

# **P-Values on the Free-Slave State Border: A Critique of Bleakley and Rhode**

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Working Paper

September 2024

## **Abstract**

Hoyt Bleakley and Paul Rhode use a “regression discontinuity design” (RDD) to find a persistent negative effect of slavery’s legality on rural population density throughout the period from 1790 to 1860. Yet their reported results cannot be replicated. Instead, the replication shows slavery’s negative effects only become statistically significant from 1840 onwards. Furthermore, the addition of an interaction term for slavery’s legality multiplied by longitude suggests that slavery may have facilitated the westward expansion of the Southern frontier in the antebellum period. This does not support the claim that slavery impeded the growth of American capitalism.

Keywords: Slavery, American capitalism, economic history, replication, regression discontinuity design

JEL codes: C21, N11, N21, N51, O43\*

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Joseph Francis is an economic historian from Wales (joe Francis505@gmail.com). Replication files for this paper are available at <http://kingcotton.info>. Hoyt Bleakley and Paul Rhode kindly provided comments on earlier drafts.

In a recent NBER Working Paper, Hoyt Bleakley and Paul Rhode have used a “regression discontinuity design” (RDD) to make the argument that slavery, if anything, impeded the growth of American capitalism.<sup>1</sup> In doing so, they claim to have all but settled the debate—a debate in which Rhode, writing together with Alan L. Olmstead, has been a prominent participant.<sup>2</sup> First, Bleakley and Rhode document in considerable detail statistically significant negative effects of slavery’s legality on various indicators drawn from census data in 1860. Then, crucially, they provide a figure showing a negative effect of slavery’s legality on rural population density all the way back to 1790. “The coefficients vary by year,” they note, but “the general finding throughout the antebellum years is similar to what we report above”—that is, they imply, similar to the negative effects shown in detail for 1860. “Similar results for population density hold in 1840 and before,” Bleakley and Rhode state.<sup>3</sup>

The present paper, by contrast, finds that slavery may have promoted the growth by facilitating the westward expansion of the Southern frontier. It first attempts to replicate Bleakley and Rhode’s reported results but finds little in the way of statistical significance before 1840. Furthermore, introducing an interaction term for slavery’s legality multiplied by longitude changes the picture substantially. It suggests that slavery’s effects became positive beyond an inflection point that tended to move westward over time. The caveat, of course, is that this is only an observation based on correlation; any causality can only be inferred. At best, it can be said that the results of the regressions do not

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<sup>1</sup> Hoyt Bleakley and Paul Rhode, “The Economic Effects of American Slavery: Tests at the Border,” NBER Working Paper 32640, June 2024.

<sup>2</sup> Alan L. Olmstead and Paul W. Rhode, “Cotton, Slavery, and the New History of Capitalism,” *Explorations in Economic History* 67 (January 2018): 1–17. For the context of Olmstead and Rhode’s article, see James L. Huston, “Slavery, Capitalism, and the Interpretations of the Antebellum United States: The Problem of Definition,” *Civil War History* 65, no. 2 (June 2019): 119–156; and Christopher Morris, “With ‘the Economics-of-Slavery Culture Wars,’ It’s Déjà Vu All Over Again,” *Journal of the Civil War Era* 10, no. 4 (2020): 524–557.

<sup>3</sup> Bleakley and Rhode, “Economic Effects,” 16.

contradict the particular narrative being tested. In Bleakley and Rhode's case, they clearly fail to support the argument that they wish to make.

### *A Non-Replication*

A RDD is an econometric method that looks at either side of a cut-off point where a treatment is applied. The goal is to infer causality by comparing the two sides of the cut-off, which should be similar apart from the treatment. In this case, the treatment is the legality of slavery and the cut-off point is the free-slave state border. Distance from that border then becomes a running variable centered on the cut-off point. This allows the RDD to estimate the effect of passing from free to slave states on various dependent variables, which come from county-level census data.<sup>4</sup>

Bleakley and Rhode's RDD uses three equations. They apply the first to counties adjacent to the free-slave border and a "donut" sample, which they define as counties within 55 miles, based on their central point or "centroid," but not actually on the border. It is as follows:

$$Y_i = \beta_1 \cdot \text{slavery} + \beta_2 \cdot \text{longitude}_i + \beta_3 \cdot \text{longitude}_i^2 + \beta_4 \cdot \text{longitude}_i^3 + \beta_0 + \varepsilon_i \quad (1)$$

Where the dependent variable is the product of a dummy variable for slavery being legal, with longitude and its polynomials used as geographical controls. For various larger samples from a wider range, they add controls for distance from the border as further controls:

$$Y_i = \beta_1 \cdot \text{slavery} + \beta_2 \cdot \text{distance}_i + \beta_3 \cdot \text{longitude} + \beta_4 \cdot \text{distance}_i^2 + \beta_5 \cdot \text{distance}_i^3 + \beta_6 \cdot \text{longitude}_i^2 + \beta_7 \cdot \text{longitude}_i^3 + \beta_0 + \varepsilon_i \quad (2)$$

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<sup>4</sup> For the basics of RDD, see Susan Athey and Guido W. Imbens, "The State of Applied Econometrics: Causality and Policy Evaluation," *Journal of Economic Perspectives* 31, no. 2 (May 1, 2017): 5–8; and Matias D. Cattaneo and Rocío Titiunik, "Regression Discontinuity Designs," *Annual Review of Economics* 14, no. 1 (August 2022): 821–851.

Here, then, slavery’s legality is the treatment, while the distance from the border is the running variable.<sup>5</sup> These are the basic elements of a RDD, and they are the basic elements of Bleakley and Rhode’s working paper, with longitude and its polynomials used as extra covariates. In the third equation, they then introduce another element from the RDD methodology:

$$Y_i = \beta_1 \cdot \text{slavery} + \beta_2 \cdot \text{distance} + \beta_3 \cdot \text{longitude}_i + \beta_4 \cdot \text{slavery} \cdot \text{distance} \quad (3) \\ + \beta_5 \cdot \text{distance}_i^2 + \beta_6 \cdot \text{distance}_i^3 + \beta_7 \cdot \text{longitude}_i^2 + \beta_8 \cdot \text{longitude}_i^3 \\ + \beta_0 + \varepsilon_i$$

The interaction term for slavery’s legality multiplied by distance thereby allows for a change in the slope of the dependent variable and distance either side of the border.<sup>6</sup> Apart from the longitude covariates, this is now the standard equation recommended in the RDD literature,<sup>7</sup> although it seems notable that they never actually reference that literature or specify what their methodology is. Objectively, however, this is the methodology they are employing.

Most of what is now considered best practice in the RDD literature is ignored entirely. Bleakley and Rhode do not, for instance, use an algorithm to select their samples using bandwidths that balance between bias (using data too far from the cutoff) and variance (using too little data). Their approach is instead to arbitrarily choose which distances from the border to use, with a baseline sample covering a wide 600-mile-wide strip of the United States. This obviously complicates their frequent suggestions—not least in the paper’s title—that they are looking at slavery’s impact at the border. On top of that, they do not use the kernels that more heavily weight observations closer to the border, as is considered best practice in the RDD methodology. And, finally, their visual inspection

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<sup>5</sup> Bleakley and Rhode label Equations 1 and 2 the other way around. “Economic Effects,” 8.

<sup>6</sup> In Bleakley and Rhode’s Equation 3, distance is divided by 100 in the interaction term, although this seems to be only intended to make the coefficient easier to read. “Economic Effects,” 18.

<sup>7</sup> Athey and Imbens, “State of Applied Econometrics,” 5–8.

of the data—the most important part of RDD—is dubious. Among a plethora of figures, only one presents an actual plot of their data. For 1860, it shows the natural logarithm of farm values per acre on the vertical axis and distance from the border on the horizontal axis, stretching from about 1,000 miles into the slave states and 600 miles into the free states. They have then imposed “estimated quadratic spatial trends” without giving any indication of the estimation procedure used or why they departed from the more common technique of using linear or quadratic polynomial trendlines. Bleakley and Rhode have thus adopted the basic elements of a RDD while ignoring best practice in its implementation—best practice that is intended to minimize the risks that researchers engage in the kind of statistical manipulation that has become known as “p-hacking.”<sup>8</sup>

Worse still, a replication of their study suggests that its results lack statistical significance before 1840—that is, in the period for which they claim “similar results” hold, specifically for rural population density. The replication was done in R, based on the borders shown in Map 1, which were drawn in QGIS using the National Historical Geographic Information System (NHGIS) shapefiles. Equation 1 was then applied to the border and donut samples, and Equation 2 to the others. Following Bleakley and Rhode, each county was weighted by its area and standard errors were clustered by 15 bins of longitude. Equation 3 was also applied to the relevant samples. The results, shown in Tables 1 and 2, indicate little to no statistical significance before 1840, despite Bleakley and Rhode’s assertions that their results for those years were similar to those of 1860. Instead, slavery’s negative effects appear to have been limited to the late antebellum period rather than being persistently negative, as should be expected if the institution had been inherently antithetical to growth.

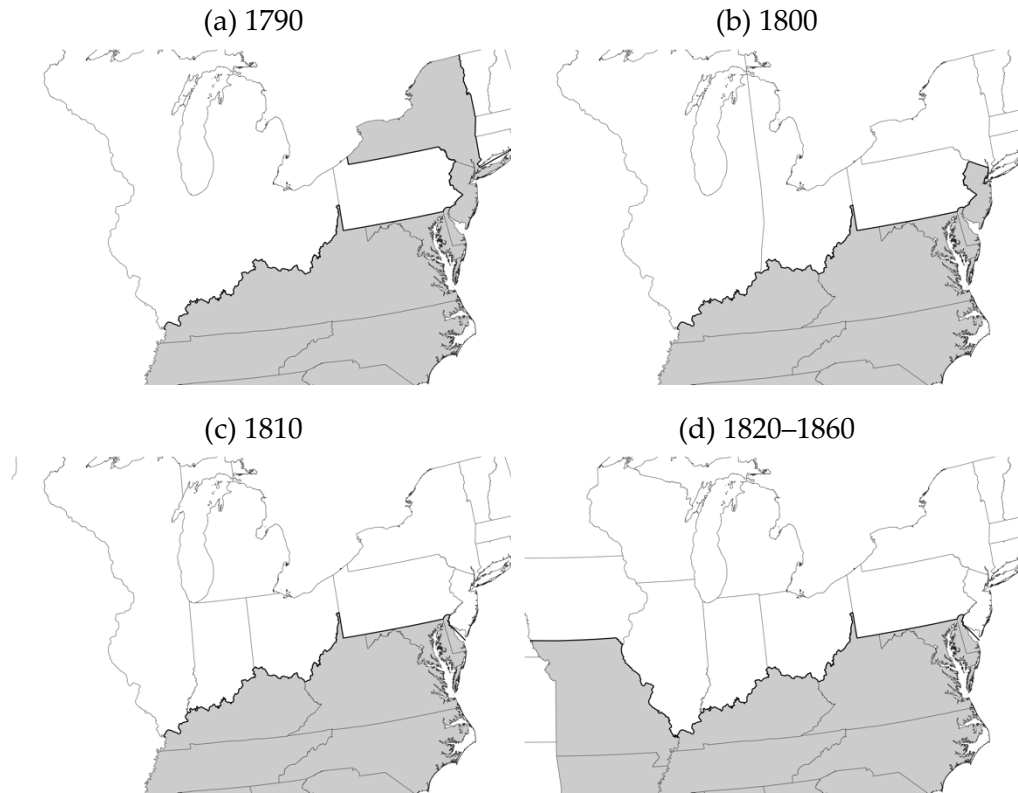
On top of that, even the statistically significant results for later years are weak. Hence, by applying Equation 3 to their 300-mile “baseline” sample,

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<sup>8</sup> Stuart Ritchie, *Science Fictions: How Fraud, Bias, Negligence, and Hype Undermine the Search for Truth* (New York: Metropolitan Books, 2020).

*Map 1*

The Free-Slave State Border, 1790–1860



Note: Slavery was legal in the grey states and territories; the black line is the free-slave state border. In Panel (d), the state borders are for 1860.

Source: Drawn using shapefiles from Steven Manson et al., “IPUMS National Historical Geographic Information System (NHGIS): Version 17.0,” (Minneapolis: IPUMS, 2022), <https://www.ipums.org/projects/ipums-nhgis/d050.v16.0>, 2023.

*Table 1*  
Effects of Slavery's Legality, 1790–1860 (Equations 1 and 2)

|      | (a)<br>Border                    | (b)<br>Donut                 | (c)<br>300-mile                | (d)<br>450-mile               | (e)<br>600-mile                | (f)<br>900-mile                 |
|------|----------------------------------|------------------------------|--------------------------------|-------------------------------|--------------------------------|---------------------------------|
|      | (a) Log rural population density |                              |                                |                               |                                |                                 |
| 1790 | -0.646**<br>(0.235)<br>[57]      | 0.147<br>(0.081)<br>[40]     | -1.056**<br>(0.357)<br>[251]   | -1.237**<br>(0.383)<br>[278]  | -1.278***<br>(0.372)<br>[282]  | -1.278***<br>(0.372)<br>[282]   |
| 1800 | 1.140<br>(0.577)<br>[62]         | 0.134<br>(0.223)<br>[42]     | 0.050<br>(0.396)<br>[359]      | 0.720<br>(0.608)<br>[411]     | 0.750<br>(0.609)<br>[415]      | 0.750<br>(0.609)<br>[415]       |
| 1810 | 0.191<br>(0.314)<br>[63]         | -0.399<br>(0.308)<br>[62]    | -0.288<br>(0.510)<br>[453]     | 0.222<br>(0.544)<br>[547]     | 0.604<br>(0.474)<br>[569]      | 0.604<br>(0.474)<br>[569]       |
| 1820 | -0.218<br>(0.254)<br>[95]        | -0.354<br>(0.301)<br>[103]   | -0.766<br>(0.497)<br>[604]     | -0.854<br>(0.540)<br>[725]    | -0.641<br>(0.522)<br>[755]     | -0.641<br>(0.522)<br>[755]      |
| 1830 | -0.289<br>(0.199)<br>[108]       | -0.303<br>(0.231)<br>[135]   | -0.412<br>(0.442)<br>[769]     | -0.456<br>(0.452)<br>[931]    | -0.751*<br>(0.376)<br>[981]    | -0.666*<br>(0.284)<br>[985]     |
| 1840 | -0.447**<br>(0.146)<br>[121]     | -0.687**<br>(0.253)<br>[158] | -0.364<br>(0.288)<br>[1,020]   | -0.734*<br>(0.361)<br>[1,213] | -1.095**<br>(0.337)<br>[1,268] | -1.076***<br>(0.296)<br>[1,274] |
| 1850 | -0.246<br>(0.139)<br>[141]       | -0.450*<br>(0.201)<br>[200]  | -0.422<br>(0.233)<br>[1,196]   | -0.869*<br>(0.389)<br>[1,425] | -1.118**<br>(0.433)<br>[1,528] | -0.503<br>(0.508)<br>[1,584]    |
| 1860 | -0.282***<br>(0.084)<br>[144]    | -0.550**<br>(0.174)<br>[217] | -0.516**<br>(0.178)<br>[1,358] | -0.659*<br>(0.279)<br>[1,662] | -0.893**<br>(0.309)<br>[1,807] | -1.388***<br>(0.287)<br>[1,904] |

Table 1 (cont.)

|                              | (a)<br>Border                | (b)<br>Donut                  | (c)<br>300-mile                | (d)<br>450-mile                 | (e)<br>600-mile                 | (f)<br>900-mile                 |
|------------------------------|------------------------------|-------------------------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| (b) Log farm values per acre |                              |                               |                                |                                 |                                 |                                 |
| 1850                         | -0.349**<br>(0.110)<br>[141] | -0.652***<br>(0.151)<br>[199] | -0.448**<br>(0.152)<br>[1,190] | -0.562**<br>(0.211)<br>[1,411]  | -0.558**<br>(0.213)<br>[1,509]  | -0.655**<br>(0.218)<br>[1,564]  |
| 1860                         | -0.328**<br>(0.108)<br>[144] | -0.734***<br>(0.186)<br>[218] | -0.565**<br>(0.198)<br>[1,357] | -0.754***<br>(0.223)<br>[1,642] | -0.790***<br>(0.212)<br>[1,781] | -0.853***<br>(0.214)<br>[1,869] |

Note: The coefficients represent the effect of slavery on the dependent variable. The border and donut samples are calculated using Equation 1; the other samples using Equation 2. Standard errors are shown in parentheses and the number of observations in brackets; \* indicates significance at the 5 percent level; \*\* at the 1 percent level; and \*\*\* at the 0.1 percent level. See Map 1 for the source.

Bleakley and Rhode obtain a coefficient of -0.509, with a standard error of 0.157 and 1,357 observations, resulting in a p-value of 0.0012, which nearly reaches the 0.1 percent threshold for statistical significance.<sup>9</sup> The replication in R, meanwhile, finds a slightly larger coefficient of -0.514 but has a standard error of 0.175, with 1,358 observations, giving a p-value of 0.0034; it is slightly higher, but still well below the 1 percent threshold.<sup>10</sup> There is, then, a statistically significant effect, according to conventional measures. Nonetheless, Figure 1 demonstrates that the data are extremely noisy. The dashed vertical line represents the border, with the distance from it on the horizontal axis and rural population density on the vertical axis. For counties in the slave states, the distance from the border has been made negative, which results in them being to the left of the vertical line, while counties in the free states are on the right. As can be seen, there is no obvious jump up at the border, which is why visual inspection of the data is so

<sup>9</sup> Bleakley and Rhode, “Economic Effects,” Table 5.

<sup>10</sup> Simen Gaure et al., “Lfe: Linear Group Fixed Effects,” February 29, 2024.



*Table 2*  
Effects of Slavery's Legality, 1790–1860 (Equation 3)

|                                  | (a)<br>300-mile                | (b)<br>450-mile               | (c)<br>600-mile                 | (d)<br>900-mile                 |
|----------------------------------|--------------------------------|-------------------------------|---------------------------------|---------------------------------|
| (a) Log rural population density |                                |                               |                                 |                                 |
| 1790                             | -1.196***<br>(0.334)<br>[251]  | -1.399***<br>(0.400)<br>[278] | -1.427***<br>(0.374)<br>[282]   | -1.427***<br>(0.374)<br>[282]   |
| 1800                             | -0.082<br>(0.389)<br>[359]     | 0.728<br>(0.609)<br>[411]     | 0.724<br>(0.599)<br>[415]       | 0.724<br>(0.599)<br>[415]       |
| 1810                             | -0.316<br>(0.512)<br>[453]     | 0.274<br>(0.562)<br>[547]     | 0.634<br>(0.493)<br>[569]       | 0.634<br>(0.493)<br>[569]       |
| 1820                             | -0.632<br>(0.470)<br>[604]     | -0.532<br>(0.504)<br>[931]    | -0.341<br>(0.576)<br>[755]      | -0.341<br>(0.576)<br>[755]      |
| 1830                             | -0.503<br>(0.397)<br>[769]     | -0.548<br>(0.426)<br>[931]    | -0.792*<br>(0.402)<br>[981]     | -0.965**<br>(0.309)<br>[985]    |
| 1840                             | -0.365<br>(0.288)<br>[1,020]   | -0.788*<br>(0.360)<br>[1,213] | -1.137***<br>(0.341)<br>[1,268] | -1.192***<br>(0.320)<br>[1,275] |
| 1850                             | -0.429<br>(0.237)<br>[1,196]   | -0.863*<br>(0.359)<br>[1,425] | -1.081**<br>(0.418)<br>[1,528]  | -0.806<br>(0.463)<br>[1,584]    |
| 1860                             | -0.514**<br>(0.175)<br>[1,358] | -0.660*<br>(0.280)<br>[1,662] | -0.907**<br>(0.309)<br>[1,807]  | -1.433***<br>(0.277)<br>[1,904] |

Table 2 (cont.)

|                              | (a)<br>300-mile                 | (b)<br>450-mile                 | (c)<br>600-mile                | (d)<br>900-mile                 |
|------------------------------|---------------------------------|---------------------------------|--------------------------------|---------------------------------|
| (b) Log farm values per acre |                                 |                                 |                                |                                 |
| 1850                         | -0.454**<br>(0.153)<br>[1,190]  | -0.565**<br>(0.213)<br>[1,411]  | -0.557**<br>(0.214)<br>[1,509] | -0.656**<br>(0.227)<br>[1,564]  |
| 1860                         | -0.565**<br>(-0.199)<br>[1,357] | -0.760***<br>(0.223)<br>[1,642] | 0.801***<br>(0.212)<br>[1,781] | -0.875***<br>(0.215)<br>[1,869] |

Note: See Table 1 for details.

fundamental to RDD: even when an effect meets a threshold for statistical significance, it can mean little in practice.<sup>11</sup> Consequently, even the statistically significant results in the replication need to be treated with caution.

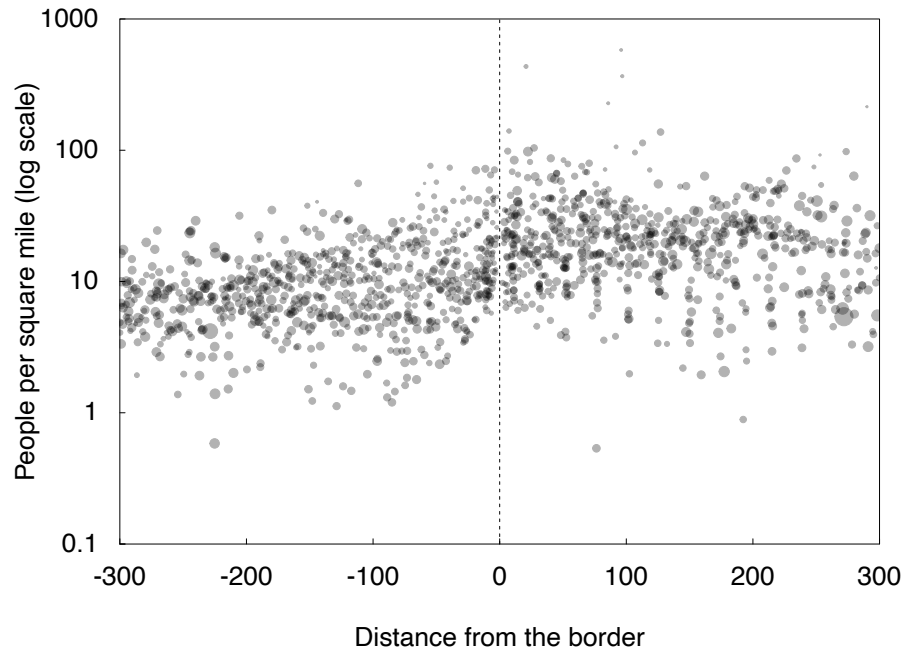
Overall, the replication's message is that Bleakley and Rhode's model provides little support for their argument that slavery's legality negatively impacted growth in the antebellum period. Bleakley and Rhode's claim that the correlations they detail for 1860 are "similar" all the way back to 1790 has not been substantiated. One possibility is that they did not account for how the free-slave state border moved in the United States' early decades: slavery was prohibited in New York in 1799 and in New Jersey in 1804, and then the border was pushed westward by the Missouri Compromise in 1820. Bleakley and Rhode may have simply projected the 1820 border back to 1790. Yet even that does not seem sufficient to explain the divergence with the replication and should, in any case, not affect the results from 1820 onward.<sup>12</sup> Ultimately, only an inspection of

<sup>11</sup> Stephen Thomas Ziliak and Deirdre N. McCloskey, *The Cult of Statistical Significance: How the Standard Error Costs Us Jobs, Justice, and Lives* (Ann Arbor: University of Michigan Press, 2008).

<sup>12</sup> Using the 1820 border for Equation 1 and the 300-mile sample produces, for instance, a coefficient for slavery's legality of -0.216, whereas Bleakley and Rhode show about -0.666 in "Economic Effects," Figure 5.

*Figure 1*

Rural Population Density and the Free-Slave State Border, 1860



Notes: The points show counties, with their sizes set by their area. The distances from the border for counties where slavery was legal have been made negative. See Map A.1 for the source.

their raw data and code would make it possible to see where the difference comes from.

*An Addition*

A small addition can also be made to Bleakley and Rhode's model. It consists of adding an interaction term of slavery's legality multiplied by longitude. To demonstrate its importance, Column (a) of Table 3 presents the results of Bleakley and Rhode's Equation 3, applied to the data for rural population density in the 300-mile sample in 1860. The coefficient for slavery is negative and statistically significant at the 1 percent level. It suggests that crossing the free-slave

Table 3

Equation 3 with a Slavery · Longitude Interaction Term, 1860

|                         | (a)<br>Log rural<br>population<br>density<br>(Equation 3) | (b)<br>Log rural<br>population<br>density<br>(Equation 4) | (c)<br>Log farm<br>values per<br>acre<br>(Equation 3) | (d)<br>Log farm<br>values per<br>acre<br>(Equation 4) |
|-------------------------|---|---|---|---|
| Slavery's legality      | -0.514**<br>(-2.94)                                       | 0.087<br>(0.30)   | -0.565**<br>(-2.84)                                   | 0.075<br>(0.34)                                       |
| Distance from border    | -0.484<br>(-1.36)   | -0.478<br>(-1.41)   | -0.024<br>(-0.14)                                     | -0.020<br>(-0.12)                                     |
| Longitude               | 1.619***<br>(3.93)  | 1.523***<br>(4.23)  | 0.550***<br>(5.36)                                    | 0.453***<br>(5.58)                                    |
| Slavery · distance      | 0.835<br>(1.83)   | 0.832<br>(1.89)   | 0.323<br>(1.05)                                       | 0.322<br>(1.08)                                       |
| Slavery · longitude     |   | -0.108<br>(-1.81)   |   | -0.115***<br>(-3.83)                                  |
| Distance <sup>2</sup>   | 0.043<br>(0.68)   | 0.047<br>(0.75)   | -0.016<br>(-0.34)                                     | -0.011<br>(-0.24)                                     |
| Distance <sup>3</sup>   | -0.015<br>(-0.71)   | -0.014<br>(-0.67)   | -0.021**<br>(-2.80)                                   | -0.021**<br>(-2.59)                                   |
| Longitude <sup>2</sup>  | -0.253***<br>(-3.73)                                      | -0.219***<br>(-3.87)                                      | -0.097***<br>(-4.80)                                  | -0.062***<br>(-3.54)                                  |
| Longitude <sup>3</sup>  | 0.013***<br>(3.73)  | 0.011***<br>(3.86)  | 0.005***<br>(4.84)                                    | 0.003**<br>(3.21)                                     |
| Intercept               | 0.630<br>(0.96)   | 0.485<br>(0.82)   | 2.096***<br>(11.12)                                   | 1.936***<br>(12.14)                                   |
| Adjusted R <sup>2</sup> | 0.56  | 0.57  | 0.42  | 0.46  |
| Observations            | 1,358   | 1,358   | 1,357   | 1,357   |

Note: Distance and longitude are shown per 100 miles. Longitude runs from west to east. Each county is weighted by its area and standard errors are clustered by 15 bins of longitude. T-statistics are shown in parentheses; \* indicates significance at the 5 percent level; \*\* at the 1 percent level; and \*\*\* at the 0.1 percent level. See Figure 1 for the source.

state border was correlated with a 51 percent reduction in rural population density. The coefficient for the interaction term of slavery's legality multiplied by distance from the border shows the slope on the slave side, while the distance from the border coefficient is the slope on the free side. They suggest that rural population density tended to increase closer to the border on both the free and slave side, as can also be seen in Figure 1. But it is notable that neither slope is statistically significant. The positive coefficient for longitude, by contrast, is highly significant. It indicates that rural population density became greater the further east a county was.

Introducing the interaction term radically changes the results. It is done as follows:

$$Y_i = \beta_1 \cdot \text{slavery} + \beta_2 \cdot \text{distance} + \beta_3 \cdot \text{longitude}_i + \beta_4 \cdot \text{slavery} \cdot \text{distance} \quad (4) \\ + \beta_5 \cdot \text{slavery} \cdot \text{longitude} + \beta_6 \cdot \text{distance}_i^2 + \beta_7 \cdot \text{distance}_i^3 + \beta_8 \cdot \text{longitude}_i^2 \\ + \beta_9 \cdot \text{longitude}_i^3 + \beta_0 + \varepsilon_i$$

The results are shown in Column (b) of Table 3. Here, the coefficient for slavery's legality becomes of little meaning on its own because it shows the effect of crossing the border at the zero point for the longitude variable, which is at the 96th meridian west, somewhere between Missouri and Nebraska. The coefficient for the interaction term of slavery multiplied by longitude, on the other hand, is interesting. Its negative sign indicates that on the slave side of the border, slavery's effect on rural population density became less negative—and eventually more positive—as counties became more westerly. Columns (c) and (d) then show the same pattern for farm values per acre—one of the more meaningful dependent variables used by Bleakley and Rhode. In this case, the negative coefficient for the interaction is also highly significant in statistical terms.

Using the coefficients for the interaction term, it is possible to calculate the inflection point beyond which slavery's effect became increasingly positive. It is calculated by dividing the negative of the coefficient for slavery's legality by the interaction term's coefficient. In the case of rural population density, shown in Table 2's Column (b), this means dividing -0.087 by -0.108, then

multiplying by 100 to arrive at 81. According to this regression, then, the inflection point was on the Missouri-Iowa border, about 80 miles east of the 96th meridian west. In 1860, therefore, slavery only had a positive effect on rural population density in some of the most westerly counties in Missouri.

For earlier years, the inflection point was more easterly. This is illustrated by Panel (a) of Map 2, which shows the calculated inflection points on the free-slave state border, with the size of the dots indicating the level of statistical significance and their color determined by the sign and size of their effect. In 1790, the coefficient for the interaction term was actually positive and the inflection point was far to the east, somewhere in the Atlantic, indicating that slavery's effect became ever more negative as counties became more westerly. That changed dramatically, however, once the cotton boom began. Already in 1800, the coefficient was negative, large, and highly significant. West of its inflection point on the Ohio-Virginia border, its effect on rural population density was increasingly positive. Up to 1840, it then gradually shifted westward and became smaller and statistically insignificant, leading to the rapid shift to the Missouri-Iowa border in 1850 and '60. Panel (b) shows that the pattern in the final two years was similar for farm values per acre, when the census began to collect data on the subject. Compared to rural population density, slavery's effect on farm values per acre seems to have remained more significantly positive in the far west later into antebellum period.

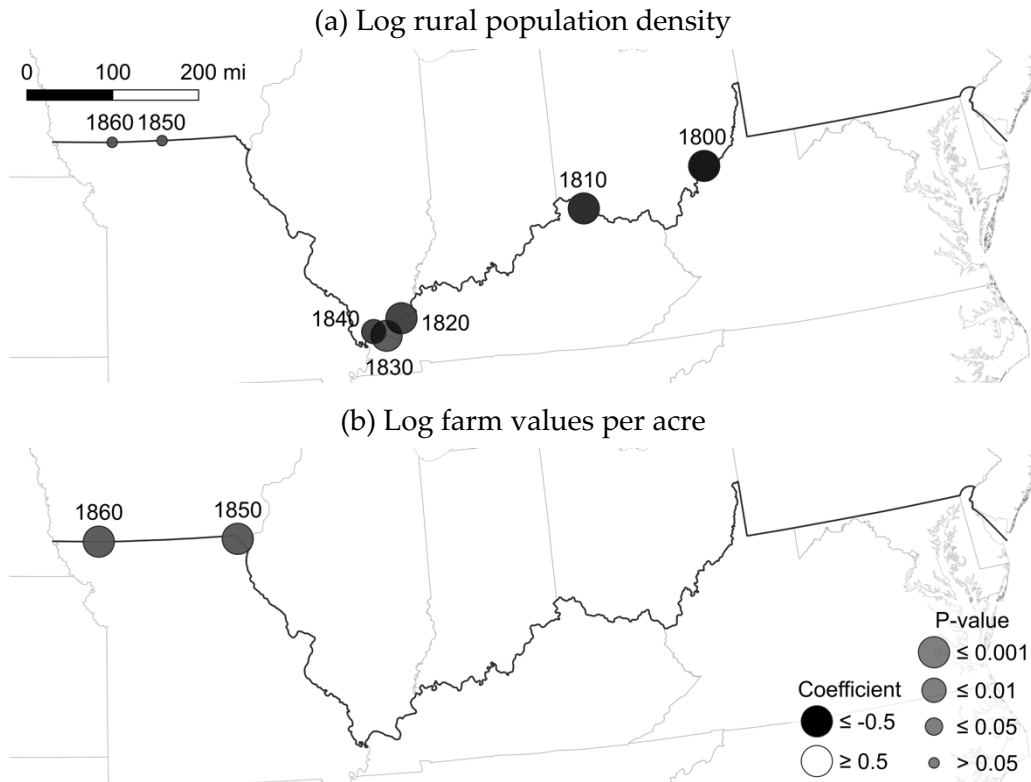
This finding thus supports an assumption that is found in much of the historiography: that slavery promoted westward expansion. Historians have detailed how Southern planters' desire for more land led first to the Mexican-American War of 1846–1849, and then to the Civil War in 1861.<sup>13</sup> Reflecting this,

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<sup>13</sup> For example, James M. McPherson, *Battle Cry of Freedom: The Civil War Era* (New York: Oxford University Press, 1988), Chs. 2–7. More recent studies of Southern expansionism include Andrew J. Torget, *Seeds of Empire: Cotton, Slavery, and the Transformation of the Texas Borderlands, 1800-1850* (Chapel Hill: University of North Carolina Press, 2015); Matthew Karp, *This Vast*

## Map 2

### Inflection Points for Slavery's Effect, 1800–1860



Note: The coefficients and p-values are for the slavery · longitude interaction term in Equation 4. Longitude increases from west to east and a negative coefficient in the interaction term indicates that slavery's effect became less negative/more positive the further west a county was. The inflection point is where on the border its effect flipped from negative to positive. It is calculated by dividing the negative of the slavery coefficient by the interaction term's coefficient. The border and state lines are for 1860. See Map 1 for the source.

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*Southern Empire: Slaveholders at the Helm of American Foreign Policy* (Cambridge, MA: Harvard University Press, 2016); and Kevin Waite, *West of Slavery: The Southern Dream of a Transcontinental Empire* (Chapel Hill: University of North Carolina Press, 2021).

interaction term for slavery's legality multiplied by longitude indicates that the Southern frontier tended to expand more rapidly than in the North. Slavery seems to have had a positive effect on rural population density beyond a certain inflection point, which tended to shift westward over time. That shift seems to have accelerated in the 1850s, which could explain why the planters were so determined not to be confined to the South once Abraham Lincoln was elected president in 1860.<sup>14</sup> Once again, this finding does not support the simplistic story that Bleakley and Rhode, like some other American economic historians, want to tell.

### *Interpretations*

The charitable interpretation of Bleakley and Rhode's paper is that they have fallen victim to confirmation bias. This is the fairly universal human tendency to interpret information in ways that confirm pre-existing beliefs.<sup>15</sup> Bleakley and Rhode may have been too quick to accept results that supported their preferred narrative of American economic history. Indeed, it can also be seen in the qualitative evidence they provide: a naïve use of Alexis de Tocqueville as a witness. In quoting his observation on the differences between the two sides of the free-slave state border, they are apparently unaware of how confirmation bias affected the French aristocrat's own writings. His views of the South were shaped by conversations with those in the North and a small number of Southerners. He spent less than eight weeks there during his nine-month stay in the United States and had little interest in witnessing the effects of slavery firsthand.<sup>16</sup> If the results of the replication reported here are correct, it is possible that Bleakley

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<sup>14</sup> The planters' economic logic is analyzed in John Clegg and Duncan Foley, "A Classical-Marxian Model of Antebellum Slavery," *Cambridge Journal of Economics* 43, no. 1 (January 2019): 107–138.

<sup>15</sup> Raymond S. Nickerson, "Confirmation Bias: A Ubiquitous Phenomenon in Many Guises," *Review of General Psychology* 2, no. 2 (June 1998): 175–220.

<sup>16</sup> James L. Crouthamel, "Tocqueville's South," *Journal of the Early Republic* 2, no. 4 (1982): 381–401.



and Rhode have similarly been led to see things in their data that were not actually there. That, at least, is the charitable interpretation.

Inevitably, however, another interpretation is possible. It may be that Bleakley and Rhode have misrepresented their methodology and/or results to support a predetermined argument that one of them has aggressively made in the past. Writing together with Olmstead, Rhode accused the so-called “new historians of capitalism” of both incompetence and dishonesty. “The authors selectively pluck material from the historical basket to support their views without considering the broader sample of available evidence,” they wrote. “In some cases, the authors hide contradictory evidence from their readers.”<sup>17</sup> Such accusations should not be made lightly. Nonetheless, it is hard to reconcile the results of the replication performed here with Bleakley and Rhode’s claim that their results for the whole of the antebellum period were “similar” to those for 1860. Assuming the replication is correct, this claim could easily be interpreted as a misrepresentation of their findings for the sake of their morality-tale version of American economic history.

This paper suggests, therefore, that Bleakley and Rhode’s model does not in fact support the story that they want to tell. They claim that slavery impeded the growth of American capitalism and that their country’s success was due to its liberal values and good institutions. Bleakley and Rhode have sought to buttress that morality tale with some quantitative evidence—evidence that American economic historians have presented little of up to now.<sup>18</sup> Yet, at best,

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<sup>17</sup> Olmstead and Rhode, “Cotton, Slavery, and the New History of Capitalism,” 15.

<sup>18</sup> What evidence they have produced has tended to be weak. Over four decades ago, for example, John R. Hanson III reported that some of Gavin Wright’s key results could not be replicated. “World Demand for Cotton during the Nineteenth Century: Wright’s Estimates Re-Examined,” *Journal of Economic History* 39, no. 4 (December 1979): 1015–1021. Nonetheless, that red flag seems to have been ignored. In 2022, for example, Wright published a table purporting to show that in 1860 wealth per capita was \$482 in the North and just \$294 in the South—a differential of 64 percent. Gavin Wright, “Slavery and the Rise of the Nineteenth-Century American Economy,” *Journal of Economic Perspectives* 36, no. 2 (May 1, 2022): 135,

their own model nevertheless suggests that the negative effects of slavery's legality can only be seen in the census data from 1840 onwards. Furthermore, when an interaction term for slavery's legality multiplied by longitude is introduced, it shows that slavery may have facilitated westward expansion on the Southern side of the border—much as historians, including some of those pilloried by Olmstead and Rhode, have implied.<sup>19</sup> As such, their use of the RDD methodology provides little support for the morality-tale version of American economic history, in which the country's success is due to liberal values and good institutions. Indeed, it seems likely that Bleakley and Rhode's results are quite compatible with the argument that slavery contributed to the growth of American capitalism.

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Table 4. Inexplicably, however, he used the preliminary census report in his calculations and ignored the final census report, where the figures for wealth reported to the census takers were higher than the Wright's figures, which come from estimates of wealth based on taxable value, with an adjustment for underreporting. When the actual census data are used, the same methodology used by Wright suggests a wealth per capita of \$542 in the North and \$455 in the South—a differential of just 19 percent. Calculated from Secretary of the Interior, *Statistics of the United States, (Including Mortality, Property, &c.,) in 1860; Compiled from the Original Returns and Being the Final Exhibit of the Eighth Census* (Washington: Government Printing Office, 1866), 294–319, Tables 1–3; Roger Ransom and Richard Sutch, "Capitalists without Capital: The Burden of Slavery and the Impact of Emancipation," *Agricultural History* 62, no. 3 (Summer 1988): 151, 158, Tables A.1 and A.6; and census population data from Steven Manson et al., "IPUMS National Historical Geographic Information System (NHGIS): Version 17.0," (Minneapolis: IPUMS, 2022), <https://www.ipums.org/projects/ipums-nhgis/d050.v16.0>, 2023.

<sup>19</sup> Walter Johnson, *River of Dark Dreams: Slavery and Empire in the Cotton Kingdom* (Cambridge, MA: Harvard University Press, 2013); Edward E. Baptist, *The Half Has Never Been Told: Slavery and the Making of American Capitalism* (New York: Basic Books, 2014); and Sven Beckert, *Empire of Cotton: A Global History* (New York: Alfred A. Knopf, 2014).

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