Financial Deepening and Economic Growth During the US Antebellum Era 1834-1863

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This paper empirically investigates the relationship between financial deepening and the US economic growth during the antebellum period 1834-1863 and the causal direction between them applying the VEC model. The ADF unit root and the Zivot-Andrea Unit Root with structural break test are performed before applying VEC. The results of the Granger causality/block exogeneity Wald tests show that the financial deepening did not have Granger caused economic growth of the antebellum America rather it was the economic growth that led to the financial development. The finding contradicts the findings of Bodenhorn (2000) and confirms the findings of Samad (2007).

INTRODUCTION

Financial deepening, and economic growth and economic development are widely discussed and debated issues. Schumpeter (1912) argued that banks providing intermediary services such as mobilizing savings, allocating resources, facilitating transactions, risk taking, and risk management support innovation, and produce economic development.

Industrial development in Britain and elsewhere has been viewed as a direct result of the development of financial institutions. Hicks (1969) and Bagehot (1962) argued that financial institutions played a pivotal role in Britain's industrial revolution. In the continental United States, bank success stories during the antebellum period were mixed. In the Antebellum Period, banks were considered "wildcats" (Hamond, 1957), "legal swindle" and fraudulent. Repeated suspension of specie and a large scale failure were the reason of for these assumptions. It was widely believed that banks invariably issued depreciated currency, these practices benefited a few but "everybody would suffer from the harm they would cause" (Scott, 2000). As a result, several states in the Midwest banned banks. Illinois was one of them.

In addition, there were also persistent complaints by the farmers of the antebellum period that banks were biased against lending farmers even though agriculture was an important source of GDP. Banks, according to Redlich (1968), did not provide capital to the development of industries. Banks were established by the merchants and traders to cater to their needs of short term capital supply. Importantly, banks, according to Redlich (1968), were engaged in merchant lending because of the mercantile philosophy of the early banks—lending for the very short term (Redlich 1968).

The other views were that banks were engaged in the internal development programs.

Taus (1967) said that "during the 1850s, banks became heavily interested in railway road construction" (page, 53). The construction of railroads, roads, and canals began. The railroads construction boom started in the 1830s and continued until the Civil War. The railroads connected to various parts and cities. At the end of the 1850s, the Eastern coast and the Great Lakes were connected to the western side of the Mississippi, and Chicago by the railroads.

By the end of the 1840s not only was the Erie Canal linked to Lake Eire, more than 10,000 miles of turnpikes were operating (WWW.historynet.com). Travel times significantly reduced before the Civil War. In the center of these developments were banks which contributed to the American economic growth. Due to the development transport, population growth, and industrial boom in the North and increased agricultural production in the West and South, the American economy experienced economic growth during the antebellum period. As a result, the average per capita GDP increased during these periods. Table 1 shows the growth of per capital GDP.

TABLE 1
THE GROWTH OF PER CAPITAL GDP OF THE ANTEBELLUM AMERICA

	PCGDP20S	PCGDP30S	PCGDP40S	PCGDP50S	PCGDP60s
Mean	1399.100	1649.800	1706.300	2022.100	2301.20
Median	1402.500	1657.500	1720.500	2061.500	2317.000
Maximum	1449.000	1727.000	1836.000	2121.000	2444.000
Minimum	1322.000	1503.000	1594.000	1796.000	2134.000
Std. Dev.	45.31728	71.63146	86.20782	111.4973	104.66001
Skewness	-0.366322	-0.914545	0.020356	-1.086379	-0.252301
Kurtosis	1.838991	2.833368	1.584892	2.718535	1.817779
Jarque-Bera	0.785296	1.405555	0.835078	2.000042	0.5684534
Probability	0.675266	0.495208	0.658666	0.367872	0.742846
Sum	13991.00	16498.00	17063.00	20221.00	8851.000
Sum Sq. Dev.	18482.90	46179.60	66886.10	111884.9	24116.75
Observations	10	10	10	10	10

Table 1 shows that the average per capita GDP was $1,399.1 during the 1820s and it increased to $1,649.8 in the 1830s to $1,706.3 in the 1840s to $2,022 in the 1850s and $2,301.2 in the 1860s.

During these periods there were tremendous growth of bank numbers and bank financial development. Table 2 supports the claims.

TABLE 2
AVERAGE GROWTH OF BANK AND BANK FINANCING

Variables	Average during 1834-1839	Average during 1840-1848	Average during 1850-1859	Average during 1860-1864
Bank numbers*	730	742	1159	1530
PCLOAN	$27.35	$18.0	$19.60	$21.0
PCNOTDEPOSIT	$14.16	9.08	13.52	15.69
PCNOTCIR	$7.90	$4.96	$6.52	$6.42

Table 2 shows that the average bank number was 730 during the 1834-1839. The number increased to 742 in the 1840s, to 1159 in the 1850s, and 1530 in the 1860-1864. The average bank per capita loan increased from $18.0 in the 1840s, to $19.60 in the 1850s, to $21 in the 1860s. Other variables show an increased average during the antebellum period.

Bodenhorn (2000) claimed "Combining newly produced information on the state level incomes and the growth rates in the antebellum era with various measures of financial depth, several empirical tests of the link between finance and growth are offered. The results, while something unequivocal, suggest that finance led economic growth during the antebellum period"(page 31). According to Bodenhorn, "banks contributed to economic growth in myriad ways" (page 87).

However, Bodenhorn (2000) mostly used the correlation technique. In his regression analysis he did not use a time series test such as the Unit Root and the Unit Root test with structural break. The regression results without such tests lead to spurious conclusions.

So, this study applies an advanced econometric tool such as the VEC and Granger causality/block exogeneity Wald tests in determining the causal relation and provides an important insight about the causal direction between the financial deepening and the economic growth of the antebellum America.

This paper is organized as follows: Section 2 provides a survey of literature and a background study about the antebellum Illinois. Data and methodology are provided in Section 4. Empirical results and the conclusion are presented in Section 5.

SURVEY OF LITERATURE

The survey of literature shows that there is wide range of studies on financial development and economic growth. This study focuses on the literature of the antebellum period 1834-1864.

The survey of financial development and economic growth literature reveal two broad category studies. The first category of studies concentrated on whether there was a link between the development of financial services and economic growth. The theoretical works by Schumpeter (1912), Hicks (1969), and Bagehot (1873) demonstrated that financial intermediaries are contributing factors for economic growth. Financial development ignited the industrialization of the United Kingdom by providing and facilitating the necessary capital to the industrial needs (Hicks, 1969). Schumpeter argued that financial institutions provided several essential intermediary services such as mobilizing savings, allocating resources, diversifying and pooling risk, and monitoring managers. By providing these essential services, financial development supported capital accumulation, including innovation and economic growth.

Several empirical researchers supported this view. The early empirical studies by Goldsmith (1969) and McKinnon (1973) showed that there was a significant relationship between financial development and economic growth. Both McKinnon and Shaw's theoretical works concluded that causation runs from financial development to economic development and not the other way.

King and Levine (1993b) used several measures of financial development and economic growth and found that they are strongly associated with real per capita GDP growth.

There are other studies which do not support the above view that financial development leads to economic growth. According to these studies, the role of financial development and its impact on economic development was exaggerated (Lucas, 1988). Robinson (1952) argued that financial development is the result of economic development. Financial development simply followed economic development.

Goldsmith's (1989) empirical study found that the causation was from economic growth to financial growth at any stage of economic development. A recent study of Ram (1997) reached the same conclusion that "empirical evidence does not support the view that financial development promotes growth".

Samad (2012) examined the financial development and economic growth of the antebellum Illinois during 1850-1863 and found that the economic growth of Illinois led to the development of several indices of financial growth.

Bodenhorn (1963) studied extensively on the antebellum American banking history. He examined the several indices of financial deepening such as loan per capita, bank credit-GDP, banknote per capita, and bank offices per capital. His study found that the financial development led to the economic growth. "The results, while sometimes equivocal, suggest that finance led growth during the antebellum period" Bodenhorn (1963, p.31).

DATA AND METHODOLOGY

Data

Time series data (1834-1863) are obtained from various sources. Per capita real GDP is obtained from the historical statistics of the United States, Millennial Edition. Banks' financial information such as loans, deposits, and capital are obtained from the Controller of Currency Office.

Methodology

Unit Root Tests

Since the publication of Nelson and Plosser (1982), it is widely recognized that most time series macroeconomic variables contain unit root i.e. variable $X_t \sim I(1)$. So, this paper, first, examines the existence of unit root in the per capita GDP (PCGDP), per capital loans (PCLOAN), and per capita bank note (PCNOTE)) indices by using the augmented Dickey-Fuller (ADF). In the following equation, the null hypothesis, α=0 is tested against the alternative hypothesis, α<0:

$$\Delta y_t = \alpha_0 + \beta t + \gamma y_{t-1} + \sum_i^k \lambda i \Delta y_{t-1} + \varepsilon_t \quad (1)$$

Schwarz Bayesian Criterion (SBC) will be used to determine the lag length or K. The results of ADF and PP test are presented in the empirical section.

Structural Break Test

The issue of testing the presence of unit root gained further momentum when Parron (1989) emphasized the importance of structural break while testing the unit root test. The structural break test is needed because the most macroeconomic series suffers some kind of shock i.e. structural break. So, the unit root test is not enough. Perron (1989) argued that conventional unit root tests have low power to reject the null hypothesis of nonstationarity when there is a structural break in the series. To overcome this problem, Perron (1989) modified the augmented Dickey Fuller (ADF) test by adding dummy variables to account for structural breaks at known points in time. Zivot and Andrews (1992) suggested that structural breaks in the series may be endogenous and they extended Perron's methodology to allow for the endogenous estimation of the break date. We employ the following two alternative models proposed by Zivot and Andrews (hereafter ZA) to examine the presence of unit root with structural break in the stock market price series:

$$\text{Model C: } \Delta PCGDP_t = \mu + \emptyset DU_t(\lambda) + \beta t + \gamma DT(\lambda) + \alpha \Delta PCBKNOTE_{t-1} + \Sigma C_j \Delta PCDEPOSIT_{t-j} + \varepsilon_t \quad (2)$$

where PCGDP is the per capita GDP , DU_t and DT_t are indicator variables for mean shift and trend shift for the possible structural break-date (*TB*) and they are described as following:

$$DT_t = \begin{cases} t - TB & if\ t > TB \\ 0 & otherwise \end{cases}$$

The null hypothesis of unit root (α=0) can be tested against stationary with structural breaks (α<0) in Equations 1 and 2. Every time points are considered as a potential structural break date in the ZA unit root test and the break date is determined according to minimum one-sided t-statistic. Results of Zivot-Andrew test are provided in Table 3.

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Cointegration Test

Having established that the variables are non-stationary i.e. I(1), there raises the possibility that they are co-integrated. Consequently, the co-integration properties of the variables are examined. That is, it is necessary to determine whether there is at least one linear combination of these variables that is I(0). To investigate multivariate cointegration, this paper applies Johansen (1991 and 1995) VAR based Trace and Maximum Eigenvalue tests. Johansen (1991 and 1995a) cointegration is a VAR test and written in general form as:

$$\Delta Yt = \pi Yt - 1 + \sum_{i=1}^{p-1} \tau i \Delta Yt - i + \beta Xt + \varepsilon t \tag{3}$$

Where $\Pi = \sum_{i=1}^{p} \beta i - I$ and $\tau = -\sum_{j=i+1}^{P} \beta j$

Based on Granger's theorem, if the coefficient matrix Π has reduced rank r<k, then there exists k x r matrices α and β each rank r such that $\Pi = \alpha\beta'$ and $\beta' yt$ is I(0). r is the number of cointegrating relations (the cointegrating rank) and each column of β is the cointegrating vector. The null hypothesis is that number of cointegration:

H_0 : r=0
H_a : r=1

Vector Error Correction and Unrestricted VAR

Finally, this paper uses VEC and unrestricted VAR model for direction of causality. VEC is applied when series are found cointegrated tested by Johansen (1991 and 1995) VAR based Trace and Maximum Eigenvalue tests. Unrestricted VAR is employed to determine the direction of causality if the series are not cointegrated.

In terms of three variables, PCGDP, PCNOTE, and PCLOAN, VECM can be written and estimated from:

$$\Delta PCGDP_t = \Sigma\alpha_1 \Delta PCGDP_{t-I} + \sum\beta_1 \Delta PCNOTE_{t-I} + \sum\gamma_1\, \Delta PCLOAN_{t-1} + \lambda_1(PCGDP_{t-1} - PCNOTE_{t-1} - PCloan_{t-1}) + u_t \tag{4}$$

$$\Delta PCNOTE_t = \Sigma\alpha_2 \Delta PCNOTE_{t-I} + \sum\beta_2 \Delta PCGDP_{t-I} + \sum\gamma_2\, \Delta PCLOAN_{t-1} + \lambda_2(PCNOTE_{t-1} - PCGDP_{-1} - PCLOAN_{t-1}) + u_t \tag{5}$$

$$\Delta PCLOAN_t = \Sigma\alpha_3 \Delta PCLOAN_{t-I} + \sum\beta_3 \Delta PCGDP_{t-I} + \sum\gamma_3\, \Delta PCNOTE_{t-I} + \lambda_3(PCLOAN_{t-1} - PCNOTE_{-1} - PCGDP_{-1}) + u_t \tag{6}$$

Where λ_1, λ_2, and λ_3 are the coefficients of error correction term (ECT) for ($PCGDP_{t-1}$- $PCNOTE_{-1}$ – $PCDEPOSIT_{-1}$), ($PCNOTE_{t-1}$ –$PCGDP_{-1}$ - $PCDEPOSIT_{-1}$), and ($PCDEPOSIT_{t-1}$- $PCNOTE_{-1}$– $PCGDP_{t-1}$ respectively.

The null hypothesis, now that PCNOTE does not Granger cause PCGDP given PCLOAN, H_0 ($\alpha_1 = \lambda_1 = 0$. That is, there are two sources of causation for economic growth, PCGDP, either through the lagged terms of $\Delta PCNOTE_{t-1}$ or through the lagged Error correction term, i.e. the lagged cointegrating vector.

In the Error Correction Model, the causality inference is obtained through the significance of λ_i. That is, the null hypothesis that PCDEPOSIT and PCNOTE do not Granger cause PCGDP is rejected if λ_i, (the coefficient of error correction term) is statistically significant even if $\sum\beta_i$ and $\sum\gamma_i$ (from 4,5, and 6) are not jointly significant.

Granger causality direction is obtained from VAR estimates applying Granger Causality/block exogeneity - tests.

Reports of VEC and VAR are provided in the empirical section.

EMPIRICAL RESULTS

Result of AFD Unit Root test and Zivot-Andrew Unit Root with structural break is presented in Table 3.

TABLE 3
ADF UNIT ROOT TEST AND ZIVOT-ANDREW UNIT ROOT WITH STRUCTURAL BREAK

ADF test (intercept and Trend) Null hypothesis: Variable has unit root Lag Length: (Automatic-based on SIC, Maxlag= 7			Zivot-Andrew Unit Root test with a structural Break Chosen Lag length: 1 (Max lag=4)	
Variables	Level (t-Statistics)	1st difference (t-Statistics)	t-Statistics	Break point
LNPCGDP	-2.64	-4.47*	-3.93	1843
LNPCLOAN	-1.43	-4.95*	-3.92	1841
LNPCNOTE	-2.12	-5.94*	-4.19	1845

*= Significant at 1 percent level, ** = Significant at 5 percent level, and *** = Significant at 10 percent level.

Both the AFD and the Zivot-Andrew Unit Root test with structural break fails to reject the null hypothesis that the series have unit root at level whereas the tests reject the null hypothesis that the series have unit root at 1st difference at 1 percent level of significance.

TABLE 4
JOHANSEN COINTEGRATION TEST RESULTS

Trend assumption: No deterministic trend
Lags interval (1st differences): 1to1

Variables LNPCGDP LNPCLOAN LNPCNOTE	Hypothesized No. of CE(s)	Eigenvalue	Trace statistics	Max-Eigen Statistics
	None (r=0)	0.42	26.06*	15.31
	At most one (r=1)	0.21	10.75	6.92
	At most one (r=2)	0.12	3.83	3.83

The trace test indicates 1 conintegrating equation(s) at the level of 5 percent. However, the Maximum-Eigen tests support no cointegration.

Causality, according to Granger and Lin (1995), in the long run exists only when the coefficient of cointegrating vector, i.e. the Error Correction Term (ECTT) is statistically significant. The significance of the ECT, in Table 4, indicates that there is causation through the lagged cointegrating vecto. Following Granger and Lin (1995), the conventional Granger causality test is not valid because two cointegrating series cannot cause each other in the long run unless they are cointergrated. The paper, therefore, uses the

Granger causlaity/Block Exogeniety test in determining the causal relation. The results are reported in Table 5.

TABLE 5
RESULT OF THE ECM

Dependent variable	Coefficient of CointEq1	∑Coefficient $\Delta LNPCGDP_{t-i}$	∑Coefficient $\Delta LNPCLOAN_{t-i}$	∑Coefficient $\Delta LNPCNOTE_{t-i}$
LNPCGDP	0.02 [-2.23]*	-0.48 [2.15]	0.17 [2.56]	-0.02 [-2.36]
LNPCLOAN	0.007 [0.12]	3.13 [1.23]	-0.49 [-1.62]	-0.11 [-0.55]
LNPCNOTE	-0.67 [-2.67]*	3.43 [2.75]	1.12 [3.12]	-0.45 [-1.15]

*= Significant at 1 percent level.

TABLE 6
GRANGER CAUSALITY/BLOCK EXOGENEITY WALD TESTS

Dependent variable: D(LNPCGDP)

Excluded	Chi-sq	df	Prob.	Causal direction
D(LNPCLOAN)	2.819450	2	0.2442	Note and Loan ≠ →GDP
D(LNPCNOTES)	0.203776	2	0.9031	
All	5.607313	4	0.2305	

Dependent variable: D(LNPCLOAN)

Excluded	Chi-sq	df	Prob.	
D(LNPCGDP)	6.168889	2	0.0458	GDP → Loan
D(LNPCNOTES)	0.227499	2	0.8925	
All	9.384809	4	0.0522	

Dependent variable: D(LNPCNOTES)

Excluded	Chi-sq	df	Prob.	
D(LNPCGDP)	5.473119	2	0.0648	GDP → Notes Loan → Notes
D(LNPCLOAN)	5.941144	2	0.0513	
All	11.99582	4	0.0174	

Table 6 shows that the neither note nor loan does Granger cause GDP. On the other hand, GDP does Granger cause note and loan.

The paper finds that the financial development did not lead to the economic growth of the antebellum period. It was the economic growth that led to the financial deepening. The paper, thus, contradicts the findings of Bodenhorn (2000), who said "The results, while something unequivocal, suggest that finance led economic growth during the antebellum period". The findings of this paper confirm the finding of Samad's (2012) Illinois study.

CONCLUSIONS

The paper examines the financial deepening and the economic growth of the antebellum period 1834-1863. Financial deepening is measured by per capita loan and per capita bank capital. As the time series data suffer from the unit root and structural break, ADF and Zivot-Andrew unit root with structural break tests are performed before applying VEC model. Results of the Granger Causality/Block Exogeneity Wald tests suggest that the economic growth Granger caused financial development of the antebellum America. The finding contradicts the findings of Bodenhorn (2000) and confirms the findings of Samad (2007).

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