VARIATIONS IN THE FLOW OF CREDIT FROM REGIONAL FINANCIAL INSTITUTIONS AS A SOURCE OF CYCLICAL INSTABILITY IN THE REGIONAL ECONOMY: AN APPLICATION OF CAUSAL ANALYSIS

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A growing body of literature in economics has addressed the problem of economic stabilization posed by the uneven regional distribution of cyclical unemployment. In an economy suffering simultaneously from unemployment and inflation, significant regional differentials in cyclical unemployment substantially complicate the problem of economic stabilization and raise serious doubts about the compatibility of full employment with price stability.

The feasibility of implementing regional economic stabilization policies depends in large measure on the magnitude of the economic impact in the immediate region of local cyclical shocks. The issue at stake in regionally pinpointed stabilization policies is the extent to which the effects of a change in local expenditures in a targeted region are weakened by sizable geographical leakages to related or adjacent regions. On the basis of conventional static multiplier and impact analysis, an indigenous cyclical shock in the regional economic system is likely to be diffused through the massive hemorraging of expenditures on regional imports without inducing a measurable cyclical reaction in the regional economy. In a dynamic context, there may be other factors, such as the principle of acceleration, which reinforce the effect of the regional multiplier in magnifying the response of the regional system to exogenous shocks.

Fluctuations in the volume of lending by regional financial institutions such as commercial banks, savings and loans, and credit unions represent one source of cyclical shocks which impinge upon the regional economy. The prime objective of this paper is to explore the role and importance of variations in the flow of credit from local financial institutions in initiating cyclical behavior in the regional economic system. The justification for this study stems from the fact that credit availablility is usually viewed as a feasible instrument of economic control.

The Beaumont, Port Arthur, Orange SMSA, with a population of 250,000 provided the data base for this study. The next section discussed the theory of regional business cycles and is followed by a section on methodology. A discussion of the data analysis follows. The paper closes with a summary and conclusions.

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The Theory of Regional Business Cycles

The regional business cycle can be envisioned as the reaction of the regional economic system to the buffets of short term cyclical impulses or shocks. Two types of cyclical impulses, which excite local economic fluctuations, are postulated.

Firstly, exogenous aggregative cyclical impulses, caused by the national business fluctuations and government stabilization policies, impress on all regions a cyclical component of approximately the same duration as the national cycle. However, the timing and amplitude of the regional response may differ, since the cyclical pattern of individual industries varies considerably and since a particular industry may be much more important or much less in the regional economy, in comparison to the national economy.

Secondly, regional cyclical impulses may originate from shifts in regional investment and consumption functions, local strikes and plant closures, construction of social overhead capital, natural disasters, population movements, etc. As the size of a region increases, shifts in the local-investment and local-consumption of local production functions come to rival fluctuations in exports as the major cause of the regional business cycle. In a relatively small open economy, such as Beaumont, Port Arthur, Orange SMSA, the potential for local cyclical impulses to be quickly diffused without leaving an impression on the regional economy is maximized.

Empirical studies support the hypothesis that regional business cycles cannot be explained entirely by fluctuations in national economic activity. Borts [1] tested the industrial composition theory of regional economic fluctuations. According to this theory, variations in regional patterns of cyclical behavior can be explained by differences in industrial composition. Borts concluded that variations in industrial composition alone cannot explain differences in cyclical behavior among regions; his analysis revealed that regions whose important industries are subject to wide cyclical swings also experience wider swings in other industries.

Brechling [2, 3] regressed regional unemployment against national unemployment and time and interpreted the residuals generated by this equation as a measure of the regional component of the local cycle. The results of his analysis suggested that the regional component of cyclical unemployment varied substantially from region to region.

Jeffrey, Cassetti, and King [6] applied factor analysis to monthly unemployment rates for 30 midwestern SMSA's to test the hypothesis that economic fluctuations within a set of urban centers are composed of four basic components. These four components were assumed to represent economic forces generated at specific spatial levels, such as the national level, subnational level, etc. The factor analysis did not reject the hypothesis.

All of these studies support the hypothesis that the regional business cycle is composed of more than one component and that regional business fluctuations may partially be attributed to cyclical shocks which originate within the region. This study focuses on a specific region, the Beaumont, Port Arthur,

Orange SMSA and attempts to evaluate the extent to which one important source of indigenous cyclical shocks, variations in the flow of credit from local financial institutions, generated fluctuations which are manifested in certain indicators of regional economic activity, such as regional unemployment, regional manufacturing employment, and regional construction employment.

Methodology

The empirical analysis in this study is based on the literature on causality in econometrics. Granger's (1969) operational definition of causality in a time series context states that X "causes" Y if the past history of X can be used to predict Y more accurately than simply using the past history of Y. Pierce [7] suggested describing a variable as a leading indicator of another variable if the first causes the second according to the Granger criterion of causality. The procedure employed in this study to test the Granger-type causality utilized a cross correlation technique suggested by Haugh and Pierce [8]. The Haugh and Pierce test is based on the cross-correlation function of the univariate innovations of the two series. Firstly, the Box-Jenkins methods of building time series models are employed to estimate a linear filter which transforms each series into a white noise series. The white noise series constitute sample innovations and are used to calculate a sample cross-correlation function from which inferences about the population cross-correlation function are made.

More formally, a general class of time series models known of auto-regressive integrated moving average models (ARIMA) take the form

$$\emptyset_p(B)\ (1-B)^d Z_t = \theta_q\ (B) e_t$$

where $\emptyset_p(B)$ is the p^{th} order polynomial in B (the back shift operator) with roots outside the unit circle, $(1-B)^d$ is the d^{th} difference of the series required for stationarity, and $\theta_q(B)$ is the q^{th} order polynomial with roots outside the unit circle. The input series e_t is white noise. Box and Jenkins provided the methodology for estimating the parameters and the residual series for ARIMA models such that

$$\hat{\emptyset}_{p+d}(B)\ Z_t = \hat{\theta}_q\ (B)\ ^d\hat{e}_t$$

where:

$\hat{\emptyset}_{p+d}(B) = \hat{\emptyset}_p\ (1-B)^d$

$\hat{e}_t$ = residual series

The estimated sample innovations of the Z series are computed as

$$\hat{e}_t = \frac{\hat{\emptyset}_{p+d}(B)}{\hat{\theta}_q\ (B)} = Z_t$$

After ARIMA estimates of univariate filters for two variables X_t and Y_t have been constructed from the estimated univariate residuals:

$\hat{V}_t$ and $\hat{U}_t$, obtained from
$\hat{U}_t = F(B)^{-1} = Y_t$
$\hat{V}_t = G(B)^{-1} = X_t$

The sample cross-correlations ($\sigma^2_{\hat{u}\hat{v}}(k)$) are employed to calculate a test statistic and test the main hypothesis that X_t or Y_t are statistically independent. The small sample test statistic is given by:

$$S = T^2 \sum_{-L_1}^{L_2} (T-k)^{-1} \sigma_{\hat{u}\hat{v}}(k)$$

which is chi-square distributed with $(L_1 + L_2 + 1)$ degrees of freedom where T is the number of sample observations, L_1 is the number of future lags, and L_2 is the number of past lags. If the calculated S value exceeds the critical X^2, the null hypothesis of independence is rejected.

Data Analysis

Three time series measuring the flow of credit in the regional economy were employed in this analysis. The three time series, regional commercial bank industrial loans (CBIL), regional loans by savings and loans (LSL), and regional credit union loans (CUL), were selected largely on the basis of data availability. Indicators of economic activity are not as plentiful at the small region level. The regional unemployment rate (UN), regional manufacturing employment (ME), regional construction employment (CE), and regional retail trade employment (RE) were chosen as measures of economic activity in the region. These time series were available in a seasonally unadjusted form from various state agencies for the interval 1969 through 1979.[1] Two coincident indicators of economic activity in the national economy were employed to check the exogeneity of the regional credit series with respect to fluctuations in income and output in the national economy; industrial production (USIP), and personal income (USPI) were selected largely because of their availability on a monthly basis. The personal income series was only available in a seasonably adjusted form.

Table 1 displays the estimated ARIMA models for each of the time series under construction. The residuals from these models are estimates of the innovations for each series. From the cross-correlation functions for alternative pairs of the estimated innovations, the small sample S-statistics required for the independence test are computed.

[1] C. W. J. Granger and Paul Newbold [5] recommend the use of seasonally unadjusted data. All financial and income data are in 1972 dollars.

Table 1: Estimated ARIMA Models

Time Series	ARIMA Models	Test of Residuals Q	D.F.
Manufacturing Employment	$(1 - B)(1 - B^{12})(1 - .7874B)(1 + .3581B^{12})ME = (1 - .9447B - .2652B^{2} - .9576B^{12})e_t$	17.6636	24
Construction Employment	$(1 - B)(1 - B^{12})CE = (1 - .2663B^{1} - .2083B^{8} - .9245B^{12})e_t$	25.6038	24
Unemployment rate	$(1 - B)(1 - B^{12})(1 + .3927B)UN = (1 + .1616B^{4} + .2284B^{5} - .8864B^{12})e_t$	20.1723	24
Retail trade Employment	$(1 - B)(1 - B^{12})(1 + .4839B^{12})RE = (1 + .2868B^{11} - .6304B^{12})e_t$	15.2061	24
Loans by Savings and Loans	$(1 - B)(1 - B^{12})LSL = (1 - .2328B^{1} + .2869B^{2} - .8637B^{12})e_t$	28.6712	24
Commercial Bank Industrial Loans	$(1 - B)(1 - B^{12})(1 + .5130B)CBL = (1 - .2298B^{3} + .2025B^{6} - .9474B^{12})e_t$	14.3958	24
Credit Union Loans	$(1 - B)(1 - B^{12})CUL = (1 - .8717B^{12})e_t$	20.3742	24
U.S. Industrial Production	$(1 - B)(1 - B^{12})USIP = (1 + .1059B^{3} + .2246B^{4} - .9182B^{12})e_t$	10.4492	24
U.S. Personal Income	$(1 - B)(1 - B^{12})(1 - .8927B)USPI = (1 - .8183B - .2174B^{6} + .2019B - .8928B^{12} - .2907B^{15})e_t$	22.6937	24

The Q statistic is a chi-square distributed test statistic with k degrees of freedom where k is the number of sample autocorrelations. This statistic provides a test of the hypothesis that the time series of interest is white noise.

Table 2 shows the results of the cross-correlation analysis of commercial bank industrial loans with the regional unemployment rate, regional manufacturing employment, regional construction employment, U.S. industrial production, and U.S. personal income. The latter two cross-correlation analyses were conducted to establish the exogeneity of regional commercial bank industrial loans with respect to the national business cycle.

The cross-correlation analysis suggests that regional commercial bank industrial loans do influence the regional unemployment rate in the expected direction. The cross-correlation coefficients at lags four and eight are significantly different from zero at the ninety-seven and ninety-nine percent confident levels, respectively. The correlation coefficient at lag two is statistically significant at the ninety-five percent confidence level. The coefficient at lag six is significant at the ninety percent confidence level. The large negative coefficient at lag four compares in size with the values of the

Table 2: Estimated Cross Correlations Between Regional Commercial Bank Industrial Loans And Regional Employment Indexes

Series (128 obs.)	Lags	Cross Correlations 0	1	2	3	4	5	6	7	8	9	10	11	12
ε(CBL) on ε(UN)	0 to 12	.06	−.03	.16	−.02	−.30	.03	−.15	.04	−.18	.06	−.05	.10	.09
	−1 to −12		−.08	−.02	.07	.01	−.01	.08	−.09	−.01	.02	−.02	.03	.10
ε(CBL) on ε(ME)	0 to 12	−.09	.04	.16	.02	.02	.15	−.03	−.05	−.14	−.18	−.02	.20	.13
	−1 to −12		−.09	.01	.02	−.06	.03	−.19	.07	.0	.11	−.03	−.03	−.12
ε(VSIP) on ε(CBL)	0 to 12	.08	.08	.04	−.01	−.04	.03	−.05	−.02	.10	−.02	.05	−.18	−.12
	−1 to −12		.01	.10	.08	.16	.03	.15	.0	.03	.06	.06	.02	−.04
ε(VSPI) on ε(CBL)	0 to 12	.13	.09	.12	.04	.01	.02	−.01	−.01	.16	.01	−.03	.06	−.10
	−1 to −12		.07	−.03	.04	.01	.16	.10	.07	.10	−.13	−.06	.03	.04

cross-correlation coefficients between innovations in the money supply and various stock indices discovered by Rogalski and Vinso [9]. The future cross-correlation coefficients do not suggest any evidence of bi-directional causality.

The results of applying the chi-square test for different lags are reported in Table 3. These tests of causality indicate rejection of the null hypothesis of stochastic independence between commercial bank industrial loans and the regional unemployment rate.

The estimated cross-correlation function between innovations in regional commercial bank industrial loans and innovations in regional manufacturing employment does not disclose any clear-cut positive relationship. The largest positive coefficient appears at lag twelve and is the only positive coefficient which is statistically significant at the five percent level of significance. However, negative coefficients which are statistically significant at the five percent level of significance occur at a lag of nine and a future lag of six. A clear interpretable pattern is difficult to extract from this cross-correlation function. The future lags collectively considered suggest a slightly negative relationship, which can only be explained as a faint echo of a counter-cyclical monetary policy. The expected positive relationship between innovations in regional commercial bank industrial loans and innovations in regional manufacturing employment is difficult to substantiate in view of the large negative

Table 3. Haugh-Pierce X^2 Tests for Independence: Regional Commercial Bank Industrial Loans

Test	(128 Obs.) L_1	L_2	ε (CBL) on ε(UN)	ε(CBL) on ε(ME)	ε(CBL) on ε(CE)	ε(USIP) on ε(CBIL)	ε(USPI) on ε(CBIL)
Causality	0	+6	18.9900*	7.7952	2.0097	7.5262	5.3702
	−6	−1	2.4000	6.5538	6.8138	8.6741	5.7265
	0	−12	26.5200*	22.9760*	16.6462	15.9188	10.9342
	−3	+6	20.2099*	8.9055	2.9385	9.6782	11.0170
	−6	+12	28.9200**	29.5298**	23.4600	24.5929	16.6609

* significant at the 5% level.

** significant at the 10% level.

coefficients at lags eight and nine. According to Table 3, the null hypothesis of stochastic independence between these two series can be rejected when the past lag span reaches twelve.

The cross-correlation function between innovations in regional commercial bank industrial loans and innovations in regional construction employment reveals a much more plausible pattern. At lag five, the cross-correlation coefficient is significantly positive at the five percent level of significance. Evidently, industrial loans are largely involved in financing the construction of industrial and commercial sites. There is some indication of bi-directional causality at future lag six where a spike in the cross-correlation function occurs which is significantly positive at the five percent level of significance. However, according to Table 3 the null hypothesis of stochastic independence between these time series must be accepted.

Another major cause of innovations in regional economic activity originates from cyclical impulses propagated by the national economy. The cross-correlation functions between innovations in regional commercial bank industrial loans and innovations in U.S. industrial production and innovations in U.S. personal income respectively, suggest that regional industrial loans are not serving as a proxy for the national business cycle component. The chi-square statistics in Table 3 indicate that the null hypothesis of stochastic independence between regional commercial bank industrial loans and these two coincident indicators of the national business cycle must be accepted. Based on the estimated cross-correlation analysis with the regional unemployment rate, and the tests of exogeneity, regional commercial bank industrial loans can be an independent source of cyclical shocks in the regional economy.

Table 4 shows the results of the cross-correlation analysis between innovations in regional loans by savings and loans and innovations in the regional unemployment rate, level of regional construction employment, U.S. industrial production and U.S. personal income. The cross-correlation function computed between innovations in regional loans by savings and loans and innovations in the regional unemployment rate suggests a negative association at lag one. Regional loans by savings and loans impact the regional

Table 4: Estimated Cross Correlations Between Regional Loans By Savings and Loans and Regional Employment Indexes

Series		Cross Correlations												
(128 obs.)	Lags	0	1	2	3	4	5	6	7	8	9	10	11	12
ε(LSL) on ε(UN)	0 to 12	.09	−.20	−.10	.0	−.06	−.06	−.12	−.12	.02	.05	.09	.03	.03
	−1 to −12		−.03	−.05	.0	.07	.09	−.12	.07	−.01	.06	−.18	.18	.18
ε(LSL) on ε(CE)	0 to 12	.14	−.08	.03	.04	.17	.01	.18	−.04	−.08	.01	.18	.08	.06
	−1 to −12		−.05	−.11	−.17	−.04	−.02	.02	.04	.10	.04	.03	.10	.09
ε(USIP) on ε(LSL)	0 to 12	.04	.15	.09	.08	.12	.0	.10	−.25	.22	−.12	−.05	−.05	.0
	−1 to −12		.09	.19	.14	.21	.02	.08	.04	−.10	.04	.03	.10	.09
ε(USPI) on ε(LSL)	0 to 12	.13	−.01	.04	.01	.05	.07	.04	−.12	−.13	−.10	−.02	−.12	−.02
	−1 to −12		.08	.04	.13	.09	.02	.12	.23	.06	.11	.03	.06	.08

unemployment rate to a much lesser degree than regional commercial bank industrial loans. The coefficient at lag one is significantly different from zero at the ninety-seven percent level of confidence. However, the other coefficients at the past lags are not significantly different from zero at the ninety-five percent level of confidence. Spikes at future lags ten, eleven, and twelve represent statistically significant correlations but the opposing signs and the long lags render interpretation very difficult. Seasonal factors remaining in the residuals may be responsible, particularly in view of the proximity to lag twelve. The chi-square statistics do not support an hypothesis of causality at the lag structures reported in Table 4. A lag structure limited to two past lags would require rejection of the null hypothesis of stochastic independence.

The cross-correlation function computed between innovations in regional loans by savings and loans and innovations in regional construction employment reinforces the findings of the cross-correlation analysis on the regional unemployment rate. There is a positive association between innovations in regional loans by savings and loans and innovations in regional construction employment at lags four and six. The spikes at these lags are statistically significant at the ninety-five percent level of confidence, although the absolute sizes are not impressive. The large negative correlation at past lag twelve is most likely the symptom of some remaining seasonality in the residuals and the statistically significant negative coefficient at future lag three is difficult to interpret; the impact of regional loans by savings and loans on regional economic activity appears less identifiable when compared to the impact of regional industrial loans. In any case, according to the chi-square statistics the null hypothesis of stochastic independence must be accepted.

The hypothesis of the exogeneity of regional loans by savings and loans with respect to U.S. industrial production should be rejected on the basis of the chi-square test at most lag lengths, according to Table 4. The opposite signs of the statistically significant coefficients in the cross-correlation function at past lags seven and eight are quite frankly puzzling. At past lags zero to six, regional loans by savings and loans satisfy the test of exogeneity. An examination of the future lags provide some support for the hypothesis that regional loans by savings and loans cause U.S. industrial production. While

Table 5: Haugh-Pierce X^2 Tests for Independence: Regional Loans by Savings and Loans

Tests	(128 Obs.)		ε (LSL)	ε(LSL)	ε(USIP)	ε(USPI)
	L_1	L_2	on ε (UN)	on ε (CE)	on ε (LSL)	on ε (LSL)
Causality	0	+6	10.38640	11.8437	8.2452	3.5951
	−6	−1	4.10140	6.0022	15.2528	6.3993
	0	+12	14.11290	20.8484**	25.9960*	9.1731
	−3	+6	10.88250	17.5275**	16.5530	6.8920
	−6	+12	18.21430	26.8506	41.0440*	15.5724

* significant at the 5% level.

** significant at the 10% level.

the evidence lacks clarity, in all probability, regional loans by savings and loans fluctuate in step with the national business cycle component and are reflecting the general tendency for housing to react sooner than other sectors at cyclical turning points.

The chi-square test of innovations in U.S. personal income on innovations in regional loans by savings and loans support the null hypothesis of stochastic independence between these two series. An examination of the cross-correlation function reveals a statistically significant coefficient at future lag seven which supports the previous suggestion that regional loans by savings and loans move in phase with the national business cycle and therefore must not be viewed as an important source of indigenous cyclical shocks in the regional economic system.

Innovations in regional loans by savings and loans and other innovations series of various employment sectors were cross-correlated, but no patterns came to light.

The results of the cross-correlation analysis between residual credit union loans and residual unemployment rates, residual retail trade employment, residual U.S. industrial production, and residual U.S. personal income are presented in Table 6.

The cross-correlation function between innovations in regional credit union loans and innovations in the regional unemployment rate contains only one statistically significant correlation coefficient, which is located at past lag twelve. The coefficient has the correct sign. The application of the chi-square test to these two series, however, as shown in Table 7, supports the null hypothesis. The statistically significant inverse correlation at future lag seven may indicate that unemployed workers are no longer able to obtain credit union loans.

The estimated cross-correlation function between innovations in regional credit union loans and innovations in regional retail trade employment contains statistically significant spikes at past lags zero, six, and eleven. Table 7 reports the chi-square statistics for various positve and negative lag combinations. In only one instances does the test statistic fail to exceed the critical

Table 6: Estimated Cross Correlations Between Regional Commercial Bank Industial Loans and Regional Employment Indexes

Series		Cross Correlations												
(128 obs.)	Lags	0	1	2	3	4	5	6	7	8	9	10	11	12
ε(CUL) on ε(UN)	0 to 12	.01	.04	−.06	−.01	−.02	.0	−.04	.04	.09	.01	.09	.04	−.19
	−1 to −12		.08	−.14	−.03	.10	.13	.02	−.21	.01	−.02	−.04	−.08	−.08
ε(CUL) on ε(RE)	0 to 12	31	−.01	.01	−.14	.07	−.06	.17	.07	−.05	−.03	−.05	.29	−.13
	−1 to −12		−.03	.07	.01	−.08	−.12	.02	−.15	−.05	.14	−.07	.15	−.06
ε(VSIP) on ε(CUL)	0 to 12	.05	.04	−.08	.12	−.08	−.06	−.04	−.04	−.02	.22	.01	.11	−.02
	−1 to −12		−.03	−.02	.01	.12	−.33	.24	−.09	−.04	−.03	.07	.15	−.01
ε(VSPI) on ε(CUL)	0 to 12	.10	.13	−.02	.04	.08	−.09	−.06	−.14	.08	.02	.0	.03	−.04
	−1 to −12		.01	.0	−.09	.07	.0	.05	.04	.02	−.04	.01	.25	−.10

Table 7: Haugh-Pierce X^2 Tests for Independence: Regional Credit Union Loans

Test	(128 Obs.) L_1	L_2	ε (CUL) on ε (UN)	ε(CUL) on ε (RE)	ε(USIP) on ε(CUL)	ε(USPI) on ε(CUL)
Causality	0	6	.7667	19.9039*	4.7860	6.1299
	−6	−1	7.1183	3.5838	24.3250*	2.0577
	0	−12	8.5379	33.2735*	13.6490	10.0647
	−3	+6	4.2589	20.6701*	4.9672	7.2044
	−6	+12	15.6562	36.8573*	37.7940*	12.3685

* significant at the 5% level.

** significant at the 10% level.

X^2 value at the five percent significance level and thus the null hypothesis that regional retail trade employment and regional credit union loans are stochastically independent must be rejected.

The estimated cross-correlation function between innovations in regional credit union loans and innovations in U.S. industrial production reveals statistically significant spikes at a lag of minus eleven and at positive lags five and six. The significant cross-correlations at positive lags five and six have opposing signs, rendering any interpretation highly speculative. In Table 7 it is only in lag structures exceeding six positive lags that the chi-square statistic exceeds the critical X^2 value at the five percent significance level, which suggests that credit union loans causes U.S. industrial production instead of vice versa. The chi-square statistic on the past lags indicate the regional credit union loans are exogenous with respect to U.S. industrial production. The estimated cross-correlation function between innovations in regional credit union loans and innovations in U.S. personal income and the calculated chi-square statistic at the various lag structures, indicate that the null hypothesis of stochastic independence between these two time series must be accepted. Since stochastic independence between regional credit union loans and U.S. industrial production cannot be established, and the fact that the hypothesis of causality between regional credit union loans and regional unemployment cannot be accepted, regional credit union loans are not an important source of indigenous cyclical shocks in the regional economic system.

Summary

This study has examined the degree to which innovations in selected regional economic indicators can be traced to innovations in the flow of credit from regional financial institutions as opposed to innovations in the level of income and output in the parent economy. The study concluded that the time path of the regional unemployment rate is partially composed of innovations emanating from innovations in the flow of commercial bank industrial loans and loans by savings and loans. The commercial bank industrial loan series did pass the test of exogeneity with respect to income and output in the parent

economy. The loans by savings and loan series failed the test of exogeneity. Therefore, innovations actually originating from fluctuations in income or output in the parent economy could be mistakenly attributed to innovations in loans by savings and loans.

Innovations in loans by credit unions did not appear to be a source of innovations in the regional unemployment rate. In any case, loans by credit unions also failed the exogeneity test.

Innovations in commercial bank industrial loans appear to affect the regional unemployment rate through innovations in manufacturing employment and possibly construction employment. Strangely enough the impact of loans by savings and loans on construction employment is not all that visible. The correlation between innovations in loans by credit unions and retail trade employment, respectively, is very strong. However, the innovations emanating from commercial bank industrial loans are the only innovations that can most certainly be separated from the tide of the parent economy business cycle.

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