

Relatórios Coppead é uma publicação do Instituto COPPEAD de Administração da Universidade Federal do Rio de Janeiro (UFRJ)

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Fleck, Denise

Drawing growth trajectories of firms / Denise Fleck. – Rio de Janeiro : UFRJ/COPPEAD, 2001.

22 p. ; 27 cm. – (Relatórios Coppead; 345).

ISBN 85-7508-029-6

ISSN 1518-3335

1. Tamanho da empresa. I. Título. II. Série.

CDD – 658.4

Pedidos para Biblioteca

Caixa Postal 68514 – Ilha do Fundão
21941-970 – Rio de Janeiro – RJ
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Drawing Growth Trajectories of Firms¹

Denise Fleck²

Several indicators of size have been suggested in the literature. However, none has succeeded in describing the growth trajectory of firms over time. This paper identifies sources of conceptual ambiguity in the notion of growth, suggesting an indicator of firm size. The proposed indicator is both simple and powerful, it uses information that is, in general, easily available and consistent over time, it shows a company's growth relative to the economy and it automatically corrects for inflation. It allows, therefore, for the drawing of growth trajectory curves that visually describe the growth path a firm performs in the economy through its existence. By providing a concise description of the evolution of the firm over long periods of observation, the indicator enables the identification of growth, contraction and stationary periods. A procedure to generate other accounting-based measures of the firm, which may help longitudinal analyses of firm and industry evolution. The suggestions proposed in the paper equip both research and practice with analytical tools to map growth over economic space and time, addressing, therefore, the criticism of overly static and methods in the study of the firm.

1 INTRODUCTION

The growth notion is anything but straightforward. Yet, growth is indisputably one of, if not the most, important issues on management's agenda. Multidimensionality seems to be at the root of the concept ambiguity. In fact, growth has been equated both with size change and success, although neither of them has one unique definition.

This essay addresses these issues advancing an *indicator of firm size*, which *shows the company's relative growth and automatically corrects for inflation*. The proposed indicator produces a measure that is comparable over time, across firms and across industries. As a result, it allows for the drawing of growth trajectory curves. Such curves enable the visual description of a firm's growth path throughout the

1 I would like to thank Henry Mintzberg, Jan Jørgensen, Ann Langley and Mario Bunge for their insightful comments.

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economy, as well as the identification of continuing growth (Chandler, 1977) and continuing contraction periods throughout a firm's existence. In addition, the procedure used to generate the size indicator can also be applied to produce other measures, such as productivity, that are comparable over time, across firms and across industries. In sum, the proposed approach equips both research and practice with longitudinally-oriented analytical tools.

The need for longitudinal studies has been acknowledged in several instances. In his review of the theory of multinational enterprises, Buckley (1983) suggests the avoidance of certain kinds of reductions in the study of the multinational firm, such as by fixing a point in time. In his view, the *growth of firms should be mapped over economic space and time*. In addition, a process rather than a content view of strategy has been argued for (Mintzberg, 1990; Melin, 1992; Mintzberg, 1994). Viewing internationalization as a strategy process, Melin (1992) has classified internationalization process studies into four longitudinal types: time series of events, relatively short episodes, longer epochs, and biographic history. In his study, he found that the last two types are the less frequent ones, having concluded that *models and methods in the international management field are overly static*.

Static pictures of firms have been criticized in favor of more dynamic accounts. Porter (1981, 1991), for example, acknowledges the static perspective of studies drawing on the Industrial Organization premises, such as the assumption of a stable industry structure. He has maintained that the "view that strategic choices do not have an important influence on industry structure is nearly dead" (Porter, 1981, p. 615-616). He has further argued that despite some fundamental structural parameters of an industry, *industry evolution can take many paths*, "depending on such factors as the luck of the draw in terms of the identity of industry rivals and uncertain events, as well as, on the strategic choices firms actually make that follow from their unique objective function." (p. 616)

Management has also been prescribed the adoption of a longitudinal perspective in business. Miller's study (1990) on the declining paths of a number of formerly successful firms is a case in point. Besides identifying different downward trajectories where success can lead to failure, Miller has suggested a longitudinal view of business as a way to counter the "myopia induced by cohesive configurations." (Miller, 1992, p. 31) Maintaining that "self-knowledge cannot be attained in a vacuum" (p. 32), Miller has advised managers at many levels and from a variety of departments to gather relevant information so as to enable them to monitor trends. According to

him, "a static statistic tells us much less than a trend, so *monitor everything over time. Plot graphs of information so that trends become apparent.*" (Miller, 1992, p. 33, italics were added to the original text)

The suggestions advanced in this essay allow for the mapping of growth over economic space and time (Buckley's suggestion), as well as, for the plotting of relevant information over time (Miller's prescription). They also enable to visualize industry distinct paths (Porter's assertion) and advance a procedure for generating longitudinally comparable measures of the firm, addressing in this way Melin's (1992) criticism of overly static models and methods.

The text is made up of four sections. The first one examines the multidimensionality of the growth concept. The second proposes the size indicator, applying it to the top ten firms in the 1956 Fortune 500 list. The third section applies the procedure to generate other relevant measures to the analysis of firm development over time. Finally, the concluding section summarizes the essay's contributions to both research and practice.

2 THE MULTIDIMENSIONALITY OF THE GROWTH CONCEPT

More often than not, no clear-cut definition of growth is included in texts on the growth of the firm. Penrose (1980), for example, developed a theory of the process of growth, viewing size as "but a by-product of the process of growth" (p. 2). In her view, rate of growth would "vary depending on the measure of size adopted, whether total sales, assets of one kind or another, employment, or something else" (p. 213). In sum, to Penrose, growth is associated with change in size, although size could be associated with firm resources, or firm outputs.

Other authors equate growth with change in the organization's size. Starbuck (1971), for example, measures size in terms of the organization's membership or employment. Ijiri & Simon's model of business firm growth (1971), on the other hand, states that size may be measured either by the total assets of the firm or its sales volume. Therefore, while Starbuck associates size with firm resources, in Ijiri & Simon's view, both firm resources and firm outputs may indicate organization size.

Growth has also been associated with success. Drucker (1954), for instance, views growth as a success indicator, stating that growth is a result of success. More

recently, success has been associated with firm value and value creation. A number of measures have been promoted in the management literature, such as *market capitalization*, *market value creation* and *economic value creation*. Concern for measuring the firm's market capitalization is deeply related to the widespread notion that management's utmost goal should be the maximization of shareholder value. The *market capitalization measure* evaluates a firm in terms of the price its shares get in the stock market. By this measure for example, General Electric has been the largest American company throughout the late 1990s. The two value creation measures also aim at assessing management effectiveness in managing for value creation. *Market value added (MVA)* is calculated by subtracting the firm's capital employed from the market value of the firm's total capital (Hawanini & Viallet, 1999). *Economic value added (EVA)* is calculated by subtracting from the firm's operating profits the cost of all of the capital employed to produce earnings (Stewart, 1990). Although conceptually sound, such measures require substantial efforts to be quantified. EVA, for example, requires the computation of the cost of capital, which involves the making of a number of assumptions, as well as intimate knowledge of a firm's accounting system and its changes over time. MVA, on the other hand, needs to estimate the amount of capital employed by the firm, which comprises debt capital and equity capital. Such estimation is but straightforward requiring to "add to the book value of equity reported in the balance sheet a number of items that standard accounting conventions *exclude* from the figure shown in the balance sheet" (Hawanini & Viallet, 1999, p. 483). Finally, due to the intrinsically oscillatory behavior of the stock market, measures based on market value face additional complication.

According to McKinley (1987), the pairing of growth and success has been so prevalent that growth-oriented paradigms have dominated organization theory generating a considerable lack of interest in the study of decline. Equating growth with success, and contraction with decline and failure, induces the normative view that assigns to growth positive qualities – and negative ones to contraction. Such notion, however, should be discarded if a deeper understanding of growth is sought for.

Apart from the success notion, there seems to be a common understanding in the literature conceiving *growth as a change in the size of the firm*. Size, however, remains ambiguous. As a matter of fact, it has been associated with either firm resources – assets, employment – or firm outputs, such as sales. Although firm resources allow for intra-industry comparison of growth paths, they fail to generate size measures comparable over time or across industries. In the course of time, technology may bring about productivity increases, affecting, therefore, the amount of assets and/or

employment needed to perform activities in a given industry. As a result, a firm might be increasing its *business size* – sales – while decreasing its *organizational size* – assets and/or employment. Moreover, across-industry comparisons might be meaningless so far as industries differ with respect to the intensity of resources use.

Yet, size measured in terms of firm outputs – sales – allows for longitudinal comparisons. Business size, when properly adjusted for inflationary and deflationary effects does enable the longitudinal study of firm growth. In practice, the most common analyses include: same quarter sales comparison, annual sales comparison, and firm sales as compared to industry sales. Although all these analyses compare firm sales over time, they present limitations. For one, the length of time analyzed usually does not exceed a few years, precluding therefore the identification of long-term trends. This limitation could conceivably be fixed by extending the time horizon used in such analyses. However, the most limiting aspect of these analyses concerns their *inward focus*. Same quarter and annual sales comparisons typically compare the firm to itself over time, no matter what is going on around it. On the other hand, the *relative measure* – firm sales as compared to industry sales – incorporates an outward look to firm growth by accounting for the general state of the industry. Yet, it is inwardly focused at industry level, not taking into account the general state of the economy.

In sum, there are many ways of assessing the growth of the firm. Growth is generally viewed as change in firm size. Size can be measured in terms of business or organizational size. From an organizational viewpoint, it may seem adequate to employ an internally-oriented indicator equating size with, for example, the total number of employees. However, such an indicator provides no additional information on how well or poorly the firm is performing in the business landscape. From a strategic viewpoint, it would be preferable to devise an externally-oriented indicator of size such as sales. Yet, such a measure should be time-invariant, i.e., not affected by phenomena such as inflation and deflation. In addition, it should measure firm size relative to the business landscape so as to provide a wider perspective of the firm's trajectory over time.

3 AN INDICATOR OF SIZE

This essay proposes a relative measure of firm size that satisfies the two requirements above stated: external orientation and time-invariance. The *size of a firm* in the American economy in a given year should be measured by calculating *the firm's*

total annual sales as a percentage of the US GNP. Size is therefore expressed in the following way:

$$\text{SIZE}_i = \frac{\text{SALES}_i * 100}{\text{GNP}_i}$$

where

SIZE_i = firm size in year i

SALES_i = total annual sales in year i

GNP_i = US GNP in year i

This indicator can be said to express the *firm's share of the economy at a certain point in time*. The curve of the firm's share over long periods of time describes *the growth trajectory of the firm throughout its existence*. In essence, it provides a concise description of the evolution of the firm over long periods of time allowing for the identification of growing, declining and stationary periods. Furthermore, the proposed indicator of firm size produces an adimensional value automatically adjusted for inflationary and deflationary changes in currency value. Finally, it allows for inter- and intra-industry longitudinal comparisons.

To illustrate the application of the size indicator, growth trajectories of the top ten companies in the 1956 Fortune 500 list will be drawn. Table 1 lists the top ten companies in 1956 and their situation as of December 1998.

Table 1 – Top ten companies in the 1956 Fortune 500 list

Ranking in 1956	Situation in December 1998
1. General Motors	Number 1 in 1999 Fortune 500 list
2. Exxon	Number 4 in 1999 Fortune 500 list
3. Ford	Number 2 in 1999 Fortune 500 list
4. U S Steel (USX)	Number 47 in 1999 Fortune 500 list
5. Chrysler	Merged with Daimler-Benz in 1998
6. General Electric	Number 5 in 1999 Fortune 500 list
7. Swift	Acquired in 1972
8. Bethlehem Steel	Number 346 in 1999 Fortune 500 list
9. Armour	Acquired in 1982
10. Dupont	Number 16 in 1999 Fortune 500 list

Growth trajectories are shown in figures 1 to 7. Same industry firms were plotted in the same graph (figures 1, 3 and 4). With one exception, Chrysler, trend curves were produced using Microsoft Excel's *add trend line* option. In fact, Chrysler's trend curve (figure 2) was plotted apart from GM's and Ford's with the help of Matlab, a software which allows the drawing of sinusoidal trend curves. As a result, figure 2 displays

Chrysler's trajectory and trend curves in a slightly different way from the other figures in this essay.

The proposed indicator allows the visualization of the trajectory a firm performs in the economy over time. Continuing growth, stationary and continuing contraction periods can be identified with the help of the time-invariant measure of size that automatically corrects for inflation. DuPont (figure 5), for example, exhibits a continuing growth period (during the 1940s) that is followed by a quite stable period (late 1940s to early 1980s). Exxon (figure 4) has also experienced rather stable periods (mid 1920s to early 1940s; mid 1950s to mid 1970s), continuing growth in the 1970s and continuing contraction from the 1980s on.

Accentuated descending paths can be observed in US Steel, Swift, Bethlehem Steel, and Armour (figures 2 and 3). The long duration of the descending path in these four companies is suggestive of deterioration processes that may have been overlooked at some critical points in time. It is conceivable to suppose that deterioration processes might possibly have been reverted had they been identified, understood and fixed early on. However, these conjectures will remain mere speculations unless a thorough analysis of these companies histories is done.

Interestingly, more often than not, their annual sales curves exhibit an upward trend (refer to Figures 8 to 11, which plot total annual sales in US\$). The examination of figures 8 to 11 in light of figures 2 and 3 helps realize how deceiving certain kinds of analyses can be. Management usually performs comparison of the firm's annual sales in a given year with its annual sales over a short period of time in the past. As figures 8 to 11 show, such comparisons may indicate a slight sales reduction, or even sales recovery, while the four companies were in fact reducing their share of the economy for decades. Another analysis usually done compares the firm with the industry. Once more, this can be deceiving if the whole industry is undergoing contraction and firms keep mimicking each other, i.e., if organizational isomorphism takes place (DiMaggio & Powell, 1983).

The examination of the trajectories of the automobile manufacturers (refer to figure 1) reveals three rather different paths. More often than not, Ford has been performing an ascending trajectory. General Motors (GM) on the other hand, seems to be experiencing contraction for quite some time. In fact, the distance between GM and Ford curves has been decreasing over time. In contrast to the other two

automobile companies, Chrysler's size has oscillated within a limited zone. In fact, as figure 7 shows, its trend curve performs a sinusoidal kind of pattern.

In sum, our proposed indicator of firm size produces an adimensional value automatically adjusted for inflationary and deflationary changes in currency value. Moreover, it is helpful in the drawing of growth trajectories of firms, and allows for longitudinal inter- and intra-industry comparisons. Yet, the longitudinal analysis of a firm's evolution should include other measures that can also be comparable over time, across firms and across industries. Next section addresses this issue.

4 GENERATING OTHER MEASURES OF THE FIRM

Though eloquent as the growth trajectories may be in describing the trajectories of firms in the economy over long periods of time, their explanation calls for deeper analyses. This comprises the scrutinizing of the firm's and the industry's history, as well as, the generation of other quantitative measures. While elaborating on the historical analysis lies outside the scope of this essay, a procedure will be suggested to address the second issue.

Other accounting-based measures of the firm should be derived to complement the portrayal of the firm's evolution over time. Such measures should have the same characteristics the size indicator has, i.e., external orientation, time invariance and implicit adjustment for inflation and deflation in order to enable longitudinal comparisons. As a result, we suggest *that other accounting-based measures be derived by calculating the correspondent percentage of the US GNP.*

One such measure is profit. By applying the % of US GNP operator to annual profits, it is possible to produce profit curves comparable inter- and intra- industry. Figures 12 to 14 illustrate this indicator as applied to the top ten firms in the automotive, meat packing and steel industries, while figure 15 shows GE's sales and profits evolution over time. Figures 12 to 15 allow us to identify different growth and contraction scenarios. For example, during World War II's last 3-4 years, firms grew in size but not in profits; in the post-World War II years most industries grew in size and in profits; while in the Great Depression years firms contracted their size and their profits.

Perhaps more interesting than visualizing the effects of major macroeconomic factors on firms' trajectories is the ability to help analyze growth paths of firms. In fact, by examining figures 13 and 14, it is possible to realize that meat packers' and steel manufacturers' several decades long size contraction occurred in an all-encompassing contraction scenario, where the firms' profits paths indicate performance decline and reduction of financial capacity to grow. Also, figure 15 enables to identify GE's size contraction periods in the 1980s and 1990s within a profit expansion path – a path, which in fact started in the 1970s. In sum, by including profits paths in the analysis of the growth trajectory of the firm it is possible to introduce a longitudinal indication of performance improvement/decline.

Other accounting-based measures can be conceived, such as retained earnings, and productivity and/or profitability per employee. The creation of such

measures faces, however, one major limitation: the compatibility of accounting systems over long periods of time. Special attention should, therefore, be devoted to evaluate historical accounting procedures and financial data so as to guarantee uniformity over time.

5 CONCLUSION

After identifying the sources of ambiguity in the growth concept, this essay has proposed a size indicator that represents the firm's share of the economy over time. Several advantages can be identified: the indicator is both simple and powerful, it uses information that is in general easily available and consistent over time, it shows a company's growth relative to the economy, and it automatically corrects for inflation.

A procedure to generate other longitudinally comparable measures has also been advanced. It uses the % of US GNP operator, which automatically corrects accounting-based measures for inflation or deflation over time. As a result, the procedure enables the creation of other measures of the firm that may help longitudinal analyses of firm and industry evolution.

In this way, the suggestions advanced here equip both research and practice with analytical tools to perform longitudinal analyses of firms and industries. They enable the mapping of the growth of firms over economic space and time, the plotting of relevant information on the firm evolution over long periods of time, and the visualization of industry evolution. They, therefore, address the criticism of overly static models and methods in the study of the firm.

Yet, the suggestions are not without limitations. Longitudinal compatibility of data in historical data series is a major requirement. Therefore, the creation and use of additional accounting-based measures may face limits in the event of changes that accounting systems may have experienced over time. For example, it might be argued, that value added, i.e., sales less value of purchased goods, relative to GNP would be a stronger indicator firm size. However, it seems likely that longitudinally consistent data on value added measures would be hardly available. In sum, special care is needed to avoid inconsistency in the measures produced.

Another limitation pertains to this essay's scope, which is circumscribed to the growth of firms in the American economy. It is reasonable to suggest that by replacing

the US GNP operator by another country's GNP growth trajectories of firms in other economies could be drawn in a similar way. However, more work is required to account for the growth trajectory of firms experiencing increasingly higher levels of globalization.

The descriptive power of the growth trajectory curves seems evident. What is far from clear is their prediction power, if any. On the one hand, the declining curves eloquence is undoubtedly impressive. On the other hand, more work should be done to support any degree of predictive power. Notwithstanding this, the curves descriptive capability can contribute to both research and practice. Academics may benefit from the indicators suggested to start visualizing the trajectory of firms examined in longitudinal studies. This would allow industry studies to compare and better understand the role played by different firms in the formation, development and eventual decline of both firms and industries. Practitioners, on the other hand, by extending the breadth and depth of their analyses, can perform a reality check and aim at better understanding their firms and the industries they operate in.

Figure 1

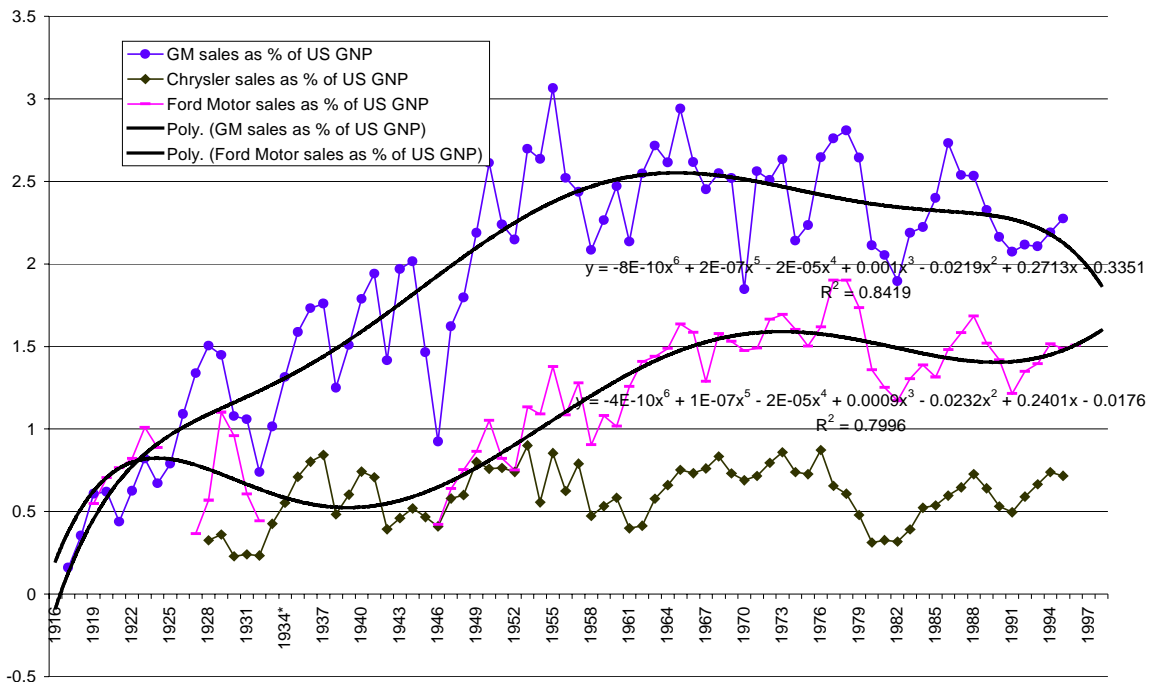


Figure 2

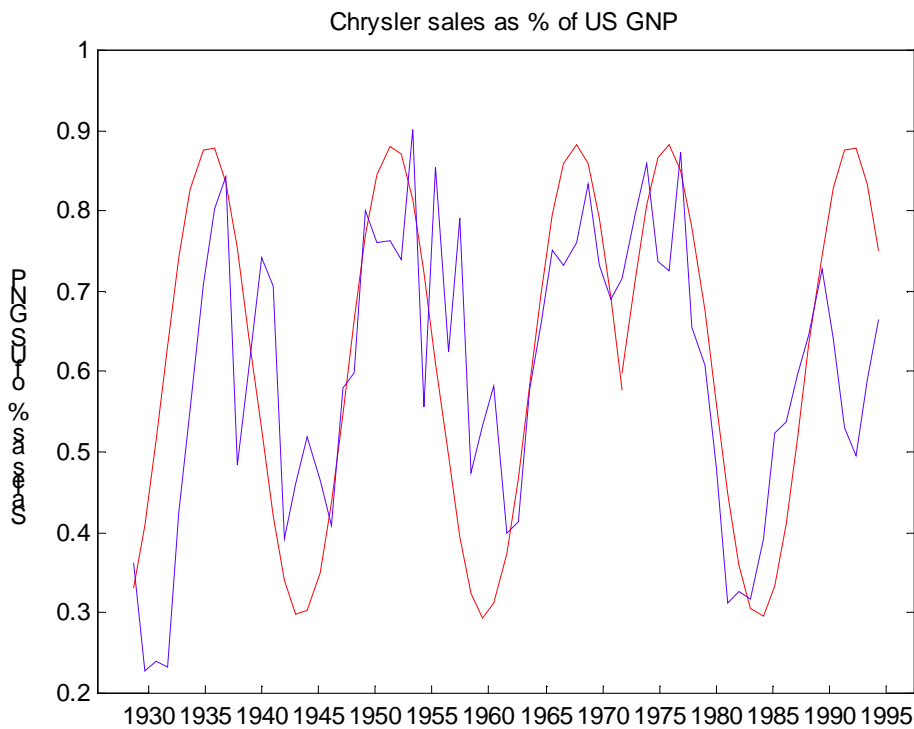


Figure 3

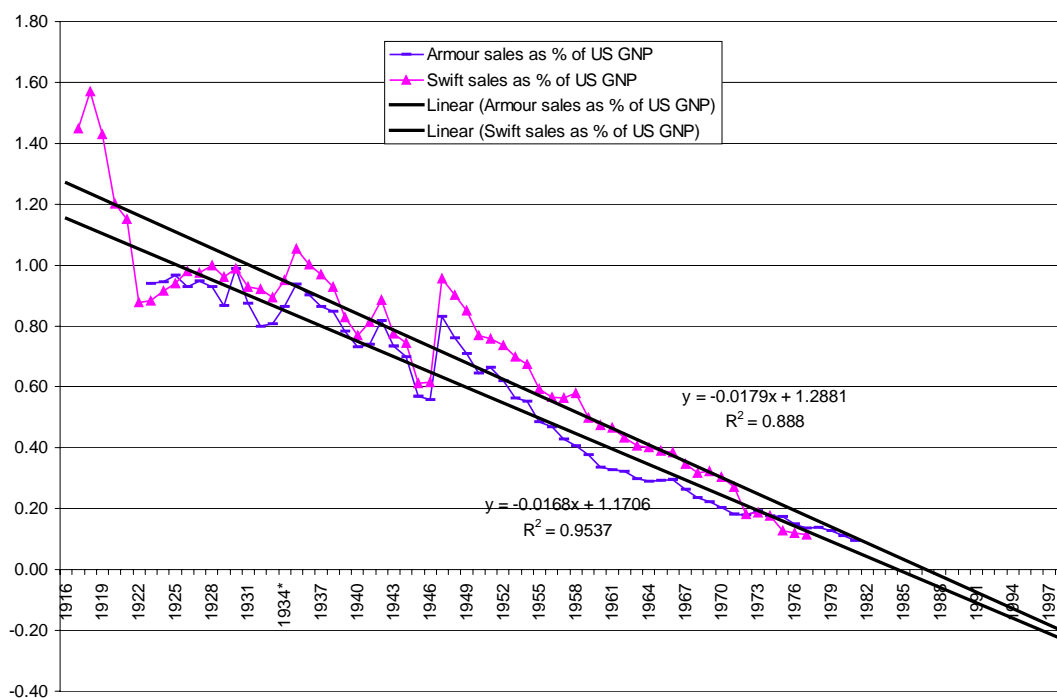


Figure 4

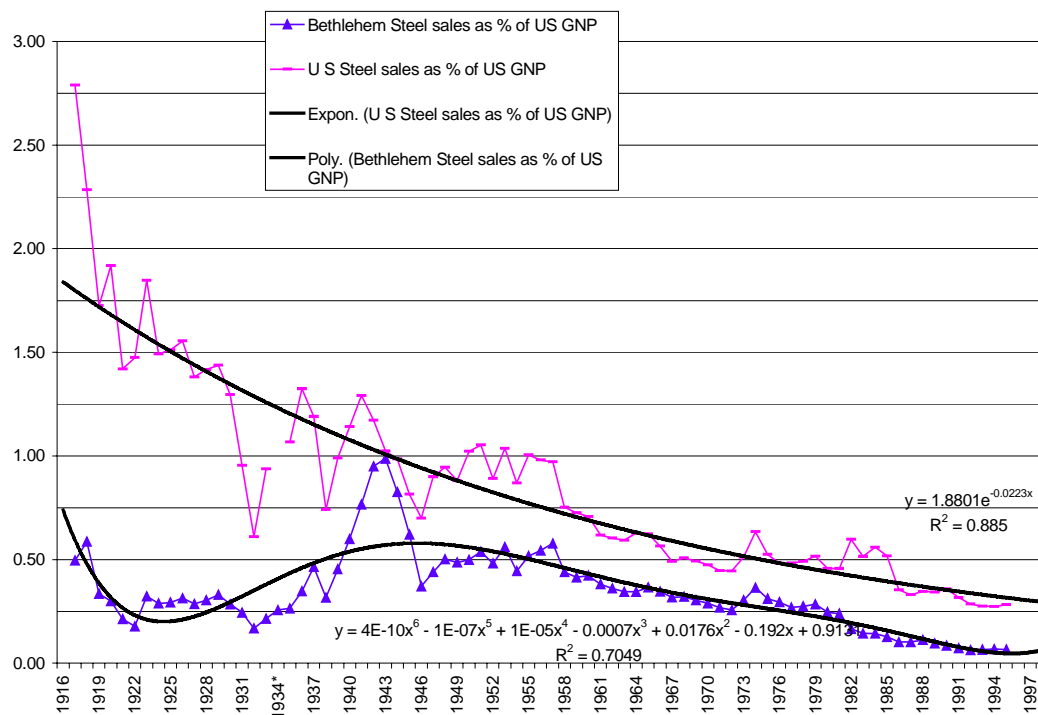


Figure 5

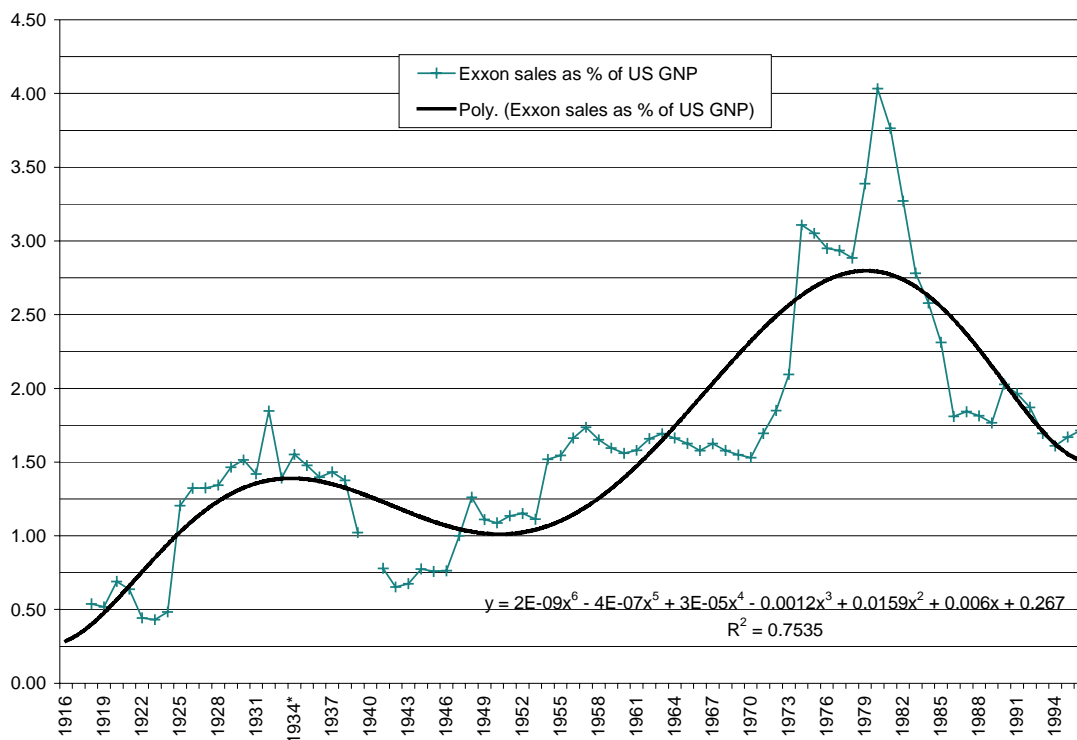


Figure 6

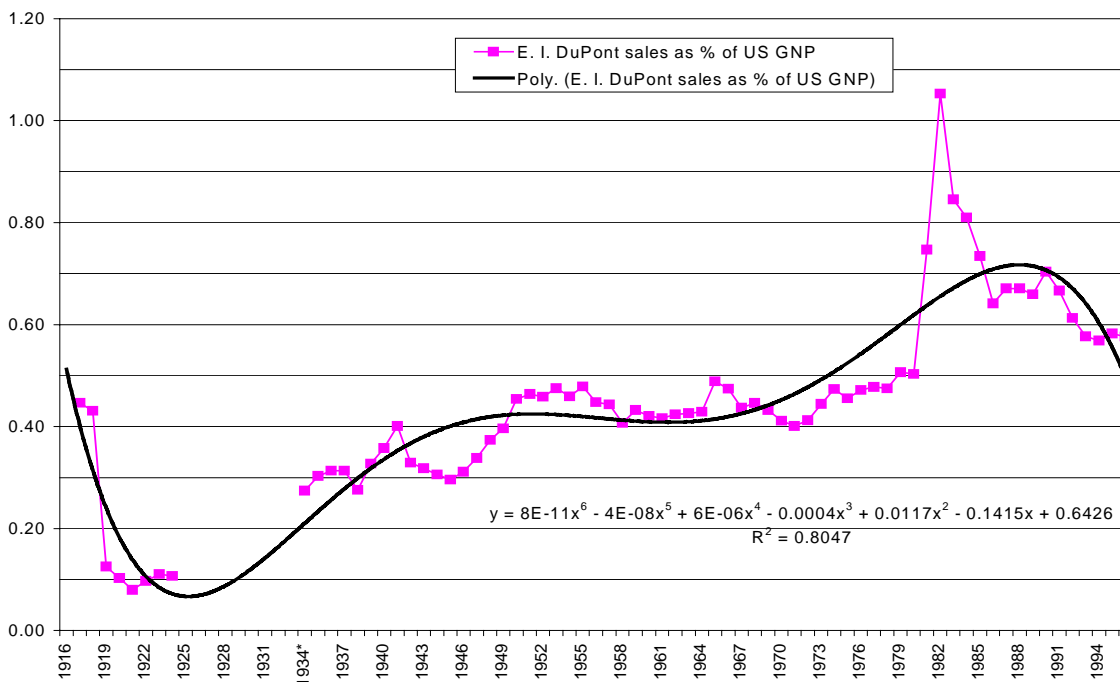


Figure 7

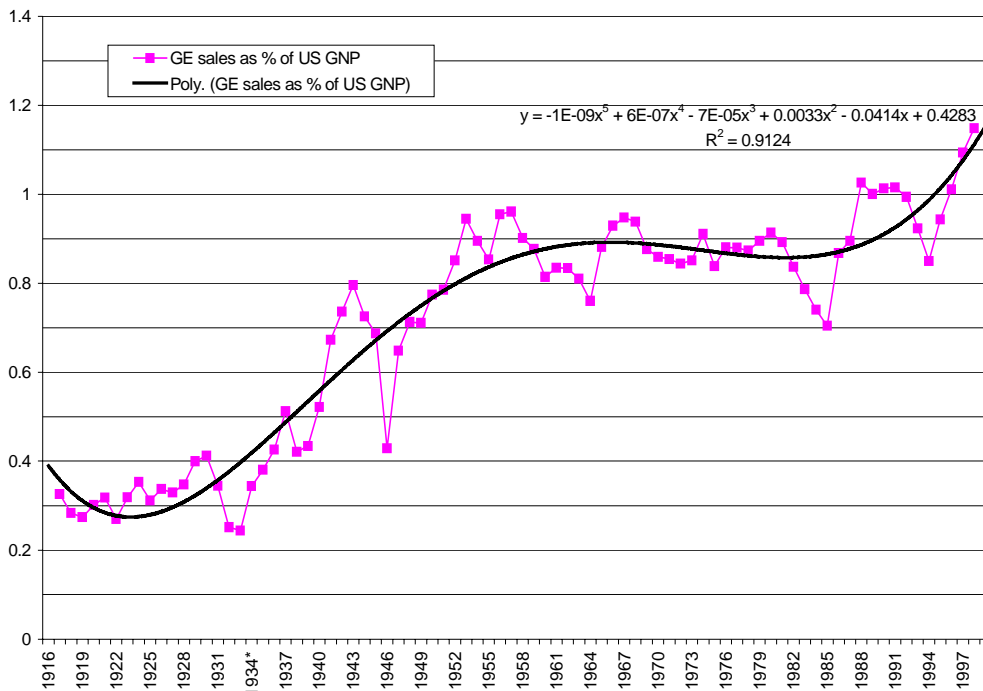


Figure 8

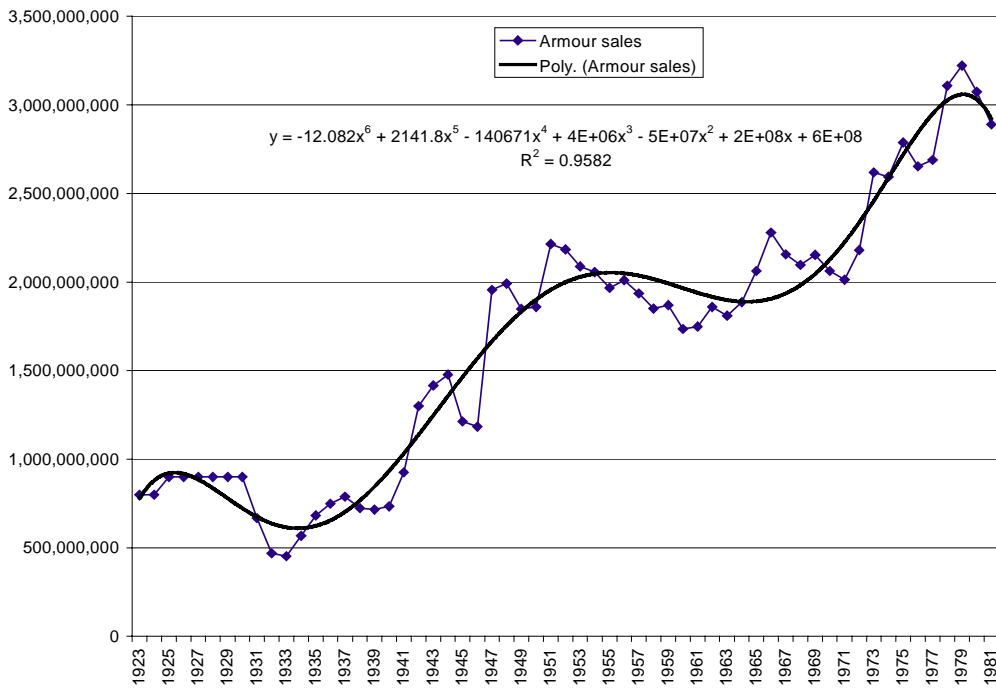


Figure 9

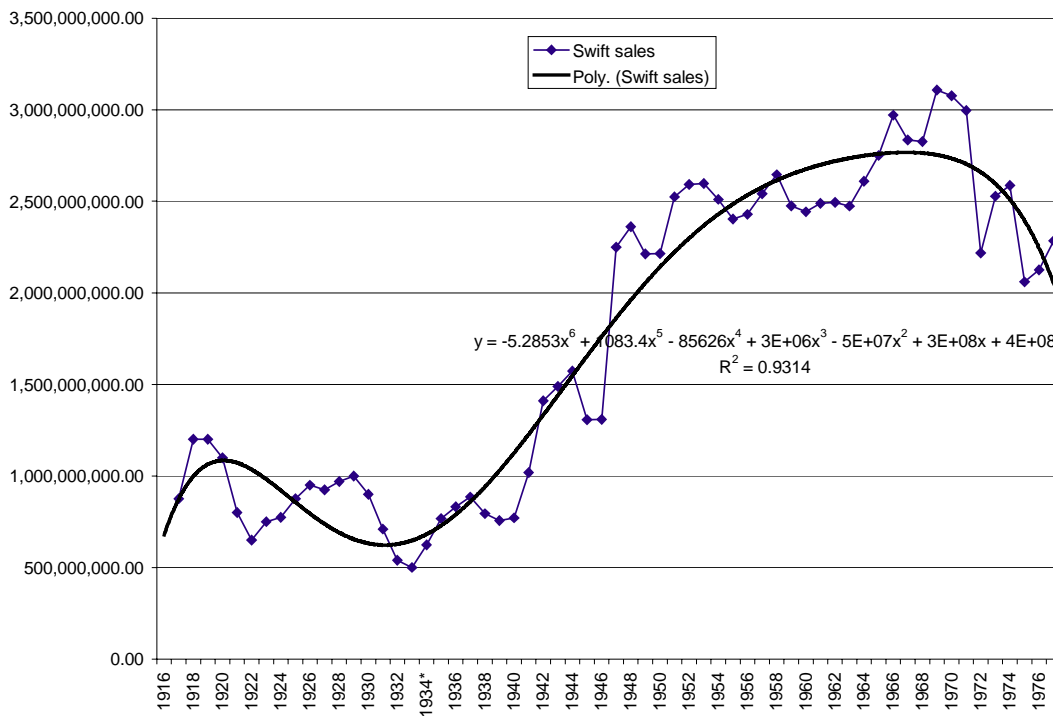


Figure 10

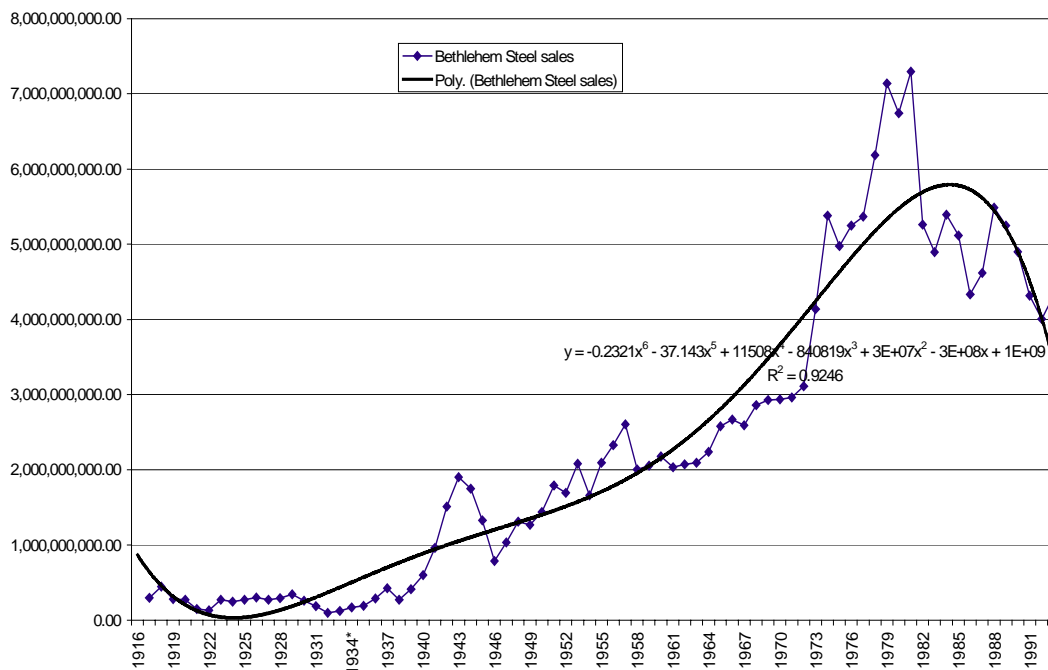


Figure 11

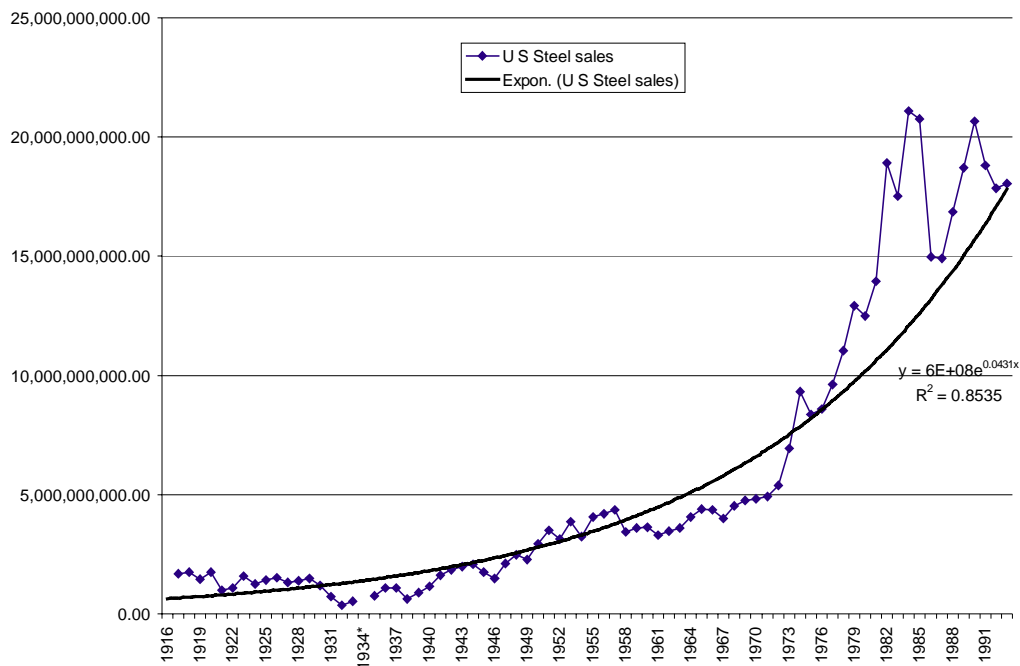


Figure 12

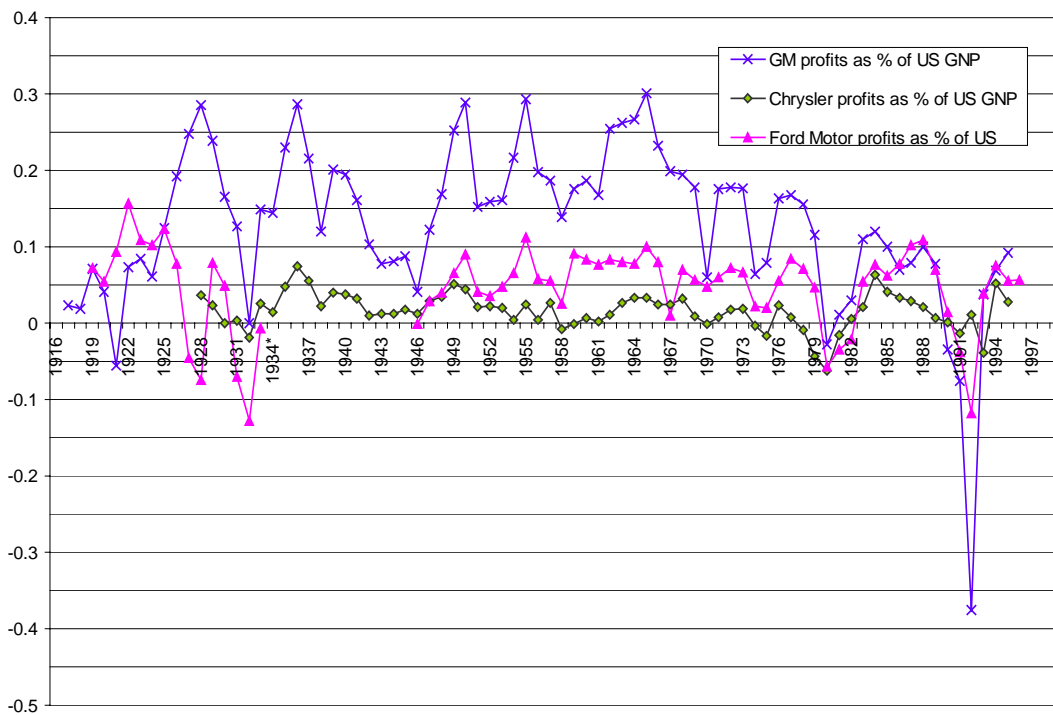


Figure 13

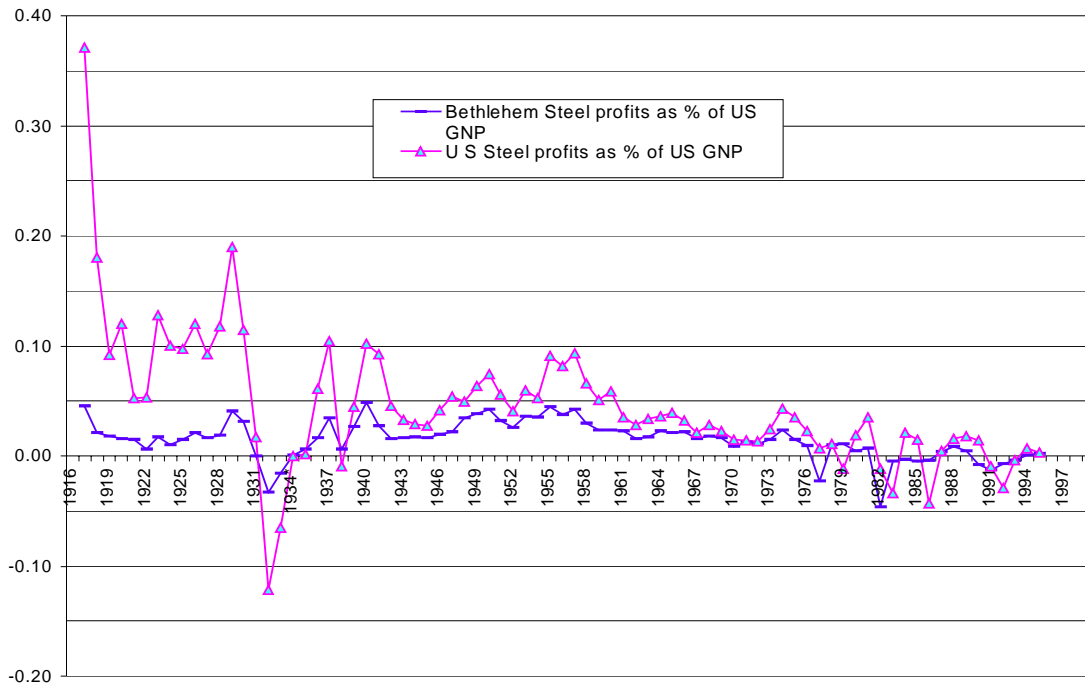


Figure 14

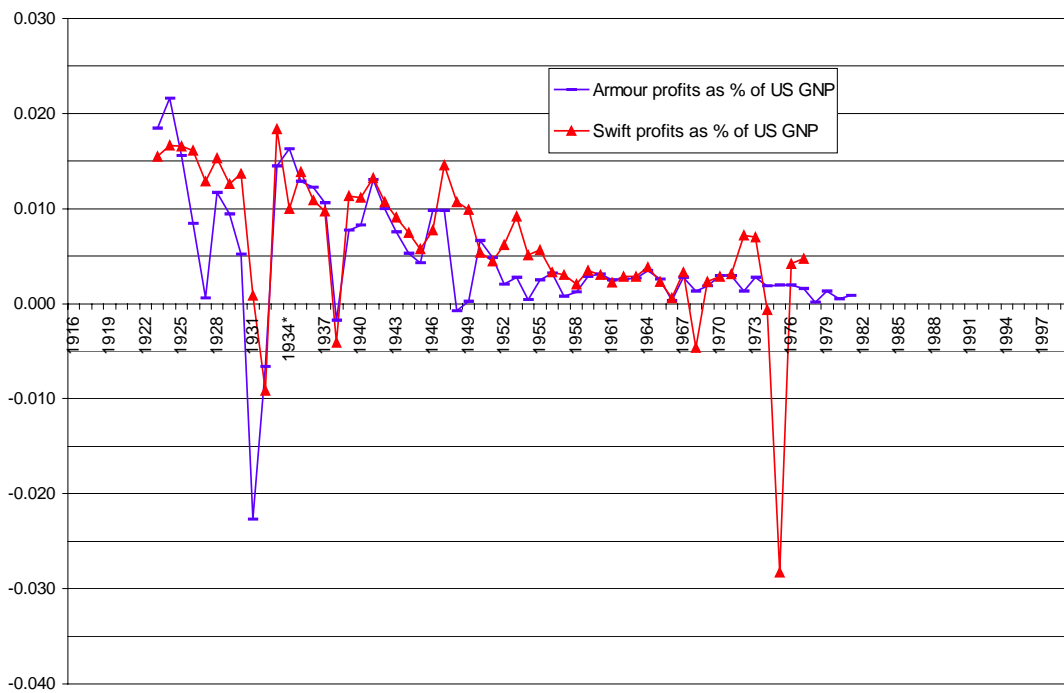
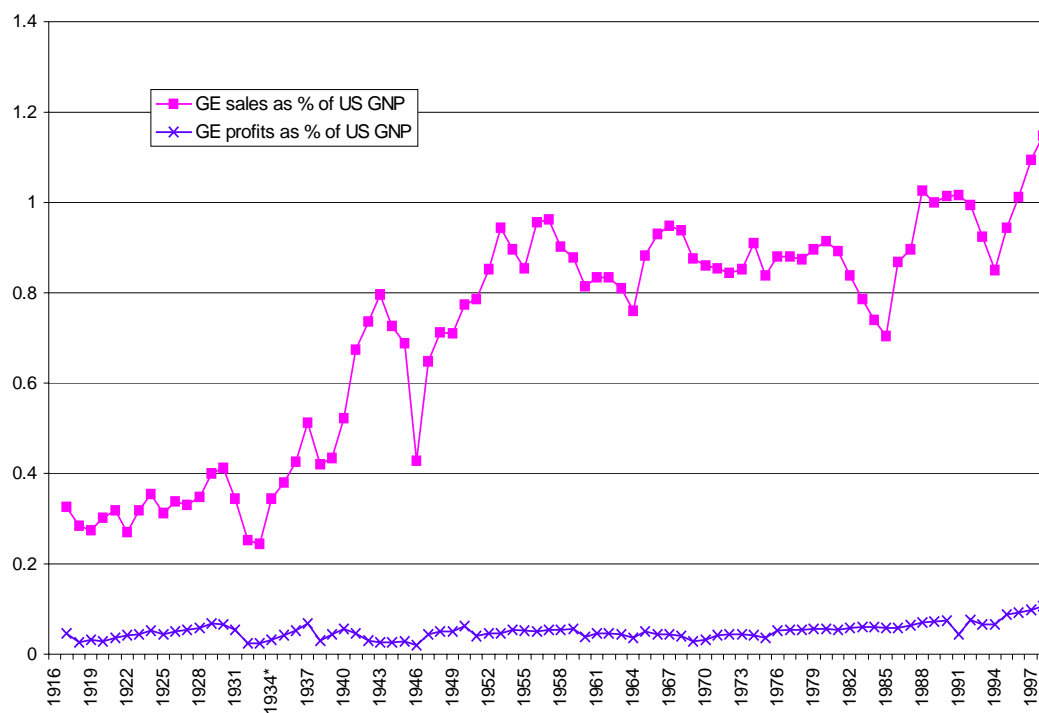


Figure 15



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