X Encontro Nacional de Economia Política

Prices, Distribution and the Business Cycle

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In this work we intend to investigate the relation between relative prices and the income distribution by initially presenting the results of an statistical test fashioned by Jacob Schwartz's (1961), where he shows the relative stickiness of relative prices during the short and quite violent movements of the product on the event of a trade cycle, which can be interpreted as an empirical test of the Ricardian claim that wage-profit changes will not have much of an impact on relative prices. We extend his test by using a broader and more all-inclusive data base, containing results of average product and price variation over 31 business cycles in US industries and get results strictly comparable with the original research.

Neste trabalho investigamos a relação entre preços relativos e distribuição de renda através da apresentação de resultados de um teste estatístico feito por Schwartz (1961), onde é mostrada a relativa rigidez de preços relativos durante os movimentos de curto prazo no produto, taxa de lucro e salários típicos de um ciclo de negócios. Este teste pode ser visto como um interpretação da hipótese ricardiana de que movimentos na fronteira lucro-salários não terá grande impacto na determinação do comportamento de preços relativos. Estendemos este teste através da análise de uma ampla base de dados referentes a 31 ciclos de negócios na indústria america e obtemos resultados que confirmam a hipótese de Schwartz.

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Sub-Área: Economia Política, Capitalismo e Socialismo

1 Introduction:

In one of most widely debated episodes in the history of economic thought, Ricardo's critique of Adam Smith states that his doctrine had a fundamental mistake regarding value. Smith had confused the quantity of labor commanded by a commodity in the market - that could be also seen as an deflation of the commodity price by the average wage rate, and the quantity of embodied labor - a measure of the amount of direct and indirect labor time expended in its production. He then strives to show that as a general rule, it was rather the 'quantity of labour bestowed on the production' of commodities the element that regulated their relative value and served as 'a good approximation to truth' (Ricardo, 1951-73, Vol. I).

In his exposition, Ricardo also helped clarify some questions regarding the relation between changes in distribution and movements in relative prices in a way no other Classical economist did. He showed quite clearly how the interaction of changes in distributive shares had very little impact in relative prices in a two-step presentation. Initially, he demonstrated that, under free competition and equal compositions of capital between sectors, a rise in the wage rate would cause a general fall in the profit rate (and vice versa) and hence have no impact on relative prices. Then, he also demonstrated that changes in distribution under different cross industry compositions and/or durability of capital could have caused changes in relative prices but, according to him, this would be an almost negligible effect if compared with the impact caused by changes in embodied labor. In this manner, Ricardo's labor theory of value also helped dispel the notion, also associated with Smith, of prices as the sum of profit and wages and that the wage rate and the rate of profit could be determined independently of each other.

This approach to the relation between distribution and prices, largely obscured by the impact of the marginalist revolution, experienced a modern days comeback with the work of Sraffa and his followers, who focused their analysis on a system of relative prices facing changes in distributive variables under competitive conditions. For Sraffa, the behavior of relative prices of production in an input-output framework was far too complex to allow any description of the

relation between the price of a commodity and any single individual variable. According to him, the central element explaining how relative prices behaved as, for example, a change in the wage rate occurred was the proportions in which labor and means of production are employed in every industry.

Pasinetti (1977) takes a slightly different perspective on the same issue. He asserts that relative price movements are dominated by the degree of capital intensity in the correspondent industries and therefore 'we can say that an increase in the rate of profit will be associated in most cases with an increase in the prices of commodities which for their production require a ratio of means of production to direct labor which is greater than that required by the numéraire-commodity' (p.84). Notwithstanding this fact, he believes that not much more can be said regarding the relation between changes in prices corresponding changes is the rate of profit, as there will be always be commodities for which this capital intensity effect can be compensated by a opposite and stronger price-effect, originating from the complex network of interindustry relationships. In what refers to the specific relation between income distribution and prices, this somewhat erratic behavior of relative prices makes the correspondence between the wage rate and the rate of profit become quite complicated, as not only the net effect of a variation in one distributive parameter affects income distribution, but also the feedback distributive influence of relative price changes create unpredictable patterns in a wage rate-rate of profit schedule. Hence, the case originally analyzed by Ricardo (and Marx), where there structure of relative prices is invariant to income distribution, would be no more than an implausible particular situation, i.e., the case when uniform organic compositions of capital are observed across the industrial structure.

Hence, although having reestablished at the methodological level the works of Ricardo and Marx, some of the basic conclusions of this version of the 'classical revival' strongly deny the idea of a relative independence between relative prices and distributive variables, materialized in the idea of the inflexibility of relative prices when changes along the wage-rate-profit-rate frontier are observed. In spite of that, the relative rigidity of relative market prices in the short run has long been recognized in the literature.

From the seventies, another branch of the classical revival found quite strong empirical evidence that supported the original classical argument on the relation between relative prices and distribution (Shaikh, 1998; Chilcote, 1997; Bienenfeld, 1988; Ochoa, 1984). By using input-output data, these authors have shown that competitive relative prices are in fact quite inflexible in the face of changes in the division of the net product between wages and profits. This is equivalent to say that at the empirical level the behavior of individual prices is quite regular, as observed in the near linearity of the profit rate-wage rate curves in the US economy. In addition, by showing the empirical correlation between market prices and relative vertically integrated labor coefficients, these results give support to the idea that these coefficients determine market prices and hence that Classical theory of prices can provide a quite robust framework for the explanation of price formation.

In this work we intend to further investigate the relation between relative

prices and the income distribution by initially presenting the results of an statistical test fashioned by Jacob Schwartz's (1961), where he shows the relative stickiness of relative prices during the short and quite violent movements of the product on the event of a trade cycle, which can be interpreted as an empirical test of the Ricardian claim that wage-profit changes will not have much of an impact on relative prices.

In addition, we extend his test by using a broader and more all-inclusive data base, containing results of average product and price variation over 31 business cycles in US industries and get results strictly comparable with the original research.

Conclusion summarizes the findings and presents suggestions for further research.

1.1 Jacob Schwartz and Ricardo's Hypothesis

Jacob Schwartz presented in 1961, on his Lectures on the Mathematical Method in Analytical Economics one of the confirmations, in the context of the post world war II debates in Political Economy, of the inflexibility of relative prices face the sudden and violent changes in output that occur during a business cycle.

Schwartz conducted his test in the context of a linear production model of the following type:

Assume we have a Leontieff type economy where $C_1, ..., C_n$ are the various commodities produced. In order to produce an unit C_i, it is technologically required that π_{ij} amounts of other commodities C_j be used up; in addition, it is also required that ϕ_{ij} units of C_j be tied up for a production period. In this model, we call the matrix π_{ij} the *input-output matrix* and the matrix ϕ_{ij} the *fixed capital matrix.* Let π_{jo} represent the amount of labor required for the production of one unit of C_j and π_{oj} be the amount of C_j which is consumed in order to produce one unit of labor (say, in man-hours, i.e. the average real wages paid out per hour of labor). We then have a closed system, where the set of commodities produced is equal to the set of commodities utilized/consumed in production.

Now let $p_o, p_1, ..., p_n$ be the prices of the various commodities produced; then according to our assumptions, $p_o, p_1, ..., p_n$ are also the prices of the commodities utilized/consumed in production. We can then define the price of commodity C_i as

$$p_i = \sum_{j=0}^{n} \pi_{ij} p_j + \rho \sum_{j=0}^{n} \phi_{ij} p_j, \qquad i = 1, ..., n. \tag{1}$$

Where, $\sum \pi_{ij} p_j$ represents the sum of all of the products consumed on the manufacture of C_i. The second term is the markup for profit, proportional to the sum of values of products in the fixed capital matrix and hence we assume that $\phi_{io} = 0$. In addition we have our rate of profits ρ is the same for all capitals under conditions of free competition in long term equilibrium.

Recalling that π_{oj} denotes the bundle of goods that composes the real wage of labor, we define the price p_o of an hour's labor as

$$p_0 = \sum_{i=0}^{n} \pi_{oi} p_i \tag{2}$$

Introducing additional matrix elements ϕ_{oj} by putting $\phi_{oj} = 0$, we may write equation (2) in the same for as equation (1) and write (1) and (2) together in the form

$$p_i = \sum_{j=0}^{n} \pi_{ij} p_j + \rho \sum_{j=0}^{n} \phi_{ij} p_j, \qquad i = 0, ..., n. \tag{3}$$

We then have a set of $n+1$ equations homogeneous in the $n+1$ variables p_j, and contains an unknown variable ρ. Thus system in (3) now can determine the n ratios of $n+1$ prices p_i and the quantity ρ. Under the current assumption of free competition and further assuming that π and ϕ matrices are connected and non-negative, it can be shown that if a positive rate of profits is possible, the rate of profits is unique and the prices are positive and unique within a multiplicative constant. It amounts to say that prices and the rate of profits depend only upon the production coefficients π_{ij} and ϕ_{ij}. Hence, according to this model, relative prices are determined by the technological conditions of production and thus independently from supply and demand forces.

In order to test this model, Schwartz devised what he called a 'rough statistical test' of the assumption that π_{ij} and ϕ_{ij} are constants and not functions of the level of production of the various commodities, i.e., the idea of constant returns to scale. The model assumes that, for a given wage rate, relative prices depend solely on the π_{ij} and ϕ_{ij} matrices and on the rate of profit ρ. Hence, if we assume a constant ρ, relative prices should be inflexible face changes in production levels.

He took peak-trough average percent variation of production and relative prices over business cycles of the American economy and tested the hypothesis that relative prices should be much the same in a boom and recession.

In tables 3.1 and 3.2 we reproduce J. Schwartz original tables[1] built on data provided by W.C. Mitchell's work on business cycles at the National Bureau of Economic Research. Both tables indicate that production levels of diverse U.S. industries averaged over four business cycles in the period 1919-1938 present variations of 33% to 60%. On the other hand, relative prices for the same cycles - but for different industries - present much smaller differences in the range of peak-trough movements.

Table 1. Output Variation over 4 business Cycles - USA

	Peak	Trough	Variation(%)
Industrial Production	120	87	33
Auto Production	130	70	60
Cotton	120	90	30
Housing Contracts	130	90	40
Factory Pay	125	85	40

Table 2. Relative Price Variation over 4 business Cycles - USA

[1] Schwartz,1960:43, tables IIIa and IIIb

	Peak	Trough	Variation(%)
Wholesale Price of Finished Goods	100	100	0
Wholesale Prices for Semi Manufactured Goods	104	97	7
Raw Materials	105	96	9
Wholesale Foods	100	98	2
Retail Foods	101	97	4
Pig Iron	106	94	12
Farm Prices	106	96	10

Based on this evidence Schwartz concluded that the assumptions of the linear production model seem plausible and justify further research.

The response of the profession to similar empirical evidence has been mostly based on the assumption that the rigidity of relative prices is due to market imperfections. Here we find a great level of convergence between neoclassical economists, who advocate the imperfect competition theories, and a large part of the Post Keynesian tradition that develops from the works of diverse authors who try to create a non-neoclassical account of the firm in a new industrial environment (Weintraub, 1979; Sylos-Labini, 1962; Steindl, 1952; Burchardt, 1944; Hall&Hitch, 1939). Under this perspective, it seems that one the possible explanations for the rigidity of relative prices rely exactly on the idea that oligopolist firms would set and administer their prices to the market (Godley and Nordhaus,1972; cf. Lee, 1998), keeping them constant despite movements originating from the demand side. Evidently, one needs to assume that the same sort of 'imperfections' are present in all markets so that not only 'fixed' relative prices are observed but also constancy in income distribution in regard to short run fluctuations of output.

However, these statements seem to be inconsistent with reality. In figures 1 and 2 and table B.1 (see appendix) we observe respectively the real hourly wage rate, the margin of profits in the manufacturing sector and the average real wage variation for 22 industries in the business cycles. As we can notice, both variables seem to have a quite clear pro-cyclical movements, results confirmed by diverse studies of the distribution of income during the cycle (*vide* Iyoda, 1998).

Consequently, it seems that a consistent explanation for the behavior of relative prices should necessarily incorporate the changes in income distribution that occur during the trade cycle. It turns out that Ricardo's idea of the insensitivity of relative prices in the face of changes in income distribution can give us a more robust framework for the treatment of the phenomena in question. We are aware that the treatment of the question in Ricardo is conducted in terms of long run prices, while here we are dealing with market prices in a disequilibrium process. However, as it was indicated in Shaikh(1998), the degree of variation of market prices in relation to labor values is quite limited and therefore the business cycle exercise can be seen as a general test of the Ricardian hypothesis.

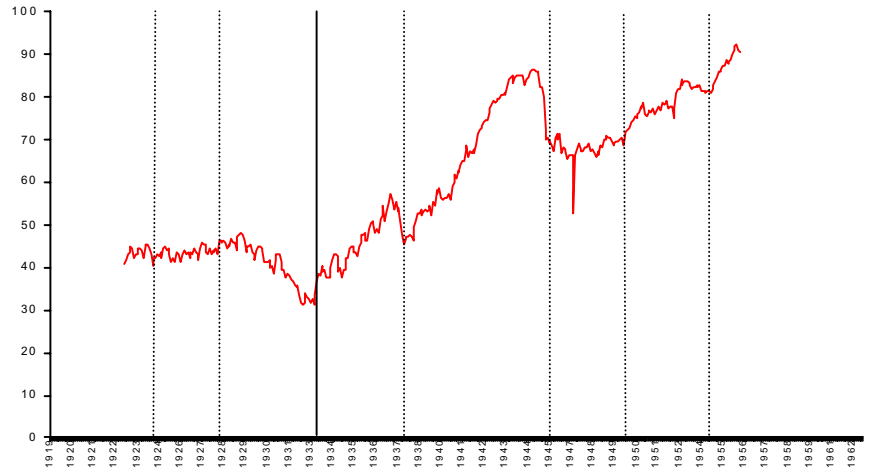


Fig. 1. Real hourly wage rate, US manufacturing sector - 1922-1956. Dashed vertical lines indicate the official NBER troughs, while the solid line marks the trough for the 1929 Great Crash. Real wages seem to move more or less pro-ciclically. Source: NBER.

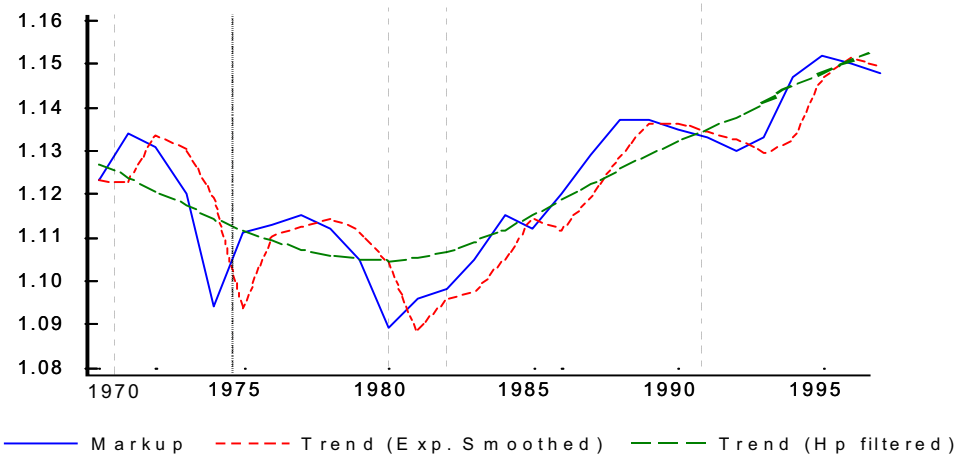


Fig. 2. Mark up, Manufacturing sector, USA, 1970-97. Mark up in the US manufacturing sector seems to present a pro-cyclical movement, although peaks and troughs do not necessarily coincide with official dates. Source: OECD

2 Relative Prices and the Business Cycle - US Manufacturing Industry 1856-1969

2.1 Data

We now plan to extend Schwartz original exercise by using a broader database, covering a more extensive set of industries as well as a larger number of business cycles. However, before going over the empirical results, a brief but necessary discussion on data sources and methods used in this work.

2.1.1 Sources

The source for all time series utilized is the National Bureau of economic Research (NBER) Macrohistory database. We basically utilized monthly historical series for prices and production of the manufacturing sector, following the classification found on NBER's original documentation (NBER, 1967). Although a closer observation of the series reveals that they do not strictly correspond to the more recent ISIC classification, we believe that this should not be motive for great concern, as the robustness of our results do not depend on any specific division of industries. On the contrary, they should generally hold in spite of local realities. A second reason that may justify the use of the Macrohistory database is that it provides the most extensive coverage of the variables of interest. For some of the series, observations start as early as mid nineteenth Century and continue until the post-World War II period.

Series used are available at www.nber.org/macrohistory. We chose series for the manufacturing industry referring to entries "indexes and aggregates", which roughly correspond to the two-digit level. As not all aggregated price series find an exact product counterpart due to differences in coverage and changing classification, we have listed the series by industry of the manufacturing sector and explain the differences for the same entry whenever they occur. Series are identified by their original NBER reference codes; product series starting with numbers 1 or 2 and price indexes with number 4.

2.1.2 Relative Price Series

Relative price series were built by deflating individual price indexes by the wholesale price index available at the Macrohistory database. Production and price series had different base years. As some of the series had non-coincident samples, we have opted to keep the original indexation intact, as relative percent variations over the cycle are supposedly not affected by changes in the base year.

2.1.3 Seasonal Adjustment

Monthly series were originally not adjusted for seasonal fluctuations. We performed both ratio-to-moving average and difference from moving average seasonal adjustment and as results did not substantially change with the choice of smoothing method, we present here only those found with the first procedure.

2.1.4 Trends

Trends in the series did not happen a serious obstacle in the analysis of production and relative price movements. Relative price series do not present a very convincing trended movement - its behavior can even resemble a random walk in the short/medium term. Production series are traditionally known to be series 'dominated' by a trend in the long run, but as for economic theory the output and relative price variations occur in the short run, we found unnecessary to de-trend series in order to identify local peaks and troughs.

2.1.5 Local Cycles

NBER cycles are defined not only with base on product movements. Indicators that help define the various moments of the business cycle include observations of the behavior of employment, income, price and product series as well as the direction and persistency of the movement in each of these series (NBER, 1994). Notwithstanding this fact, NBER official dates coincide reasonably well with peaks and troughs of product series, showing that this is by large the most relevant element in the definition of the business cycle.

However, some discrepancies between official and local cycles still occurred, which called for the separation of cycles by industry. We have identified local peaks and troughs for every series here utilized by using official cycles dates as reference. Whenever the peak (trough) did not coincide with the local reality, we would look in the same semester for and higher (lower) point of the series, not before observing if at least the four precedent observations showed a defined pattern of rising (falling) product. In great part of the series, this quite intuitive method yielded good results, with local peaks (troughs) being located in the same semester of the official date. We repeated this procedure for both original and seasonally adjusted series.

2.1.6 Averaging cycles variation

Average product and relative price movements over cycles were found by identifying (official and local) extremities of the cycle, taking peak-trough percent variations for individual cycles and then finally the average variation for all available cycles.

This procedure is different from the one utilized by J. Schwartz on his original statistical test. Schwartz's procedure seems to be based on the so-called 'nine-stage' approach of developed by Wesley C. Mitchell and the NBER to describe business cycles. According to NBER's method, trough-to-trough cycles are divided in nine stages. Stage 1 of each cycle is its initial trough, stage 5 is the cycle peak and stage 9 is the final trough. Intermediate stages as 2,3 and 4 equally divide the expansion period whilst stages 6,7 and 8 equally divide the contraction. The level at each stage is expressed as a percentage of the average value over the whole cycle. The cycle average is set equal to 100, so 83% is stated as 83 (Hahnel and Sherman, 1982). Having established the average for each cycle as 100, Schwartz then averaged separately peak and troughs for four

cycles and only then calculated the average peak-trough percent variation (see tables 3.1 and 3.2).

We believe our procedure is justified by the fact that it yields individual cycle deviations and the possibility to identify general characteristics of the sample, like cross sectional patterns, as well as the existence of singular features in the series, specially outliers.

2.2 Results

Table A.1 (see appendix) shows results of average product and price variation over 31 business cycles of U.S. industries. In this first table, we have taken NBER's official business cycles peaks and troughs as a general reference. Two problems derive from this procedure. The first one relates to the fact that the NBER does not define a recession in terms of two consecutive quarters of decline in real GNP. Rather, a recession is 'a period of significant decline in total output, income, employment, and trade, usually lasting from six months to a year, and marked by widespread contractions in many sectors of the economy' (NBER, 1994). Hence, the very definition of a business cycle and its reference dates will depend not only on product movements but also upon a set of indicators. Notwithstanding this fact, product movements will still be the most relevant factor in the determination of the business cycle and hence we believe that the utilization of official reference dates is a justifiable procedure. The second complication refers to local cycles. We know that reference dates refer to more aggregated series and that the exact peaks and troughs will not be valid for every industry. However, we want to observe how different results one may get by testing all series with a general date and then working with industry specific cycles.

In this table we have worked with nineteen product series and twenty-eight relative price series. Regarding output series we observe that seven series presented a percent variation over the cycles of more than 30%, nine with more than 20%, twelve more than 15% and sixteen product series had bigger variation than the correspondent price series. Prices, on the other hand, moved quite differently. We found twenty-six price series with variations smaller than 20%, twenty-three smaller than 15%, seventeen smaller than 10% and seven with less than 5%. Overall average product variation was 23,63%, whilst prices varied 9,13%.

We also wanted to verify the specific impact of the 1929's Great Depression on both sets of data. We estimated average variations ignoring the cycle that lasted from October of 1929 to March of 1933, period where most production series faced record variations. We found that all average deviations for product and price series are smaller when we ignore the '1929 effect' - a somewhat obvious result. Product average was 19,86%. Less obvious, however, was the much smaller impact on prices, whose average variation became 8,36%.

Pre-1929 and post-1929 averages were also taken in order to check if any discernible temporal pattern appears on available series as we divide them by periods. For product, seven series presented smaller variations in the period after the 1929 depression, fives series greater variations and two series had almost the same averages in the two periods. Price series presented thirteen series with smaller average variation in the post-1929 period, eight with larger and two with roughly the same pre-1929 figures. Hence, while product series had an almost equal division between series with smaller and greater variation in the latter period, prices behaved in a more distinguishable way, being even steadier during those cycles. Notwithstanding the fact that the smaller number of observations in the post-1929 period could be source of some distortion in our figures, these patterns suggest further investigation.

Another relevant feature of the data in table A.1 are the supposedly 'wrong' signs in some product observations. We perceive positive variations of output during the general cycle. This is due to the above-mentioned utilization of only one reference date to all series that probably yielded figures that are not really peak-trough variations. This phenomenon is more evident in cycles whose troughs are in 1919, 1921 and 1949 when a greater number of product series presented positive variations. For example, series 1107 and 1126 showed 'wrong' signs in 1919 and 1949. In this case, the possible cause, apart from discrepancies in local extremities is also the effect of a stronger than average trend in the data, especially in the case of petroleum (1107) series. It is worth mentioning that these and the remaining cases (2122, 1259,1260, 2119, 1106) are all equivalent to two-digit industries therefore cycle dates discrepancies are most likely to be the cause of this phenomenon.

Even with the limitations of the method, results are quite clear and confirm Schwartz' findings on a larger scale. While product series varied up to 45%, with an overall average of 22,63%, prices varied up to 25%, but with an average variation of only 9,13%.

Table A.2 (see appendix) presents results of product and relative price variation for local business cycles. According to what was explained in section 2, we still utilized NBER's reference dates as a starting point for the determination of industry specific peaks and troughs. Hence, as a consequence of the use of individual product series for the definition of cycles, we had the number of price series reduced to seventeen, as they were the only ones with a product series counterpart.

We observe that this time nine output series presented variations larger than 30%, 13 with more than 20% of variation, 15 with more than 15%. Regarding prices, no series had average variations larger that 20%, 13 series varied less than 15%, 11 series varied less than 10% and 7 varied less than 5% over local business cycles As we had suspected, the 'wrong signs' in output series disappeared and all price series that had presented higher variations in comparison to its correspondent product series now presented quite smaller variations. Prices in textiles industry presented a variation of 2,32%(for an output variation of 20,07%), machinery 16,26% (output variation of 29,32%). The only exception was petroleum, probably for the reasons pointed above, i.e. a quite strong trend

and lack of compatibly between product and price series. Overall output average variation was of 30,73% for 8,45% variation in relative prices.

Once again we checked for averages ignoring the 1929 depression. As a result, this time we had a more definite picture - all series had smaller averages, with a slightly more accented impact on product series (28,20% for 7,47% price variation). Regarding time patterns of series, we found that all product series, with exception of Durable Manufactures and Stone & Clay had larger variations in the post 1929 period while eleven out of thirteen price series present smaller variations in the same period. This much stronger result confirms the findings on table 5.3 and helps clarify trend in product series, whose mixed results were probably due to the use of general cycle dates for all industries.

Finally, we have noticed that the use of local peaks and troughs to analyze the data has not changed substantially our earlier findings. However, the new method did allow us to have a clearer picture as every crucial finding of table A.1 was not only confirmed by table A.2 but also presented in stronger colors. Product movements were stronger, price behaved in an even steadier manner and it seems that there was a tendency for a stronger rigidity in relative prices after the 1929 crisis.

Finally, as product variations were much more significant than correspondent price movements in the case of local cycles, we also wanted to verify on what extend seasonal elements could be contributing for these results.

We seasonally adjusted all output and price series by ratio-to-moving-average and difference to average methods, found local cycles and calculated percent variations. Results did not change significantly when either method was used and therefore we present in table A.3 (see appendix) figures for series adjusted with the ratio-to-moving average method.

For output series, we have 8 industries that varied more than 30%, 13 more than 20% and 17 with 15% peak trough average variation. Prices had all series varying less than 20%, 13 series with less than 15% variation, 10 series with less than 10% variation and 5 series that varied less than 5%. Our 'problematic' series also behaved in a more predictable manner: petroleum varied less than its correspondent proxy for output, textiles presented only 0,62% average price variation (for 20,84% in output) and machinery prices varied 20,84% (for a 31,14% output variation). Total industries average variation were 29,7% for output and 9,22% for prices.

Again, when the 'cycle' 1929-33 was not considered, we had a total average of 27,13% for output and 7,48% for prices. Every series presented smaller averages in this case, especially, as in the previous results, price series. As for the comparison between our pre and post 1929 periods, we found once again that while product series presented a greater variation in the latter period, prices behaved in exactly opposite form, becoming, as we suspected, less volatile during the business cycles considered. The average pre-1929 product variation was 30,33%, for 33,84% post-1929 variation (28,97% when we consider only series who had no observations for the earlier period). Prices varied 12,47% over the pre-1929 business cycles and only 7,36% after that (5,76% for series with no pre-1929 data).

Looking at all figures present so far, table A.3 just confirms previous results and show that seasonal adjustments and the consequent redefinition of peaks and troughs did not change the core of our findings in table A.3. The most visible change in overall averages based on local cycles (see table 4) refers to output variation rather than relative prices, which remained quite stable. On the other hand, series that seemed as outliers at first observation reverted to the mean as local cycles and seasonal adjustment was performed. For example, the series textiles, chemicals and building material that initially had presented higher price variation than its own product variation ended up showing of one the most marked differences between product and price variation over the period in consideration.

Cross sectional observations also confirm the consistency of our results. Figures 1 to 3 plot total average price and product variation and show some association between higher price and product figures which do not seem however to have any relation with any specific industrial structure, specially in the sense pointed out by Schwartz, i.e., that raw materials and less processed commodities tended to present higher price flexibility. Our results show that, on the contrary, Raw materials and Intermediate Materials presented one of the lowest price variations, smaller than most of the industrial products. Moreover, the exclusion of eight price series in the calculation of total averages in the local cycles based tables did not change substantially price averages, showing some more evidence of the inter-industry convergence.

Hence, in all three tables, we have basically confirmed that relative prices are quite stable over different business cycles - although are there is evidence that price variations really became smaller in the period after 1929 and justify further investigation - and also in cross sectional terms. Our figures are clearly consistent among the three sets of results and therefore, we believe, are quite robust.

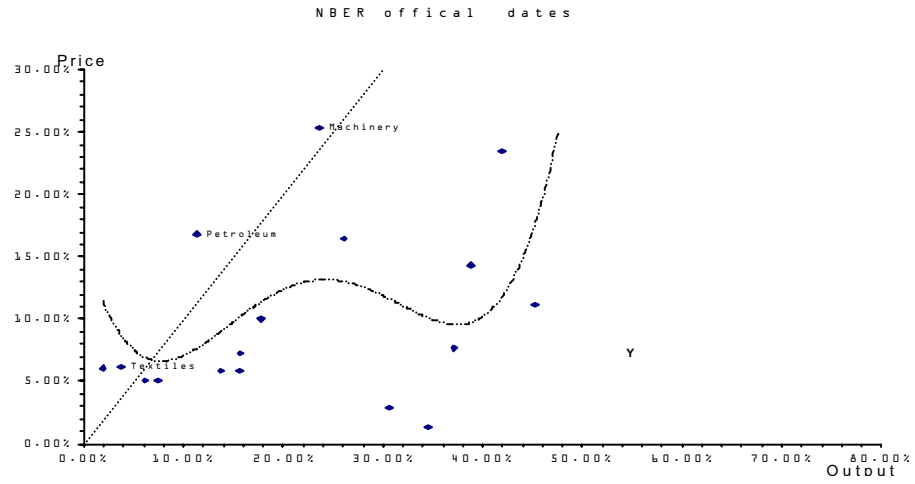


Fig. 3. Total Average Output and Relative Price Variation - Official Cycle Dates

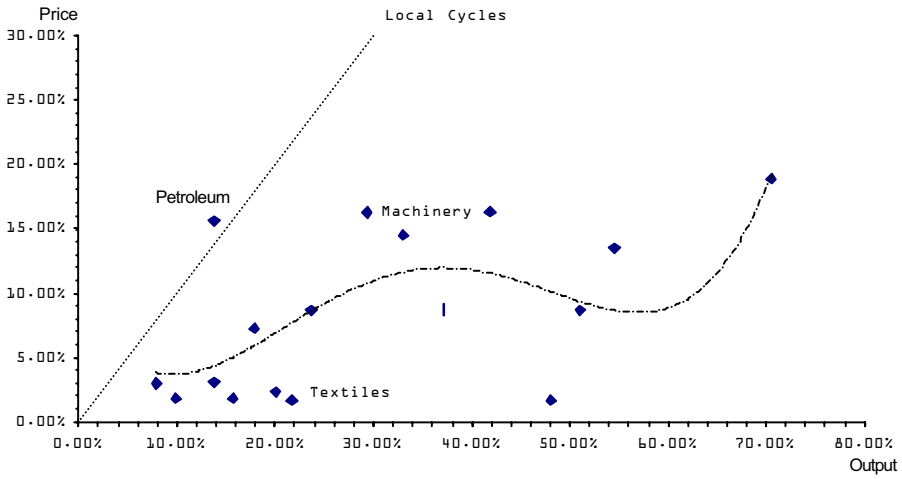


Fig. 4. Total Average Output and Relative Price Variation - Local Cycles

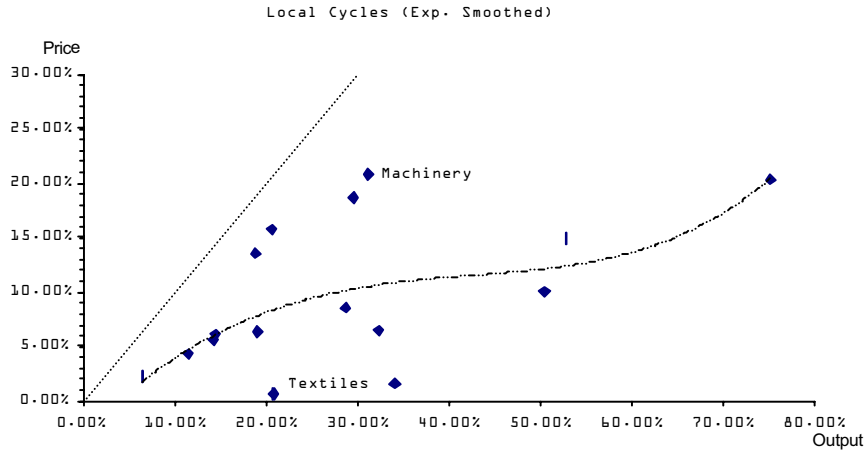


Fig. 5. Total Average Output and Relative Price Variation - Local Cycles for Smoothed Series. Fig.3-5 plot total average relative price and product variation in the peak trough range f. In fig. 3 most relative price variation are below the 10% mark, while output variation is above 15%. Moreover, only three presented output variaton smaller than corresponding relative price variation. The effect of adjustment is seen in fig. 4 and 5, where average relavitve price variation falls without changes in output variation. Ouliers that had presented higher realtive price than product variation revert to the mean and behave according to our hypothesis. The only exception is Petroleoum. Graphs present the same overall patterns and show positive correlation between variables.

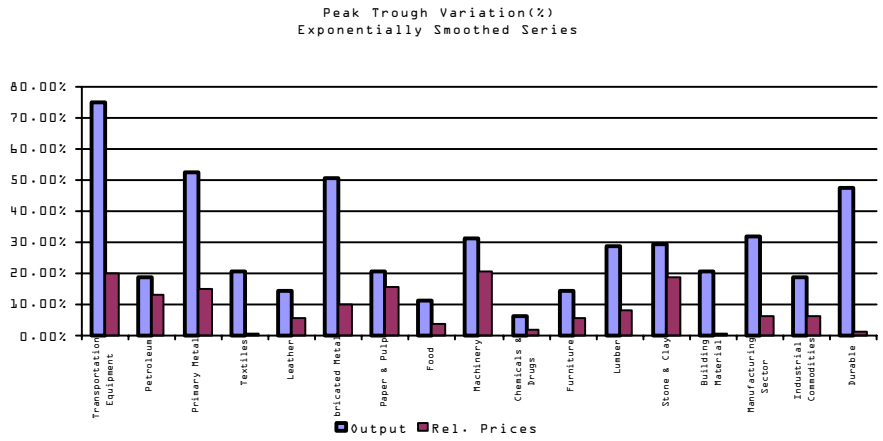


Fig. 6.

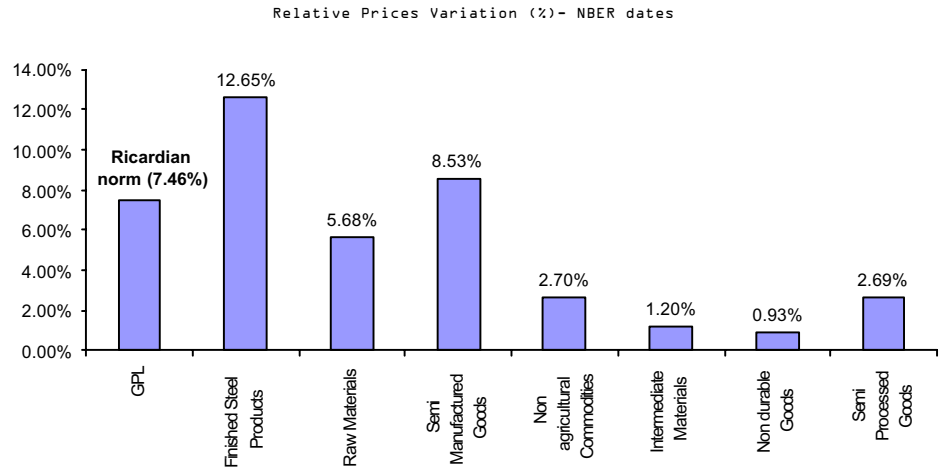


Fig. 7. As figures 6 and 7 indicate, the magnitude of relative price variation does not seem to have a relation with specific industrial structure. In fig. 7 we deflated the *general price level* by the wholesale price index to represent a crude agregate relative price variation and called it our 'Ricardian norm'. It is higher than the average relative price variation in the raw materials and intermediate materials industry during the cycle.

Table 3. Relative Price and Output Variation over 31 Business Cycles, USA.

	NBER		*Local Cycles*		*Local Cycles (Smoothed)*	
	Y	P	Y	P	Y	P
Transportation Equipment	41.97	23.46	70.48	18.90	75.16	20.33
Primary Metal	38.80	14.32	41.88	16.33	52.78	14.91
Textiles	3.68	6.16	20.07	2.32	20.84	0.62
Leather	15.65	5.83	15.65	1.84	14.26	5.57
	-	13.41	-	-	-	-
Fabricated Metal	45.29	11.18	51.02	8.66	50.49	10.06
Paper & Pulp	17.77	10.02	23.68	8.67	20.60	15.78
Food	7.49	5.06	7.87	2.95	11.47	4.33
Machinery	23.60	25.31	29.32	16.26	31.14	20.84
Chemicals & Drugs	1.89	6.08	9.86	1.82	6.44	2.30
Furniture	13.77	5.85	13.77	3.06	14.46	6.10
Lumber	37.12	7.70	37.12	8.72	28.69	8.57
Stone & Clay	26.08	16.43	54.52	13.51	29.54	18.61
	-	17.16	-	-	-	-
	-	12.24	-	-	-	-
Building Material	*6.18*	*5.10*	21.69	1.64	20.69	0.68
Petroleum	11.35	16.83	13.81	15.61	18.81	13.54
Industrial Commodities	15.68	7.28	17.87	7.21	19.02	6.36
Durable Manufactures	34.51	1.36	35.71	-	34.07	1.61
Durable Goods	47.59	-	48.08	1.69	47.71	-
Printing & Publishing	10.84	-	38.45	-	35.74	-
Manufacturing Sector	*30.64*	*2.93*	33.08	14.49	32.32	6.50
General Price Level	-	7.46	-	-	-	-
Finished Steel Products	-	12.65	-	-	-	-
Raw Materials	-	5.68	-	-	-	-
Semi Manufactured Goods	-	8.53	-	-	-	-
Non Agricultural Commodities	-	2.70	-	-	-	-
Intermediate Materials	-	1.20	-	-	-	-
Non durable Goods	-	0.93	-	-	-	-
Semi Processed Goods	-	2.69	-	-	-	-
Total	**22.18**	**9.13**	**30.73**	**8.45**	**29.70**	**9.22**

Table 4. Product and Price Variations - Pre-1929, Post-1929 periods and without the 1929 outlier
(Smoothed Series, percent averages)

Smoothed Series	*Product*			*Relative Prices*		
	Pre	Post	No	Pre	Post	No
Transportation Equipment	71.24	81.25	72.91	16.46	23.28	17.59
Petroleum	27.18	9.96	18.57	12.37	1.80	10.26
Primary Metal	46.87	60.40	50.92	19.28	2.44	14.33
Textiles	-	20.84	20.84	-	0.62	0.62
Leather	-	14.26	14.26	-	5.57	5.57
Fabricated Metal	41.07	49.14	45.68	14.07	3.68	8.13
Paper & Pulp	19.48	17.41	18.29	14.19	3.99	11.64
Food	8.58	9.71	9.22	4.07	2.72	3.29
Machinery	19.56	26.86	25.03	9.38	15.24	11.33
Chemicals & Drugs	-	6.44	6.44	-	2.30	2.30
Furniture	-	14.46	14.46	-	6.10	6.10
Lumber	19.22	25.65	23.50	13.38	2.84	8.11
Stone & Clay	30.74	22.11	26.03	20.66	16.08	19.89
Building Material	-	20.69	20.69	-	0.68	0.68
Manufacturing Sector	21.93	41.33	26.78	5.57	4.89	5.40
Industrial Commodities	16.78	17.38	16.93	7.74	4.05	6.40
Durable Manufactures	30.74	28.60	29.31	-	-	-
Durable Goods	33.29	59.59	39.87	-	1.61	1.61
Printing & Publishing	37.89	24.42	35.65	-	-	-
Total	**30.33**	**28.97**	**27.13**	**12.47**	**5.76**	**7.84**

3 Conclusion

In this paper we have shown that average relative prices in twenty-eight industries of the U.S. economy, as observed in business cycles from 1918 to 1968 - inclusive of the 1929's Great Crisis - present a remarkably smaller variation in the range of peak-trough production levels if compared to the behavior of the corresponding output series. In this sense, we extended Schwartz's (1961) test of the business cycle and, by using a broader database and got results strictly comparable with the original research.

We performed three different tests on the series. First we used the NBER business cycles reference dates for all series and calculated average variations for price and production. As this method is somewhat dubious in the sense that it imposes the same dates for every industry, we also performed the same statistical exercise for local cycles. Finally, we replicated the test again with seasonally adjusted series.

Our results showed that while quantities varied on average of 30,73% for local cycles estimations, prices varied only 8.45% on average. We also tested for the

impact of the 1929 depression on overall averages and found that relative price fluctuations in the post-1929 period became even steadier (7,36% for 12,47% pre-1929 average, smoothed series), while product movements increased, although less significantly (30,33% to 33,84%).

We have also observed that although cross sectional differences are present, they do not seem to be related necessarily to the traditional distinction fix-flex prices of the monopoly capital/oligopoly theories of industrial organization that tend to depict raw material and agricultural products as more volatile in production and prices, while traditional industrial goods would tend to be more rigid, as a consequence of market power and administrated prices. For example, Raw material prices varied less (5,68%) than most of the core industrial goods like machinery (25,31%) and primary metal production (14,32%). We believe that even these results are not conclusive and suggest further investigation. Cross-sectional analysis did show some association between high volatility in production and prices, however, not clearly linked to market structure or any specific industrial constitution.

Our results were consistent among the different methods utilized and with the original studies above-mentioned. In this sense, the conclusions are clear and confirm the relative stability of prices even when fierce moments in production take place.

We also presented some evidence that any account represented by the notion of a constant-up-to-capacity average (marginal) cost curve can hardly be successful in elucidating the question of the rigidity of relative prices over the business cycle, as it implies constant margins of profits. We have shown that the mark up series for the manufacturing industry the USA presents a strong pro-cyclical component and after this element is extracted we cannot even rule out the hypothesis that the mark up is a random walk process.

Finally, an extension of this study both in vertical and horizontal terms i.e. covering the more recent cycles and expanding to new sectors of the economy, is justified. Econometric analysis could also be performed, especially in what refers to stability analysis of price series, which also includes the calculation of price elasticities in relation to changes in distributive variables in the short run and the test of the constancy of these parameters over a larger period.

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5 Appendix

Table A.1 - NBER Official dates

REFERENCE DATES		*Transportation Equipment*		*Petroleum*		*Primary Metal*		*Textiles*		*Leather*			*Fabricated Metal*		*Paper Pulp*	
Peak	*Trough*	*y*	*p*	*y*	*p*	*y*	*p*	*y*	*p*	*y*	*p*	*p*	*y*	*p*	*y*	*p*
Quarterly dates are in parentheses		*m01107*	*180*	*m01126*	*123*	*m01130*	*10*	*m01201*	*64*	*m01202*	*97*	*171*	*m01203*	*66*	*m01259*	*165*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-13.69%	-	-	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-9.22%	-	-	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-	-	-29.21%	-10.10%	-	-7.69%	-	-5.78%	-	-	-15.48%	-	-
January 1893(I)	June 1894 (II)	-	-	-	-	-54.93%	3.94%	-	-1.75%	-	8.83%	-	-	-2.17%	-	-
December 1895(IV)	June 1897 (II)	-	-	-	-	-21.93%	-15.84%	-	-3.56%	-	0.53%	-	-	-4.92%	-	-
June 1899(III)	December 1900 (IV)	-	-	-	-	-6.71%	-22.33%	-	0.66%	-	-7.66%	-	-	-18.34%	-	-
September 1902(IV)	August 1904 (III)	-	-	-	-	-18.66%	-42.48%	-	3.59%	-	-5.58%	-	-	-16.37%	-	-
May 1907(II)	June 1908 (II)	-	-	-	-	-50.84%	-32.22%	-	-12.29%	-	-1.16%	-	-	-26.06%	-	-
January 1910(I)	January 1912 (IV)	-	-	-	-	-21.12%	-15.70%	-	-4.50%	-	3.94%	-	-	-1.53%	-	-
January 1913(I)	December 1914 (IV)	-13.04%	-20.12%	-	-8.46%	-45.77%	-19.83%	-	-7.55%	-	14.14%	12.75%	-	-15.64%	-	1.63%
August 1918(III)	March 1919 (I)	85.69%	9.95%	-5.73%	-6.00%	-8.83%	-8.18%	-	-18.13%	-	8.43%	4.14%	-	-6.02%	-	6.19%
January 1920(I)	July 1921 (III)	4.26%	66.57%	24.56%	36.17%	-71.32%	-12.15%	-	-17.63%	-	-10.39%	-20.60%	-68.82%	42.44%	-39.34%	30.55%
May 1923(II)	July 1924 (III)	-31.12%	5.71%	17.49%	-8.39%	-53.83%	-29.58%	-	-2.26%	-	-2.61%	-4.75%	-41.38%	-1.13%	-13.24%	4.00%
October 1926(III)	November 1927 (IV)	-62.07%	2.78%	8.62%	-33.40%	-17.94%	-7.36%	-	2.38%	-	16.53%	21.85%	-14.53%	-2.41%	-2.44%	3.67%
August 1929(III)	***March 1933 (I)***	***-78.05%***	***36.36%***	***-18.09%***	***-19.91%***	***-85.56%***	***23.84%***	***-***	***-8.49%***	***-***	***-0.38%***	***-20.12%***	***-81.25%***	***23.05%***	***-27.78%***	***34.96%***
May 1937(II)	June 1938 (II)	-67.76%	22.74%	-5.39%	5.45%	-68.97%	10.13%	-	-7.27%	-	-5.91%	-9.62%	-63.64%	11.77%	-26.89%	4.23%
February 1945(I)	October 1945 (IV)	-	-	-	-	-	2.60%	-	0.60%	-9.60%	0.15%	-	-	0.07%	-	-
November 1948(IV)	October 1949 (IV)	38.62%	-	7.04%	-	-89.09%	0.55%	6.29%	0.21%	-20.34%	3.14%	-	-35.78%	1.48%	1.87%	3.81%
July 1953(II)	May 1954 (II)	-7.92%	-	-3.87%	-	-29.02%	-0.25%	1.08%	-	-17.02%	-4.00%	-	-11.63%	-1.26%	12.82%	1.12%
August 1957(III)	April 1958 (II)	-38.66%	-	-	-	-41.66%	-0.66%	-	-	-	-	-	-	-	-	-
April 1960(II)	February 1961 (I)	-34.41%	-	-	-	-37.77%	-	-	-	-	-	-	-	-	-	-
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:																
1854-1991 (absolute value, no 1929)		**38.36%**	**21.31%**	**10.39%**	**16.31%**	**36.34%**	**13.76%**	**3.68%**	**6.01%**	**15.65%**	**6.17%**	**12.29%**	**39.30%**	**10.44%**	**16.10%**	**6.90%**
1854-1991 (Absolute)		**41.97%**	**23.46%**	**11.35%**	**16.83%**	**38.80%**	**14.32%**	**3.68%**	**6.16%**	**15.65%**	**5.83%**	**13.41%**	**45.29%**	**11.18%**	**17.77%**	**10.02%**
pre-1929 average		**39.24%**	**21.03%**	**14.10%**	**18.48%**	**30.28%**	**18.31%**	**-**	**6.83%**	**-**	**7.13%**	**12.82%**	**41.58%**	**12.71%**	**18.34%**	**9.21%**
post-1929 average		**37.47%**	**22.74%**	**5.43%**	**5.45%**	**53.30%**	**2.84%**	**3.68%**	**2.69%**	**15.65%**	**3.30%**	**9.62%**	**37.01%**	**3.65%**	**13.86%**	**3.05%**

Table A.1 - NBER Official dates

REFERENCE DATES		***Food***		***Machinery***			***Chemicals and Drugs***	***Furniture***		***Lumber***		***Stone & Clay***		*Window Glass*	*Common Bricks*	***Building Material***	
Peak	***Trough***																
Quarterly dates are in parentheses		***y*** *m01260*	***p*** *61*	***y*** *m01277*	***p*** *137*	***y*** *m01279*	***p*** *96*	***y*** *m01281*	***p*** *95*	***y*** *m02119*	***p*** *164*	***y*** *m02122*	***p*** *76*	***p*** *078*	***p*** *'099*	***y*** *m02245*	***p*** *68*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	0.39%	-	-	-	2.47%	-	-1.77%	-	-	-	-	-3.13%	-3.13%	-	-6.64%
January 1893(I)	June 1894 (II)	-	-7.84%	-	-	-	-4.22%	-	12.69%	-	-	-	-	-0.42%	-5.07%	-	13.65%
December 1895(IV)	June 1897 (II)	-	-4.55%	-	-	-	18.05%	-	0.85%	-	-	-	4.65%	32.68%	-2.89%	-	-0.24%
June 1899(III)	December 1900 (IV)	-	5.80%	-	-	-	-4.93%	-	0.41%	-	-	-	-2.29%	-11.78%	-14.66%	-	-4.77%
September 1902(IV)	August 1904 (III)	-	2.18%	-	-	-	-2.58%	-	0.57%	-	-	-	-32.18%	-9.42%	54.83%	-	-1.93%
May 1907(II)	June 1908 (II)	-	9.51%	-	-	-	5.74%	-	-2.87%	-	-	-	-7.91%	-30.29%	-17.66%	-	-7.73%
January 1910(I)	January 1912 (IV)	-	8.47%	-	-	-	6.99%	-	4.35%	-	-	-	-7.71%	-21.92%	8.18%	-	7.39%
January 1913(I)	December 1914 (IV)	-	10.14%	-	7.52%	-	12.69%	-	4.99%	-	-9.65%	-9.90%	8.36%	0.01%	-23.48%	-	-7.63%
August 1918(III)	March 1919 (I)	-	8.25%	-	2.37%	-	-13.41%	-	0.28%	35.15%	1.53%	-39.01%	2.37%	2.37%	7.15%	-	-0.93%
January 1920(I)	July 1921 (III)	-6.58%	1.86%	-	79.09%	-	15.25%	-	33.32%	-48.48%	-21.00%	51.90%	83.24%	32.07%	3.79%	-	2.75%
May 1923(II)	July 1924 (III)	0.00%	0.81%	-20.22%	21.40%	-	0.15%	-	0.04%	-24.46%	-16.75%	8.68%	6.50%	6.50%	-14.80%	-	-7.57%
October 1926(III)	November 1927 (IV)	1.16%	3.95%	-11.43%	3.23%	-	1.15%	-	1.15%	-20.81%	-5.19%	-12.95%	0.77%	-9.55%	-21.75%	-	-5.14%
August 1929(III)	***March 1933 (I)***	***-23.08%***	***-15.55%***	***-74.63%***	***47.97%***	***-***	***21.33%***	***-***	***22.64%***	***-75.45%***	***-0.98%***	***-80.19%***	***25.02%***	***2.57%***	***46.41%***	***-***	***18.29%***
May 1937(II)	June 1938 (II)	-0.98%	-3.26%	-42.42%	15.60%	-	1.90%	-	8.68%	-47.01%	-10.97%	-9.37%	16.20%	-8.71%	16.49%	-	2.82%
February 1945(I)	October 1945 (IV)	-	0.31%	-	-	-	-0.06%	-	-0.50%	-51.16%	-0.18%	-	-	-	-	-	0.41%
November 1948(IV)	October 1949 (IV)	3.77%	-1.29%	-10.91%	-	0.93%	-3.20%	-20.08%	3.58%	-33.81%	-3.00%	3.42%	-	-	-	-	0.90%
July 1953(II)	May 1954 (II)	-16.85%	-0.30%	-8.84%	-	2.84%	0.85%	-7.05%	0.70%	-25.78%	-	-3.52%	-	-	-	7.20%	-2.23%
August 1957(III)	April 1958 (II)	-	4.59%	-15.64%	-	-	0.29%	-18.09%	-	-16.64%	-	-23.59%	-	-	-	-6.91%	-2.46%
April 1960(II)	February 1961 (I)	-	2.30%	-4.71%	-	-	-0.18%	-9.87%	-	-29.54%	-	-44.34%	-	-	-	-4.43%	-3.35%
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:																	
1854-1991 (absolute value, no 1929)		**4.89%**	**4.44%**	**16.31%**	**21.54%**	**1.89%**	**5.23%**	**13.77%**	**4.80%**	**33.28%**	**8.53%**	**20.67%**	**15.65%**	**12.99%**	**14.91%**	**6.18%**	**4.36%**
1854-1991 (Absolute)		**7.49%**	**5.06%**	**23.60%**	**25.31%**	**1.89%**	**6.08%**	**13.77%**	**5.85%**	**37.12%**	**7.70%**	**26.08%**	**16.43%**	**12.24%**	**17.16%**	**6.18%**	**5.10%**
pre-1929 average		**2.58%**	**5.31%**	**15.83%**	**22.72%**	**-**	**7.30%**	**-**	**5.27%**	**32.23%**	**10.83%**	**24.49%**	**15.60%**	**13.34%**	**14.78%**	**-**	**5.53%**
post-1929 average		**7.20%**	**2.35%**	**16.51%**	**15.60%**	**1.89%**	**1.08%**	**13.77%**	**3.36%**	**33.99%**	**4.72%**	**16.85%**	**16.20%**	**8.71%**	**16.49%**	**6.18%**	**2.03%**

Table A.1 - NBER Official dates

REFERENCE DATES Peak	Trough	Manufactures (agg)		Industrial Commodities		Durable manufact.	Durable Goods		Printing & Publishing	GPL	Finished Steel Prod	Raw Materials	Semi nufact. Go	Non cultural Cc	ntermediate Materials	Non durabl. Goods	processe Goods
Quarterly dates are in parentheses		y	p	y	p	y	y	p	y								
		m01054	169	m01001	189	m01234	m1057a	199	m01106	051	155	167	168	170	188	200	203
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	3.33%	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	5.24%	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	4.31%	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	14.99%	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-	-	-	-	12.45%	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-	-	-	-	0.12%	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	1.23%	-	-	-	-	-	-3.13%	-	-	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-12.21%	-	-	-	-	-	9.15%	-	-	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	2.79%	-	-	-	-	-	5.84%	-	-	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	0.90%	-	-	-	-	-	-3.27%	-	-	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	2.69%	-	-	-	-	-	0.32%	-21.93%	-	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-24.52%	-15.86%	-	-	-	-	2.54%	0.35%	-	-	-	-	-	-
January 1910(I)	January 1912 (IV)	-	-	-1.34%	-0.62%	-	-	-	-	8.18%	-11.52%	-	-	-	-	-	-
January 1913(I)	December 1914 (IV)	-	1.62%	-15.93%	-14.57%	-	-	-	3.41%	4.62%	-19.31%	0.20%	-9.42%	-1.32%	-	-	-
August 1918(III)	March 1919 (I)	-	1.24%	-14.43%	-8.94%	-	-	-	13.57%	4.96%	-5.33%	1.34%	-12.22%	-0.60%	-	-	-
January 1920(I)	July 1921 (III)	-31.06%	13.04%	-28.10%	-11.13%	-53.71%	-52.63%	-	2.60%	43.73%	13.07%	-11.65%	-27.33%	5.29%	-	-	10.52%
May 1923(II)	July 1924 (III)	-20.73%	-0.77%	-15.86%	-8.68%	-23.73%	-28.97%	-	-33.65%	5.86%	-5.87%	4.11%	-12.89%	-2.38%	-	-	-1.85%
October 1926(III)	November 1927 (IV)	-8.74%	-0.93%	-8.80%	-8.09%	-12.61%	-18.58%	-	-11.21%	4.43%	-4.98%	2.71%	-2.19%	-2.05%	-	-	-0.65%
August 1929(III)	***March 1933 (I)***	**-55.23%**	***10.55%***	**-51.18%**	**-7.04%**	**-76.66%**	**-80.12%**	**-**	**-3.52%**	***8.26%***	***35.08%***	***-20.23%***	***-2.52%***	***8.84%***	-	-	**2.99%**
May 1937(II)	June 1938 (II)	-37.90%	4.67%	-30.04%	-9.00%	-50.13%	-57.66%	-	-7.94%	4.54%	9.07%	-8.66%	-5.64%	3.20%	-	-	-2.82%
February 1945(I)	October 1945 (IV)	-30.17%	-0.30%	-34.16%	1.66%	-63.35%	-	-	-	-	-	0.17%	1.19%	0.10%	-	-	-0.39%
November 1948(IV)	October 1949 (IV)	-	1.31%	-14.63%	-1.69%	-16.37%	-	4.15%	-	-	-	-2.00%	-3.40%	0.49%	-1.22%	-1.20%	-1.95%
July 1953(II)	May 1954 (II)	-	0.44%	-7.80%	-3.44%	-15.35%	-	0.00%	-	-	-	-	-	-	-1.10%	1.03%	-0.37%
August 1957(III)	April 1958 (II)	-	-0.30%	-	-3.88%	-22.48%	-	-0.29%	-	-	-	-	-	-	-1.19%	-0.30%	-
April 1960(II)	February 1961 (I)	-	0.00%	-	-	-10.75%	-	-0.98%	-	-	-	-	-	-	-1.28%	1.20%	-
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:																	
1854-1991 (absolute value, no 1929)		**25.72%**	**2.24%**	**13.46%**	**7.30%**	**29.83%**	**39.46%**	**1.36%**	**12.06%**	**7.42%**	**10.16%**	**3.86%**	**9.28%**	**1.93%**	**1.20%**	**0.93%**	**2.65%**
1854-1991 (Absolute)		**30.64%**	**2.93%**	**15.68%**	**7.28%**	**34.51%**	**47.59%**	**1.36%**	**10.84%**	**7.46%**	**12.65%**	**5.68%**	**8.53%**	**2.70%**	**1.20%**	**0.93%**	**2.69%**
pre-1929 average		**25.72%**	**2.24%**	**13.46%**	**7.30%**	**29.83%**	**39.46%**	**1.36%**	**12.06%**	**7.42%**	**10.16%**	**3.86%**	**9.28%**	**1.93%**	**1.20%**	**0.93%**	**2.65%**
post-1929 average		**20.17%**	**3.52%**	**10.73%**	**9.70%**	**30.02%**	**33.39%**	**-**	**12.89%**	**7.58%**	**10.29%**	**4.00%**	**12.81%**	**2.33%**	**-**	**-**	**4.34%**

Table A.2 - Local Cycles

REFERENCE DATES		*Transportation Equipment*		*Petroleum*		*Primary Metal*		*Textiles*		*Leather*		*Fabricated Metal*		*Paper Pulp*	
Peak	*Trough*														
Quarterly dates are in parentheses		*y*	*p*	*y*	*p*	*y*	*p*	*y*	*p*	*y*	*p*	*y*	*p*	*y*	*p*
		m01107	*180*	*m01126*	*123*	*m01130*	*10*	*m01201*	*64*	*m01202*	*97*	*m01203*	*66*	*m01259*	*165*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-15.34%	-	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-14.97%	-	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-	-	-42.57%	-9.48%	-	-	-	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-	-	-57.04%	1.88%	-	-	-	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	-	-	-25.02%	-20.93%	-	-	-	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	-	-	-27.22%	-37.33%	-	-	-	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	-	-	-27.08%	-39.04%	-	-	-	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-	-	-51.13%	-32.37%	-	-	-	-	-	-	-	-
January 1910(I)	January 1912 (IV)	-	-	-	-	-22.48%	-14.98%	-	-	-	-	-	-	-	-
January 1913(I)	December 1914 (IV)	-50.87%	-23.75%	-	-	-47.06%	-3.42%	-	-	-	-	-	-	-	-
August 1918(III)	March 1919 (I)	-77.07%	17.41%	-3.43%	-7.20%	-40.32%	-17.98%	-	-	-	-	-	5.19%	-	-
January 1920(I)	July 1921 (III)	-76.55%	29.68%	6.82%	31.61%	-74.39%	-18.28%	-	-	-	-	-70.10%	31.73%	-42.19%	13.65%
May 1923(II)	July 1924 (III)	-36.60%	6.32%	14.37%	3.33%	-53.83%	-29.58%	-	-	-	-	-41.38%	-1.13%	-14.49%	3.21%
October 1926(III)	November 1927 (IV)	-72.18%	3.04%	-4.09%	-34.56%	-12.74%	-10.28%	-	-	-	-	-15.25%	-2.14%	-7.32%	6.11%
August 1929(III)	***March 1933 (I)***	**-93.49%**	**27.73%**	**-30.59%**	**-13.94%**	**-86.08%**	**20.85%**	**-**	**-**	**-**	**-**	**-81.88%**	**22.67%**	**-38.71%**	**29.53%**
May 1937(II)	June 1938 (II)	-86.59%	24.34%	-13.61%	3.03%	-27.76%	30.35%	-	-	-	-	-63.64%	11.77%	-38.02%	3.73%
February 1945(I)	October 1945 (IV)	-	-	-25.39%	-	-75.58%	0.81%	-9.21%	-0.77%	-9.60%	0.15%	-71.62%	0.05%	-7.19%	na
November 1948(IV)	October 1949 (IV)	-	-	-12.30%	-	-51.68%	1.26%	-23.56%	-3.88%	-20.34%	1.69%	-38.05%	2.45%	-28.70%	3.91%
July 1953(II)	May 1954 (II)	-	-	-13.68%	-	-29.79%	1.42%	-27.43%	-	-17.02%	-3.68%	-26.24%	0.82%	-12.78%	0.57%
August 1957(III)	April 1958 (II)	-	-	-	-	-46.34%	3.60%	-	-	-	-	-	-	-	-
April 1960(II)	February 1961 (I)	-	-	-	-	-51.08%	-	-	-	-	-	-	-	-	-
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:															
1854-1991 (absolute, no 1929)		**66.64%**	**17.43%**	**11.71%**	**15.94%**	**39.67%**	**16.06%**	**20.07%**	**2.32%**	**15.65%**	**1.84%**	**46.61%**	**6.91%**	**21.53%**	**5.20%**
1854-1991 (Absolute)		**70.48%**	**18.90%**	**13.81%**	**15.61%**	**41.88%**	**16.33%**	**20.07%**	**2.32%**	**15.65%**	**1.84%**	**51.02%**	**8.66%**	**23.68%**	**8.67%**
pre-1929 average		**62.65%**	**16.04%**	**7.18%**	**19.17%**	**36.51%**	**19.63%**	**-**	**-**	**-**	**-**	**42.25%**	**10.05%**	**21.33%**	**7.66%**
post-1929 average		**86.59%**	**24.34%**	**16.24%**	**3.03%**	**47.04%**	**7.49%**	**20.07%**	**2.32%**	**15.65%**	**1.84%**	**49.89%**	**3.77%**	**21.67%**	**2.74%**

Table A.2 - Local Cycles

REFERENCE DATES		***Food***		***Machinery***		***Chemicals and Drugs***		***Furniture***		***Lumber***		***Stone & Clay***		***Building Material***	
Peak	***Trough***														
Quarterly dates are in parentheses		***y***	***p***	***y***	***p***	***y***	***p***	***y***	***p***	***y***	***p***	***y***	***p***	***y***	***p***
		m01260	*61*	*m01277*	*137*	*m01279*	*96*	*m01281*	*95*	*m02119*	*164*	*m02122*	*76*	*m02245*	*68*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1910(I)	January 1912 (IV)			-	-	-	-	-	-	-	-	-	-	-	-
January 1913(I)	December 1914 (IV)	-	-	-	-	-	-	-	-	-	-	-63.79%	3.87%	-	-
August 1918(III)	March 1919 (I)	-	-1.49%	-	-	-	-	-	-	35.15%	34.27%	-61.23%	0.47%	-	-
January 1920(I)	July 1921 (III)	-7.89%	-0.87%	-	-	-	-	-	-	-48.48%	-4.45%	-54.90%	47.18%	-	-
May 1923(II)	July 1924 (III)	-3.61%	1.19%	-20.22%	21.40%	-	-	-	-	-24.46%	-13.97%	-33.46%	2.01%	-	-
October 1926(III)	November 1927 (IV)	-2.25%	3.84%	-11.43%	3.23%	-	-	-	-	-20.81%	-7.10%	-48.63%	1.15%	-	-
August 1929(III)	***March 1933 (I)***	**-24.04%**	**-13.51%**	**-52.94%**	**26.15%**	**-**	**-**	**-**	**-**	**-75.45%**	**-2.79%**	**-85.04%**	**25.79%**	**-**	**-**
May 1937(II)	June 1938 (II)	-3.92%	-4.21%	-45.52%	14.25%	-	-	-	-	-47.01%	-3.82%	-66.29%	14.07%	-	-
February 1945(I)	October 1945 (IV)	-0.68%	0.31%	-56.88%	na	-	-	-	-	-51.16%	-1.26%	-70.64%	-	-	-
November 1948(IV)	October 1949 (IV)	1.27%	-0.05%	-22.17%	na	-17.59%	-2.73%	-20.08%	4.88%	-33.81%	-2.09%	-32.20%	-	-	-
July 1953(II)	May 1954 (II)	-19.34%	-1.12%	-24.33%	na	-2.13%	0.90%	-7.05%	1.25%	-25.78%	-	-29.96%	-	-23.99%	-0.29%
August 1957(III)	April 1958 (II)	-	-	-21.76%	na	-	-	-18.09%	na	-16.64%	-	-55.05%	-	-24.92%	-1.91%
April 1960(II)	February 1961 (I)	-	-	-8.64%	na	-	-	-9.87%	na	-29.54%	-	-53.00%	-	-16.18%	-2.72%
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:															
1854-1991 (absolute, no 1929)		**5.57%**	**1.63%**	**26.37%**	**12.96%**	**9.86%**	**1.82%**	**13.77%**	**3.06%**	**33.28%**	**9.57%**	**51.74%**	**11.46%**	**21.69%**	**1.64%**
1854-1991 (Absolute)		**7.87%**	**2.95%**	**29.32%**	**16.26%**	**9.86%**	**1.82%**	**13.77%**	**3.06%**	**37.12%**	**8.72%**	**54.52%**	**13.51%**	**21.69%**	**1.64%**
pre-1929 average		**4.59%**	**1.85%**	**15.83%**	**12.31%**	**-**	**-**	**-**	**-**	**32.23%**	**14.95%**	**52.40%**	**10.94%**	**-**	**-**
post-1929 average		**6.30%**	**1.42%**	**29.88%**	**14.25%**	**9.86%**	**1.82%**	**13.77%**	**3.06%**	**33.99%**	**2.39%**	**51.19%**	**14.07%**	**21.69%**	**1.64%**

Table A.2 - Local Cycles

REFERENCE DATES		***Manufactures (agg)***		***Industrial Commodities***		***Durable manufact.***	***Durable Goods***		***Printing & Publishing***
Peak	***Trough***	***y***	***p***	***y***	***p***	***y***	***y***	***p***	***y***
Quarterly dates are in parentheses		m01054	169	m01001	189	m01234	m1057a	199	*m01106*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-1.85%	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-5.59%	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	-15.05%	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	-12.07%	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	-12.98%	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-27.79%	-14.68%	-	-	-	-
January 1910(I)	January 1912 (IV)	-	-	-7.63%	3.73%	-	-	-	-
January 1913(I)	December 1914 (IV)	-	-	-18.97%	-15.57%	-	-	-	-42.93%
August 1918(III)	March 1919 (I)	-	-	-15.76%	-9.78%	-	-	-	-38.78%
January 1920(I)	July 1921 (III)	-35.54%	-27.68%	-32.24%	-1.23%	-54.67%	-52.63%	-	-32.37%
May 1923(II)	July 1924 (III)	-20.80%	-8.11%	-17.28%	-10.80%	-23.73%	-29.91%	-	-33.65%
October 1926(III)	November 1927 (IV)	-10.20%	-4.51%	-9.20%	-8.11%	-15.90%	-18.58%	-	-37.85%
August 1929(III)	***March 1933 (I)***	**-55.62%**	**-30.84%**	**-52.19%**	**-8.38%**	**-76.89%**	**-80.32%**	-	**-45.53%**
May 1937(II)	June 1938 (II)	-43.24%	-1.31%	-27.12%	-10.31%	-50.89%	-58.98%	-	-38.06%
February 1945(I)	October 1945 (IV)	-	-	-21.68%	0.95%	-63.47%	-	-	-
November 1948(IV)	October 1949 (IV)	-	-	-15.62%	1.73%	-17.84%	-	4.81%	-
July 1953(II)	May 1954 (II)	-	-	-10.74%	-1.26%	-15.93%	-	0.01%	-
August 1957(III)	April 1958 (II)	-	-	-	-	-23.56%	-	-0.49%	-
April 1960(II)	February 1961 (I)	-		-	-	-14.24%	-	-1.47%	-
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-
Average, all cycles:									
1854-1991 (absolute, no 1929)		**27.44%**	**10.40%**	**15.72%**	**7.10%**	**31.14%**	**40.02%**	**1.69%**	**37.27%**
1854-1991 (Absolute)		**33.08%**	**14.49%**	**17.87%**	**7.21%**	**35.71%**	**48.08%**	**1.69%**	**38.45%**
pre-1929 average		**22.18%**	**13.43%**	**14.70%**	**9.13%**	**31.43%**	**33.70%**	**-**	**37.11%**
post-1929 average		**43.24%**	**1.31%**	**18.79%**	**3.56%**	**30.99%**	**58.98%**	**1.69%**	**38.06%**

Table A.3 - Local Cycles - ES

REFERENCE DATES Peak	Trough	Transportation Equipment		Petroleum		Primary Metal		Textiles		Leather		Fabricated Metal		Paper & Pulp	
Quarterly dates are in parentheses		***y*** *m01107*	***p*** *180*	***y*** *m01126*	***p*** *123*	***y*** *m01130*	***p*** *10*	***y*** *m01201*	***p*** *64*	***y*** *m01202*	***p*** *97*	***y*** *m01203*	***p*** *66*	***y*** *m01259*	***p*** *165*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-66.65%	-	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-40.34%	-	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-	-	-64.00%	-8.04%	-	-	-	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-	-	-58.39%	-5.92%	-	-	-	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	-	-	-45.21%	-15.81%	-	-	-	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	-	-	-28.35%	-28.17%	-	-	-	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	-	-	-46.40%	-37.31%	-	-	-	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-	-	-58.06%	-19.82%	-	-	-	-	-	-	-	-
January 1910(I)	January 1912 (IV)	-	-	-	-	-33.90%	-11.40%	-	-	-	-	-	-	-	-
January 1913(I)	December 1914 (IV)	**-98.04%**	-21.37%	-	-	-46.16%	-19.68%	-	-	-	-	-	-	-	-
August 1918(III)	March 1919 (I)	**-73.02%**	14.25%	-41.89%	-3.79%	-32.01%	-19.73%	-	-	-	-	-	-	-	-
January 1920(I)	July 1921 (III)	**-72.26%**	38.16%	-30.05%	22.69%	-68.32%	-32.00%	-	-	-	-	-66.98%	40.06%	-40.85%	36.06%
May 1923(II)	July 1924 (III)	**-48.01%**	5.35%	-25.20%	-20.79%	-48.03%	-25.74%	-	-	-	-	-36.95%	-0.55%	-9.64%	3.65%
October 1926(III)	November 1927 (IV)	**-64.88%**	3.15%	-11.58%	-2.21%	-20.29%	-7.77%	-	-	-	-	-19.29%	-1.61%	-7.95%	-2.87%
August 1929(III)	***March 1933 (I)***	**-88.67%**	**36.76%**	**-20.78%**	**-29.94%**	**-89.94%**	**24.81%**	**-**	**-**	**-**	**-**	**-84.14%**	**23.60%**	**-36.76%**	**32.32%**
May 1937(II)	June 1938 (II)	**-81.25%**	23.28%	-10.48%	1.80%	-70.24%	9.10%	-	-	-	-	-63.72%	11.63%	-31.67%	3.99%
February 1945(I)	October 1945 (IV)	-	-	-17.53%	-	-75.97%	0.88%	-9.02%	0.39%	-9.77%	1.47%	-70.95%	0.11%	-5.81%	na
November 1948(IV)	October 1949 (IV)	-	-	-3.51%	-	-88.45%	1.38%	-31.93%	-0.85%	-21.88%	-9.94%	-38.40%	2.46%	-22.04%	na
July 1953(II)	May 1954 (II)	-	-	-8.29%	-	-32.61%	-0.15%	-21.57%	-	-11.12%	-5.30%	-23.50%	0.50%	-10.10%	na
August 1957(III)	April 1958 (II)	-	-	-	-	-44.36%	-0.71%	-	-	-	-	-	-	-	-
April 1960(II)	February 1961 (I)	-	-	-	-	-50.75%	-	-	-	-	-	-	-	-	-
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:															
1854-1991 (Absolute value, no 1929)		**72.91%**	**17.59%**	**18.57%**	**10.26%**	**50.92%**	**14.33%**	**20.84%**	**0.62%**	**14.26%**	**5.57%**	**45.68%**	**8.13%**	**18.29%**	**11.64%**
1854-1991 (Absolute)		**75.16%**	**20.33%**	**18.81%**	**13.54%**	**52.78%**	**14.91%**	**20.84%**	**0.62%**	**14.26%**	**5.57%**	**50.49%**	**10.06%**	**20.60%**	**15.78%**
pre-1929 average		**71.24%**	**16.46%**	**27.18%**	**12.37%**	**46.87%**	**19.28%**	**-**	**-**	**-**	**-**	**41.07%**	**14.07%**	**19.48%**	**14.19%**
post-1929 average		**81.25%**	**23.28%**	**9.96%**	**1.80%**	**60.40%**	**2.44%**	**20.84%**	**0.62%**	**14.26%**	**5.57%**	**49.14%**	**3.68%**	**17.41%**	**3.99%**

Table A.3 - Local Cycles - ES

REFERENCE DATES Peak	Trough	Food		Machinery		Chemicals & Drugs		Furniture		Lumber		Stone & Clay		Building Material	
Quarterly dates are in parentheses		*y* m01260	*p* 61	*y* m01277	*p* 137	*y* m01279	*p* 96	*y* m01281	*p* 95	*y* m02119	*p* 164	*y* m02122	*p* 76	*y* m02245	*p* 68
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1910(I)	January 1912 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1913(I)	December 1914 (IV)	-	-	-	-	-	-	-	-	-	-	-36.88%	6.07%	-	-
August 1918(III)	March 1919 (I)	-	-	-	-	-	-	-	-	-	-	-53.11%	-1.76%	-	-
January 1920(I)	July 1921 (III)	-15.12%	-3.92%	-	-	-	-	-	-	**-27.78%**	**-25.73%**	-31.69%	82.03%	-	-
May 1923(II)	July 1924 (III)	-5.89%	6.62%	-24.34%	14.97%	-	-	-	-	**-13.67%**	**-12.84%**	-16.13%	11.26%	-	-
October 1926(III)	November 1927 (IV)	-4.73%	-1.66%	-14.77%	3.78%	-	-	-	-	**-16.20%**	**1.56%**	-15.90%	2.16%	-	-
August 1929(III)	***March 1933 (I)***	**-27.18%**	**-11.60%**	**-80.01%**	**49.37%**	-	-	-	-	**-75.41%**	**-11.34%**	**-68.11%**	**-10.92%**	-	-
May 1937(II)	June 1938 (II)	-7.43%	-5.15%	-46.73%	15.24%	-	-	-	-	**-39.50%**	**-1.99%**	-24.89%	16.08%	-	-
February 1945(I)	October 1945 (IV)	-6.87%	-0.14%	-47.10%	na	-	-	-	-	**-34.92%**	**-0.47%**	-14.84%	na	-	-
November 1948(IV)	October 1949 (IV)	-2.27%	-4.37%	-18.58%	na	**-8.67%**	**-3.23%**	-20.58%	10.50%	**-21.65%**	**-6.05%**	-16.80%	na	-	-
July 1953(II)	May 1954 (II)	-22.27%	-1.21%	-21.14%	na	**-4.21%**	**1.38%**	-12.85%	1.70%	**-23.84%**	-	-8.56%	na	-30.40%	-0.82%
August 1957(III)	April 1958 (II)	-	-	-20.45%	na	-	-	-13.85%	na	**-17.71%**	-	-33.70%	na	-20.94%	-0.95%
April 1960(II)	February 1961 (I)	-	-	-7.16%	na	-	-	-10.56%	na	**-16.25%**	-	-33.87%	na	-10.73%	0.27%
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-	-	-		-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average, all cycles:															
1854-1991 (Absolute value, no 1929)		**9.22%**	**3.29%**	**25.03%**	**11.33%**	**6.44%**	**2.30%**	**14.46%**	**6.10%**	**23.50%**	**8.11%**	**26.03%**	**19.89%**	**20.69%**	**0.68%**
1854-1991 (Absolute)		**11.47%**	**4.33%**	**31.14%**	**20.84%**	**6.44%**	**2.30%**	**14.46%**	**6.10%**	**28.69%**	**8.57%**	**29.54%**	**18.61%**	**20.69%**	**0.68%**
pre-1929 average		**8.58%**	**4.07%**	**19.56%**	**9.38%**	**-**	**-**	**-**	**-**	**19.22%**	**13.38%**	**30.74%**	**20.66%**	**-**	**-**
post-1929 average		**9.71%**	**2.72%**	**26.86%**	**15.24%**	**6.44%**	**2.30%**	**14.46%**	**6.10%**	**25.65%**	**2.84%**	**22.11%**	**16.08%**	**20.69%**	**0.68%**

Table A.3 - Local Cycles - ES

REFERENCE DATES		**Manufacturing Sector**		**Industrial Commodities**		**Durable manufact.**	**Durable Goods**		**Printing & Publishing**
Peak	***Trough***								
Quarterly dates are in parentheses		***y*** m01054	***p*** 169	***y*** m01001	***p*** 189	***y*** m01234	***y*** m1057a	***p*** 199	***y*** *m01106*
June 1857(II)	December 1858 (IV)	-	-	-	-	-	-	-	-
October 1860(III)	June 1861 (III)	-	-	-	-	-	-	-	-
April 1865(I)	December 1867 (I)	-	-	-	-	-	-	-	-
June 1869(II)	December 1870 (IV)	-	-	-	-	-	-	-	-
October 1873(III)	March 1879 (I)	-	-	-	-	-	-	-	-
March 1882(I)	May 1885 (II)	-	-	-	-	-	-	-	-
March 1887(II)	April 1888 (I)	-	-	-	-	-	-	-	-
July 1890(III)	May 1891 (II)	-	-	-7.12%	-	-	-	-	-
January 1893(I)	June 1894 (II)	-	-	-23.72%	-	-	-	-	-
December 1895(IV)	June 1897 (II)	-	-	-16.78%	-	-	-	-	-
June 1899(III)	December 1900 (IV)	-	-	-11.49%	-	-	-	-	-
September 1902(IV)	August 1904 (III)	-	-	-12.47%	-	-	-	-	-
May 1907(II)	June 1908 (II)	-	-	-28.42%	-13.76%	-	-	-	-
January 1910(I)	January 1912 (IV)	-	-	-9.32%	-1.04%	-	-	-	-
January 1913(I)	December 1914 (IV)	-	-	-16.84%	-14.91%	-	-	-	-48.37%
August 1918(III)	March 1919 (I)	-	-	-14.93%	-6.43%	-	-	-	-37.78%
January 1920(I)	July 1921 (III)	-33.62%	15.06%	-32.65%	-1.25%	-55.64%	-51.36%	-	-42.41%
May 1923(II)	July 1924 (III)	-22.15%	-0.56%	-17.32%	-9.17%	-23.28%	-29.83%	-	-27.64%
October 1926(III)	November 1927 (IV)	-10.01%	-1.09%	-10.30%	-7.64%	-13.28%	-18.69%	-	-33.27%
August 1929(III)	***March 1933 (I)***	**-54.48%**	**10.89%**	**-52.38%**	**-5.93%**	**-76.94%**	**-79.07%**	-	**-36.30%**
May 1937(II)	June 1938 (II)	-41.33%	4.89%	-29.92%	-9.64%	-51.90%	-59.59%	-	-24.42%
February 1945(I)	October 1945 (IV)	-	-	-15.23%	2.20%	-52.34%	-	-	-
November 1948(IV)	October 1949 (IV)	-	-	-15.25%	1.68%	-13.45%	-	4.07%	-
July 1953(II)	May 1954 (II)	-	-	-9.14%	-2.69%	-15.94%	-	0.21%	-
August 1957(III)	April 1958 (II)	-	-	-	-	-23.89%	-	-0.67%	-
April 1960(II)	February 1961 (I)	-	-	-	-	-14.07%	-	-1.51%	-
December 1969(IV)	November 1970 (IV)	-	-	-	-	-	-	-	-
November 1973(IV)	March 1975 (I)	-	-	-	-	-	-	-	-
January 1980(I)	July 1980 (III)	-	-	-	-	-	-	-	-
July 1981(III)	November 1982 (IV)	-	-	-	-	-	-	-	-
July 1990(III)	March 1991 (I)	-	-	-	-	-	-	-	-
March 2001(I)		-	-	-	-	-	-	-	-
Average, all cycles:									
1854-1991 (Absolute value, no 1929)		**26.78%**	**5.40%**	**16.93%**	**6.40%**	**29.31%**	**39.87%**	**1.61%**	**35.65%**
1854-1991 (Absolute)		**32.32%**	**6.50%**	**19.02%**	**6.36%**	**34.07%**	**47.71%**	**1.61%**	**35.74%**
pre-1929 average		**21.93%**	**5.57%**	**16.78%**	**7.74%**	**30.74%**	**33.29%**	**-**	**37.89%**
post-1929 average		**41.33%**	**4.89%**	**17.38%**	**4.05%**	**28.60%**	**59.59%**	**1.61%**	**24.42%**

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Table B.1 - Real Average Wages (% variation over Cycles)

BUSINESS CYCLE REFERENCE DATES		Meat Packing *m8202b*	*Silk and Rayon m8203b*	*Leather Tanning m8204b*	*Shoes m8205b*	*Furniture m8206b*	*Automobiles m8207b*	*Iron & steel m8210b*	*Electrical m8211b*	*Rubber m8219b*	*Machine m8223*	*Heavy equipment m8227*
January 1920(I)	July 1921 (III)	3.67%	9.44%	11.72%	11.43%	2.76%	9.42%	25.35%	7.91%	14.16%	-	-
May 1923(II)	July 1924 (III)	-3.66%	2.46%	-3.39%	8.10%	-0.67%	0.98%	-7.29%	-4.00%	1.13%	-	-
October 1926(III)	November 1927 (IV	-1.52%	-2.15%	-5.01%	-0.51%	2.10%	-5.75%	-2.76%	-4.40%	-0.71%	-2.00%	0.66%
August 1929(III)	March 1933 (I)	-10.73%	2.27%	-12.93%	0.24%	0.43%	-9.93%	-6.02%	-24.15%	-16.28%	-22.58%	-11.36%
May 1937(II)	June 1938 (II)	-3.17%	-5.23%	-2.65%	4.62%	-8.28%	-4.93%	0.43%	-8.01%	0.54%	-3.82%	-9.43%
February 1945(I)	October 1945 (IV)	-2.56%	-6.33%	-0.95%	0.25%	6.09%	6.20%	4.78%	4.57%	8.73%	-	-
November 1948(IV)	October 1949 (IV)	-0.04%	-2.67%	-4.35%	-1.69%	-2.39%	-2.54%	-1.44%	-1.77%	-2.60%	-	-
July 1953(II)	May 1954 (II)	-2.47%	0.21%	-1.53%	-1.31%	-1.74%	0.21%	2.03%	-2.62%	-0.30%	-	-
August 1957(III)	April 1958 (II)	2.14%	-3.45%	-1.09%	-0.77%	-1.53%	-0.90%	-0.29%	1.72%	-1.22%	-	-
erage (absolute values)		**3.33%**	**3.80%**	**4.85%**	**3.21%**	**2.89%**	**4.54%**	**5.60%**	**6.57%**	**5.07%**	**9.46%**	**7.15%**
average (pre 1929)		2.95%	4.68%	6.71%	6.68%	1.85%	5.38%	11.80%	5.44%	5.33%	2.00%	0.66%
average (post 1929)		2.08%	3.58%	2.11%	1.73%	4.01%	2.96%	1.79%	3.74%	2.68%	3.82%	9.43%

BUSINESS CYCLE REFERENCE DATES		*Wool m8231b*	*Paper & Pulp m8235b*	*Construction Skilled m8258*	*Construction Common m8259*	*Manufacturing m8286*	*Manufacturing (weekly), ND m8287*	*Manufacturing, Durable m8288*	*Manufacturig, ND m8289*	*Manufacturing all employees m8332*	*Manufacturing Production workers m8343*	*Nonagricultural Establishments m8350*
January 1920(I)	July 1921 (III)	16.31%	6.89%	11.14%	4.07%	-	-	-	-	-	-	-
May 1923(II)	July 1924 (III)	6.73%	-2.64%	-3.40%	-1.53%	10.46%	5.71%	-	-	-	-	-
October 1926(III)	November 1927 (IV	-3.85%	-2.28%	-2.82%	1.02%	1.05%	-1.01%	-	-	-	-	-
August 1929(III)	March 1933 (I)	-0.47%	-6.70%	-26.31%	-56.07%	30.39%	4.64%	-	-	-	-	-
May 1937(II)	June 1938 (II)	-0.50%	-7.26%	-3.95%	-4.97%	16.73%	5.55%	-1.83%	-3.07%	-	-2.65%	-
February 1945(I)	October 1945 (IV)	1.90%	-2.69%	-9.17%	-11.17%	18.34%	3.96%	8.16%	-0.29%	-	9.20%	-
November 1948(IV)	October 1949 (IV)	-2.98%	-2.78%	-	-	-0.43%	-3.72%	-1.71%	-2.68%	-1.40%	-4.58%	-4.08%
July 1953(II)	May 1954 (II)	1.48%	-0.34%	-	-	0.85%	-0.02%	-1.38%	-2.89%	-4.06%	-1.39%	-2.28%
August 1957(III)	April 1958 (II)	-2.09%	-1.64%	-	-	-	-	-	-	3.35%	-2.55%	-0.02%
erage (absolute values)		**4.03%**	**3.69%**	**9.47%**	**13.14%**	**11.18%**	**3.51%**	**3.27%**	**2.23%**	**2.94%**	**4.08%**	**2.13%**
average (pre 1929)		8.96%	3.93%	5.79%	2.21%	5.75%	3.36%	-	-	-	-	-
average (post 1929)		1.79%	2.94%	6.56%	8.07%	9.09%	3.31%	3.27%	2.23%	2.94%	4.08%	2.13%