rights were enforced better and faster in these cities compared to surrounding areas with lower institutional power (Amin 1999, Rodriguez-Pose 2010).

5. Conclusion

There appears to be consensus in the economic literature that attracting high skilled workers is an important prerequisite for regional economic growth. Far less consensus exits with regard to the concrete question how to attract high-skilled workers. A prominent hypothesis among some researchers and, in particular, among politicians is that investments in cultural amenities are a good strategy, since a copious cultural life might attract high-skilled workers and, in turn, foster regional economic growth. Empirical studies on the causal link between cultural

amenities and regional growth, however, face a serious chicken-egg problem: it is unclear what comes first – economic prosperity or cultural life.

In a recent paper, Falck et al. (2011) claim to have solved this problem by using the location of historical cultural amenities as a natural experiment. They show that the distance to baroque operas in Germany, which they claim to be exogenous, is strongly related to the contemporary regional share of high-skilled workers. Using the distance to baroque operas as an instrumental variable, they demonstrate that the share of high skilled workers causes higher regional economic growth. Based on their results – and mistaking the instrumental variable of their first-stage regression as a genuine causal factor – they conclude that public subsidies for cultural amenities could be justified as an investment strategy to foster regional economic growth.

In this paper, we question the validity of this causal interpretation of the auxiliary first-stage regression. Instead, we argue that historical cultural amenities are just one among several candidate regressors whose causal nature would have to be justified on the basis of further theoretical considerations and empirical findings. In fact, after having replicated the results of Falck et al. (2011), we demonstrate that similar estimation results could be obtained by using measures of historical amenities that undoubtedly are not able to attract high-skilled workers. In particular, it appears that the distance to historical brothers and breweries have an effect on the contemporary regional share of high-skilled workers which is similar in size and significance to the effect of historical opera houses.

Second, our empirical results indicate that other and at least as reasonable historical characteristics, such as being a ruling or large city in the baroque era, are also found to exert a long-lasting effect on today's regional share of high-skilled workers. Third, the effect of being a historically ruling city is also reflected in our estimates, if we only consider ruling cities without a baroque opera. Finally, the effect of baroque operas on the location choice of high-skilled workers disappears as soon as other historical characteristics of a region, such as being a former ruling city, are controlled for.

Overall, the empirical evidence of this paper casts serious doubts on the validity of interpreting historical cultural amenities as a natural experiment to identify the causal relationship between culture and regional prosperity. Therefore, there is still no convincing evidence that subsidizing cultural amenities is a viable investment strategy for local governments in their quest for enhanced economic growth. It rather appears that those cities which hosted institution-setting units of legislative, political and economic power in the past, tend to enjoy a long-lasting advantage in attracting high skilled workers.

Table 1: Descriptive Statistics

Variable	Definition	Mean	Min.	Max.
Human Capital	Share of employed workers with tertiary education	7.141 (3.356)	1.928	25.268
Distance to Opera	Distance to the closest baroque Opera house (in km)	50.3 (30.5)	0	179.1
Distance to Ruling City	Distance to the closest Ruling City before 1818 (in km)	37.5 (24.9)	0	130.7
Distance to Large City	Distance to the closest large city from 1650 (in km)	63.2 (37.4)	0	187.3
Distance to Brothel	Distance to the closest Brothel existed before 1600 (in km)	38.7 (34.1)	0	188.8
Distance to Brewery	Distance to the closest Brewery existed before 1700 (in km)	30.9 (38.7)	0	189.0
Initial GDP	GDP per employee in 1998	3.871 (0.1659)	3.465	4.529
West Germany	West German county (indicator variable)	0.789 (0.408)	0	1
County-Type Dummies	Classification of German counties in 9 groups (siedlungsstrukturelle Kreistypen) depending on size, density and spatial position (for details see BBR 2003)			

Table 2: Pooled-OLS with Operas, Brothels and Breweries

(Dependent Variable: Local share of employees with tertiary education)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Opera	Opera	Opera	Brothel	Brothel	Brothel	Brewery	Brewery	Brewery
Distance to...	-0.026***	-0.021***	-0.007**	-0.015***	-0.018***	-0.009***	-0.005	-0.010***	-0.003*
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.002)	(0.004)	(0.003)	(0.002)
West Germany		-2.628***	-5.993***		-2.964***	-6.032***		-2.984***	-6.121***
		(0.352)	(0.477)		(0.361)	(0.488)		(0.363)	(0.494)
ln(GDP $_{1998}$)			7.806***			7.644***			7.839***
			(1.604)			(1.621)			(1.648)
County-type	N	N	Y	N	N	Y	N	N	Y
No. of Groups	413	413	413	413	413	413	413	413	413
No. of Obs.	2478	2478	2478	2478	2478	2478	2478	2478	2478

Note: ***,**,*= denote significance at the 1%-, 5%- and 10%-level. Standard errors in parentheses.

Table 3: Pooled-OLS with Ruling Cities, Large Cities and Artificial Operas

(Dependent Variable: Local share of employees with tertiary education)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Ruling City	Ruling City	Ruling City	Large City	Large City	Large City	Artificial Opera	Artificial Opera	Artificial Opera
Distance to...	-0.041***	-0.042***	-0.017***	-0.022***	-0.023***	-0.006*	-0.020**	-0.020**	-0.011**
	(0.007)	(0.006)	(0.004)	(0.005)	(0.005)	(0.005)	(0.009)	(0.008)	(0.005)
West Germany		-2.861***	-5.769***		-2.905***	-5.966***		-2.272***	-5.316***
		(0.345)	(0.487)		(0.343)	(0.492)		(0.479)	(0.640)
ln(GDP $_{1998}$)			7.015***			7.518***			7.552***
			(1.609)			(1.641)			(2.057)
County-type	N	N	Y	N	N	Y	N	N	Y
No. of Groups	413	413	413	413	413	413	236	236	236
No. of Obs.	2478	2478	2478	2478	2478	2478	1416	1416	1416

Note: ***,**,*= denote significance at the 1%-, 5%- and 10%-level. Standard errors in parentheses.

Table 4: Pooled-OLS with Operas, Ruling Cities and Large Cities (jointly)

(Dependent Variable: Local share of employees with tertiary education)

	(4)	(5)	(6)
Distance to Opera	-0.015*** (0.006)	-0.008 (0.005)	-0.004 (0.004)
Distance to Ruling Center	-0.030*** (0.007)	-0.030*** (0.007)	-0.016*** (0.004)
Distance to Large City	-0.009* (0.005)	-0.011** (0.005)	-0.0002 (0.003)
West Germany		-2.796*** (0.337)	-5.720*** (0.552)
$\ln(GDP_{1998})$			6.992*** (1.608)
County-type	N	N	Y
No. of Groups	413	413	413
No. of Obs.	2478	2478	2478

Note: ***,**,*= denote significance at the 1%-, 5%- and 10%-level. Standard errors in parentheses.

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