

# **Winners and Losers from Globalization: Why Both European and US Farmers Were Angry in the Grain Invasion Era, 1870-1900<sup>1</sup>**

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**Abstract:** We demonstrate that the agrarian unrest in the United States between 1870 and 1900 can be given an economic explanation, despite its association with increases in the real price of agricultural produce – it was not the result of nominal illusions as other scholars have suggested. Falling transportation costs allowed for the extension of the frontier and for more farmers to enter the international grain market. These farmers received, however, the world price minus the transaction costs involved in getting their produce to market. Many considered these costs to be unfairly large, owing to the perceived market power of rail firms and the discriminatory practices of middlemen, and farmers closer to the frontier were clearly more exposed to such market imperfections. Recognizing this, they protested. Using the vote shares for James B. Weaver, the People’s Party (Populist) candidate in the 1892 Presidential elections, as a measure of the extent of the protest, we demonstrate that this is negatively related with state wheat prices relative to East Coast prices, even when we control for other factors often also considered relevant.

**JEL codes:** F6, N5, N7

**Keywords:** Agriculture, Grain Invasion, populism, United States

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## 1. Introduction

For the historian of European agriculture, the last decades of the nineteenth century are perhaps principally associated with the American 'Grain Invasion' when, in the wake of rapidly falling transportation costs, the United States began exporting unprecedented quantities of cheap wheat to Europe (Williamson 1980, O'Rourke 1997, O'Rourke and Williamson 1999). This episode inspired the economic historian Eli Hecksher to speculate about the role of resource endowments for trade patterns and thereby provided the foundation for the Hecksher-Ohlin theorem. Following the elaboration of Stolper-Samuelson one would expect owners of the scarce resource, land, in Europe to lose, and landowners in the Americas to gain. The resultant agricultural distress and protest in the Old World was therefore both predictable and understandable (see also Rogowski 1989). Countries either chose to shield themselves through protectionism, as in the cases of Sweden, Germany and France, or allowed their economies to adjust. The UK saw a large decline in cereal production (Ejrnæs, Persson & Rich 2007) whereas Denmark - a particularly interesting case - changed from being a net exporter of grain in the 1850s and 1860s to become a net importer in the 1880s of wheat as well as fodder for an agricultural sector switching to bacon and dairy products (Henriksen 1993).

Somewhat paradoxically, however, the historian of American agriculture would also associate this period with agrarian discontent. A succession of protest movements flourished throughout this period, culminating with the Presidential campaign of the Populist William Jennings Bryan. Shortly before securing the Democratic nomination for the 1896 election he delivered a famous address highlighting the importance of the rural economy:

*'Burn down your cities and leave our farms, and your cities will spring up again as if by magic, but destroy our farms and the grass will grow in the streets of every city in the country.'*

However, it has been difficult to find a wholly convincing argument as to why farmers were angry. The problem rests on evidence that the real incomes of farm households (usually proxied by the real prices of farm output) actually rose over this period. This explanation ignores, however, both the geographical pattern of the protests and that of agricultural prices across the country. In fact, wheat prices were lower the further west the farmer was located. This was

due to the fact that local prices were as a first approximation equal to the world (UK) price minus transaction costs, as follows from the Law of One Price, which states that  $p = p^* + t$ , where  $p$  is the price in the importing market,  $p^*$  is the price in the exporting market, and  $t$  are the transaction costs involved in shipping the product between the markets. The further west the farmer household was located, the higher was  $t$ , and the lower was the price received,  $p^*$ .

The local prices and the prices in the US export hubs were widely published in the local press and a constant reminder of the high transportation and transaction costs, and a look through the contemporary press reveals the anger felt about this. For example, as a local resident in Omaha, Nebraska, told the *Omaha Daily Bee* (May 15, 1891): 'There is something radically wrong when it takes half of the farmer's output to get the other half to market'. The agrarian reform movements singled out price discrimination on the part of the rail corporations as a major problem and the People's Party made the public ownership of railways and other natural monopolies such as the telegraph a cornerstone of their political program. Many of the protests concerned the supposed monopoly power of railroads, and the discriminatory practices of middlemen<sup>2</sup>. Using the voting share for the People's Party (Populist) candidate in the 1892 Presidential election, we demonstrate that this was lower (higher) where the prices received by farmers relative to East Coast prices were higher (lower).

The remainder of this paper is as follows. Section 2 reviews and critically examines previous attempts at providing an explanation for the agricultural distress. Section 3 explores how the geographical pattern of agricultural unrest is linked to the extent of exposure to high transportation and transaction costs, limited access to alternative means of transportation, and high borrowing costs in settler areas. Section 4 provides empirical evidence for our conjecture. Section 5 concludes.

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<sup>2</sup> Particularly in terms of their products being graded inappropriately for their quality.

## 2. The Agrarian Protest in the United States

The history of the agrarian protest in the United States during the latter part of the nineteenth century is well known. A succession of protest movements emerged starting with Oliver Kelly's 'National Grange of the Patrons of Husbandry' in 1867, followed by the Greenback party, the Farmers' Alliance, and finally the Peoples' Party of the 1890s, which was the backbone of the Populists in the late nineteenth century. The farmers' concerns have been summarized as 'falling commodity prices, increased entry costs to farming, rising tenancy, farm foreclosure, and uncertainties generated by harvests in another hemisphere and reliance upon markets an ocean away' (Atack, Bateman & Parker 2000).

However, the reasons for the discontent have long been disputed and putting it into the context of the emergence of the United States as the leading agricultural exporter can only appear to add to the confusion. Indeed, the reaction of American farmers was sharply at odds with the standard interpretation of the Grain Invasion as first suggested by Harley (1980, 1986). He demonstrated within a simple theoretical framework that the gains from falling transportation costs should have been shared by producers in the US and consumers in Europe with the establishment of a transatlantic grain market. The lower transportation costs caused the price gap between American and European grain to narrow, resulting in a price decrease in Europe (good for consumers) and a price increase in the United States (good for producers).

The Harley hypothesis fitted well into earlier research by North (1974), who argued that the real price of farm products increased and transportation costs fell. However, this made it difficult to relate the agrarian protest movement to deteriorating economic conditions. The consensus view<sup>3</sup> was therefore that the economic plight of farmers seemed to have been exaggerated or misrepresented in earlier research which took farmers at their own word. As Frieden (1997, p. 372) points out, 'there is a puzzling weakness of evidence' for a relationship between economic conditions and farm protest.

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<sup>3</sup> This was shared for example by W. Parker and R. Higgs.

Accepting this, other researchers have looked elsewhere. One line of argument suggests that income uncertainty increased or was particularly high in regions with strong farm reform movements. The logic here is that there were welfare losses associated with price volatility if farmers were risk averse (McGuire 1981). Another line of argument looks at the particular problems of indebted farmers in a period of deflation. Since the general price level fell by half or more in the Grain Invasion period, debt as a proportion of current income might increase when nominal prices fall because the nominal debt for a farmer remains unaffected by the fall in prices. The risk of foreclosures increased and fuelled unrest (Stock 1983). The problem with this interpretation is that foreclosures were not very frequent, but Stock argues that even so most farmers would have known someone who was affected which fuelled a fear of being the next victim. States with a higher frequency of foreclosures were fertile ground for the protest movement.

Interesting as these explanations are they do not seem to have convinced the profession of economic historians. As Mayhew (1972, p. 466) points out, it is 'puzzling that farmers began complaining about railroad rates, interest rates, and problems of obtaining credit in a period when freight rates and interest rates were falling rapidly and when... credit was easily available'. She continues that it 'is also puzzling that earlier fluctuations in prices did not provoke farmer protest'. Thus, in a recent survey, Whaples (1995) reports that only 22 percent of economists in the Economic History Association agreed with the proposition that 'The Agrarian protest movement in the Middle West from 1870 to 1900 was a reaction to the deteriorating economic status of farmers'. 52 percent disagreed. Did farmers suffer from money illusion, mistaking a nominal fall in income for a real fall? This seems unlikely given that if farmers were aware of the prices of their own produce they must surely also have been informed about the prices of the goods they purchased.<sup>4</sup>

In fact, we ought to be concerned about any argument that implies that people protest for the wrong reasons, especially since European farmers are usually considered to have reacted in accordance with economic theory. Economists usually believe that man acts fairly rationally on

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<sup>4</sup> Although see Friedman (1990, p. 1171) for a dissenting view.

the basis of knowledge that is accurate or at least not systematically misleading or biased. Indeed, Cooley and DeCanio (1977) convincingly argued that American farmers responded rationally to price signals during the period of discontent. However, in the dominant explanation for the unrest farmers were simply wrong or seriously misinformed.<sup>5</sup>

In fact, the favored explanation for the unrest according to Whaples' survey is almost aggressively non-economic. Mayhew (1972) argued that farmers were simply upset by 'commercialization', 'the increasing importance of prices' and their being forced into an economic system in which money was all important. Although we will attempt to reveal an economic basis for the farmers' concerns, our explanation is in fact compatible in a sense with Mayhew's. From a study of the contemporary political debate there is no doubt that farmers themselves were clearly under the impression that their economic condition was deteriorating. And there is also no doubt that the objects of their frustration were those identified by Mayhew: the owners of railroads, moneylenders, manufacturers, banks etc. All these were perhaps representative of the increasing commercialization of agriculture but more generally they were just one aspect of the increasing internationalization of agriculture, and indeed economic life in general, which occurred in the second half of the nineteenth century.

What the farmers were then really experiencing was their submergence in the new Atlantic Economy. This gave rise to concerns which were entirely economic in nature. Exposure to distant export markets had differential effects on producers in America. The farmers' concerns were thus entirely consistent with those of rational economic agents.

### **3. A Simple Model for Understanding the Populist Protests**

Our explanation for the protests thus rests on the perceived 'unfairness' of the transaction costs endured by farmers wishing to get their produce to market, and that these were greater

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<sup>5</sup> This idea was also apparent in the statements of contemporaries, for example the President of the Boston Manufacturers' Mutual Fire Insurance Company in evidence before the British Royal Commission on Agriculture in 1879 (1881, C. 7400): "You do not think that the [agrarian protest] movement then has any real economic basis?-- No..."

for farmers further west. In fact, rail services in the US were dominated by price-fixing cartels<sup>6</sup> which were remarkably stable because they were good at deterring new entrants and at penalizing defectors. In many areas, they faced little competition, with the greatest exception being area with access to water, and in particular in terms of the export trade through New York from transportation over the Great Lakes. Lake transport was more competitive because it was serviced by a large number of independent vessel owners<sup>7</sup>.

Populist agitators thus frequently singled out grain traders and railroad companies as culprits. These alleged or real distortions related to railroad companies exploiting their monopoly power and middlemen downgrading the grain delivered to market thereby lowering the farm gate price. The founding convention of the People's (Populist) Party set out the basic political line in the Omaha Platform adopted on July 4, 1892. Tight regulation of railways, and in fact government ownership of rail and telegraph, was advocated, or as it was polemically formulated: '...the time has come when the railroad corporations will either own the people or the people must own the railroads.'<sup>8</sup>

Much of the farmers' protest was thus related to alleged or real price distortions which made price gaps too big. As referred to above and following the Law of One Price, price differentials will reflect transportation and other transaction costs between markets, and we thus argue that cartel pricing was more of a concern the more farmers were exposed to larger transportation costs. For states further west this was even more of a concern because they were land-locked,

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<sup>6</sup> Legislators and public opinion had their eyes on the cartels and the Interstate Commerce Act in 1897 was a first attempt to regulate the cartels, which however continued as 'voluntary associations' and seemed not to lose their grip on price-fixing. Freight rate changes were announced by these associations and were duly noted and commented upon by the local press. The Sherman Antitrust Act (1890) was supposed to be a more effective way of tackling this collusion, but it was not until the Trans-Missouri decision of the Supreme Court in 1897 that the cooperation of rail operators was considered a violation of the Sherman Act. There is no consensus on whether the Sherman Act in the end was effective. There were significant rate reductions after the Trans-Missouri decisions on some roads and antitrust legislation triggered off a merger movement which seems to have counteracted the effect of this on rail equity (Kolko 1965, Binder 1988). Anyway, most of these developments are from after the period analyzed in the present paper.

<sup>7</sup> This is illustrated nicely by the fact that rail prices regularly followed a seasonal pattern of increasing when transport over the lakes was stopped by ice only to fall again in the spring.

<sup>8</sup> They also advanced the idea of government supported granaries, the so-called 'sub treasury plan', where farmers could store their grain until prices had recovered after the post-harvest fall. These granaries, which never materialized, were supposed to advance temporary cash to farmers to evade loan-sharks while waiting for higher prices.

that is they had no direct access to the Great Lakes which, as noted above, had a more competitive transport sector.

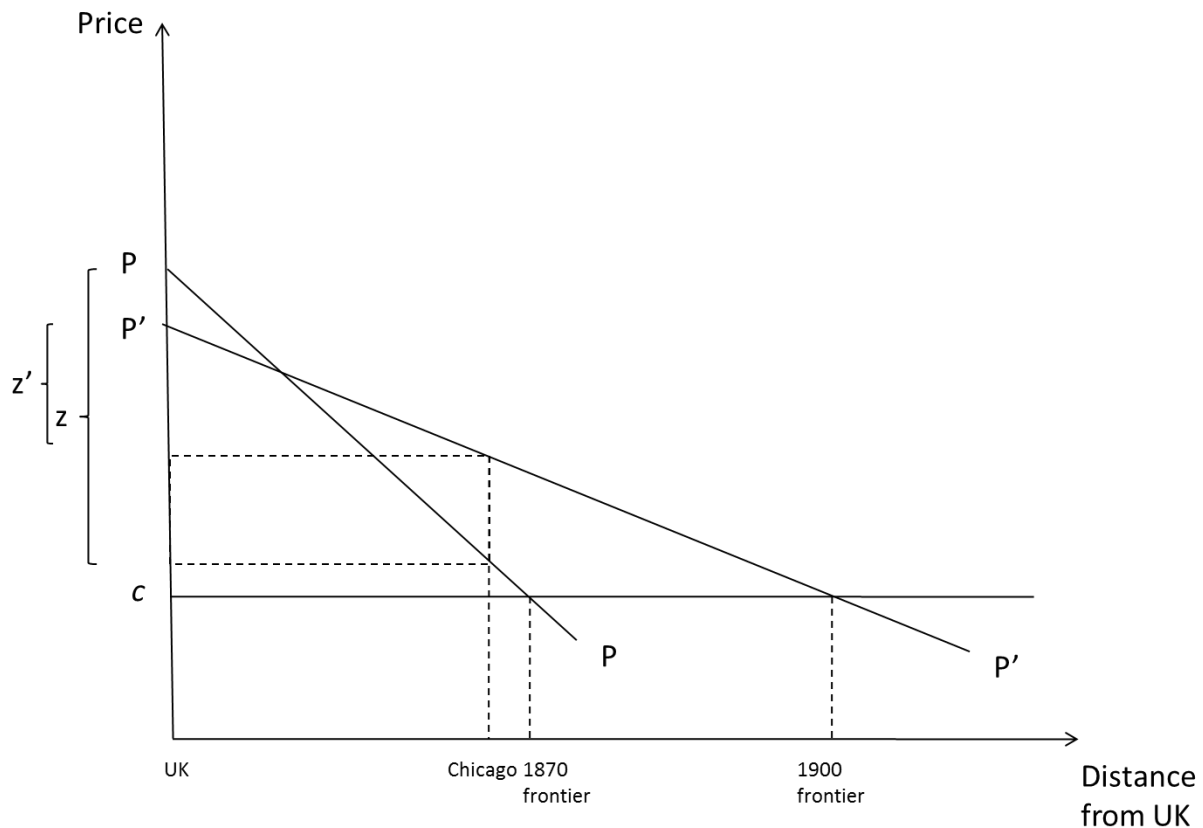
Moreover, it is also well known from behavioral economics that people are particularly concerned by what they consider to be unfair outcomes. For example, in a pioneering article, Kahneman et al (1986) singled out the exploitation of the market power of firms or employers as particularly objectionable. This sentiment is of course the background for much of the popular support for anti-trust legislation which was a cornerstone of Populist politics. In this sense, a 'fair' price would be that which would be set in the absence of the monopolistic practices of rail companies and the monopsonistic power of grain merchants and credit institutions.

Evidence to support our theory would be that the Populist vote rose with the exposure to high transportation costs and other transactions costs as revealed by the size of the gap between the export hub price and the local price. However, to the extent that the price gap is due to railroad operators exploiting their market power, it should be smaller in states with access to alternative means of transportation, and thus the Populist vote should also be smaller.

This framework does not directly address the timing of the discomfort and protest of US farmers, however. This we believe had to do with the increasing globalization of the grain markets in the last third of the nineteenth century, due largely to declining transportation costs, which both made farmers knowledgeable about prices in export hubs and in Europe, and brought new land into world agricultural markets. Furthermore, thanks to rapid biological innovation, in this period the frontier was being extended westwards (Olmstead and Rhode 2002, 2008, 2011). Falling domestic transportation costs and the creation of new biological technologies thus provided the mechanism whereby frontier farmers were invited into the world market for grain. Over the nineteenth century the center of wheat production moved from New York State, Virginia and Pennsylvania to the Midwest states which dominated around the Civil War with states such as Illinois, Iowa, Michigan and Wisconsin. But by the end of the nineteenth century the major new wheat producing states were Nebraska, Kansas and North and South Dakota (Olmstead and Rhode 2007).



There was a reduction in real transportation costs mainly because of the fall in domestic freight rates from the producing regions in the Midwest to the ports on the Atlantic coast. These falling transportation costs in our interpretation made it possible for newly populated distant states to ship grain at the going wage and local price, rather than giving them a share in the gains from falling transportation costs, as a result of 'unlimited' supplies of land and labor from the old world. This is illustrated in Figure 1.<sup>9</sup>



**Figure 1: A simple model for understanding the distribution of grain prices**

Schedule  $PP$  represents the prices received by farms at different locations moving west from the UK (the price which we take as representing the world price for wheat) and from the East Coast of the US westwards in 1870. Farmers west of the UK receive the world (UK) price minus

<sup>9</sup> Figure 1 is inspired by a similar diagram presented by Harley (1978).

the transportation and other transaction costs, following the Law of One Price. The location of the frontier is given where farmers can just cover their costs, i.e. where  $p = c$ .<sup>10</sup> Note that this model assumes that land and labor supply is very elastic, which is also true for this period, given the availability of land in the West, and the immigration from especially Europe.

$z$  represents the transaction costs involved in shipping wheat from a fixed location to the UK. We call this location 'Chicago', since this is where the prices typically used to analyze this period come from. By the end of the nineteenth century, technological advances in transportation have resulted in transaction costs falling at all locations, and  $z$  falls to  $z'$ . This causes the slope of the  $PP$  schedule to flatten, giving the new schedule  $PP'$ . Clearly, in Chicago farmers enjoy higher prices, and lower shipping costs to the UK, where consumers thus pay lower prices. Everyone's a winner. Or are they?

Most statements of what happened to the real price of, say, wheat, refer either to the price at a specific location or to some average price including several locations, but usually this average is unweighted. This practice has important repercussions if the geographical concentration of production changes. In the present case, wheat production moved away from states with high prices to states with lower prices. In fact, the location and output share weighted real price of US wheat actually stagnated, albeit with large swings, between 1870 and 1900. In 1892 the price of wheat was approaching a trough, at just 79 percent of its 1890 level or 82 percent of its 1880 level.

This aside, from our model it can be seen that whether farmers gained or lost from globalization depended on their location. Those furthest east (to the left of where the  $PP$  and  $P'P'$  schedules intersect) receive a lower price for their produce, while farmers west of this point and up to the old frontier receive a higher price. Beyond the 1870 frontier, new farmers are being brought into the world economy, and whether they receive higher or lower prices depends on the previous local demand and supply conditions. Note, however, that frontier farmers always receive only  $c$  for their produce, and thus just cover their costs. Note also, that

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<sup>10</sup> The assumption of constant costs across states is not important. Allowing for a Ricardian extensive margin with increasing costs further west would, however, imply even lower markups for these farmers. This if anything strengthens our argument.

productivity improvements in agriculture will simply cause  $c$  to fall, thus causing prices to fall at *all* locations.

The implication from this in terms of the farm protest is quite simple. If the transaction costs were considered 'unfair' (i.e. due to e.g. the monopoly power of railroads) then the protest should have been louder in the recently settled areas of the frontier, where the price received was considerably lower than the East Coast price (for example than in New York). We will demonstrate in the next section that farm gate prices were indeed lower the further west the producer was, and that this matched the pattern of protest.

As Figure 1 illustrates, however, producers close to export harbors on the East Coast would actually face *lower* prices as transportation costs fell. So why did they not react in the same way as Western farmers? To understand this it is helpful to apply Hirschman's exit-voice dichotomy (Hirschman 1970). This idea essentially acknowledges two types of reactions to a deteriorating economic situation: you either *exit* the market (or the condition) or you *voice* your concerns.

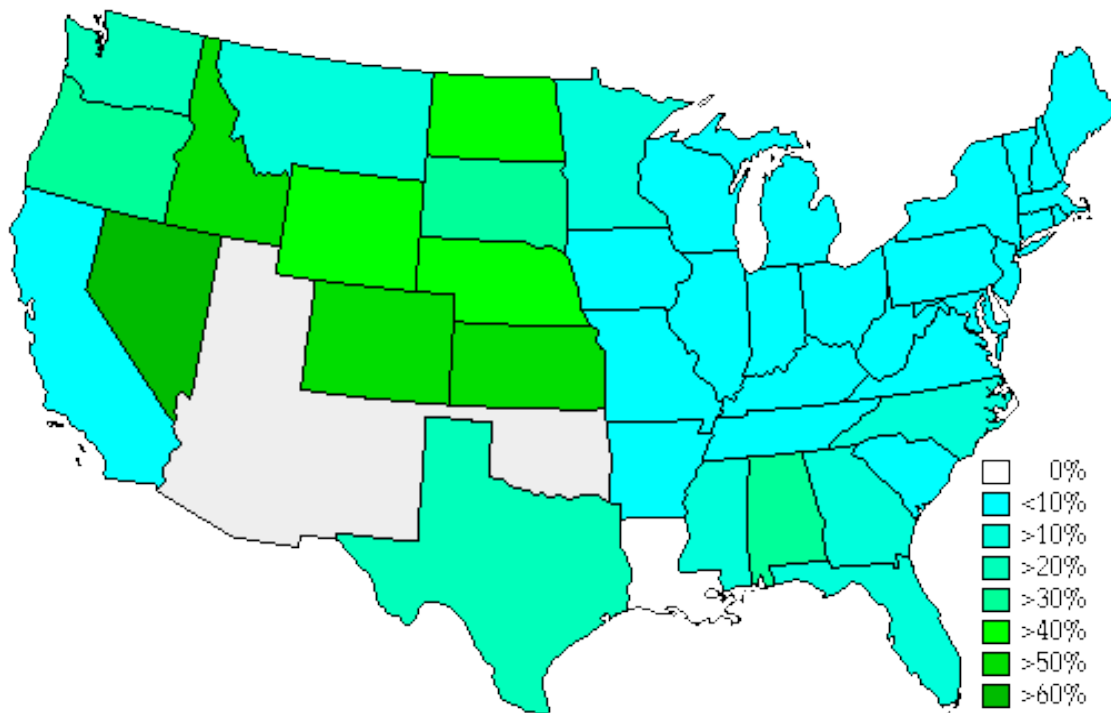
Eastern farmers were able successfully to follow the 'exit' strategy by diversifying out of grain to other agricultural products: vegetables, meat, dairy products, poultry etc., or by a movement into other sectors of the economy. This strategy was possible because these farmers worked close to large urban centers with a diversified demand for goods relying on fairly swift transportation. Farmers in the Western settler states did not have the opportunity to exit, and thus voiced their concerns politically. We test for both the 'voice' in protest at price differentials, and the 'exit' from wheat production in the following.

#### **4. An Empirical Investigation of the Reasons for the Populist Protest**

We test whether the burden of transportation costs as revealed by price differentials explains the pattern of protest by regressing the level of protest by state on the price of wheat by state relative to an export hub price, New York. However, as noted above, the cartel power that railroad corporations held was challenged in those states which had access to sea transport over the Great Lakes. We therefore expect voting preferences for the People's Party to be

negatively correlated to location on the Great Lakes. Geographical location also has other effects. In the areas of recent settlement the financial infrastructure was less developed and less competitive. This might explain (part of) the interest rate premium paid in those states. When perceived as a discriminatory practice it can be expected to increase voting preferences for the populists.

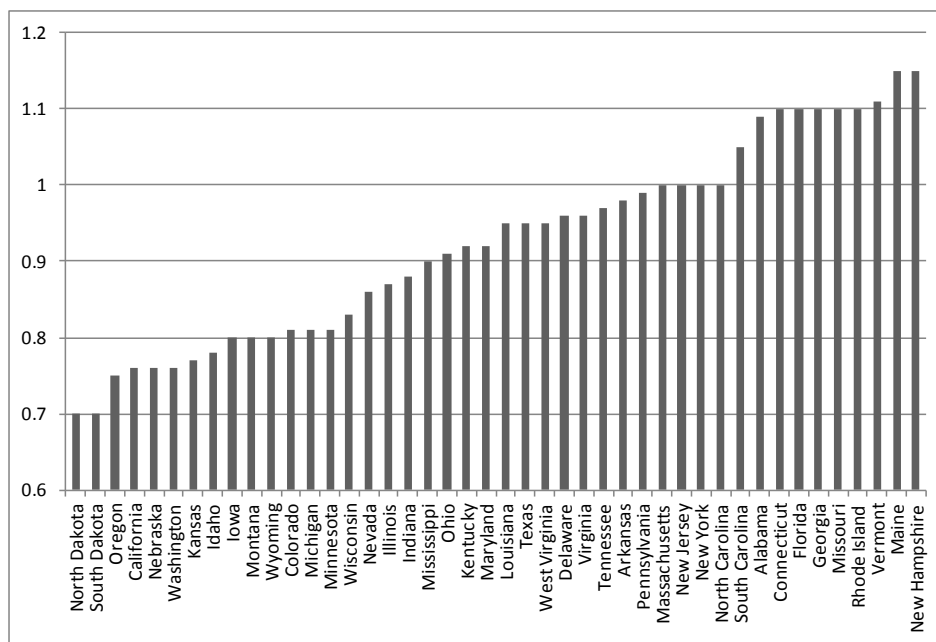
We quantify the extent of political protest by state using the percentage share of votes for the People's Party candidate in the 1892 Presidential election, which we term  $vote_i$ . Although 1896 perhaps marked the height of the protests, the Populist candidate in that year stood for the Democratic Party. The advantage with the 1892 election is thus that the Populist vote is recorded separately. Figure 3 illustrates this: clearly, Midwestern states were those with the highest voting shares. Note that AK, AZ, HI, NM, OK, and UT (six present day states) had not yet achieved statehood, thus giving 44 observations in total.



**Figure 3: Percentage of votes for the People's Party candidate in the Presidential election of 1892**

Source: [www.uselectionatlas.org](http://www.uselectionatlas.org)

For prices, we use the ATICS dataset, collected and described in detail by Cooley et al (1977)<sup>11</sup>, for the prices of wheat by state in 1890. The database refers to farm gate prices (recorded on December 1) and thus measures directly the prices relevant for the welfare of farmers. Our use of relative wheat prices alone might seem odd, but wheat was both the most ubiquitous crop and the most important in terms of exports. Figure 4 gives some price series relative to the price in New York: note the pattern of prices – high in the East, low in the West. This seems to fit our model very well.<sup>12</sup> States which received particularly high prices were most likely not exporting, and were rather paying a premium for imports from New York.



**Figure 4: Farm gate prices of wheat relative to New York on December 1, 1890**

**Source:** ATICS, see Cooley et al (1977).

<sup>11</sup> ATICS was kindly made available to us by Stephen J. DeCanio.

<sup>12</sup> A possible objection is that the price differences were simply due to quality differences between the states. Of course, this is a possibility, but in fact there are theoretical reasons to believe that the wheat furthest from the East Coast should have had the highest quality, and thus the highest price *ceteris paribus*. A.A. Alchian and W.R. Allen (1967) noted long ago that there is good reason to ‘ship the best apples out’ since transportation costs do not differ for good and bad apples making the low quality apple relatively more expensive in foreign markets. Transportation is thus simply a specific price increase which lowers the relative price of the higher-quality produce in the distant market. East Coast and European demand will therefore shift to the high quality variety of the commodity. Producers might have been expected to meet that demand by improving the quality of the product.

We use the price of wheat in New York in 1890 as the reference price, since this price was well publicized, and it was to New York that grain was typically shipped for export to European markets, and thus define the ratio of the price in 1890 in state  $i$  to the 1890 price in New York.<sup>13</sup> To take account of the competition afforded to rail by water transportation, we also include a dummy, which takes the value 1 if the state borders one of the Great Lakes.<sup>14</sup>

It might seem likely that the strength of the impact of wheat prices on protest might be stronger if wheat is of greater importance for the state. To control for this we include the percentage area of the state under wheat in 1889 taken from the 1890 census and its interaction with the relative price variable.

Other variables take inspiration from the literature on the Populist protests, and are mainly taken from the 1890 census. We include a measure of the percentage of males over 10 in agriculture in 1889 and a dummy for whether or not silver was mined in the state. The Populists are generally associated with an alliance of farmers and those desiring a return to a bimetallic standard. The percentage of foreign born in each state in 1889 is also included, as is a dummy for the Southern states (the fifteen slave states at the Civil War and West Virginia). Since the Populists complained about increasing indebtedness and tenancy, we also include measures of these. We also include the 'lag' of the protests with a variable for the members of the Patrons of Husbandry per 100 agrarian population in 1876 taken from Buck (1913). We also include the (log of) the income per worker estimates for 1890<sup>15</sup> given by Turner et al (2007). Finally, we control for the logarithm of (one plus) the distance to New York, in case the protest was simply greater further from the East Coast, due for example to alienation from the country's center of power. Table 1 gives some summary statistics for these variables.

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<sup>13</sup> We have no observations for Florida, Louisiana, Massachusetts, and Rhode Island, for which we substitute the prices in Georgia, Texas, New York, and Connecticut, respectively.

<sup>14</sup> We experimented with adding a dummy for the three West Coast states, since they had access to alternative (although hazardous) means of transportation by shipping via Cape Horn. This was significant, but did not otherwise affect our results.

<sup>15</sup> Due to missing observations, we have used the income per worker for 1900 for North and South Dakota.

**Table 1: Summary statistics**

	Mean	Std.Dev	Min	Max
% votes for Populists	15.72	19.00407	0	66.780
State price / NY price of wheat (A)	0.92	0.130089	0.700	1.150
Access to the Great Lakes	0.18	0.390154	0	1
Acres wheat / person	1.05	2.643296	0.000	16.200
% males over 10 in agriculture	48.02	18.805	10.500	80.110
Silver producing	0.30	0.461522	0	1
% Members of Patrons of Husbandry 1876	26.11	19.6467	0.000	88.500
% foreign born	0.16	0.119387	0.002	0.446
South	0.36	0.486607	0	1
Real Income	10526.69	4325.311	2870.047	19330.09

Tables 2a-b illustrate the strong correlation between the price ratio and the protests, and the importance of access to the Great Lakes. None of the other variables, which we introduce one at a time due to the limited degrees of freedom, have much explanatory power at all.

**Table 2a: Explaining the Populist vote**

Dependent variable: Share of votes to Populist Party	(1)	(2)	(3)	(4)	(5)
State price / NY price of wheat (A)	-76.40*** (18.29)	-81.35*** (17.04)	-85.19*** (24.95)	-78.91*** (16.79)	-69.50*** (19.07)
Access to the Great Lakes		-17.45*** (3.37)	-12.56*** (4.04)	-15.50*** (3.79)	-13.67*** (3.95)
Acres wheat / person (B)			42.01 (26.90)		
A*B			-59.41 (39.09)		
% males over 10 in agriculture				0.18* (0.10)	0.16 (0.12)
Silver producing					8.27 (6.36)
Constant	86.35*** (17.94)	94.10*** (17.04)	100.40*** (26.59)	82.83*** (19.95)	72.24*** (21.83)
Observations	44	44	44	44	44
R-squared	0.27	0.40	0.44	0.43	0.47

Robust standard errors in parentheses. \* significant at 10% \*\* significant at 5% \*\*\* significant at 1%



**Table 2b: Explaining the Populist vote**

Dependent variable: Share of votes to Populist Party	(6)	(7)	(8)	(9)	(10)	(11) <sup>16</sup>	(12)
State price / NY price of wheat (A)	-81.72*** (19.94)	-75.83*** (17.32)	-73.07*** (16.00)	-89.52*** (18.07)	-81.89*** (16.84)	-85.84*** (14.61)	-63.31*** (19.81)
Access to the Great Lakes	-17.48*** (3.61)	-18.22*** (3.82)	-19.99*** (4.20)	-16.40*** (3.77)	-17.96*** (3.33)	-16.44*** (4.45)	-13.65*** (6.10)
Members of Patrons of Husbandry per 100 agrarian population, 1876	-0.00 (0.12)						
% foreign born		13.15 (22.31)					
South			-6.31 (5.01)				
% of incumbrance of value (of those with incumbrance )				0.30 (0.37)			
% change in farms cultivated by owners					-27.96 (39.09)		
log real income						-3.06 (5.57)	
log(1+distance to NY)							3.60* (1.95)
Constant	94.57*** (21.59)	87.03*** (17.95)	89.21*** (16.08)	90.08*** (18.47)	93.76*** (17.15)	126.14** (51.59)	54.00** (27.10)
Observations	44	44	44	44	44	44	44
R-squared	0.40	0.41	0.42	0.41	0.41	0.41	0.45

Robust standard errors in parentheses. \* significant at 10% \*\* significant at 5% \*\*\* significant at 1%

<sup>16</sup> We also estimated this model with the estimates of total personal income pc by Klein (2013). The coefficient was 2.73 with an associated robust standard error of 5.87.

We then experiment with another variable which has been considered to be of importance, the interest rate premium calculated by Eichengreen (1984, PREM1), i.e. the markup on the interest rate required to be paid further west, which implied higher costs for debtor farmers, and then a measure of ‘exit’ as described above: the change in the wheat production between 1880 and 1890 (from the ATICS dataset). Summary statistics are given in Table 3, and the regression results in Table 4.

**Table 3: Summary statistics**

	Mean	Std.Dev	Min	Max
Log interest risk premium	3.93	1.44	1.29	7.59
Change in wheat production	0.88	4.33	-1.00	23.67

**Table 4: Explaining the Populist vote**

Dependent variable: Share of votes to Populist Party	(13)	(14)
State price / NY price of wheat	-47.04*** (16.98)	-36.65* (19.81)
Access to the Great Lakes	-9.39** (4.40)	-8.14* (4.50)
Log interest risk premium	21.86*** (6.45)	22.14*** (6.41)
% change in wheat production 1880-1890		0.63* (0.35)
Constant	32.67 (21.63)	21.92 (23.71)
Observations	44	44
R-squared	0.56	0.57

Robust standard errors in parentheses. \* significant at 10% \*\* significant at 5% \*\*\* significant at 1%

The coefficient to the relative prices changes with the new variables, but the qualitative result is robust. It seems that a substantial proportion of the variation in the Populist voting share can be explained by our price and water variables, although the risk premium was also important. This might have reflected the true risk of lending in frontier regions, but it seems likely that there was also a role for monopoly markups in areas where bank depth was minimal. Whatever the case, it is likely that farmers interpreted high interest rates as a demonstration of the market power of the banks, clearly a story compatible with what we argue in the case of transportation costs. The 'exit' variable also has the right sign – if wheat production fell, as it might if farmers had the possibility to diversify out of grain as an exit strategy, then farmers were less likely to protest. We take this as strong evidence in favor of our hypothesis.

## **5. Conclusion**

We have argued that US farmers producing for foreign markets were right in identifying economic stress in the Grain Invasion period. The traditional argument that wheat prices increased relative to the general price level is not disputed, but we argue that the impact of the fall in transportation costs on the grain producing sector differed according to location. Farm protest was most intense in the regions near or at the grain producing frontier. Farmers in these regions, we argue, were permitted by falling transportation costs to access foreign markets, but only at the pre-determined farm income. These farmers received the world price minus the transaction costs involved in getting their produce to market. Many considered these costs to be unfairly large, owing to the monopoly power of rail firms and the discriminatory practices of middlemen. Recognizing the gap between what they received and the price in export hubs, the burden of transport and other transaction costs became apparent, and the farmers most affected protested. It was only after this period that farmers found ways to do something about this, first with the establishment of cooperative grain elevators, particularly in the north-central United States (Kenkel 1922, p. 16), and later with the introduction of the regulation of freight rates (Federico and Sharp 2013).

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