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Financial Convergence: The Role of Institutions

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ABSTRACT: In a world without financial market frictions or variance in risk premia, interest rates must be equalized between all geographic areas. However, as has been documented by a wide literature, there was widespread geographic variation in interest rates in the United States at the end of the 19th century and beginning of the 20th century. Simultaneously, a large literature has looked at the importance of institutions for financial markets. Is it possible that differences in institutions between US states explains differences in interest rates? To answer this question, I estimate the impact of a wide variety of state-level institutions on interest rates. I then use these estimates to infer that approximately a quarter of regional variation in US interest rates can be explained by variation in institutions.

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1 Introduction

In a world without financial market frictions or variance in risk premia, interest rates must be equalized between all geographic areas. However, as has been documented by a wide literature, there was widespread geographic variation in interest rates in the United States at the end of the 19th century and beginning of the 20th century. Simultaneously, a large literature has looked at the importance of institutions for financial markets. Is it possible that differences in institutions between US states explains differences in interest rates? To answer this question, I estimate the impact of a wide variety of state-level institutions on interest rates. I then use these estimates to infer how much regional variation in US interest rates can be explained by variation in institutions.

Much of the financial regulation done in the US prior to the Federal Reserve system (1914) was at the state level. Mitchener and Jaremski (2015) construct data series on many of these institutions as part of their analysis of how these institutions came into being. In particular, they construct data on double liability laws for bank shareholders, whether a state had a minimum reserve requirement for banks, and whether a state had a state banking authority or published a detailed state banking report. Hazan, Weiss and Zoabi (2018) analyze the financial market implications of granting married women property rights in the US, exploiting variation in the timing of these rights by state. As part of their research, they also extend the time series Holmes (1892) creates on state regulation of maximum legal rates of interest. The idea of this paper is simple. I first explain intuitively how each of these state-level may impact interest rates (Section 2), and then empirically document which institutions actually did influence interest rates, and by how much (Section 3). I then use my estimates to analyze counterfactuals in which I make uniform institutions throughout the US (Section 4). I find that approximately a quarter of interregional dispersion in interest rates can be accounted for by differences in institutions.

The literature on financial market integration over this time period is vast. There are two general arguments made in order to explain interest rate differentials. The first cites interstate bank branching prohibitions and similar restrictions on regional capital flows (Davis 1965, Sylla 1969). Under this story, each area of the US was in financial autarky, and thus it is no surprise that we see great variations in interest rates. To the extent that these capital market restrictions explain variation in US interest rates, the analysis performed in this paper would seek to explain why different areas in autarky may have different interest rates, and argue that the underlying reason is differing institutions (an idea advanced by Sylla (1969)). The second explanation in the literature argues that risk premia varied greatly between areas of the country (Smiley 1975, James 1976, Eichengreen 1984). This argument

does not explain the source of regional variation in risk premia. As explained in Section 2, the institutions listed above may have significant implications for the risk profile that banks choose for their investments. As such, variation in institutions may explain variation in risk premia. Relatedly, Rockoff (1977) argues that variance in bank failure rates, which also may well be due to differences in institutions, can help account for variation in interest rates.

There is also a wide literature on the importance of institutions for financial markets. La Porta, Lopez-de Silanes, Shleifer and Vishny (1998) examine legal rules and their enforcement across countries. They found large variation across types of legal systems, such as between civil and common laws. La Porta, Lopez-de Silanes, Shleifer and Vishny (1997) use this variation in investors' protection to show that poorer investor protection is associated with smaller and narrower capital markets. Relatedly, Demirgüç-Kunt and Levine (2005) study how legal origin relates to the obstacles firms face in obtaining external finance. More recently, Giannetti (2003), Brown, Martinsson and Petersen (2013), and Ponticelli and Alencar (2016) all show that investor protection leads to financial market deepening. I view some of these institutions, especially women's economic rights and double liability laws, as influencing investor protection. Understanding the sources of financial market deepening, as suggested by interest rates, is also important for understanding growth. King and Levine (1993), Levine (1997), Acemoglu and Zilibotti (1997), and Rajan and Zingales (1998) all found that more financial intermediation positively affects development.

I proceed as follows. Section 2 presents the data on interest rate variation between regions in the US from 1878 to 1920, and details the source of institutional data as well as mechanisms by which each institution may affect interest rates. Section 3 quantifies the relationship between each proposed institution and interest rates. Section 4 uses the estimates from Section 3 in order to analyze a counterfactual world in which every state had uniform institutions. Section 5 paints a path for future research and concludes.

2 Data and Institutional Mechanisms

In this section, I describe the data used. First I describe the interest rate data, then the state-level institutions.

Towards the end of the 19th century, there was significant geographic dispersion in interest rates. This dispersion existed even after controlling for risk premia of debtors. For instance, Breckenridge (1898) documents regional dispersion in interest rates of "first class double-name commercial paper" (high quality corporate bonds) in the 1890s. Breckenridge argues that the comparison across cities of these commercial papers takes into account default risk, and thus compares discount rates across the US. Below is a snapshot of his findings in Figure

1, reproduced from Hazan et al. (2018). The figure shows that interest rates varied from about 4% in Boston to more than 9% in Denver. Thus, similar debtors faced different interest rates across the country.

Breckenridge's data is not representative of the entire capital markets, and does not contain a time series dimension. The interest rate data used in this paper from 1878-1920 is from Bodenhorn (1995). These interest rates are widely used and have been developed over the years through a series of important works. As explained in the Appendix of Landon-Lane and Rockoff (2007), p. 11, "Bodenhorn (1995) followed Smiley (1975) and James (1976a,b), and purged the data originally compiled by Davis (1965) of various revenues and losses in order to arrive at something closer to contractual loan rates. Davis had attributed all bank earnings to loans, and divided that figure by total loans to get a proxy for the rate of interest. Smiley and James removed earnings on bonds and other non-loan earnings from the numerator and various non-loan assets from the denominator. Bodenhorn (1995) extended these estimates to 1960." I calculate real interest rates by using a price deflator from Burgess (1920). While these interest rates are not necessarily calculated over similar portfolios, yielding the possibility of different risk premia on the side of lenders, they cover more thoroughly the capital markets of the time and have a time series dimension that is easily understood.

Figure 1, reproduced from Hazan et al. (2018), shows the time series dispersion of interest rates between regions in the Breckenridge data. Interest rates in the northeast were always lower than the rest of the country, with interest rates in the west the highest. Dispersion in interest rates decreased almost uniformly between 1878 and 1920.

Turning towards state-level institutions, the first one evaluated is married women's property rights, as in Hazan et al. (2018). The rights evaluated in this paper were the ones that undid coverture, the British common law doctrine that greatly limited women's legal rights. Under coverture, property was divided into two types. Moveable property (also referred to as "personal property"), including money, stocks, bonds, furniture, and livestock, became the husband's property entirely upon marriage. He could sell or give the property away, or even bequeath it to others. Real assets, such as land and structures, were placed under the husband's partial control while remaining in the wife's name. He could manage the assets as he saw fit, including any income generated by the assets, but he could not sell or bequeath the property without his wife's consent.¹ After analyzing the laws of coverture, Holcombe (1983) concludes that "[w]hatever the reasons for the distinction between real

¹See Blackstone (1896) for the laws of coverture. For a summary of the general responsibilities husbands and wives had to one another under coverture, see Basch (1982) Tables 1 and 2.

and personal [moveable] property, the legal rules applying to these categories of property were substantially different. The common law afforded married women considerable protection with respect to real property. It afforded no protection for their personal property.” (Holcombe 1983, p.20).

By differentially allocating property rights, coverture affected portfolio incentives not only for women, but for parents wishing to bequeath or gift assets to their daughters. Consider a father who wants to bequeath his estate to his daughter upon his death. He would face an incentive to hold his wealth in real assets. Indeed, parents did bequeath to daughters in the US as primogeniture was abandoned after the War of Independence. The default became to divide equally inheritances of both types of assets equally among children, including girls (Shammas, Salmon and Dahlin 1987, p.67). Hazan et al. (2018) show that undoing coverture caused portfolios to shift towards moveable assets, such as financial assets, because removing legal constraints allows households to purchase assets with higher returns or diversify their portfolios. They then argue that the shift in portfolios towards moveable assets represents an increase in the supply of financial assets, and find an according reduction in interest rates. This paper expands on this idea by arguing that variance in women’s legal rights can help explain dispersion in interest rates. Accordingly, I expect to find a negative relationship between interest rates and property rights, as in Hazan et al. (2018), and that this difference can help explain dispersion in financial conditions in the US.

The second institution we evaluate is the maximum legal rate of interest, otherwise known as usury laws, which determined the highest interest rate that could be legally charged in a state-year. Rockoff (2009) argues that “usury laws had a substantial impact on the structure of lending.” However, the focus of that paper is to give an overview of usury laws from antiquity to 1900, as well as a discussion in their place in the history of economic thought, rather than prove the claim that usury laws had an impact. It is not obvious that such laws would have an impact on credit markets, given that the main historical sources are ripe with discussions on how easily people were able to avoid usury laws, both legally and illegally. Lenders could charge loan origination fees and late fees to circumvent these laws (Rockoff 2009). Usury laws were on the rate received by lenders, rather than the rate paid by borrowers, such that lenders could include intermediaries in loans to implicitly increase rates (Holmes 1892). Additionally, Holmes (1892, p. 450) argues that “[i]t is an acknowledged exception to the statute of usury that, when the principal is subject to substantial risk, more than the maximum legal rate may be received. But this risk must not be the ordinary possibility of debtor’s insolvency. Examples of risk that is sufficient to make an exception to the statute are found in a contract to repay a loan with a certain number of heifers or bushels

of corn, and in agreement that advances for victualling a ship should be repaid with usury upon its return from a voyage – the risk in these cases being the possible fall in the price of heifers or corn, and the possible failure of the ship to return.”

Benmelech and Moskowitz (2010) study the evolution of usury laws, by state, over time. They find that lending volume increases with looser usury laws; that usury penalties are tougher when usury laws are more binding; relaxed usury laws lead to higher growth rate for small farms (but not large farms); states tend to relax usury laws when market interest rates approach/exceed the maximum legal rate and during financial crises; and that states respond to neighboring laws, presumably as a method of competing for capital; states restrict usury laws during times of greater incumbent firm power, presumably as the incumbents try to keep entrants from accessing capital. Accordingly, I expect to find a negative relationship between interest rates and maximum legal rates of interest, as in Benmelech and Moskowitz (2010), and that this difference can help explain dispersion in financial conditions in the US.

Data on usury laws covering the sample time period is relatively new in this literature. Both Rockoff (2009) and Benmelech and Moskowitz (2010) use Holmes (1892) as their source of usury laws by state-year. Holmes (1892), however, only provides data through the end of 1891. Hazan et al. (2018) extend this series to 1920, and reference Ryan (1924) as providing an overview of the history and rationale of usury laws, as well as in-depth studies on legal issues surrounding the laws in some states of the US. Ryan (1924) provides a snapshot of usury laws as of 1921, as well as a snapshot of related laws such as state level small-loan laws, attempts at unifying these laws (“uniform small-loan law”), and pawnbroking laws.² However, these data are a snapshot of 1921, and not a history of the 30 years since Holmes (1892).

The remaining institutions, a minimum bank reserve requirement, double liability for bank shareholders, the existence of a state banking authority, and a detailed annual bank report are from Mitchener and Jaremski (2015), who graciously shared their data. A minimum bank reserve requirement directly affects bank lending and interest rates, an idea advanced by Sylla (1969). This reserve ratio presumably affects both the amount of loans given as well as the risk profile banks choose for their portfolio of loans. Lower risk profiles are less likely to unexpectedly, and expensively, drop below the reserve requirement. Both mechanisms affect interest rates, and thus variance in whether a reserve requirement existed could explain variances in interest rates between regions. Accordingly, I expect to find a negative

²Usury laws did not apply to all types of loans, hence the extra sets of laws examined by Ryan (1924). See Holmes (1892) and Ryan (1924) for a description of when each type of law did and did not apply.

relationship between interest rates and bank reserve requirements, and that this difference can help explain dispersion in financial conditions in the US.

Double liability laws for bank shareholders allow a banks' creditors, such as depositors, to sue bank shareholders for losses in the event of a bank failure.³ These shareholders, as a result, may pressure bank managers to be more cautious with lending and increased depositor faith, especially given that many managers were themselves shareholders of the banks they managed. See Macey and Miller (1992) for a thorough legal history of double liability laws, including their effectiveness and flaws. Thus, variance in the liability of bank shareholders can explain variance in bank risk taking, and thus interest rates. Accordingly, I expect to find a negative relationship between interest rates and double liability laws, and that this difference can help explain dispersion in financial conditions in the US.

State banking authorities could deny charters to banks without sufficient capital, monitor banks for compliance with regulations, and help unwind failed institutions. These institutions discouraged excessive risk taking on the part of banks, which in turn increased faith in financial markets. Similarly, detailed state bank reports increased transparency in the banking system, which discouraged risk taking. Accordingly, I expect to find a negative relationship between interest rates and a state banking authority or existence of a detailed state bank report, and that this difference can help explain dispersion in financial conditions in the US.

3 Impact of Institutions on Interest Rates

In this section, we evaluate the empirical relationship between the various state-level institutions described in the preceding section and the state level real interest rate.

I begin by estimating equations of the form

$$R_{st} = \alpha \cdot I_{st}^i + \beta U_{st} + \lambda_s + d_t + T_{st} + \epsilon_{st}, \quad (1)$$

where R_{st} is the interest rate in state s and year t . I_{st}^i is an indicator function for the existence of institution $i \in \{\text{rights, reserve requirement, double liability, banking authority, bank report}\}$. U_{st} is the maximum legal rate of interest, or usury rate, in state s and year t . λ_s is a set of state fixed effects, while d_t are a set of year fixed effects. T_{st} is an indicator function as

³I use this term somewhat generously. I do not distinguish from cases of double liability, triple liability, or unlimited liability for bank shareholders.

to whether or not state s was a territory in year t . I use population weights in these regressions and cluster standard errors at the state level. The population for each state is linearly interpolated between census years.

Table 1 shows the results. Column 1 shows the effect of granting married women property rights on real interest rates. The estimate implies that granting these rights reduced interest rates by a large amount – 68 basis points – and is significant at the 10% level. This is a large reduction in interest rates, given that the average rate of interest was 8% in this time period. Column 2 switches the evaluated institution from married women’s property rights to the existence of a required reserve ratio. While the estimate is negative, as indicated by theory, and suggests a 12 basis point drop in interest rates with the introduction of a reserve requirement, it is not statistically significant in this sample. Column 3 switches the evaluated institution to the existence of double liability laws. I find that these laws are associated with an economically meaningful reduction of interest rates of about 52 basis points that is statistically significant at the 1% level. This finding is consistent with the theory described above. Column 4 switches the evaluated institution to the existence of a state banking authority. The results imply a large reduction of interest rates when a state banking authority is introduced of about 50 basis points. While this finding is consistent with theory, it is not statistically significant. Column 5 switches the evaluated institution to the existence of a detailed state banking report. These reports are associated with a large reduction of interest rates, of about 75 basis points, that is significant at the 1% level. This finding consistent with the theory described above. Column 6 switches the evaluated institution to the maximum legal rate of interest. The finding indicates that a 1 standard deviation (7.2 percentage point) increase in the real maximum legal rate of interest yields a 43 basis point increase in interest rates. The effect is statistically significant at the 10% level, and consistent with the theory described above.

Column 7 of Table 1 examines all institutions simultaneously. The institutions found to be statistically significant in explaining interest rates in Columns 1-6, namely women’s rights, double liability laws, a detailed state banking report, and usury laws, are statistically significant in Column 7 and within a standard error of their point estimates from Columns 1-6. Interestingly, however, the state banking authority no longer has an economically (if not statistically) meaningful relationship with interest rates.

It is not clear how to interpret these results in a causal sense. That is, did changing state-level institutions induce changes in interest rates? Or did financial conditions induce states to change their institutions? On one hand, Hazan et al. (2018) argues that women’s rights was exogenous to local interest rates. On the other hand, (Benmelech and Moskowitz 2010)

Table 1: State Institutions and Interest Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Interest Rate						
Women's Rights	-0.681*						-0.536*
	(0.339)						(0.297)
Reserve Requirement		-0.119					0.067
		(0.208)					(0.166)
Double Liability			-0.522***				-0.402**
			(0.188)				(0.169)
State Banking Authority				-0.504			-0.006
				(0.333)			(0.339)
Detailed State Banking Report					-0.749***		-0.715**
					(0.239)		(0.287)
Maximum Legal Rate						0.060*	0.044*
						(0.033)	(0.026)
N	1,971	1,971	1,971	1,971	1,971	1,971	1,971
R2	0.740	0.737	0.741	0.741	0.748	0.738	0.754

Notes. All regressions include state fixed effects, year fixed effects, and a dummy for territory. "Women's Rights" is a dummy variable for married women having property rights. "Reserve Requirement" is a dummy variable for the existence of a bank minimum reserve requirement. "Double Liability" is a dummy variable for the existence of at least double liability laws for bank shareholders. "State Banking Authority" is a dummy variable for the existence of a state banking authority. "Detailed State Banking Report" is a dummy variable for a state publishing a detailed report of its banks. "Maximum Legal Rate" is the maximum legal rate of interest allowed by a state. Regressions are weighted by state population. Standard errors, clustered by state, are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

argues that usury laws and interest rates responded to one another. Mitchener and Jaremski (2015) gives the history of the remaining institutions, and while they do not explicitly examine interest rates, imply a two-way relationship between economic conditions and state institutions. For the purposes of the remainder of this paper, I will assume a causal impact of institutional change on interest rates, and leave for future research issues of exogeneity in this relationship.

4 Dispersion of Institutions and Interest Rates

In this section, I take the effects of institutions estimated in Section 3 in order to analyze how institutional variation affected interest rate variation in the US.

In order to do so, I create a counterfactual time series exploiting the estimates from Section 3 in order to ask what what regional interest rates would have looked like had they had the same institutions? To do so, I take the four institutions that had a significant impact on interest rates, namely women's rights, double liability laws, state banking reports, and usury laws, and create a counterfactual interest rate as if all states had these institutions the entire time. Accordingly, for every state-year observation before women were granted rights, I reduce interest rates by 68.1 basis points in order to simulate the effects women's rights would have had on them. For double liability laws and bank reports these numbers are 52.2 and 74.9 basis points, respectively. Since usury laws are continuous, rather than binary, my counterfactual interest rate assumes that all states had the same usury law the entire time, namely a 12.47% maximum legal rate of interest. I therefore adjust a state-year observation's interest rates by 0.06 for every percentage point deviation from this average rate.

Figure 3 shows the actual interest rate for the US, as calculated by a population-weighted average interest rate by state-year, as well as the equivalent interest rate for this counterfactual interest rate series. It should not be surprising that the counterfactual interest rate is both lower than the actual interest rate, and that the gap is disappearing over time. It is lower as the institutions analyzed tended to lower interest rates, and the counterfactual assumes that all states had all institutions during the sample period.⁴ The interest rates converge as states in fact did institute these institutions over time, bringing reality closer to the counterfactual rate.

Figure 4 does the same exercise as Figure 3, but breaks the results down by region. The counterfactual interest rate is almost the same as the actual interest rate in the Northeast.

⁴Note that this statement is not 100% true regarding usury laws, which states raised and lowered over the sample time period. However, quantitatively, usury laws were not the most important institution analyzed.

They are quite close in the Midwest. However, the counterfactual interest rate is noticeably lower in the South and West than the actual interest rates, as these regions did not have most of the discussed institutions. Notice that, as shown in Figure 2, these are also the regions with the highest interest rates. Therefore, institutions may well have reduced interest rates in the South and West to be more similar to the Northeast and Midwest, reducing dispersion.

To measure this effect, I calculate the coefficient of variation of interest rates between regions in the actual data and counterfactual data, shown in Figure 5. Indeed, the coefficient of variation of interest rates between regions is substantially lower in the counterfactual world, with unified institutions, than in the actual data. Notice both that the coefficient of variation is decreasing over time, as financial convergence progresses in the US, and that the data converges to the counterfactual as more states establish institutions. The difference between the data series and the counterfactual series is the amount of regional variation in interest rates that can be explained by differences in institutions. As a fraction of the total variation, the amount explained by institutions is shown in Figure 6. The average fraction of regional variation explained by institutions is 24%. However, this number is higher at the beginning of the sample time period, and falls greatly after 1910 as institutions become more uniform.

In order to disentangle how much each institution contributed to this, I redo the analysis for each institution one at a time. I find that, of the variation explained by institutions, property rights explains 4%, bank reports explain 6%, and usury laws explains about 10%. Double liability laws are negligible in their effects on regional variation in interest rates.

5 Conclusion

In a world without financial market frictions or variance in risk premia, interest rates must be equalized between all geographic areas. However, as has been documented by a wide literature, there was widespread geographic variation in interest rates in the United States at the end of the 19th century and beginning of the 20th century. Simultaneously, a large literature has looked at the importance of institutions for financial markets. Is it possible that differences in institutions between US states explains differences in interest rates? To answer this question, I estimate the impact of a wide variety of state-level institutions on interest rates. I then use these estimates to infer that approximately a quarter of regional variation in US interest rates can be explained by variation in institutions.

Moving forward, an issue unaddressed in the current work is that of endogeneity. I assume that institution change is exogenous, and that the correlation between institutions and interest rates is causal. A more formal investigation, perhaps by using an instrumental variables approach, would be more convincing on this dimension.

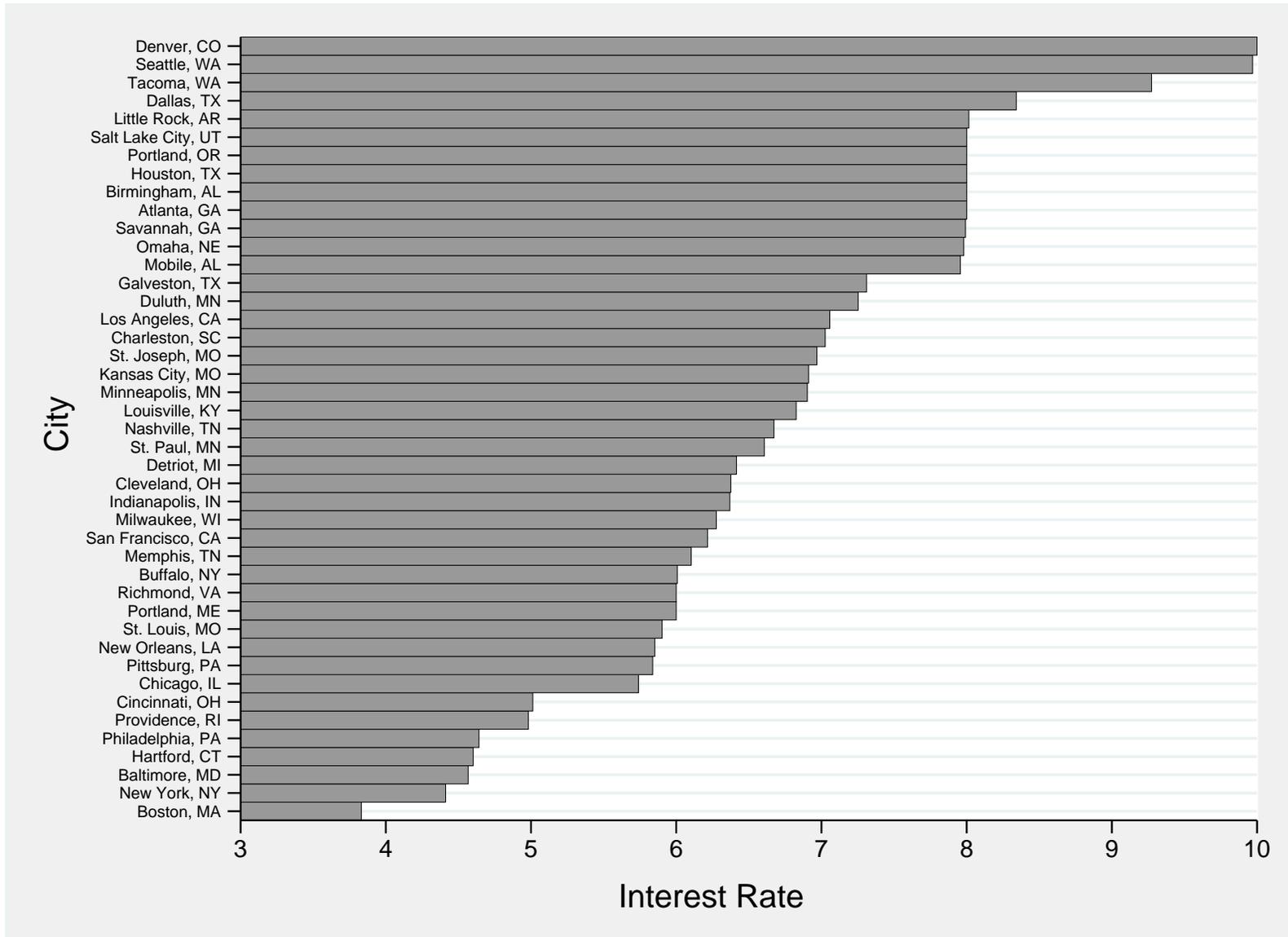


Figure 1: Dispersion of Interest Rates, 1893-1897. Source: Breckenridge (1898).



Figure 2: Cross Region Variation in Interest Rates

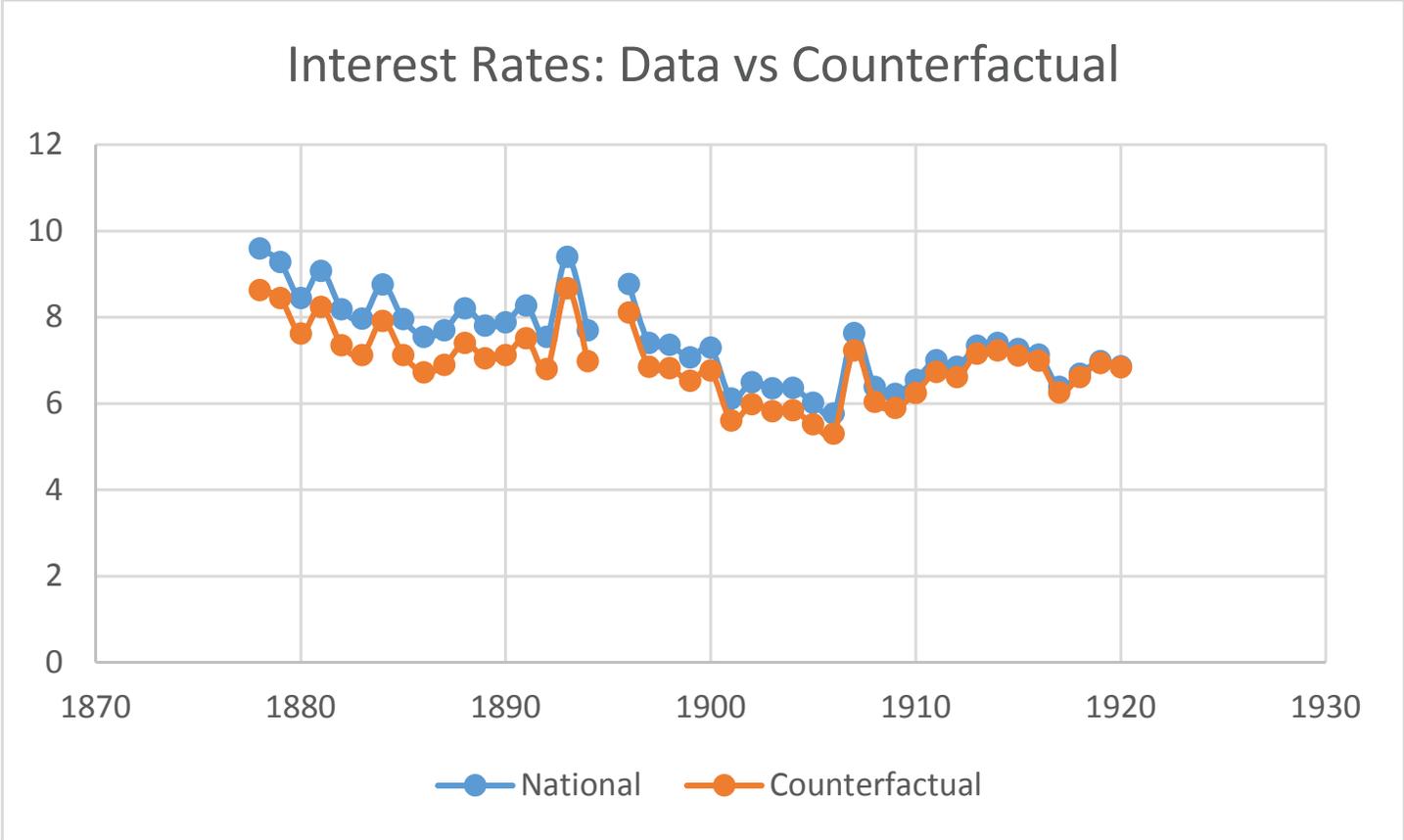


Figure 3: Interest rates vs Counterfactual: National

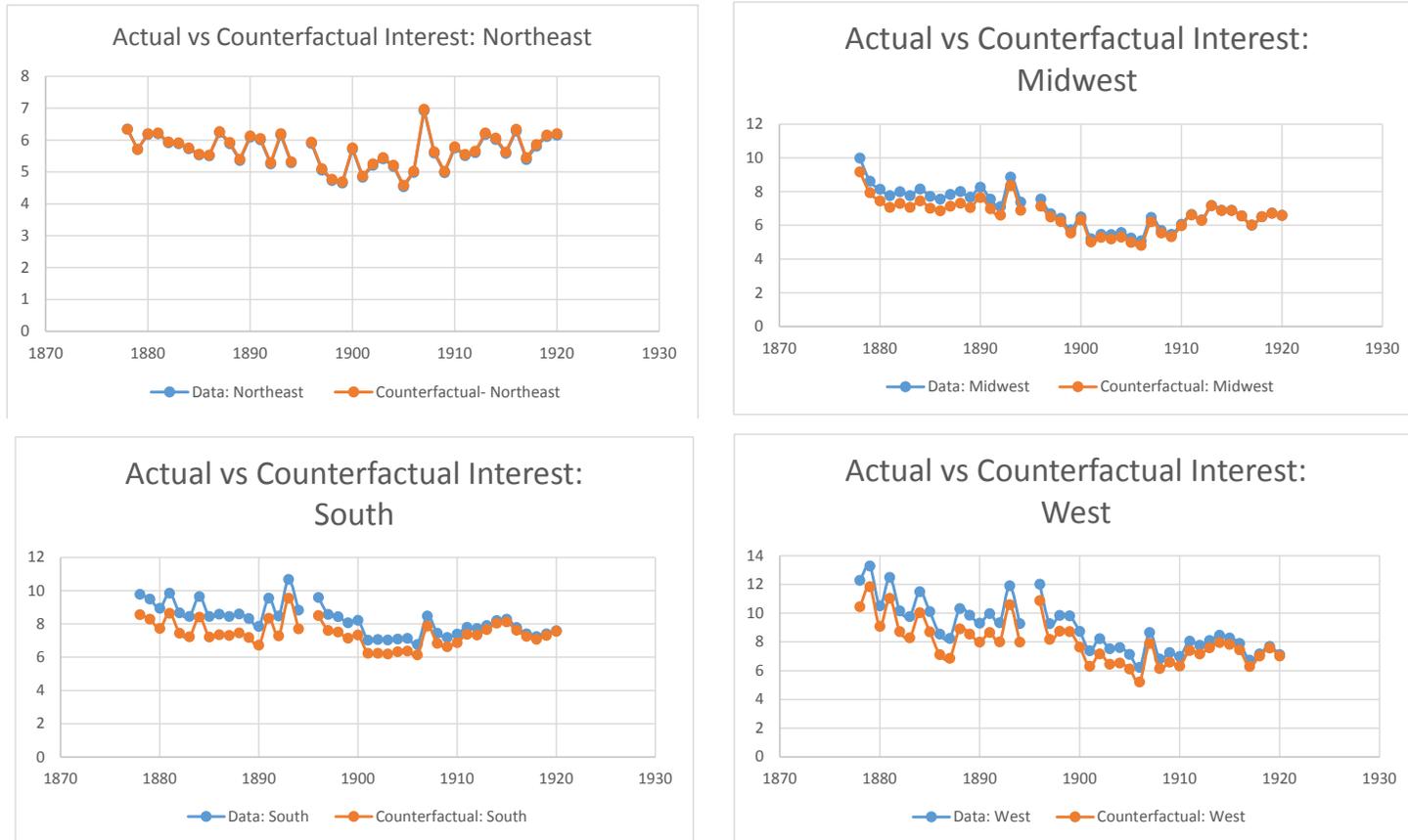


Figure 4: Comparison of counterfactual interest rates with actual interest rates, by region.

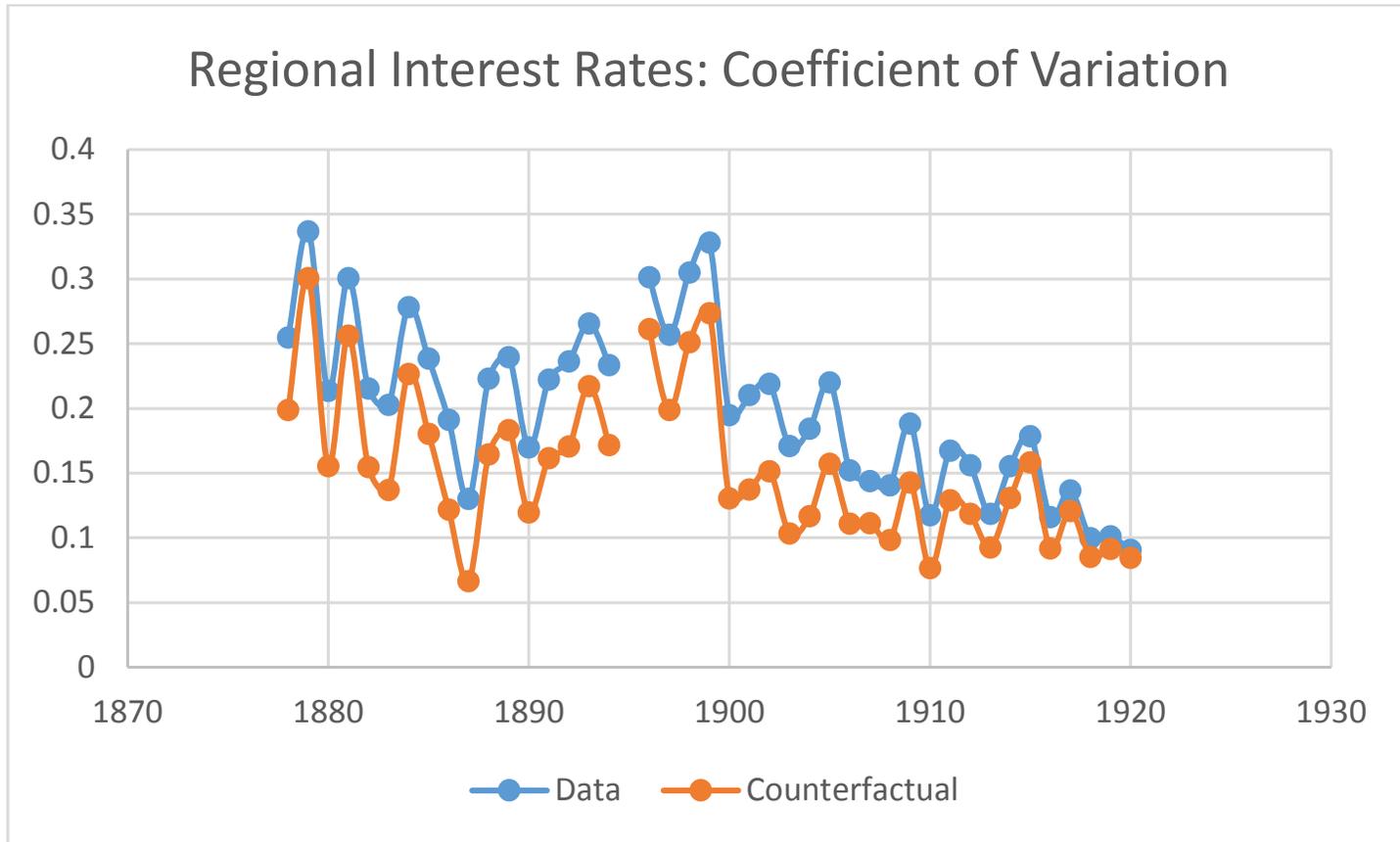


Figure 5: Regional Interest Rate Variation: Data vs Counterfactual

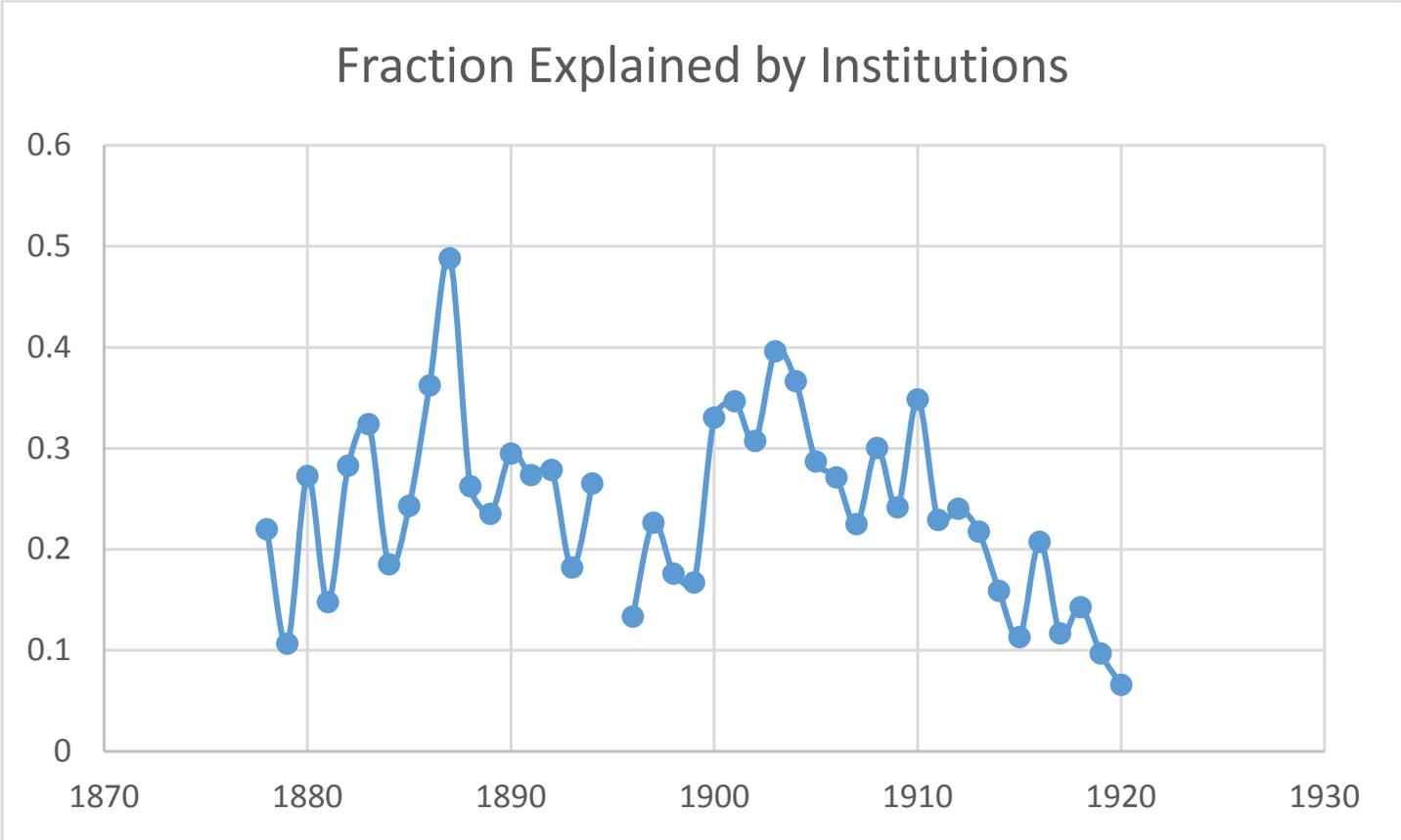


Figure 6: Fraction of Regional Interest Rate Dispersion Explained by Institutional Variation

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