Recovery from the Great Depression: The Farm Channel in Spring 1933

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Abstract

From March to July 1933, seasonally adjusted industrial production rose 57 percent. We argue that an important channel aiding recovery came through the direct effect of devaluation on farm prices, incomes, and consumption. We call this the farm channel. Using U.S. and British crop price data, we document that devaluation raised prices of traded crops. And using state and county auto sales and income data, we document that recovery proceeded much more rapidly in farm areas. A one standard deviation increase in the share of a state's population living on farms is associated with a 12-35 percentage point increase in auto sales growth from winter to fall 1933. This effect is entirely concentrated in states producing traded crops, suggesting an important role for devaluation. In annual county data we show that the farm channel is stronger in counties with more indebted farmers but weaker in counties with previous bank failures. We argue that the farm channel may have been expansionary for the economy as a whole by redistributing income to indebted farmers with a high marginal propensity to consume.

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"[T]he depression in the manufacturing industry of the country is due chiefly to the fact that agricultural products generally have been selling below the cost of production, and thereby destroyed the purchasing power in the domestic market of nearly half of all our people. We are going to restore the purchasing power of the farmer." - Franklin D. Roosevelt, campaign speech in Atlanta, Georgia, 24 October 1932.[1]

1 Introduction

From its low point in March 1933, seasonally adjusted industrial production rose 57 percent in four months.[2] Yet after the nearly complete collapse of the banking system in March 1933, and amidst a partial default on U.S. government debt (Edwards, Longstaff, and Marin, 2015), the U.S. experienced its most rapid four months of growth since at least World War I. We argue that an important driver of recovery was the effect of devaluation on farm prices, incomes, and consumption. We call this mechanism the farm channel. This channel is distinct from the existing literature's emphasis on a change in expectations as the explanation for the economy's emergence from the Depression in spring 1933 (Temin and Wigmore (1990), Eggertsson (2008), Jalil and Rua (2015), and Taylor and Neumann (2016)).

As the quote beginning the paper suggests, the importance of farmers for recovery was much emphasized in the 1930s. But with the exception of Temin and Wigmore (1990)—which inspired this paper—it has not figured prominently in the modern literature. Our goal is to document the farm channel's operation and its relevance to the aggregate economy's recovery. We do so in three steps. First, we show that crop prices rose rapidly in spring 1933, and that this increase was in part caused by devaluation. Second, we show that auto sales and income grew more rapidly in farm areas of the country, in particular those producing traded crops whose prices were most affected by devaluation. Finally, we explore how redistribution of income to farmers via higher crop prices could have been expansionary for the economy as a whole.

[1] See http://teachingamericanhistory.org/library/document/campaign-speech/ for the complete speech.
[2] FRED series INDPRO.

After reviewing the facts of the recovery in the following section, we start our analysis of the farm channel in section 3 by examining the 1933 path of prices and production of all major farm products. Monthly data shows a rapid increase in crop prices after devaluation, with much smaller price increases for livestock and dairy products. An analysis of daily cotton and wheat prices around the announcement of the U.S. departure from the Gold Standard as well as a comparison of the time series of U.S. and British cotton and wheat prices provides evidence for a causal effect of devaluation in driving crop price increases.

In section 4, we turn to the behavior of farm relative to nonfarm consumption. Using monthly state and annual county auto sales data, we find that new auto sales in 1933 grew much more rapidly in farm areas of the country. A one standard deviation increase in the share of a state's population living on farms is associated with a 12-35 percentage point increase in auto sales growth from winter to fall 1933. This effect is driven by areas growing cotton, tobacco, and wheat. Conditional on state fixed effects, a $1 increase in the value of cotton or tobacco grown in a county in 1929 was associated with roughly half a percentage point more rapid auto sales growth between 1932 and 1933.

We focus primarily on new car sales because they were (relatively) well measured, are correlated with broader measures of consumption, and are available at higher frequency and greater geographical detail than other economic indicators. But we obtain similar qualitative findings using data on state-level personal income or data on county-level income tax return counts. This increases our confidence that there was a broad-based more rapid recovery, not confined to auto sales, in farm areas.

It is itself of interest to know that the initial recovery from the Depression proceeded more rapidly in farm areas of the country. But these cross-sectional results do not establish that the farm channel from devaluation to farm prices, incomes, and consumption contributed to aggregate recovery. Given the small contributions of net exports to GDP growth in 1933 and 1934, higher farm product prices essentially redistributed income to farmers from nonfarm households and corporations. It is not obvious, a priori, that this would matter for the aggregate economy.

In section 5, we examine three possible mechanisms through which such a redistribution of income to farmers via higher crop prices could have been expansionary for the aggregate economy. A long-standing theoretical literature (e.g., Bewley, 1986; Aiyagari, 1994) and more recent empirical work (e.g., Mian, Rao, and Sufi, 2013; Jappelli and Pistaferri, 2014) suggests that debtor households are likely to have higher marginal propensities to consume than creditor households. Since farmers had large debt burdens in early 1933, a transfer of income to farmers could well have raised aggregate demand. Consistent with this hypothesis, we estimate that the farm channel is stronger in counties with more indebted farmers.

A second possible mechanism runs through rural bank health. Higher farm product prices likely allowed farms to repay loans to rural banks, improving the health of the overall financial system. But while plausible in theory, we find no empirical evidence in support of this hypothesis. If anything, we find the farm channel to be weaker in counties with past bank failures, consistent with the view that the banking system remained in distress (Bernanke, 1983). These results provide some evidence in favor of the recent literature (e.g. Reinhart and Rogoff (2009), Reinhart and Reinhart (2010), and Wieland and Yang (2016)) arguing that financial crises can inhibit rapid recovery from recessions. But the fact that aggregate growth was so rapid in spring 1933 suggests that economies can overcome the drag on growth of a damaged financial system.

A third mechanism through which higher farm product prices may have had positive aggregate effects runs through higher farm product prices raising inflation expectations. The argument is similar to that made in Coibion and Gorodnichenko (2015) for the recent recession: they argue that oil price changes had outsized effects on inflation expectations in the Great Recession due to their visibility to households. Narrative evidence suggests that farm prices in the 1930s may have played a similar role.

This paper relates most obviously to the literature on economic policy and economic recovery in 1933. Edwards (2015) and Rauchway (2015) discuss the Roosevelt's administration's decision making in 1933. In line with the argument of this paper, they emphasize the priority that the administration put on raising the price of agricultural goods. According to Edwards (2015) p. 20, Henry Morgenthau, head of the farm relief administration and later treasury secretary, "believed that uncoupling the value of the dollar from gold was a requisite to increase agricultural prices and, in that way, bring relief to farmers. His main concern was not gold itself, but relative prices; for him the goal of policy - and a required step towards recovery - was increasing the price of agricultural products relative to manufacturing goods." This is consistent with the view of Frank Pearson and George Warren, the latter of whom was an important economic advisor to Roosevelt. In their book, *Gold and Prices*, Warren and Pearson (1935) discuss the link between devaluation and crop prices.

The literature on the initial recovery in spring 1933 includes Temin and Wigmore (1990), Eggertsson (2008), Jalil and Rua (2015), Taylor and Neumann (2016) and Sumner (2015). All argue that a regime change played a positive role. In particular, by taking the U.S. off the gold standard and explicitly voicing his desire for higher prices, these papers credit Roosevelt with inducing inflation expectations and changing expectations about future monetary policy. Accordingly, higher expected inflation lowered real interest rates, thus stimulating demand for investment goods and consumer durables.[3,4] At the same time, Eggertsson and Temin and Wigmore stress that Roosevelt's actions also led to expectations of higher future output. Consumers and businesses expecting better times in the future were more willing to spend.

Eichengreen and Sachs (1985) do not focus on the U.S. recovery from the Great Depression, but they note that countries leaving the Gold Standard earlier generally recovered more quickly. They argue that this is because departing from the Gold Standard allowed for monetary expansion. While this hypothesis fits the U.S. data well for the entire period 1933-37 (Romer, 1992), in the immediate aftermath of devaluation, in spring 1933, the high-powered money supply declined, and the broad money stock was essentially unchanged.[5] Thus the recent literature on the 1933 recovery has tended to focus on the possible effects of expectations rather than on changes in actual monetary policy.

In keeping with their focus on the effect of dollar devaluation, Temin and Wigmore argue that a weaker dollar not only led to higher expected inflation, but also was expansionary through its effect on current and expected farm incomes. Temin and Wigmore were the first

[3] Romer (1992) argues that a similar channel led to growth between 1933 and 1940.

[4] Eichengreen (1992) emphasizes not the rapidity of the 1933 recovery but its incompleteness. After rising 57 percent from March to July, seasonally adjusted industrial production fell 19 percent from July to November, before rising again (FRED series INDPRO). Despite this, March 1933 was a decisive break: before, the trend had been steadily downward, thereafter upward. While the unevenness of the recovery in 1933 is of obvious interest, the focus of this paper is narrower: what caused the initial turn-around and growth spurt in spring 1933?

[5] Friedman and Schwartz (1963) table B-3 shows seasonally adjusted high-powered money falling 6.2% between March 1933 and July 1933; their table A-1 shows the seasonally adjusted sum of currency held by the public, demand and time deposits of commercial banks, deposits of mutual savings banks, and deposits of the postal savings system rising 0.2% from March to July 1933.

(and have remained the only) paper in the modern economics literature to emphasize the possibility of a farm channel. But they are only to able to provide circumstantial evidence for its importance.[6] We build on their work by providing econometric evidence for each stage of the farm channel's operation, and by explicitly considering the general equilibrium implications of higher farm product prices.

Our results suggest that the farm channel may have been expansionary in the aggregate by redistributing income towards indebted farmers with a high marginal propensity to consume. Many recent papers have stressed the importance of household heterogeneity in indebtedness and marginal propensities to consume, both theoretically (e.g., Eggertsson and Krugman, 2012; Guerrieri and Lorenzoni, 2015) and empirically (e.g., Mian et al., 2013; Jappelli and Pistaferri, 2014). Auclert (2015), Cloyne, Ferreira, and Surico (2016), Di Maggio, Kermani, and Ramcharan (2014), Kaplan, Moll, and Violante (2016), McKay, Nakamura, and Steinsson (2015), and Werning (2015) focus in particular on the effect of income redistribution for the propagation of monetary policy shocks. To our knowledge, we are the first paper to argue redistribution may also be an important channel through which devaluation can affect output.[7]

While understanding the economy's behavior in spring 1933 is itself important, this paper is also relevant to the growing literature on macro policy at the zero lower bound. In the U.S. in spring 1933, as in Japan since the mid-1990s, and much of the developed world since 2008, short-term interest rates were near zero, and hence conventional monetary policy was ineffective. Economists continue to debate the extent to which unconventional monetary policy can stimulate an economy in these conditions.[8] In these debates, the U.S. experience

[6]Temin and Wigmore's principal evidence comes from a state-level regression of the level of auto sales in all of 1933 on farm income and other income in 1933. They interpret a larger coefficient on farm income as evidence in support of their hypothesis. While suggestive, this regression has three limitations: first, the left-hand side variable is the level of auto sales, while their hypothesis is about the *growth* of auto sales. Second, the farm income regression coefficient is positive and large for any year from 1932 until 1940, suggesting that these results are not necessarily informative about events in 1933 *per se*. Third, the regression uses annual data, hence it conflates auto sales in the period of interest, spring 1933, with sales later in the year.

[7]Drenik (2015) stresses redistribution among households following devaluation, but he focusses on the political economy implications rather than the real effects.

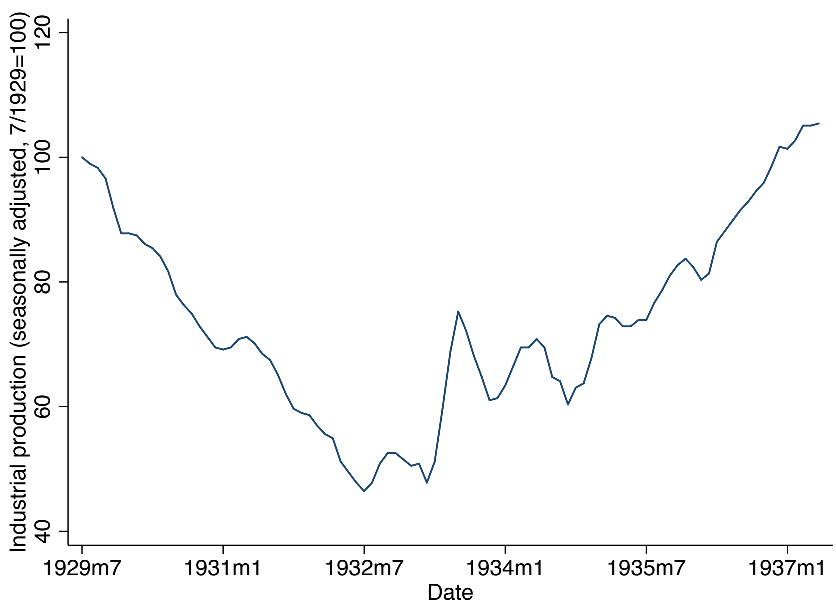
[8]The existence of the liquidity trap (i.e. the zero lower bound on interest rates) and its implications for monetary policy was first described by Keynes (1936) and Hicks (1937). Interest was reignited after rates fell to near zero in Japan in the mid-1990s (Krugman, 1998). Svensson (2003) and Woodford (2012) provide useful overviews.

in 1933 serves as an example of what policy may be able to achieve. For instance, the governor of the Bank of Japan, Haruhiko Kuroda, has used 1933 as a reference point for his ongoing attempts at a regime change in Japan (Kuroda, 2015). A better understanding of spring 1933 may inform economists' understanding of current Japanese policy (Hausman and Wieland, 2014, 2015; Romer, 2014). We conclude the paper with further discussion of the possible implications of the farm channel in 1933 for contemporary macroeconomic policy.

2 Spring 1933: Production rose

Before turning to explanations of the economy's growth in the spring of 1933, it is useful to reexamine the data. Given that the period of especially rapid growth is just four months, from March to July 1933, it is natural to ask how sensitive our measurement of growth is to seasonal adjustment methods or to alternative measures of economic activity. Our analysis of the production data in this section is brief, since our findings closely follow those in Taylor and Neumann (2016); like them we conclude that the economy indeed grew extraordinarily rapidly in spring 1933.

Figure 1 – Industrial Production, 1929-1937



Source: FRED series INDPRO.

2.1 Industrial production Figure 1 shows total, seasonally adjusted industrial production from 1929 to 1940. The 57 percent growth from March to July 1933 is extraordinary both in absolute and relative terms. Other than in spring 1933, the Federal Reserve industrial production index has never risen by more than 21 percent in four months.[9] Table 1 shows seasonally adjusted monthly growth rates of total industrial production with its three primary subcomponents, durable manufacturing, nondurable manufacturing, and minerals. Since they are central to Temin and Wigmore's farm income channel, and since our primary measure of local economic activity is auto sales, table 1 also shows the monthly growth rate of auto production.[10] All components of industrial production rose from March to July 1933, but the most dramatic increase was in durable manufacturing, with auto production rising even more rapidly than durable manufacturing as a whole. In the four-month period, seasonally adjusted durable manufacturing grew 138 percent and autos production 152 percent, while nondurable manufacturing rose 42 percent and mining 17 percent.

Table 1 – Industrial production, monthly growth rates in 1933 (%)

Month	Total IP	Dur. Manu.	Autos	Nondur. Manu.	Minerals
January	0.0	0.0	−2.2	0.0	1.5
February	−1.7	−5.1	−25.0	−1.4	4.5
March	−5.3	−13.5	−18.2	−5.7	4.3
April	7.4	21.9	51.9	9.1	−9.7
May	17.2	25.6	19.5	13.9	15.4
June	14.7	28.6	20.4	11.0	5.3
July	10.3	20.6	15.3	3.3	6.3
August	−4.7	−3.9	5.9	−6.4	3.6
September	−6.1	−8.2	2.8	−4.5	−5.7
October	−5.2	−4.5	−2.7	−4.8	−7.3
November	−5.5	−15.6	−51.4	−2.5	1.3
December	1.4	5.6	2.9	0.0	−1.3

Note: All series were seasonally adjusted by the Federal Reserve (1940).
Source: Data are from Federal Reserve (1940).

Such rapid growth rates over a short period naturally lead to questions of data quality:

[9] FRED series INDPRO. The 21 percent increase occurred from September 1934 to January 1935.

[10] Auto production itself had only a 4.8 percent weight in the Federal Reserve industrial production index (Federal Reserve (1940), p. 761). However, Temin and Wigmore argue that as a large consumer of steel and other inputs, developments in the auto industry had large effects on industrial production and the economy as a whole. For further discussion of the macroeconomic importance of the auto industry in the 1930s, see Hausman (2016).

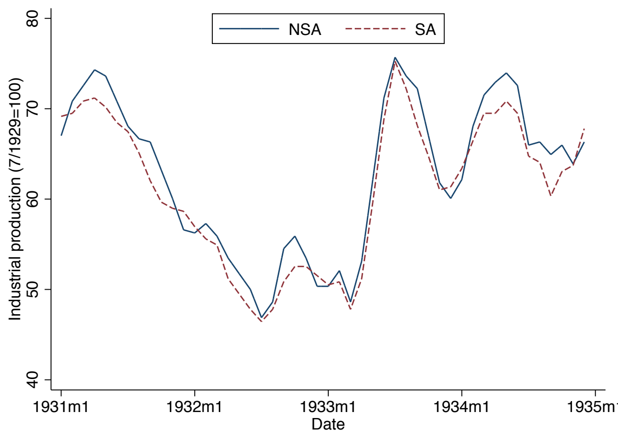
should one believe that seasonally adjusted industrial production rose 57 percent in spring 1933 or might this reported increase be a result of data construction problems? The data suggest the former. The first check is to consider the behavior of non-seasonally adjusted production. This is shown in figure 2a. The rapid increase in industrial production is also present in the raw, non-seasonally adjusted data and is not a regular seasonal phenomena. Only in 1933 does one see such a dramatic increase in spring. A second check on data quality is to see whether the rapid production increase is driven by outliers. It appear not. Of the 19 individual industry production series comprising durable manufacturing published in Federal Reserve (1940), eight saw seasonally adjusted production rise more than 100% between March and July 1933; all but one (railroad car production) of the 19 saw production rise more than 20%.

2.2 Other production indicators A further check on the industrial production data is to consider alternative indicators of economic activity. Figure 2b shows two such indicators: the Federal Reserve index of freight car loadings and nonagricultural employment (Federal Reserve, 1941). Freight car loadings measure the real quantity of shipments by rail, with underlying data from the railroads themselves. The broad picture is similar to that for industrial production. After reaching a trough in March 1933, seasonally adjusted freight car loadings grew rapidly through July. In these four months, the seasonally adjusted series rose 40 percent.

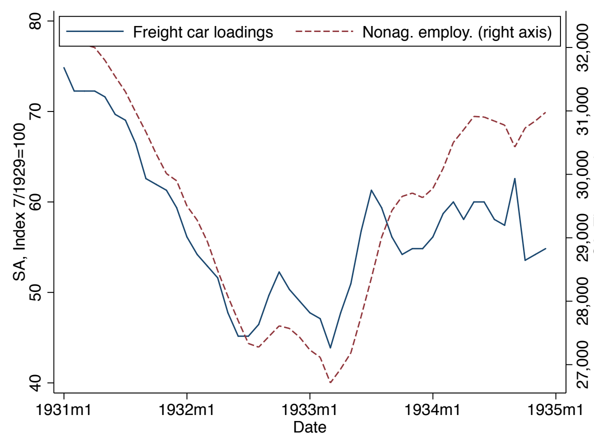
It is also natural to examine the evolution of employment. Caution is necessary since the employment data are not entirely independent of the industrial production data. For some industries, the industrial production figures rely heavily on the Bureau of Labor Statistics establishment survey, which is the employment data's source (Federal Reserve, 1940, p. 761). Nonetheless, it is reassuring that, like industrial production, employment rose rapidly in spring 1933. Total, seasonally adjusted, nonagricultural employment grew from 26.7 million in March 1933 to 28.4 million in July.[11] Seventy-three percent of this employment increase was accounted for by an astonishing 20 percent increase in manufacturing employment.[12]

[11]Note that these employment data exclude relief workers. Data are from Federal Reserve (1941) p. 534.

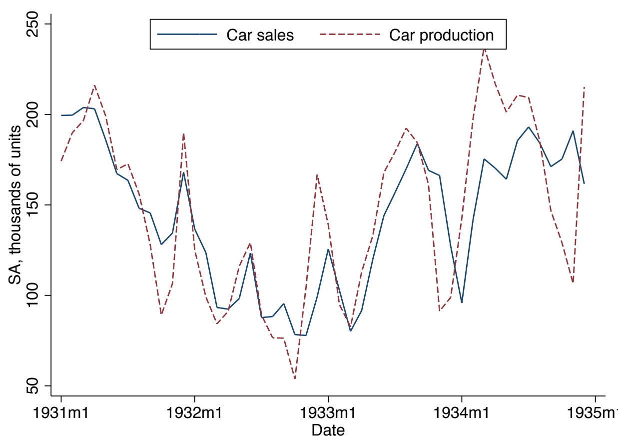
[12]Manufacturing employment rose from 6.12 million in March to 7.36 million in July (Federal Reserve, 1941, p. 534).



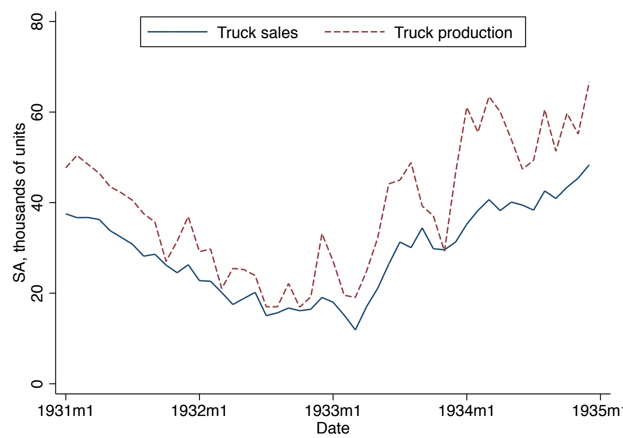
(a) Non-seasonally adjusted and seasonally adjusted industrial production



(b) Freight car loadings and employment



(c) Car sales and production



(d) Truck sales and production

Figure 2 – Notes: See text for details on the seasonal adjustment of car and truck sales / production. Production data are measured in actual units produced and differ slightly from the index of auto production produced by the Federal Reserve as part of its industrial production index. Thus the production data graphed here are similar but not identical to the auto production figures reported in table 1.
Sources: Industrial production: Federal Reserve Board, G.17 data release. Freight car loadings and employment: Federal Reserve (1941). Cars: Sales data are from NBER macrohistory series m01109; production data are from NBER series m01107a. Trucks: Sales data are from NBER macrohistory series m01146a; production data are from NBER series m01144a.

2.3 Sales Together, the data on industrial production, employment, and freight car loadings leave little doubt that output rose rapidly in spring 1933. But was the recovery of production due to contemporaneous consumer demand or to expectations of future demand? If the former, the historians' task is to explain the increase in consumption. If the latter, to explain why firms expected higher future sales. Therefore we examine the behavior of sales in spring 1933. Figure 2c shows seasonally adjusted passenger car sales and production from 1931 through 1934.[13] Seasonally adjusted sales behave similarly to production in spring 1933, roughly doubling from March to July. Figure 2d presents the analogous data for trucks. Interestingly, the recovery of truck sales is even more rapid than that of car sales in spring 1933: they rise 163 percent from March to July.[14] Unfortunately, the more rapid growth of truck sales does little to distinguish between the overall inflation expectations channel and a farm specific channel. It is consistent both with high demand for trucks from businesses and from farmers.

As with cars, the difference between truck production and sales is not obviously anomalous in spring 1933. Figures 2c and 2d suggest a roughly parallel movement in production and sales of cars and trucks. Thus explanations of the recovery, at least of this important sector, must explain a rise not only in production, but also in consumer and investment demand.[15] This mirrors the finding of Taylor and Neumann (2016) that manufacturing inventories behaved normally in spring 1933.

[13] Sales data are from NBER macrohistory series m01109; production data are from NBER series m01107a. Neither series was seasonally adjusted by the source. We seasonally adjust the series by regressing the natural logarithm of each series on monthly dummies and monthly dummies interacted with a post 1935 dummy variable. The second set of dummies are necessary since the date of new model introduction - an important determinant of car sales and production - changed in 1935 (Cooper and Haltiwanger, 1993). The sample period for the regression is January 1925 to December 1940. The series graphed in figure 2c is $e^{\hat{\varepsilon_t}} \cdot \frac{\bar{y}}{\bar{x}}$, where $\hat{\varepsilon_t}$ are the residuals from the regression of the natural log of sales or production on the monthly dummies, $\bar{y}$ is the mean of non-seasonally adjusted sales over the period, and $\bar{x}$ is the mean of $e^{\hat{\varepsilon_t}}$.

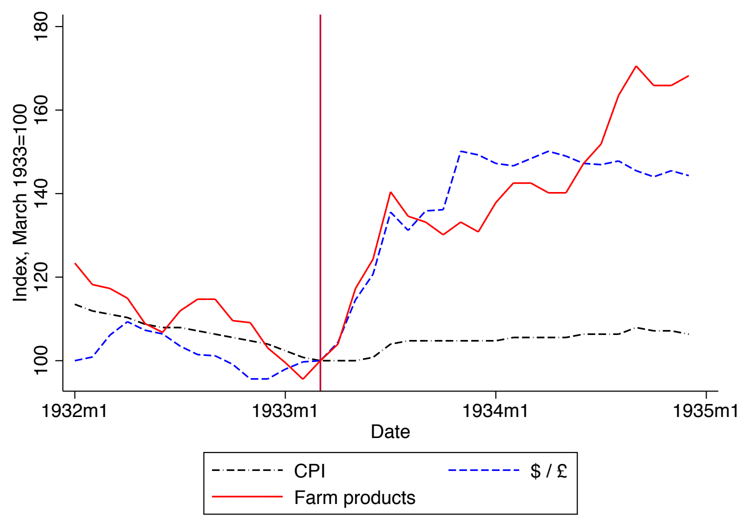
[14] Sales data are from NBER macrohistory series m01146a; production data are from NBER series m01144a. The seasonal adjustment procedure is identical to that for passenger cars. See footnote above.

[15] This casts doubt on Kindleberger's (1973) statement that recovery in spring 1933 was "[b]ased on inventory accumulation rather than long-term investment" (p. 233).

3 Spring 1933: Relative farm prices rose

Central to our argument for the importance of agriculture in 1933 is the behavior of agricultural prices. Figure 3 graphs the overall CPI and the BLS index of farm product prices. From 1932 to 1934, there was relatively little change in the CPI, though it did rise 4% between March and July 1933. By contrast farm product prices rose 40% in these four months. The figure suggests a possible cause of this large price change: devaluation. In the three months following devaluation on April 19th, the dollar depreciated by 30 percent relative to the British pound. The exchange rate vis a vis many other currencies behaved similarly: against the French franc, the dollar depreciated 34%; against the German mark, 36%.[16] Since prices of traded farm products were set in world markets, when the dollar depreciated, the dollar price of many farm products rose.

Figure 3 – The CPI, the exchange rate, and farm prices



Note: The vertical line indicates March 1933, the month before the U.S. devalued. Sources: CPI data from FRED series CPIAUCNS; exchange rate from *Survey of Current Business*, 12/1932 p. 32, 12/33 p. 31, 12/34 p. 32, 12/35 p. 33; farm product price index from *Federal Reserve Bulletin*, 12/1932 p. 788, 12/1933 p. 783, 4/1935 p. 237.

Of course, not all farm products were traded, and dollar devaluation was not the only shock to affect farm prices in 1933. Thus while in spring 1933 aggregate farm product prices tracked the exchange rate closely, there was important variation across farm products.

[16] *Survey of Current Business*, 12/1933, p. 31.

Table 2 – Farm product prices

Panel A: Crops

	\$ / £	Wheat	Corn	Oats	Cotton	Tobacco	Hay	Potatoes
Prices (Index, 3/1933=100)								
March	100	100	100	100	100	100	100	100
April	104	130	137	124	100	95	104	109
May	115	171	189	158	134	90	108	112
June	121	170	195	169	143	105	109	127
July	136	252	269	285	174	400	119	251
August	131	217	237	235	144	203	128	336
1932, average	102	110	154	115	107	164	105	101
1933, average	123	215	253	244	167	187	137	211
1934, average	147	246	396	350	203	280	234	120
Production								
1932 farm value (\$, millions)		284	925	195	424	108	516	141
1932-1933 change in quantity (%)		−29	−19	−41	0	34	−10	−11
1933 gross trade share, $\frac{(X+M)}{Y}$ (%)		9	0	0	62	39	0	1
AAA intervention in 1933		Yes	Yes	No	Yes	Yes	No	No

Panel B: Animal products

	\$ / £	Cattle	Hogs	Milk	Chickens	Eggs
Prices (Index, 3/1933=100)						
March	100	100	100	100	100	100
April	104	104	100	98	108	102
May	115	115	120	104	114	117
June	121	118	123	110	110	100
July	136	116	124	121	114	130
August	131	111	118	126	108	132
1932, average	102	119	107	117	122	141
1933, average	123	106	122	119	100	137
1934, average	147	113	130	138	123	168
Production						
1932 farm value (\$, millions)		503	540	1314	267	374
1932-1933 change in quantity (%)		8	8	3	1	−1
1933, gross trade share, $\frac{(X+M)}{Y}$ (%)		1	6	N/A	N/A	N/A
AAA intervention in 1933		Yes	Yes	Yes	No	No

Notes and sources: Prices are producer prices (prices received by farmers) with monthly prices as of the 15^{th} of the month, and annual prices a weighted average for the crop season. Farm value equals physical production times the annual price. The presence or absence of AAA intervention is based on facts reported in Nourse, Davis, and Black (1937) and United States Department of Agriculture (1934a). For further notes and source details, see appendix A.

Table 2 summarizes prices and production for the 11 farm products with greater than $100 million of farm value in 1932.[17] The top panel provides data for crops, and the bottom panel for animal products. For reference, the first column shows the dollar / pound exchange rate. It makes clear that the greatest weakening of the dollar occurred from April to May, and then again from May to June. The top panel shows that grain and cotton prices followed a similar pattern of large price increases between April and May and again between June and July. The price behavior in panel A does, however, exhibit two peculiarities. The first is the large price response of some nontraded crops. Oats, corn, and potatoes were all essentially nontraded, yet their price rose rapidly in spring 1933. A second peculiarity is the size of the price response. Between April and July 1933, the dollar depreciated 30% against the pound while wheat and cotton prices rose nearly 100%.

These peculiarities are at least in part explained by two factors: (1) there was some scope for substitution between grains. For instance, wheat was used as a substitute for corn in animal feed (Davis, 1935, p. 23). If substitution between grains was important, as a weaker dollar increased the price of traded grains such as wheat, it would also have put upward pressure on the price of nontraded grains such as oats and corn. (2) With the exceptions of cotton and tobacco, 1933 production of all the crops in table 2 declined. This decline in production was in large part due to drought (United States Department of Agriculture (1934b), United States Department of Agriculture (1934a)), but the Agricultural Adjustment Administration (AAA) programs to reduce acreage also contributed for some crops (indicated in the table). Both factors likely contributed to higher prices.

Panel B shows price and production behavior for animal products. Like corn, oats, and potatoes, animal products were mostly untraded. But unlike these crops, animal products were perhaps less likely to be close substitutes, and their production did not decline in 1933. Thus unlike crop prices, animal product prices rose only moderately in spring 1933. In the next section, we will take advantage of the quite different behavior of crop and livestock prices to examine the relationship between higher farm product prices and farmers' consumption.

The coincidence of large crop price increases and devaluation, as well as the lack of large

[17]Farm value is physical production times the producer price. In addition to the products in the table, butterfat had a farm value of greater than $100 million. We exclude it from the table because it is a by-product of milk production.

Table 3 – Announcement effect of devaluation

Date	\$ / £	Cotton cents / lb	Cotton, Liverpool pence / lb	Wheat cents / bushel
4/18/1933	3.49	6.85	5.36	86.13
4/19/1933	3.61	7.25	5.29	88.50
4/20/1933	3.85	7.45	5.27	90.50
Change 4/18-4/20 (%)	10.25	8.76	−1.68	5.08

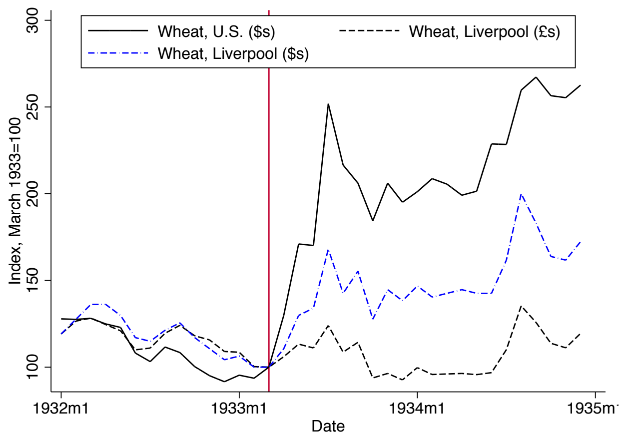
Notes and sources: The exchange rate is the noon buying rate in New York from the *Commercial and Financial Chronicle*, 4/22/1933, p. 2667. The U.S. cotton price is the New York price for Middling Upland from the *Commercial and Financial Chronicle*, 4/22/1933, p. 2821. The Liverpool cotton price is for Middling Upland; it is from the *Commercial and Financial Chronicle*, 4/22/1933, p. 2823. The wheat price is the New York price for No. 2 red from the *Commercial and Financial Chronicle*, 4/22/1933, p. 2823.

price changes for livestock products, is circumstantial evidence in favor of the importance of devaluation as a cause of crop price increases. To obtain more direct evidence of devaluation's causal effect, we perform two exercises. First, we examine daily data on the exchange rate, cotton prices, and wheat prices around April 19, 1933, when the dollar was devalued. These data are presented in table 3. Between noon on April 18th and noon on April 20th, the dollar depreciated slightly more than 10%.[18] Over this period, the dollar price of cotton moved by almost exactly the same amount. In contrast, expressed in sterling, the Liverpool price of cotton was nearly unchanged. This strongly suggests that the change in the dollar price of cotton was a causal effect of devaluation rather than a response to other shocks. The short time window increases our confidence in this conclusion, as does the *Commercial and Financial Chronicle*'s judgement that on April 19th, "the news of the gold embargo was the principal factor pushing up [cotton] prices 39 to 42 points" (4/22/1933, p. 2820). Wheat prices also advanced as the dollar weakened, but less so than cotton. As with cotton, the *Commercial and Financial Chronicle* attributed this price increase to devaluation.

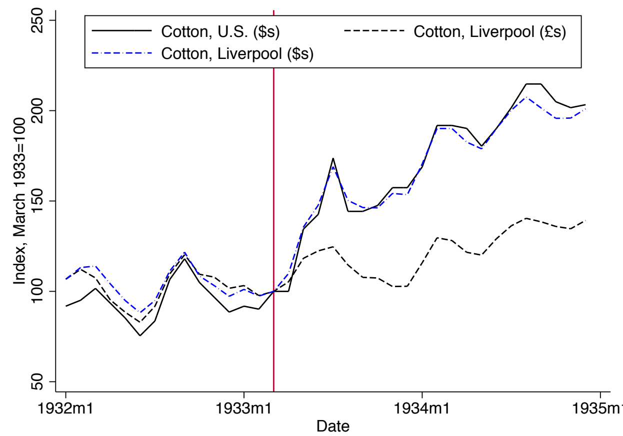
A second source of evidence on the effect of devaluation on crop prices is to compare the time series of U.S. prices with British prices in spring 1933. Figure 4 shows results

[18] The *Commercial and Financial Chronicle* emphasized unusual conditions in the foreign exchange market in this period. They seemed to think or hope that the dollar's depreciation would not persist. In their words (4/22/1933, p. 2664): "[F]oreign exchange transactions in all markets except as they originate in speculative movements have been brought to a virtual standstill. Hence it follows that the present exceptionally high quotations for sterling and the major European currencies with respect to the dolar are largely nominal, not to say fictitious and unwarranted."

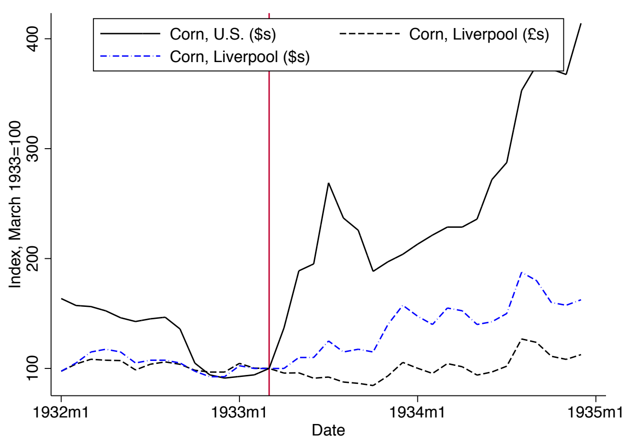
of this exercise for wheat, cotton, and corn. These are the crops in table 2 for which the Department of Agriculture provided data on Liverpool prices. Each panel of the figure shows three lines: (1) The U.S. price paid to producers; these are the prices reported in table 2. (2) The wholesale price of the product in Liverpool, in sterling. (3) The wholesale price of the product in Liverpool, in U.S. dollars. By construction, the Liverpool price in dollars equals the price in sterling multiplied by the exchange rate. Defined in this way, the difference between the Liverpool price in dollars and the Liverpool price in sterling shows the direct effect of devaluation on prices; the difference between the U.S. price and the Liverpool price in dollars shows the effect of U.S. specific factors.



(a) Wheat



(b) Cotton



(c) Corn

Figure 4 – Notes and sources: The vertical line indicates the month before devaluation, March 1933. U.S. prices are producer prices. By construction, the Liverpool price in sterling equals the U.S. price divided by the $ / £ exchange rate. For further notes and source details, see appendix A.

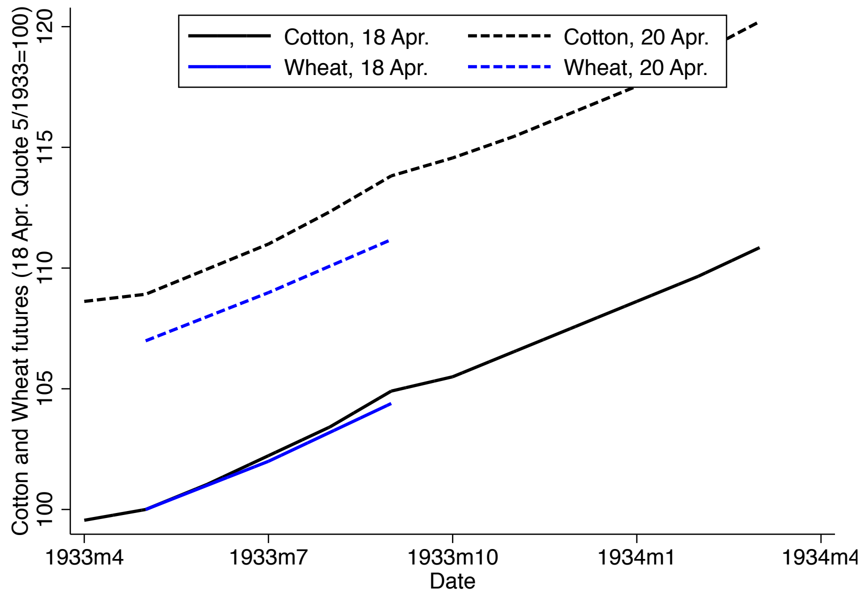
Panel 4a shows the behavior of wheat prices. All three definitions of prices move together closely prior to devaluation (indicated by the vertical line). After devaluation, Liverpool wheat prices in sterling are roughly flat. The position of Liverpool wheat prices in dollars (the blue dashed line) roughly halfway between U.S. wheat prices in dollars and Liverpool wheat prices in sterling, suggests that roughly half the U.S. wheat price increase was accounted for by devaluation, with the other half coming from shocks to the U.S. wheat market. The deviation of U.S. wheat prices from world wheat prices was presumably possible because of the only modest integration of the U.S. wheat market with the world.

In contrast to wheat, which was mostly domestically consumed (table 2), most cotton was exported, and the dollar prices of cotton in the U.S. and in Liverpool tracked each other closely. Panel 4b shows that all of the increase in U.S. cotton prices in dollars relative to Liverpool cotton prices in sterling can be accounted for by devaluation. While cotton is the extreme case of a traded crop, corn is the extreme case of a nontraded crop. As we saw in table 2, essentially none of the U.S. corn crop was exported. The predictable result, visible in panel 4c, is little alignment between U.S. prices of corn and Liverpool prices of corn expressed in dollars. Thus it is difficult to judge how much of the spring 1933 increase in corn prices was accounted for by devaluation.

To sum up, the evidence strongly suggests that devaluation accounted for a significant part of the increase in crop prices in spring 1933. The evidence for this statement is strongest for cotton, which of the major crops was most tightly tied to world markets. Wheat is an intermediate case of a partially traded crop, for which devaluation appears to account for part, but not all, of the U.S., price increase. Corn, oats, potatoes, and hay were essentially nontraded, and hence not directly affected by devaluation. But insofar as they could be substituted for wheat, devaluation likely accounted for some of their price increase.

3.1 Higher farm prices and farm income Higher farm prices translated quickly into higher farm incomes. The Department of Agriculture's seasonally adjusted index of income from crops rose 193% from March 1933 to July 1933. On a non-seasonally adjusted basis, total (crop and animal product) farm income was higher in June and July 1933 than it had been in any month in 1932 (U.S. Department of Commerce, 1936, p. 9). The current-day Bureau of Economic Analysis personal income data show nominal farm income rising

Figure 5 – Devaluation and futures prices



Notes: Devaluation occurred on 19 April, 1933. Source: *Commercial and Financial Chronicle*, 4/22/1933, p. 2820 for cotton and p. 2823 for wheat.

17% from 1932 to 1933.[19] Importantly, this increase occurred despite a large decline in the production of most crops (table 2).

These income gains were likely expected to persist. Three pieces of data support this inference. First, along with higher crop spot prices came higher crop future prices. Figure 5 shows the behavior of wheat and cotton futures prices around the day of devaluation. Thus the figure can be compared with the behavior of wheat and cotton spot prices shown in table 3. Like spot prices, wheat and cotton future prices rose significantly, even for the furthest dated contracts.

A second reason to suppose that farmers likely saw their spring 1933 income gain as persistent – or even permanent – was the Roosevelt administration's statements and policy. As discussed in the introduction, raising the relative price of agricultural products was an explicit goal of the Roosevelt administration. Roosevelt himself frequently and publicly emphasized this. The quote beginning the paper comes from a campaign speech given by Roosevelt on October 24, 1932. As president, he repeated this message. For instance, in a fireside chat in October 1933, Roosevelt said: "I do not hesitate to say in the simplest,

[19]Table SA4, downloaded on 20 June, 2016.

clearest language of which I am capable, that although the prices of many products of the farm have gone up and although many farm families are better off than they were last year, I am not satisfied either with the amount or the extent of the rise, and that it is definitely a part of our policy to increase the rise and to extend it to those products which have as yet felt no benefit. If we cannot do this one way we will do it another. Do it, we will."[20] Such language is likely to have led farmers to expect higher farm prices to persist.

Finally, the behaviour of farm land prices suggests that the increases in farm prices and incomes induced by devaluation were expected to be long-lasting. For the country as a whole, farm land prices rose 4% between March 1, 1933 and March 1, 1934. In line with the importance of devaluation, the greatest farm land price increases occurred in the south, in states growing the internationally traded crops of cotton and tobacco.[21] If farm prices increases were expected to be only temporary, it is unlikely that they would have been capitalized in land prices in this way.

4 Farm consumption

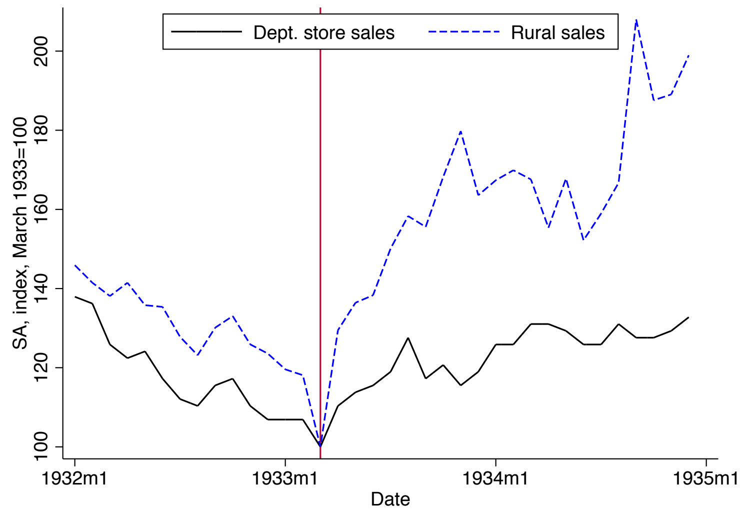
In this section, we explore the effect of higher farm prices on farm consumption. This is a partial equilibrium exercise in which we compare consumption in areas with more farmers or greater crop value per capita to areas with fewer farmers or less crop value per capita. Relatively higher consumption in farm-intensive areas is a necessary condition for positive effects of higher farm prices on aggregate output. But it is not a sufficient condition, since aggregate effects also depended on the response of nonfarm areas to higher farm product prices. In section 5, we will consider these general equilibrium effects of higher farm product prices.

To understand the evolution of farm consumption relative to nonfarm consumption, we start by comparing department store sales to rural sales of general merchandise (figure 6). We consider department store sales to be a rough proxy for urban consumption, since department stores were located in cities. Both department store and rural retail sales followed a similar downward path in 1932. Department store sales then rose 19% between March and July

[20] Complete speech available at Fireside chat, 10/22/1933.

[21] Farm land price data by state are available in Stauber and Regan (1935b), table 1, pp. 6-7.

Figure 6 – Department store sales and rural general merchandise sales



Note: The vertical line indicates the month before devaluation, March 1933. Source: U.S. Department of Commerce (1936), pp. 27-28.

1933, while rural sales of general merchandise rose 50%. The very rapid growth of rural sales was in part driven by a the sharp drop in March that was reversed in April. But the relatively more rapid growth of rural sales does not depend on this single observation: February to July, department store sales grew 11% while rural sales grew 27%; April to July, department store sales grew 8% while rural sales grew 16%. The relatively rapid increase in rural consumption fits with the argument of this paper that recovery in spring 1933 was in part driven by farm demand. But while instructive, the limited cross-sectional variation in department store and rural sales prevents us from ruling out or controlling for alternative mechanisms.

We therefore use new auto sales as our main outcome variable to measure the strength of the farm channel. Unlike other measures of consumption, auto sales were reported at the state and county level and at reasonably high frequency: monthly at the state level and annual at the county level. Of course, car sales are only one part of consumption, but they are a good measure for present purposes, because they were a significant driver of the recovery in industrial production, and because they are likely to have been correlated with overall consumption. We collected data on new passenger car sales by state from the *Automotive Daily News Review and Reference Book* (1935, pp. 22-23), and by county from

Sales Management.[22]

In what follows we use a combination of monthly state auto sales and annual county auto sales to establish the importance of the farm channel. While the county data allow us to estimate the effect of many covariates in a way that is not possible with the 48 observations in a cross-state regression, the data also come with three disadvantages. (1) They are annual rather than monthly, providing only an imperfect window into the crucial March-July 1933 period. (2) They suffer from some reporting error. We know this because uniquely for Wisconsin, we have official data on new car registrations by county that we can compare to the data from *Sales Management*.[23] Across the 48 Wisconsin counties for which *Sales Management* provides data on 1932 sales, the correlation between the 1932-33 percent change in *Sales Management* and that in the official data is 0.85. This is high enough to reassure us that there is a strong signal in the *Sales Management* data, but it also indicates substantial reporting error.[24] Since the change in auto sales will be our dependent variable, not our independent variable, this error is more likely to increase our standard errors than it is to bias our estimates. (3) The third disadvantage of the county relative to the state data is that it is incomplete. *Sales Management* provided data on 1932 sales for 2154 counties out of a total of 3100 U.S. counties.[25] But *Sales Management* covered most counties with substantial population and auto sales. Thus while the data cover 69% of U.S. counties, they account for 86% of 1932 auto sales.

Our independent variables of interest measure the agricultural intensity of a state or county. Figure 7a shows the share of each county's population living on farms in 1930. Darker shading indicates more of the population living on farms. States with large cities, such as Illinois or New York, had small shares of their population on farms. States in the Great Plains and the South had high shares. There is also substantial variation within states

[22]Data on the percent change in car sales between 1932 and 1933 are provided in *Sales Management*, 4/20/1934, pp. 363-404. Data on 1933 and 1934 sales are provided in *Sales Management*, 4/10/1935. We calculate the level of sales in 1932 by applying the percent change given in *Sales Management* to the 1933 level of sales.

[23]Official new car registration data for Wisconsin are from "Report of New Car Registrations for the Year 1932" and "Report of New Car Registrations for the Year 1933." Both are available at the Wisconsin State Historical Society.

[24]In the empirical work described below, we substitute the official data for the *Sales Management* data for Wisconsin.

[25]This is the number of counties in 1930, minus 2, because Campbell and Milton county Georgia merged with Fulton county Georgia at the end of 1931.

between rural and urban areas and between rural farm and rural nonfarm areas. For instance, the upper peninsula of Michigan was a rural area with few farmers. Of course, many farmers were engaged in the production of livestock products whose prices moved relatively little in 1933. Thus as an alternative measure of the importance of a channel from devaluation to consumer demand, we look at the value of crops sold per capita in 1929. Variation across counties in this variable is shown in figure 7b. For this variable, the highest values are in the Great Plains. Like farm share, the value of crops sold per capita is on average low in urban states.

4.1 Cross-state results Figure 8a shows a scatter plot of the farm share of the population and the seasonally-adjusted change in car sales from the October 1932-March 1933 average to the July-December 1933 average.[26] We show the change between six-month averages since the single month (or quarter) values have large amounts of noise that is more likely due to idiosyncratic variation than it is to macro shocks. There is a clear positive relationship, with auto sales growing faster in farm areas. Figure 8b replaces farm share with the per capita value of crops sold in 1929. There is again a positive relationship.

A concern is that this relationship is driven by confounding variables. Hence we estimate cross-sectional regressions of the form:

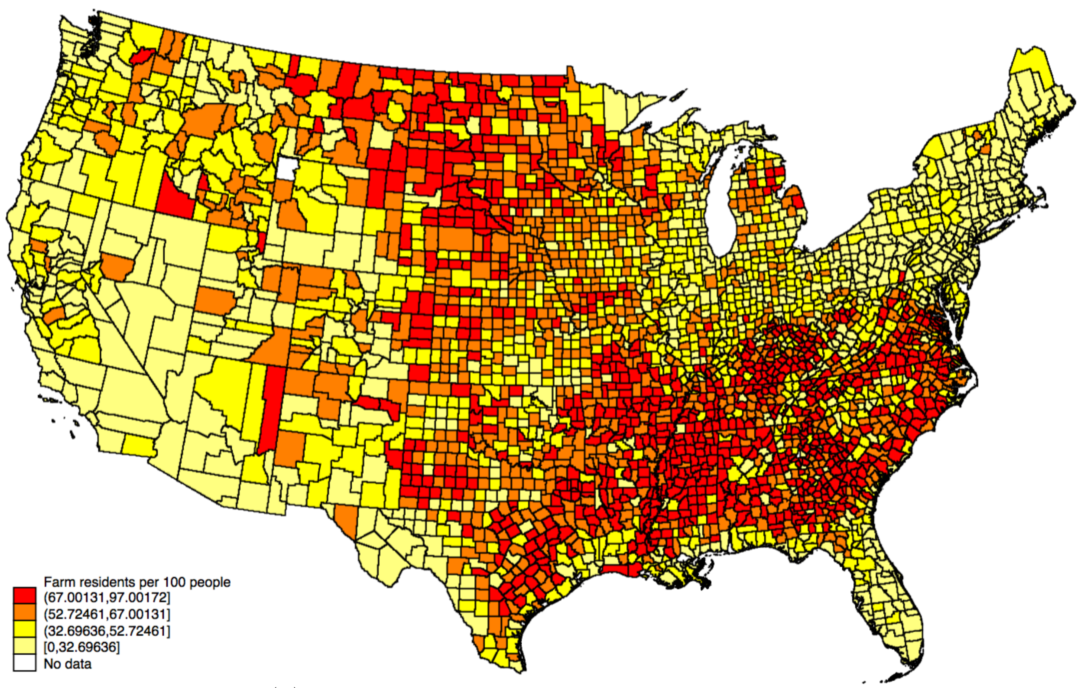
$$\%\Delta \text{Auto sales}_i = \beta_0 + \beta_1 \text{Agricultural indicator}_i + \gamma' X_i + \varepsilon_i, \tag{1}$$

where "Agricultural indicator" is an indicator of a state's exposure to the farm channel, and X is a set of control variables.

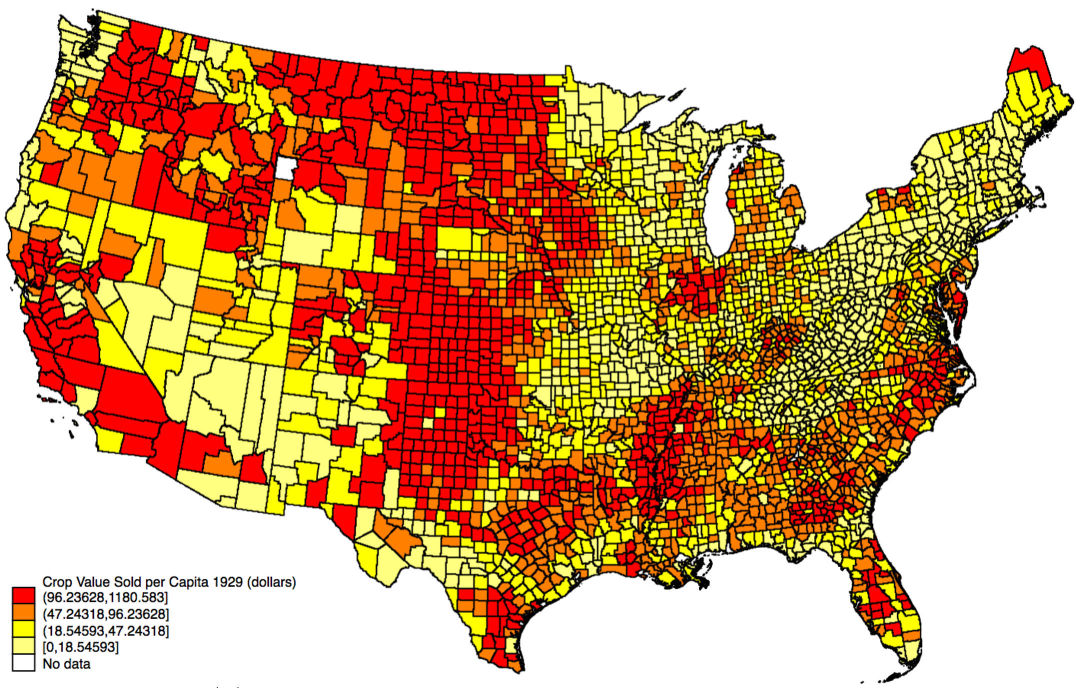
The first four columns of the top panel of table 4 show results from a regression of the percent change in seasonally adjusted auto sales on the share of a state's population living on farms and four different sets of control variables. Column 1 corresponds to figure 8a and is a univariate regression without controls. Columns 2 and 4 include state population levels, the democratic presidential vote share in 1932, the black population share, and census region fixed effects. In columns 3 and 4 we include 6 lags of the dependent variable. Columns 5 through 8 repeat the same set of regressions for non-seasonally adjusted auto sales growth.

[26] We seasonally adjust by state using an ARMA(1,1) model with twelve monthly dummies.

Figure 7 – Agricultural intensity by county



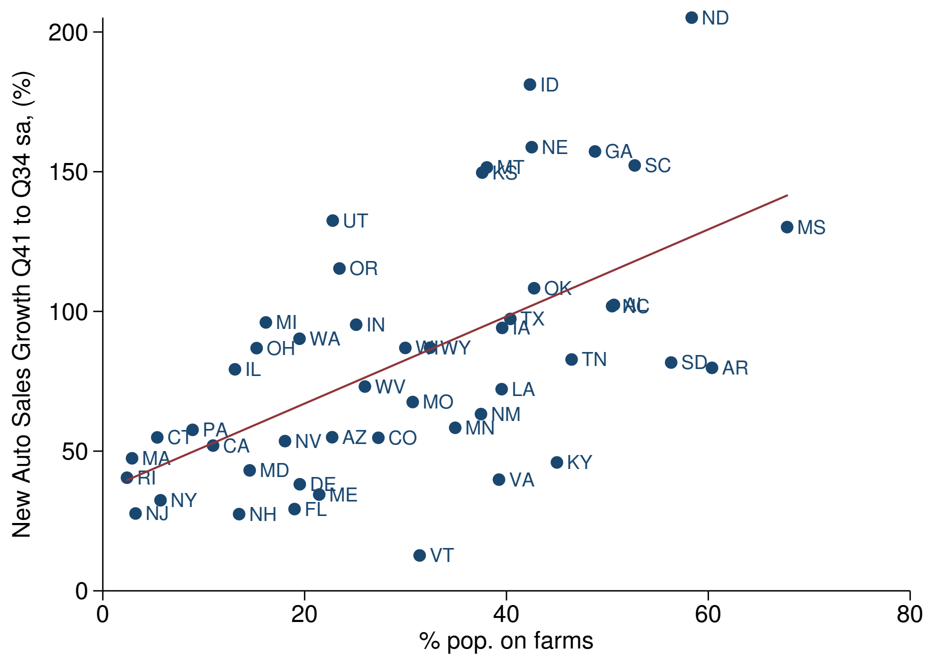
(a) Farm residents per 100 people in 1930



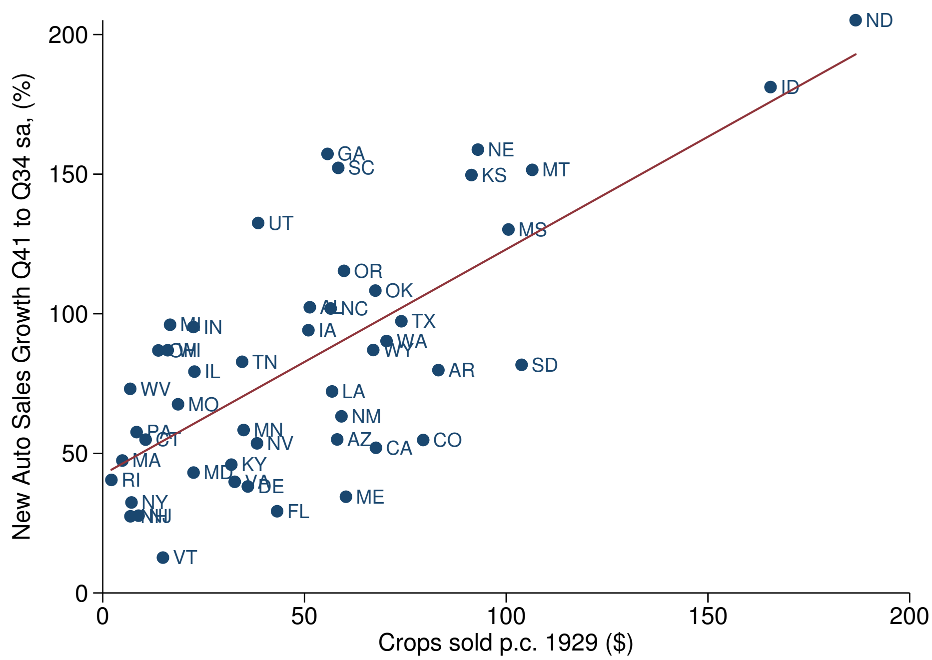
(b) Value of crops sold or traded per capita in 1929

Note: Darker colors denote more farm residents or a larger dollar value of crops sold per capita in a county.
Source: Farm population data are from the 1930 Census as reported in Haines and ICPSR (2010). Crops sold are from the 1940 Census as reported in Haines et al. (2015).

Figure 8 – Percent change in car sales and farm channel exposure



(a) Farm population share



(b) Crops sold per capita

Note: Auto sales growth is measured as the percent change in seasonally-adjusted auto sales from the October 1932-March 1933 average to the July-December 1933 average. Sources: Auto sales - see text. Farm share - the 1930 Census as reported in Haines and ICPSR (2010). Crops sold - the 1940 Census as reported in Haines et al. (2015)

Table 4 – Auto sales growth in spring 1933 (% changes)

Panel A: Farm population share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% pop. on farms	1.56***	1.39***	0.70**	0.87**	1.69***	2.15***	1.32**	1.22
	(0.30)	(0.50)	(0.30)	(0.41)	(0.53)	(0.74)	(0.54)	(0.77)
Population (millions)		0.94		1.38		−2.33		−0.52
		(1.32)		(1.44)		(1.63)		(2.47)
FDR vote % 1932		0.60		−0.064		0.039		−0.23
		(0.66)		(0.44)		(1.02)		(0.88)
% pop black		0.20		0.25		0.85		1.80
		(0.71)		(0.66)		(1.19)		(1.09)
Seasonally Adjusted Auto Sales	Yes	Yes	Yes	Yes	No	No	No	No
Region Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Lagged Dependent Variable	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.35	0.51	0.70	0.71	0.22	0.35	0.54	0.59
Observations	48	48	48	48	48	48	48	48

Panel B: Crops sold or traded per capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crops sold p.c. 1929 ($)	0.81***	0.68***	0.41***	0.47***	0.83***	0.92***	0.57***	0.58**
	(0.081)	(0.13)	(0.11)	(0.14)	(0.18)	(0.19)	(0.17)	(0.22)
Population (millions)		0.91		1.02		−2.85*		−0.97
		(1.44)		(1.29)		(1.42)		(2.24)
FDR vote % 1932		0.38		−0.061		−0.086		−0.090
		(0.53)		(0.49)		(1.02)		(0.90)
% pop black		0.60		0.31		1.37		1.72*
		(0.61)		(0.61)		(1.10)		(1.01)
Seasonally Adjusted Auto Sales	Yes	Yes	Yes	Yes	No	No	No	No
Region Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Lagged Dependent Variable	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.51	0.62	0.72	0.75	0.29	0.43	0.53	0.61
Observations	48	48	48	48	48	48	48	48

Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

Note: The dependent variable is the percent change in auto sales from the October 1932-March 1933 average to the July-December 1933 average. In specifications controlling for lags of the dependent variable, we include the percent change in auto sales from April-September 1932 to January-June 1933, from October 1931-March 1932 to July-December 1932, and so on back to October 1929-March 1930 to July 1930-December 1930.

Sources: Auto sales - see text; percent of population on farms and percent of population black - the 1930 Census as reported in Haines and ICPSR (2010); value of crops sold per capita - the 1940 Census as reported in Haines et al. (2015); population: mid-year 1933 estimate as reported by the Bureau of Economic Analysis; FDR vote percentage - ICPSR (1999).

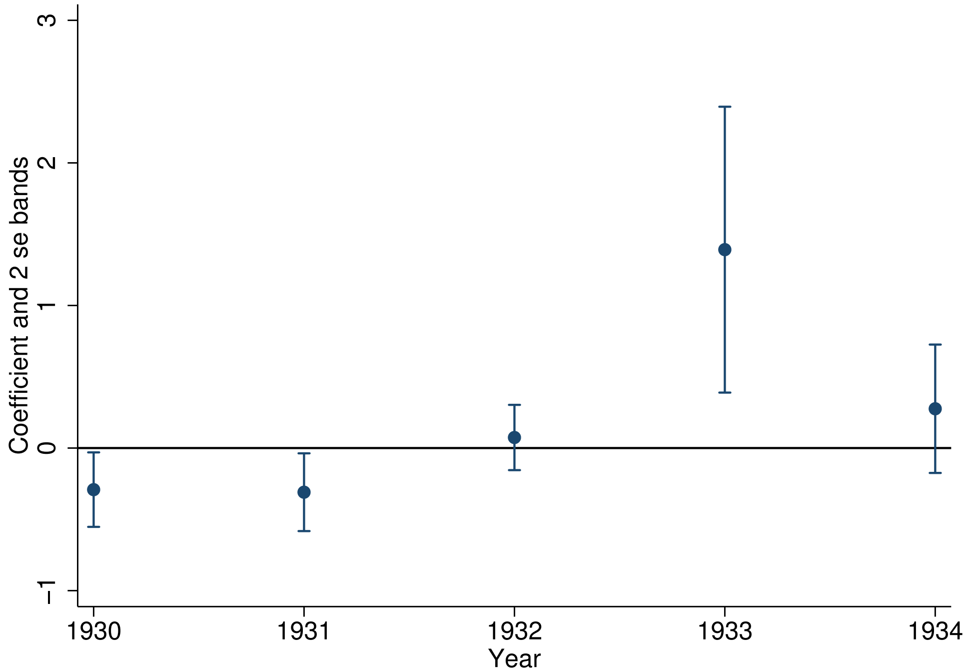
In all cases, the coefficient on the farm share of the population is positive, statistically significant, and economically large. For example, the coefficient in column 1 implies that a one standard deviation increase in the farm share (17%) raises auto sales growth in the 1933 recovery by 26.5 percentage points ($1.56 \cdot 17 = 26.5$). But even the smallest coefficient, 0.7 in column 3, means that a one standard deviation increase in the farm share would increase the growth rate of auto sales by a substantial 11.9 percentage points. As another benchmark, a coefficient of 0.7 means that if a state's farm share rose from 11 percent (that in California) to 50 percent (that in North Carolina), then auto sales growth would be 27.3 percentage points higher ($(50 - 11) \cdot 0.70 = 27.3$).

The lower panel of table 4 reproduces panel A replacing farm share with the per capita value of crops sold in a state in 1929. Again, the coefficients suggest economically significant effects. The smallest coefficient in the table, 0.41 in column (3), implies that a $1 increase in the value of crops sold per capita would increase car sales by 0.41 percentage points. The standard deviation of the per capita value of crops sold was $39, so the range of coefficients in panel B suggest that a one standard deviation increase in crops sold per person would correspond to a 16-36 percentage point increase in spring 1933 auto sales growth. This is quantitatively similar to the effect of farm share documented in panel A.

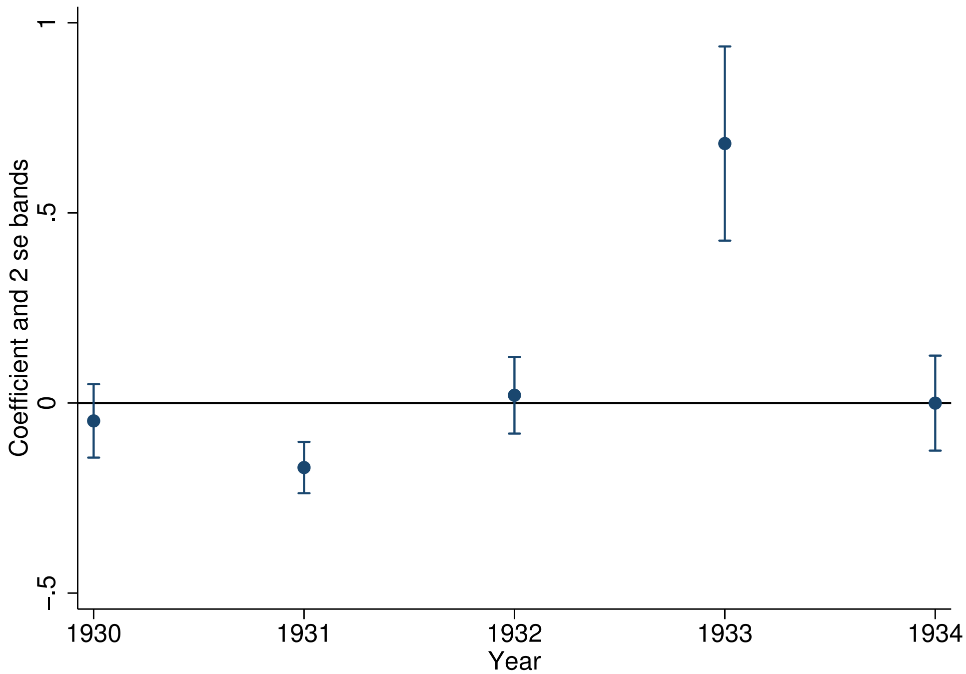
A natural question is whether auto sales always grew more rapidly in spring in states with large populations living on farms or high crop values per person. If so, this would suggest that the preceding evidence is not in fact indicative of a specific farm channel in the economy's 1933 recovery. If farm states saw more rapid auto sales growth in years when there was no dollar devaluation or change in crop prices, then the preceding results would not be evidence about the effects of these policies in spring 1933. Figures 9a and 9b show coefficients and two standard error bands from placebo tests, regressions of spring auto sales growth on farm share or crops sold for each year from 1930 to 1934 using the specification in column 2 of table 4. The large, positive, and statistically significant effect on auto sales growth is unique to 1933. This is strong evidence that the relationship between agriculture and auto sales growth reflects something specific to the 1933 recovery rather than a general relationship between agriculture and auto sales.

A second concern is that payments by the Agricultural Adjustment Act (AAA) rather

Figure 9 – Placebo tests



(a) Regression: Percent change in auto sales on farm population share (%)



(b) Regression: Percent change in auto sales on value of crops sold per capita ($)

Note: The dependent variable is the percent change in auto sales from the October 1932-March 1933 average to the July-December 1933 average. The specification is that in column (2) of panels A and B in table 4.
Source: See text.

than higher farm income through farm prices caused faster recovery in agricultural states. In appendix table 11 we provide evidence that this is not the case. To avoid capturing AAA payments, which were essentially non-existent before September 1933,[27] we define our dependent variable as the percent change in auto sales from the October 1932-March 1933 average to the July-August 1933 average. Results are essentially unchanged.

4.2 Cross-county results The state-level regressions establish that there was a strong positive relationship between auto sales growth and farm exposure in spring 1933. But the variation in farm product prices discussed above suggests that these effects were likely not uniform across farmers. In particular, to understand the specific effects of devaluation, we want to examine how farmers of traded crops versus farmers of nontraded crops and livestock responded in 1933. To do this, we turn to the county-level auto sales data.

We group crops with more than $100 million of 1932 farm value (panel A, table 2) into three categories. Traded crops include tobacco and cotton, since a significant fraction of these crops was traded internationally. Wheat was less traded than cotton and tobacco, but more traded than other crops, so we group it separately. We consider all other crops in table 2 to be nontraded. We also measure the amount of livestock sold and the amount of dairy sold in each county. Thus in total we have five farm exposure measures.

We believe that an analysis of these five different farm product categories is best done at the county level, where the large number of observations allows for precise inference. But as a benchmark, the first column of table 5 shows state level results. The dependent variable is again the percent change in seasonally adjusted auto sales from the August 1932-March 1933 average to the July-December 1933 average. There are strong positive effects in states producing cotton, tobacco and wheat. There is little evidence that states producing other crops or states producing dairy or livestock products gain. That the states producing traded crops show the largest gain suggests an important role for devaluation. By contrast, exposure to nontraded crops may have been less beneficial because their price increases were caused by supply shocks which depressed quantities.

[27] United States Department of Agriculture (1935a) (table 6, p. 10) shows that before August 1933 there were no government payments to farmers for "emergency sales and rental and benefit payments." And in August 1933, these payments totaled just $8 million or 1.9% of farm cash income in that month.

For a direct comparison with the annual county data, in column (2) we rerun this specification using annual data. The dependent variable is now the growth rate of new auto sales from 1932 to 1933. Most estimates are similar, but there is a large drop in the coefficient for wheat. This reflects poor auto sales growth in the first quarter of 1933 in wheat-producing states, which gets folded into the 1933 average using annual data. Thus the annual data is not ideal for analyzing the farm channel in wheat-growing areas. By contrast, the coefficient on traded crops per capita is very similar using annual data, suggesting that the county data will be useful for assessing the sensitivity and mechanisms for these crops.

Column 3 presents the baseline results for the county data. Using the same five measures of farm exposure, we estimate effects similar to those seen in the annual state data. The main difference is that the standard errors are roughly cut in half, even though we conservatively cluster at the state level. In column 4 we control quasi-non-parametrically for population size. We group counties into 25 population bins and include these as dummies in the regression. This has very little impact on our coefficient, suggesting that we are not conflating the farm channel with an effect of county population size.

Table 5 – The Farm Channel: State and County Level

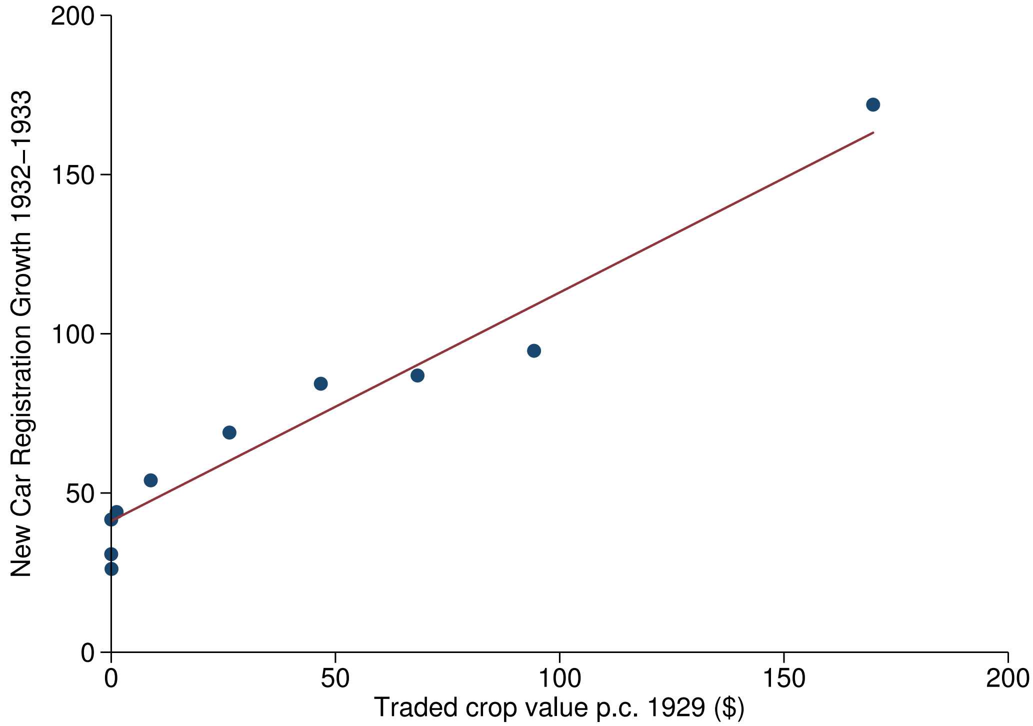
	Dependent variable: New Car Registration Growth 1932-1933							
	State		County Annual					
	Monthly	Annual						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Traded crop value p.c. 1929 ($)	0.76***	0.63***	0.74***	0.74***	0.53***	0.54***	0.55***	0.33***
	(0.18)	(0.12)	(0.085)	(0.087)	(0.094)	(0.10)	(0.11)	(0.10)
Wheat value p.c. 1929 ($)	1.12***	0.24*	0.091	0.076	−0.025	0.059	0.037	−0.15
	(0.11)	(0.14)	(0.057)	(0.056)	(0.16)	(0.063)	(0.063)	(0.17)
Non-traded crop value p.c. 1929 ($)	0.36	0.077	−0.054	−0.0088	−0.100	0.027	0.074	−0.022
	(0.28)	(0.17)	(0.11)	(0.10)	(0.14)	(0.094)	(0.096)	(0.13)
Livestock value sold p.c. 1929 ($)	−0.066	−0.041	0.14*	0.10	0.075*	0.11	0.065	0.051
	(0.17)	(0.12)	(0.077)	(0.060)	(0.042)	(0.071)	(0.054)	(0.039)
Dairy value sold p.c. 1929 ($)	−0.21	−0.43***	−0.38***	−0.35***	−0.40***	−0.21**	−0.13**	−0.24***
	(0.37)	(0.12)	(0.080)	(0.066)	(0.097)	(0.084)	(0.065)	(0.085)
Population (millions)					3.42			11.1*
					(6.46)			(5.68)
FDR vote % 1932					0.70***			0.33*
					(0.16)			(0.18)
Black share 1930 (%)					−0.35*			−0.20
					(0.19)			(0.18)
AAA Transfers p.c. 1933-39 ($)					0.14			0.25
					(0.21)			(0.24)
Rural nonfarm share 1930 (%)					0.24			0.24*
					(0.14)			(0.13)
Deposits suspended 1930-32 (%1929 deposits)					0.058			0.12**
					(0.070)			(0.059)
Percent of farms mortgaged					0.76**			1.18***
					(0.32)			(0.33)
State Fixed Effects	No	No	No	No	No	Yes	Yes	Yes
Population Bins	No	No	No	Yes	No	No	Yes	No
1933 Monthly Drought Indicators	No	No	No	No	Yes	No	No	Yes
R^2	0.63	0.54	0.25	0.26	0.29	0.35	0.36	0.38
Observations	48	48	2,055	2,055	2,017	2,055	2,055	2,017

Standard errors clustered at the state level in parenthesis. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Notes: The dependent variable is indicated in the table header. County regressions exclude counties with fewer than 500 car registrations in 1928. Population bins group counties into 25 quantiles by population and include dummy variables for each quantile. 1933 monthly drought indicators are monthly dummy variables for whether a county was in a severe or extreme drought, per the Palmer drought index. The number of observations drops in columns (5) and (8) because of some missing data in the control variables. In particular, banking data are unavailable for Wyoming in Federal Deposit Insurance Corporation (2001).

Sources: Auto sales: See text. Value of farm products sold per capita - the 1940 Census as reported in Haines et al. (2015); Population - the 1930 Census as reported in Haines et al. (2015); FDR vote percentage - ICPSR (1999); percent of population black and rural nonfarm - the 1930 Census as reported in Haines and ICPSR (2010); AAA transfers - dataset accompanying Fishback, Kantor, and Wallis (2003); deposits suspended - Federal Deposit Insurance Corporation (2001); percent of farms mortgaged - Haines et al. (2015); drought indicators - dataset accompanying Fishback, Troesken, Kollmann, Haines, Rhode, and Thomasson (2011).

Figure 10 – Percent change in car sales and farm channel exposure at the county level



Sources: Auto sales - see text. Traded crop value - the 1940 Census as reported in Haines et al. (2015).

In column 5, we add several control variables to the regression: population, democratic vote share, black population share, AAA transfers from 1933 to 1939, rural nonfarm share, average percent of bank deposits suspended between 1930 to 1932, and the percent of farms mortgaged. In addition, we control for drought in each month of 1933 using Palmer drought indicators.

We add these control variables to ensure that we do not conflate the farm channel with another mechanism that could correlate with a recovery. For example, counties receiving or expecting higher AAA payments may see more car purchases, more democratic areas may be more optimistic about recovery, areas with more deposits suspended may have benefitted relatively more from the bank holiday, and more indebted individuals may have benefitted from improved access to credit. Of course, to the extent that the farm channel disproportionally benefited areas with previous bank failures or highly indebted farmers, these variables may be over-controls. Consistent with this possibility, the coefficient on traded crop value per capita falls slightly in this specification.

Columns 6 through 8 repeat the same regressions with state fixed effects. We find that even using only within-state variation, the farm channel effect remains present. The coefficient of 0.54 on traded crops per capita means that *within a state*, counties producing a dollar more cotton or tobacco per capita in 1929 saw 0.54 percentage point more auto sales growth between 1932 and 1933. Overall, our estimates of the farm-channel within states are quantitatively similar to (and statistically indistinguishable from) our estimate of the farm-channel across states.

To check for non-linearities and outliers, figure 10 shows a binned scatter plot for the traded crop value per capita effect in column 3. Thus each point in the figure shows the mean percent change in auto sales for the traded crop per value per capita in each bin of traded crop values, conditional on the control variables used in column 3.[28] The effect of higher traded crop exposure on new car sales is monotonic and the linear specification matches well.

4.3 Other outcome measures A possible concern with our focus on car sales is that farm-intensive areas may have a general tendency to purchase cars in a recovery. We have already seen two reasons to doubt that such a tendency fully explains our findings: (1) our placebo tests (figure 9) show no similar effects during the recovery in 1934; (2) figure 6 shows that agricultural areas in 1933 also exhibited a larger relative increase in purchases of non-auto consumption goods. Furthermore, it is not obvious why a tendency for farmers to purchase more cars would line up, as our results do, with a distinction between traded and nontraded farm products. Still, to firmly establish that our findings are not idiosyncratic to car purchases, we examine the evolution of farm and total income in 1933 at the state and county level.

[28]There are 10 bins. The first bin contains the 1,454 counties with zero traded crop value; the second bin contains 172 counties with nearly zero traded crop value per capita; the remaining eight bins with ascending values of traded crop value per capita each contain 180 or 181 counties. The plot is made using the user-written STATA command, "binscatter." For details, see Stepner (2014).

Table 6 – State Income Regression

	Farm Income Growth				Income Growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Traded crops harvested p.c. 1929 ($)	0.32*	0.97**	0.43	0.94*	0.13***	0.16**	0.15***	0.16
	(0.18)	(0.39)	(0.28)	(0.52)	(0.031)	(0.061)	(0.048)	(0.11)
Wheat value p.c. 1929 ($)	−0.34	−0.27	−0.37	−0.59	−0.046***	−0.036	0.00080	−0.0081
	(0.22)	(0.26)	(0.40)	(0.58)	(0.017)	(0.023)	(0.032)	(0.038)
Nontraded farm products p.c. 1929 ($)	−0.13	−0.12	−0.078	−0.043	−0.022**	−0.018	−0.017*	−0.018
	(0.096)	(0.095)	(0.079)	(0.098)	(0.011)	(0.012)	(0.0100)	(0.012)
Population (millions)		0.10		0.32		−0.28		−0.33
		(1.27)		(1.39)		(0.21)		(0.23)
FDR vote % 1932		−2.21**		−1.98*		−0.26**		−0.21
		(1.01)		(1.07)		(0.13)		(0.20)
% pop black		0.99		0.98		0.17		0.14
		(1.17)		(1.21)		(0.12)		(0.13)
Region Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Lagged Dependent Variable	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.23	0.38	0.24	0.42	0.52	0.64	0.57	0.66
Observations	48	48	48	48	48	48	48	48

Notes: The dependent variable is indicated in the table header. In specifications controlling for lags of the dependent variable, we include the percent change in (farm) income from 1931-32, 1930-31 and 1929-1930. Robust standard errors in parenthesis.
Sources: State income data are from Bureau of Economic Analysis state personal income data, table SA04. For source information for the regressors, see table 5. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 – Tax Return Growth 1932-1933

	Dependent variable: Tax Return Growth 1932-1933					
	(1)	(2)	(3)	(4)	(5)	(6)
Traded crop value p.c. 1929 ($)	0.079***	0.075***	0.075***	0.065***	0.065***	0.071***
	(0.016)	(0.015)	(0.017)	(0.0093)	(0.0096)	(0.014)
Wheat value p.c. 1929 ($)	0.00064	−0.0035	0.023	−0.0048	−0.0087	−0.0062
	(0.013)	(0.011)	(0.024)	(0.012)	(0.011)	(0.020)
Non-traded crop value p.c. 1929 ($)	0.011	0.014	0.025	0.027	0.030	0.025*
	(0.018)	(0.021)	(0.017)	(0.017)	(0.020)	(0.013)
Livestock value sold p.c. 1929 ($)	0.0015	−0.0034	−0.0019	0.0022	−0.0033	−0.0029
	(0.012)	(0.011)	(0.011)	(0.0077)	(0.0074)	(0.0068)
Dairy value sold p.c. 1929 ($)	−0.059**	−0.060**	−0.039*	−0.029**	−0.028*	−0.036**
	(0.027)	(0.027)	(0.022)	(0.013)	(0.014)	(0.015)
Population (millions)			−3.79**			−2.41*
			(1.80)			(1.37)
FDR vote % 1932			0.027			−0.048
			(0.047)			(0.039)
Black share 1930 (%)			−0.020			−0.044
			(0.058)			(0.059)
AAA Transfers p.c. ($)			−0.032			−0.0056
			(0.022)			(0.022)
Rural nonfarm share 1930 (%)			0.054			0.072**
			(0.037)			(0.034)
Deposits suspended 1930-32 (%1929 deposits)			−0.0068			0.0024
			(0.022)			(0.020)
Percent of farms mortgaged 1929			−0.016			−0.0071
			(0.055)			(0.050)
State Fixed Effects	No	No	No	Yes	Yes	Yes
Population Bins	No	Yes	No	No	Yes	No
1933 Monthly Drought Indicators	No	No	Yes	No	No	Yes
Lagged Dependent Variables	No	No	Yes	No	No	Yes
R^2	0.03	0.04	0.07	0.15	0.16	0.18
Observations	2,492	2,492	2,421	2,492	2,492	2,421

Notes: The dependent variable is indicated in the table header. Regressions exclude counties with fewer than 30 tax returns filed in 1928. Lagged Dependent Variables includes controls for county-level tax return growth from 1931-1932, from 1930-1931 and from 1929-1930. Standard errors clustered at the state level in parenthesis. Sources: County tax return counts are from the IRS Statistics of Income. For source information for the regressors, see table 5. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 6 presents state-level evidence on how agricultural intensity affected state farm income and state total income. We distinguish between tradable crops, wheat, and non-tradable farm products (including non-tradable crops, livestock sold and dairy sold). Otherwise the specifications mirror our state-level regressions in table 4. We find statistically significant increases in farm income growth in areas producing tradable crops (columns 1 through 4). This is also reflected in an increase in total income (columns 5 through 8). Thus, the increase in car consumption in table 5 can at least in part be attributed to an increase in income.

Our results in table 6 imply a local income multiplier from farm income to total income. We estimate these local income multipliers formally using the specification,

$$\%\Delta \text{Total Income}_{i,1933} = \beta_0 + \beta_1 \frac{\Delta \text{Total Income}_{i,1933}}{\text{Total Income}_{i,1932}} + \gamma' X_i + \varepsilon_i,$$

where we instrument farm income changes with traded crop value per capita.[29] This is because the farm channel is only visible for these crops in the annual data. Note that these multipliers only take into account spillovers within states, not for the U.S. economy as a whole. As such they are not directly informative about the aggregate multiplier, since these spillovers could be either positive or negative.

In table 8 we tabulate the estimates for the same set of control variables as in table 6. We estimate local income multipliers in the range of 1 to 1.3. These are slightly higher than those found for New Deal spending in Fishback and Kachanovskaya (2015). Our estimates are statistically significant, but our F-statistics only clear the typical hurdle of a weak instrument test in one case due to the small sample size. However, since weak IV estimates tend to be biased towards OLS and the OLS multipliers are smaller (in the range of 0.2 to 0.5), this suggests that our multiplier estimates are downward-biased in these specifications.

Second, in table 7 we use the number of tax filings as a measure of how many individuals had income above the exemption threshold. While this is only an indirect measure of income, it is available at the county level at annual frequency. Repeating the county-level regressions from table 5, we find strong evidence that the number of tax filings increased in counties with high traded crop value per capita.

[29] This specification is recommended by Ramey and Zubairy (2014) in their study of fiscal multipliers.

Table 8 – State Level Income Multipliers

	Farm Income Growth		Income Growth	
	(1)	(2)	(3)	(4)
Δ Farm Income / Lagged Total Income	1.01***	0.95***	1.26***	1.11**
	(0.19)	(0.18)	(0.27)	(0.57)
Wheat value p.c. 1929 ($)	−0.029	−0.027	0.029	0.020
	(0.022)	(0.024)	(0.061)	(0.063)
Nontraded farm products p.c. 1929 ($)	−0.032*	−0.029	−0.022	−0.023
	(0.018)	(0.020)	(0.013)	(0.017)
Population (millions)		−0.20		−0.13
		(0.13)		(0.21)
FDR vote % 1932		−0.068		−0.0072
		(0.073)		(0.065)
% pop black		0.038		−0.0085
		(0.078)		(0.092)
Region Fixed Effects	No	Yes	No	Yes
Lagged Dependent Variable	No	No	Yes	Yes
F-Statistic	24.10	10.09	8.05	1.58
R^2	0.30	0.38	0.15	0.30
Observations	48	48	48	48

Notes: The dependent variable is indicated in the table header. Δ Farm Income / Lagged Total Income is instrumented using the value of traded crops per capita. In specifications controlling for lags of the dependent variable, we include the percent change in (farm) income from 1931-32, 1930-31 and 1929-1930. Robust standard errors in parenthesis. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

5 Mechanisms

Our results show that agricultural areas in 1933 experienced faster consumption growth and income growth, as measured by auto sales and tax returns. However, these cross-sectional effects do not necessarily imply that the farm channel was expansionary for the U.S. economy as a whole. The positive effects on farm consumption could have been offset by declines in nonfarm consumption. Insofar as higher farm product prices made farmers richer, they ought also to have made others poorer. If higher farm prices were passed through to higher food prices, they made urban workers poorer. If they were not passed through, they lowered the profits of food wholesalers and manufacturers. Whether through poorer urban workers or lower profits, higher farm incomes and consumption demand ought to have been matched by lower urban income and consumption demand. Thus the channel leading from farm prices to farm income could explain the much larger growth in car sales in farm areas without explaining *any* of the nationwide growth in car sales in spring 1933. Sales could have risen a lot in Iowa and fallen slightly in New York with no net aggregate effect.

In standard international macro models devaluation is expansionary for the home country in part because foreign economies switching expenditure towards domestic goods.[30] An extensive literature focusses on whether leaving the gold standard had beggar-thy-neighbor effects through such expenditure-switching (see Obstfeld and Rogoff, 1996, p. 626-630 for a survey). However, changes in net exports only made small contributions to U.S. growth in 1933 (-0.11 percentage points) and 1934 (0.33 percentage points).[31] Thus, the farm channel likely did not have large effects on aggregate GDP through this mechanism.

In this section we consider three mechanisms through which redistribution of income to farmers via higher crops prices could have been expansionary for the whole U.S. economy. The first two mechanisms stress that farmers were among the most indebted agents in the U.S. economy. We first describe the evidence for this view before describing the mechanisms. Data limitations make a precise comparison of farm and nonfarm household and corporate debt burdens difficult, but a comparison of mortgage debts strongly suggests that debt problems were more severe among farmers. In 1933, total agricultural mortgage debt equaled \$7.7 billion (Goldsmith, Lipsey, and Mendelson (1963), table Ia, pp. 80-81). This was 24% of the value of farm structures and land and 270% of farm personal income.[32] For comparison, nonfarm residential mortgages totaled \$23.1 billion (Snowden, 2006a) in 1933, or 29% of the value of nonfarm residential structures and land (Snowden, 2006b) and 52% of nonfarm personal income.[33]

Presumably because of the much more unfavorable debt-to-income ratios, foreclosure problems were far more severe among farmers than among nonfarmers. Between 15 March 1932 and 15 March 1933, foreclosures exceeded voluntary farm sales by a ratio of more than 2 to 1.[34] There were 38.8 foreclosures per 1000 farms or nearly 100 per 1000 mortgaged

[30] Bernanke and Carey (1996) and Schmitt-Grohé and Uribe (2013a,b) also emphasize the importance of such expenditure switching in relaxing downward nominal wage constraints.

[31] NIPA table 1.1.2 accessed on 2 July 2016.

[32] The value of farm structures and land is from Goldsmith et al. (1963), table Ia, pp. 80-81. Farm personal income is from the Bureau of Economic Analysis, personal income data, table SA4, downloaded on 20 June, 2016.

[33] Nonfarm personal income is from the Bureau of Economic Analysis, personal income data, table SA4, downloaded on 20 June, 2016.

[34] Stauber and Regan (1935b), table 12, p. 38 document that between 15 March 1932 and 15 March 1933, there were 16.6 "voluntary sales or trades" and 38.8 "foreclosure of mortgages, bankruptcy, etc." per 1000 farms. For more on farm foreclosures in the interwar period, see Alston (1983).

farms.[35] No exact comparison exists for nonfarm residential housing. But among all nonfarm structures—residential and nonresidential—the foreclosure rate per 1000 mortgaged properties in 1933 was just 13.3, one-eighth that for farms.[36]

As noted above, redistribution towards farmers came not only from nonfarm households, but also from corporations. It is not obvious what the appropriate metric is for comparing corporate debt burdens with those for households. But at least in the judgement of those at the time, debt problems were relatively mild for nonfarm corporations. In his treatment of U.S. debt problems Clark (1933) (p. 20) writes: "The debts of corporations and government agencies disclose a relatively low index of strain–as a whole."

Standard incomplete market models (Bewley, 1986; Aiyagari, 1994) predict that households in debt have a particularly high marginal propensity to consume out of income shocks. This occurs because consumers subject to a sequence of temporary negative income shocks (e.g., lower crop prices) run up against a borrowing constraint, which prevents them from smoothing consumption. At the borrowing constraint, any increase in income is spent on consumption to move closer to the consumption smoothing solution. Consistent with this logic Mian et al. (2013) and Jappelli and Pistaferri (2014) estimate significantly higher marginal propensities to consume for indebted households in the Great Recession. Thus, if the redistribution of income through the farm channel redistributed from low-marginal propensity to consume nonfarmers to high-marginal propensity to consume farmers, it could have been expansionary for the U.S. economy as a whole. This is the first mechanism.

A second mechanism through which the farm channel could have been expansionary in the aggregate is through the banking sector. Banking problems were particularly severe in rural areas during the Depression (United States Department of Agriculture, 1935b). Higher farm product prices promised to allow farmers to service their debt, thus improving the prospects of rural banks. As *Business Week* put it in their first issue after Roosevelt abandoned the gold standard (4/26/33, cover page), "70-cent wheat makes a lot of sick banks well again."[37]

[35] This calculation is approximate, since it uses the 1930 percentage of farms mortgaged (40%). Using the 1935 share of farms mortgaged (34%) results in slightly higher ratio of foreclosures per 1000 mortgaged farms. Data on the total number of farms and number of farms mortgaged are from U.S. Department of Commerce (1975) series K162 and K154.

[36] Interestingly given this large difference in foreclosure rates, mortgage delinquency rates were if anything higher in urban areas (Clark (1933), p. 20).

[37] Wheat prices averaged 52 cents a bushel in March 1933, 63 cents a bushel in April, and 73 cents a bushel

Extensive bank correspondent networks transmitted banking panics during the Depression (Richardson, 2007), but these same networks meant that improving conditions for rural banks probably helped the financial system overall. If so, then the farm channel would have meant easier credit access for both farmers and nonfarmers, and thus could again have been expansionary for the economy overall.

A third way that higher farm product prices could have benefited the economy as a whole is through inflation expectations. Higher farm product prices, while certainly lowering real urban incomes, may have raised urban consumption by creating expectations of higher future prices. Unlike the first two mechanisms, higher inflation expectations are not easily quantifiable. Nonetheless, we shall provide narrative evidence suggestive of this mechanism's operation.

We are able to provide quantitive evidence for the importance of debt and banking problems to the operation of the farm channel. If more indebted farmers had higher marginal propensities to consume, then the farm channel ought to be stronger in areas with more farm debt. We measure this exposure using the percent of farms in a county that were mortgaged and the average farm leverage in a county. If improving the health of rural banks was important, then we ought to see larger improvements in areas with more bank failures. We measure this exposure using deposits suspended from 1930-32 as a percentage of 1929 deposits in a county and by using the fraction of banks suspended between 1930-32, again relative to the 1929 level.

We interact each of these four farm debt / bank health variables with the value of traded crops per capita, since this is where the farm channel is visible in the annual data. First, for each farm debt/bank health variable we run a linear regression,

$$\begin{aligned}\%\Delta\text{Auto sales}_i = {} & \beta_0 + \beta_1 \text{Traded crop value p.c.}_i \times \text{Farm debt/bank health variable}_i \\ & + \beta_2 \text{Traded crop value p.c.}_i + \beta_3 \text{Farm debt/bank health variable}_i + \gamma' X_i + \varepsilon_i,\end{aligned} \tag{2}$$

and test if β_1 is statistically (and economically) significant. That is we determine whether the farm channel is weaker/stronger depending on local farm debt conditions or local banking conditions.

in May (NBER macrohistory series m04001a).

As a second specification we relax the linear structure implicit in equation (2). Instead we group counties into Q quantiles based on their farm debt/bank health variable. We then interact the traded crop value per capita (p.c.) with these quantiles,

$$
\begin{aligned}
\%\Delta\text{Auto sales}_i = \beta_0 + \sum_{j=2}^{Q} \gamma_j \text{Traded crop value p.c.}_i \times \text{Quantile } j\text{: Farm debt/bank health}_i \\
+ \beta_1 \text{Traded crop value p.c.}_i \\
+ \sum_{j=2}^{Q} \delta_j \text{Quantile } j\text{: Farm debt/bank health}_i + \gamma' X_i + \varepsilon_i,
\end{aligned} \tag{3}
$$

In this specification, the effect of the farm channel is β_1 in the lowest quantile, $\beta_1 + \gamma_2$ in the second quantile, $\beta_1 + \gamma_3$ in the third quantile and so on. Using quantiles allows us to assess whether the farm channel becomes monotonically weaker or stronger based on local farm debt or bank health, without imposing that this relationship is linear as in equation (2). The cost is that it is less precise if the true relationship is indeed linear. In our specification we use five equally-sized quantiles for farm debt and two equally-sized quantiles for bank health. We use only two quantiles for bank health, since approximately 40% of counties did not experience bank failures, and we want to concentrate these zero-observations in one bin.

Panel A of table 9 displays the estimates of the linear interaction (equation (2)) with percent of farms mortgaged and farm leverage. In panel B, we tabulate the estimates from using quantiles of percent of farms mortgaged and farm leverage as in equation (3). For percent of farms mortgaged, we find a statistically significant and positive linear interaction coefficient in all our specifications. Further, in panel B, the effect in almost all cases becomes monotonically larger as we move to higher quintiles of percent of farms mortgaged.

The estimates for the linear farm leverage interaction in panel A, while also positive, are not statistically significant. Here the data favor the less restrictive specification in Panel B: the effect of the farm channel does becomes monotonically stronger as farm leverage increases and many of these interactions are statistically significant. However, the increase in the coefficients is not as large as would be expected based on a linear relationship, giving rise to the imprecision in panel A. Overall, these results suggests an important role for farm indebtedness in the propagation of the farm channel.

In table 10 we present an analogous set of estimates for our bank health measures. We find that the farm channel is weaker in counties where more deposits were suspended between 1930-1932. However, this estimate is typically only marginally significant in panel A. The quantile interaction in panel B is estimated more precisely, again implying weaker effects conditional on past bank failures. Using the fraction of banks failed instead, the sign of the interaction is the same but less precise. This likely reflects that the fraction of deposits suspended better captures the importance of a bank failure for the local economy. Overall our estimates imply that the farm channel is *weaker* in areas with poor banking health. This suggests that the farm channel likely operated less through improving bank health, or that banks whose health was improving due to the farm channel did not significantly increase lending. This is consistent with the argument in Bernanke (1983) that banking problems remained after March 1933 and, more generally, with the evidence on slow recoveries after financial crises (Reinhart and Reinhart, 2010; Wieland and Yang, 2016).

Table 9 – Auto sales growth in spring 1933 (% changes) and farm debt

Panel A: Linear interaction

Interaction with	% farms mortgaged				Farm leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Linear Interaction	0.011**	0.017***	0.015***	0.018***	0.20	0.62	0.54	0.61*
	(0.0048)	(0.0034)	(0.0041)	(0.0032)	(0.47)	(0.44)	(0.43)	(0.36)
Traded crop value p.c. 1929 ($)	0.14	−0.60***	−0.25	−0.66***	0.46	−0.37	−0.13	−0.38
	(0.26)	(0.22)	(0.27)	(0.21)	(0.56)	(0.55)	(0.57)	(0.47)
State Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Control Variables	No	No	Yes	Yes	No	No	Yes	Yes
1933 Monthly Drought Indicators	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.23	0.39	0.29	0.40	0.21	0.35	0.26	0.36
Observations	2,055	2,055	2,017	2,017	2,055	2,055	2,017	2,017

Panel B: Interacted quartiles

Interaction with	% farms mortgaged				Farm leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Traded Crop Value × Quintile 2	0.15	0.098	0.20	0.098	0.00033	0.15	0.0097	0.070
	(0.16)	(0.096)	(0.13)	(0.091)	(0.12)	(0.13)	(0.10)	(0.096)
Traded Crop Value × Quintile 3	0.18	0.19*	0.21	0.16	0.15	0.38**	0.22	0.31**
	(0.19)	(0.11)	(0.17)	(0.11)	(0.16)	(0.17)	(0.14)	(0.12)
Traded Crop Value × Quintile 4	0.14	0.28***	0.24*	0.27***	0.24	0.50**	0.35**	0.43**
	(0.16)	(0.075)	(0.13)	(0.075)	(0.19)	(0.20)	(0.17)	(0.17)
Traded Crop Value × Quintile 5	0.48**	0.72***	0.66***	0.74***	0.26	0.56**	0.42**	0.51***
	(0.21)	(0.18)	(0.19)	(0.17)	(0.24)	(0.25)	(0.21)	(0.19)
Traded crop value p.c. 1929 ($)	0.42***	−0.080	0.13	−0.12	0.54***	0.025	0.30**	0.067
	(0.15)	(0.10)	(0.15)	(0.11)	(0.14)	(0.15)	(0.14)	(0.11)
State Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Control Variables	No	No	Yes	Yes	No	No	Yes	Yes
1933 Monthly Drought Indicators	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.23	0.39	0.29	0.40	0.21	0.35	0.27	0.37
Observations	2,055	2,055	2,017	2,017	2,055	2,055	2,017	2,017

Standard errors clustered at the state level in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$. Control variables include population (millions), the 1932 FDR vote share, the 1930 black population share, AAA transfers per capita, the 1930 rural nonfarm share, deposits suspended from 1930-32 (% of 1929 deposits). 1933 monthly drought indicators are monthly dummy variables for whether a county was in a severe or extreme drought, per the Palmer drought index. Sources: Farm leverage from Haines et al. (2015). Other variables, see table 5.

Table 10 – Auto sales growth in spring 1933 (% changes) and banking health

Panel A: Linear interaction

Interaction with	% Deposits suspended 1930-32				% Bank failures 1930-32			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Linear Interaction	−0.0041**	−0.0020	−0.0030	−0.0020	−0.0029*	−0.00084	−0.0018	−0.00091
	(0.0016)	(0.0014)	(0.0018)	(0.0015)	(0.0017)	(0.0015)	(0.0020)	(0.0016)
Traded crop value p.c. 1929 ($)	0.79***	0.53***	0.62***	0.41***	0.78***	0.51***	0.61***	0.39***
	(0.075)	(0.078)	(0.069)	(0.092)	(0.068)	(0.075)	(0.073)	(0.091)
State Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Control Variables	No	No	Yes	Yes	No	No	Yes	Yes
1933 Monthly Drought Indicators	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.21	0.34	0.27	0.38	0.21	0.34	0.27	0.38
Observations	2,035	2,035	2,017	2,017	2,035	2,035	2,017	2,017

Panel B: Interacted quartiles

Interaction with	% Deposits suspended 1930-32				% Bank failures 1930-32			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Traded Crop Value × Quantile 2	−0.22***	−0.14***	−0.16**	−0.12***	−0.12	−0.035	−0.075	−0.039
	(0.062)	(0.039)	(0.065)	(0.040)	(0.086)	(0.065)	(0.094)	(0.065)
Traded crop value p.c. 1929 ($)	0.83***	0.57***	0.65***	0.44***	0.78***	0.52***	0.61***	0.39***
	(0.075)	(0.082)	(0.070)	(0.090)	(0.067)	(0.077)	(0.077)	(0.093)
State Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Control Variables	No	No	Yes	Yes	No	No	Yes	Yes
1933 Monthly Drought Indicators	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.21	0.34	0.27	0.38	0.21	0.34	0.27	0.38
Observations	2,055	2,055	2,037	2,037	2,055	2,055	2,037	2,037

Standard errors clustered at the state level in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$. Control variables include population (millions), the 1932 democratic vote share, the 1930 black population share, AAA transfers per capita, the 1930 rural nonfarm share, and 1929 percent of farms mortgaged. 1933 monthly drought indicators are monthly dummy variables for whether a county was in a severe or extreme drought, per the Palmer drought index. Sources: see table 5.

5.1 Inflation expectations The above quantitative evidence suggests possible positive aggregate effects from the redistribution of income to indebted farmers. Narrative evidence suggests that higher farm product prices could themselves have also been expansionary by creating expectations of higher future prices. For instance, figure 11 shows an ad that appeared in the Warsaw, Indiana newspaper on May 3, 1933. It tells consumers that "Already many items made of leather have advanced," but that this store still has "shoes at the old price." Similarly, figure 12 shows an ad for Firestone tires that appeared in the *Los Angeles Times* on May 11, 1933 (p. 5). It announces "Tire Prices Going Higher" so consumers should "Buy Now!" It explains that "increasing prices of rubber and cotton are sure to bring higher tire prices." These are not isolated instances. A month later, on June 8th, the *Los Angeles Times* ran an ad (figure 13) advising readers that "[F]ur prices are going UP" (p. 5). The ad has an inset quoting an article on increases in the price of new furs.

Figure 11 – Expected price increases for shoes

Source: *The Warsaw Union*, 5/3/1933, p. 2.

While a definitive argument awaits more systematic work, these advertisements suggest that higher commodity, in particular farm, prices may have *caused* expected inflation. Since at least Hamilton (1992), economists have known that commodity prices provide information on expected inflation. This narrative evidence points to a stronger hypothesis: in spring 1933

Figure 12 – Expected price increases for tires

Source: *Los Angeles Times*, 5/11/1933, p. 5.

Figure 13 – Expected price increases for fur

Note: This is an excerpt from the advertisement.
Source: *Los Angeles Times*, 6/8/1933, p. 5.

higher commodity prices not only provide evidence of expected inflation, but, perhaps, were themselves a source of expected inflation. This points to an interpretation of expected inflation in 1933 somewhat different from that in the prior literature (e.g., Eggertsson, 2008; Jalil and Rua, 2015). Whereas the prior literature emphasizes that Roosevelt's words and actions were crucial since they signalled a commitment to higher inflation, this narrative evidence suggests a more mechanical possibility: As the dollar weakened, commodity prices rose. This in turn led consumers to expect broader inflation.

6 Conclusion

This paper provides evidence on the sources of U.S. recovery in spring 1933. We document the importance of the farm channel: devaluation raised farm prices of traded crops, stimulating income, and consumption in agricultural areas. A one standard deviation increase in the share of a state's population living on farms was associated with roughly a 12-35 percentage point increase in auto sales growth from winter to fall 1933. This effect was primarily concentrated in areas producing tradable crops, suggesting an important role for devaluation.

We considered three possible ways in which the farm channel was expansionary for the U.S. economy as a whole: a redistribution channel, a banking channel, and an inflation-expectations channel. Each of them implies that the positive effect on the consumption of farm households was larger than the (possibly) negative effect on the consumption of nonfarm households. We find our strongest evidence for the redistribution channel, since the farm channel is strongest in areas with high farm debt. We also find narrative evidence in support of the inflation-expectations channel, but we find little evidence for a banking channel.

To the extent that the farm channel contributed to overall recovery in the U.S., it means that the lessons of 1933 for macroeconomic policy are more nuanced than often assumed. In particular, our work points to the importance of redistribution as a channel for macroeconomic policies. Japan's recent efforts to raise inflation expectations and end two decades of output stagnation (so-called "Abenomics") provide an illustrative example. When Japan embarked on Abenomics, the U.S. success in 1933 was invoked to predict success in Japan (Romer, 2014; Kuroda, 2013). Just like the U.S. in 1933, Japan in 2013-14 weakened its currency and raised inflation expectations. But whereas devaluation in 1933 redistributed income to indebted farmers with a high marginal propensity to consume, the weakening of the yen may have redistributed income from workers to large, exporting corporations with a low marginal propensity to spend.[38] Thus an appreciation for the farm channel may help economists understand why Abenomics has (as of 2016) failed to produce sustained, rapid growth.

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[38] Hausman and Wieland (2014, 2015) document a decline in real wages in Japan under Abenomics. Kato and Kawamoto (2016) argue that the weakening of the yen contributed to record high corporate profits, but that these higher corporate profits translated into little business investment.

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A Notes and sources for farm product data in table 2 and figure 4

- The exchange rate: The source is *Survey of Current Business*, 12/1933, p. 31.
- Wheat: U.S. producer prices are from United States Department of Agriculture (1936), table 15, p. 19 (monthly) and table 1, p. 6 (annual). Liverpool prices in dollars are from United States Department of Agriculture (1936), table 19, p. 21. Production, farm value, and trade data are from United States Department of Agriculture (1936), table 1, p. 6. Trade quantities are for the trade year beginning July.
- Corn: U.S. producer prices are from United States Department of Agriculture (1936), table 45, p. 39 (monthly) and table 37, p. 33 (annual). Liverpool prices in dollars are from United States Department of Agriculture (1936), table 47, p. 40. Production, farm value, and trade data are from United States Department of Agriculture (1936), table 37, p. 33. Trade quantities are for the trade year beginning July.
- Oats: U.S. producer prices are from United States Department of Agriculture (1936), table 60, p. 50 (monthly) and table 53, p. 44 (annual). Production, farm value, and trade data are from United States Department of Agriculture (1936), table 53, p. 44. Trade quantities are for the trade year beginning July.
- Cotton: U.S. producer prices are from United States Department of Agriculture (1936), table 106, p. 82 (monthly) and table 98, p. 76 (annual). Production, farm value, and trade data are from United States Department of Agriculture (1936), table 98, p. 76. Trade quantities are for the trade year beginning August.
- Tobacco: U.S. producer prices are from Stauber and Regan (1935a), table 5, p. 14 and Stauber and Regan (1935a), table 5, p. 13. Production, farm value, and trade data are from United States Department of Agriculture (1936), table 143, p. 104. Trade quantities are for the trade year beginning July.
- Hay: U.S. producer prices are from United States Department of Agriculture (1936), table 274, p. 190. Production and trade data are from United States Department of Agriculture (1936), table 270, p. 187. Trade quantities are for the trade year beginning July. Production of hay is the sum of tame hay and wild hay production. We calculate farm value as the tame hay production multiplied by the December 1 price (given in United States Department of Agriculture (1936), table 270, p. 187) plus wild hay production multiplied by the December 1 price (also given in United States Department of Agriculture (1936), table 270, p. 187).
- Potatoes: U.S. producer prices are from United States Department of Agriculture (1936), table 229, p. 162 (monthly) and table 222, p. 157 (annual). Production, farm value, and trade data are from United States Department of Agriculture (1936), table 222, p. 157. Trade quantities are for the trade year beginning July.
- Cattle: U.S. producer prices are from United States Department of Agriculture (1934b), table 320, p. 587 (monthly) and United States Department of Agriculture (1936) table

307, p. 213 (annual). Production data are from United States Department of Agriculture (1934b), table 324, pp. 590-591, and United States Department of Agriculture (1935b), table 327, pp. 562-563. We calculate farm value as production multiplied by the producer price. Trade data are from United States Department of Agriculture (1936) table 312, p. 217. Trade quantities are for the calendar year. The trade data are for beef and beef products; thus they are an upper bound on trade in beef itself.

- Hogs: U.S. producer prices are from United States Department of Agriculture (1936), table 321, p. 224. Production data are from United States Department of Agriculture (1934b), table 340, p. 601, and United States Department of Agriculture (1935b), table 342, p. 572. Farm value is from United States Department of Agriculture (1934b), table 340, p. 601. Trade data are from United States Department of Agriculture (1936) table 331, p. 229. Trade quantities are for the calendar year. The trade data are for hog products; thus they are an upper bound on trade in pork itself.

- Milk: U.S. producer prices are from United States Department of Agriculture (1936), table 376, p. 267. Production data are from United States Department of Agriculture (1934b), table 383, p. 628, and United States Department of Agriculture (1936), table 368, p. 259. We calculate farm value as production multiplied by the producer price. These USDA publications provide no trade data, presumably because very little milk was traded.

- Chickens: U.S. producer prices are from United States Department of Agriculture (1936), table 410, p. 286. Production and farm value data refer to the number of chickens raised; data are from United States Department of Agriculture (1936), table 403, p. 281. United States Department of Agriculture (1936) provides no trade data, presumably because very little chicken was traded.

- Eggs: U.S. producer prices are from United States Department of Agriculture (1936), table 419, p. 291. Production and farm value data are from United States Department of Agriculture (1936), table 403, p. 281. United States Department of Agriculture (1936) provides no trade data, presumably because very few eggs were traded.

B Appendix Tables

Table 11 – Auto sales growth in spring 1933 (% changes from the October 1932-March 1933 average to the July-August 1933 average)

Panel A: Farm population share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% pop. on farms	1.43***	1.15**	0.93***	1.00**	1.66**	2.85***	2.37***	1.54*
	(0.37)	(0.48)	(0.31)	(0.46)	(0.78)	(1.04)	(0.70)	(0.79)
Population (millions)		0.31		0.82		−4.19		−1.07
		(1.31)		(1.68)		(2.57)		(3.32)
FDR vote % 1932		0.39		−0.11		−0.40		0.40
		(0.72)		(0.61)		(1.64)		(1.19)
% pop black		0.72		1.24*		0.52		2.19
		(0.82)		(0.72)		(1.69)		(1.77)
Seasonally Adjusted Auto Sales	Yes	Yes	Yes	Yes	No	No	No	No
Region Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Lagged Dependent Variable	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.28	0.46	0.68	0.71	0.09	0.34	0.68	0.74
Observations	48	48	48	48	48	48	48	48

Panel B: Crops sold or traded per capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crops sold p.c. 1929 ($)	0.73***	0.59***	0.40***	0.42***	1.09***	1.27***	0.94***	0.77***
	(0.14)	(0.17)	(0.10)	(0.14)	(0.39)	(0.43)	(0.30)	(0.27)
Population (millions)		0.39		0.40		−4.72*		−1.05
		(1.34)		(1.25)		(2.42)		(2.78)
FDR vote % 1932		0.16		−0.029		−0.64		0.47
		(0.60)		(0.54)		(1.67)		(1.12)
% pop black		1.07		1.23		1.24		2.09
		(0.70)		(0.74)		(1.63)		(1.73)
Seasonally Adjusted Auto Sales	Yes	Yes	Yes	Yes	No	No	No	No
Region Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Lagged Dependent Variable	No	No	Yes	Yes	No	No	Yes	Yes
R^2	0.40	0.54	0.68	0.72	0.22	0.41	0.66	0.76
Observations	48	48	48	48	48	48	48	48

Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

Note: The dependent variable is the percent change in auto sales from the October 1932-March 1933 average to the July-August 1933 average. In specifications controlling for lags of the dependent variable, we include the percent change in auto sales from April-September 1932 to January-February 1933, from October 1931-March 1932 to July-August 1932, and so on back to October 1929-March 1930 to July 1930-August 1930. Sources: Auto sales - see text; percent of population on farms and percent of population black - the 1930 Census as reported in Haines and ICPSR (2010); value of crops sold per capita - the 1940 Census as reported in Haines et al. (2015); population: mid-year 1933 estimate as reported by the Bureau of Economic Analysis; FDR vote percentage - ICPSR (1999).