THE DISTRIBUTIVE IMPACT OF TARIFF POLICY DURING THE INTERWAR PERIOD

Tristan Potter
Advised by Professor Mario Crucini

Senior Honors Thesis in Economics

Department of Economics
Vanderbilt University

With special thanks to Professor Mario Crucini for all of the opportunities with which he has provided me over the past two years, and for his unfailing support of my academic endeavors. Also, thanks to Professor Joel Rodrigue for his assistance during the summer of 2009, Professor Chris Bennett for his help on all things econometric, and my parents and brother for their advice on all things unrelated to economics. Finally, thanks to Vanderbilt University and (in particular) the Jean and Alexander Heard Library for allowing me to use their resources without reservation, and for providing me with the opportunity to read for honors in economics.

The Distributive Impact of Tariff Policy during the Interwar Period

By Tristan Potter[1]

"America is now facing the problem of unemployment. Her labor can find work only if her factories can sell their products. Higher tariffs would not promote such sales. American industry, in the present crisis, might well be spared the burden of adjusting itself to new schedules of protective duties."

Congressional Record-Senate, May 5, 1930

I. Introduction

The Smoot-Hawley Tariff Act was signed into law on June 17th, 1930, just as the U.S. economy was beginning to falter on the eve of the Great Depression. The measure, unlike any before it, raised existing tariffs on over 20,000 U.S. imports.

During his presidential campaign, Herbert Hoover had promised to support U.S. farmers in the form of an increase in tariffs on imported agricultural goods. Once Hoover took office on March 4th, 1929, he called a special session of Congress in order to make good on his campaign promise. After some political wrangling, a considerably expanded version of the tariff bill passed through the House, only to fail in the Senate several months later. Ironically, it was only once the U.S. economy began to collapse that the sweeping Smoot-Hawley Tariff Act was able to garner sufficient support in Congress.

This was all unfolding in full view of U.S. economists. On May 5th, 1930, 1,028

[1] With a great deal of guidance and support from Professor Mario Crucini, Department of Economics, Vanderbilt University.

U.S. economists presented a united front in opposition to the Smoot-Hawley tariffs. They argued that the tariffs would raise prices for consumers, injure a variety of industries outside of agriculture, invoke foreign retaliation and generally "inject…bitterness…into [U.S.] international relations." (*Congressional Record-Senate*, May 5, 1930) The predictions of these economists turned out to be remarkably prescient.

The Smoot-Hawley tariffs had a markedly negative impact on the aggregate economy during the Great Depression. Prior to the passage of Smoot-Hawley, the United States already had considerable import barriers. The Fordney-McCumber tariffs were levied in 1922 in order to support U.S. agricultural industry, which was suffering in the wake of the First World War. (U.S. Department of State, *Protectionism in the Interwar Period*) Thus, the Smoot-Hawley Tariff Act was in fact *adding* to a broad, previously-existing tariff structure. The concurrent decline in the overall U.S. price level made matters worse by increasing the value of specific tariffs relative to the total value imported. Finally, as predicted by the economists mentioned above, the increase in tariffs induced a series of retaliatory tariffs abroad. Within months of the passage of Smoot-Hawley, the U.S. export market had diminished considerably. By 1933, world trade had decreased by 66%. (U.S. Department of State, *Protectionism in the Interwar Period*)

The macroeconomic impact of the Smoot-Hawley tariffs was unavoidable. While the exact magnitude of this contribution is the subject of some debate, there is little doubt that Smoot-Hawley contributed in part to the collapse of the U.S. economy. In their 1996 article, "Tariffs and aggregate economic activity: Lessons from the Great Depression," Crucini and Kahn suggest that the effect of tariffs on output was small in the scope of the Great Depression, but significant nevertheless.

To this point, much of our understanding of tariffs during the interwar period is in the context of the aggregate economy. Aggregate data, however, tend to mask underlying changes in the composition of the economy, thereby limiting our understanding of the distributional impacts of policy. Furthermore, existing microeconomic studies of the Great Depression are still based on relatively aggregated data. For example, in their 2000 paper, "Effective Rates of Protection and the Fordney-McCumber and Smoot-Hawley Tariff Acts: Comment and Revised Estimates," Archibald and Feldman present a study of interwar protection with the U.S. economy disaggregated to the 41-industry level. While such quasi-disaggregation is important, it is inadequate for understanding the distributional effects of tariff policy. Clearly, tariffs on 20,000 specific items will have a broad impact on different people and firms within the economy. In order to understand this impact—how income was reallocated across firms and workers resulting from the tariffs—it is necessary to know how much protection was *actually* afforded to individual firms and workers.

The objective of this paper is to gain a quantitative understanding of exactly how income was redistributed across individual firms and by extension the owners of those firms. I begin by calculating Effective Rates of Protection (ERPs) for approximately 400 firms during the Interwar period. Once the ERPs have been constructed, I try to gain a quantitative understanding of the relationship between stock price movements and changes in effective protection between 1929 and 1930 through correlation and regression analysis. This research is both novel and relevant to the study of the Great Depression. It is novel because, to this point, ERPs have not been computed at the firm level. It is relevant because tariff levels and tariffs changes were heterogeneous across items, thus distorting the distribution of income. Moreover, the impact of a tariff on an individual intermediate input would have differential effects across firms depending on the intensity with which each firm used the input.

II. The Smoot-Hawley Tariffs

Before discussing firm-by-firm effective protection resulting from the Smoot-Hawley tariffs, it is instructive to first have a thorough understanding of the disaggregated composition of the tariffs themselves. This task is nontrivial given the breadth of the tariff schedule, but is nonetheless essential to understanding the nature of the tariffs.

Line-item tariffs come in three basic varieties: specific, ad valorem, and mixed (specific and ad valorem). Specific tariffs are levied as a certain value per unit quantity (e.g. $0.08 / lb). Ad valorem tariffs are levied as a percentage of the value imported. Mixed tariffs are a combination of specific and ad valorem tariffs (e.g. $0.08 / lb + 5%). If prices are constant then this distinction is of little importance as neither type of tariff will fluctuate about its intended target. In the early 1930s, however, prices were not constant. As the Federal Reserve sterilized gold surpluses in order to keep the economy from overheating, the price level began to fall and restrictive monetary policy came to bear on the newly enacted Smoot-Hawley Tariff Act. The fall in the price level caused no change in ad valorem tariffs, as they are defined as a percentage of value imported, but had serious consequences for specific tariffs. As the price of a good falls, a specific tariff becomes an increasingly large percentage of the good's value, thus increasing the *equivalent* ad valorem rate of duty. So, in a period of declining prices such as the early

1930s, a tariff schedule with a high proportion of specific or mixed tariffs will have a magnified impact on the economy.

This feature of specific tariffs has serious implications for the interpretation of effective rates of protection that will be computed later in this paper. All else equal, a firm will benefit from an increase in the price of its product and will suffer from a decrease in the price of its product. So, absent intermediate inputs, a firm protected by an ad valorem duty will be unambiguously hurt by an exogenous decrease in the price level. The case for specific duties, however, is quite different. Again neglecting intermediate inputs for the moment, it is ambiguous what effect a decline in the price level will have on a firm protected by a specific duty. As the price of the firm's product falls, there is a concurrent increase in the equivalent ad valorem duty protecting the firm, potentially offsetting the initial decrease in the price level. The inclusion of intermediate inputs, which is essential to a comprehensive understanding of protection, then confounds the situation even more. Thus, in the case of the Great Depression, firms protected by specific duties faced a very different situation from firms protected by ad valorem duties. It is therefore valuable to understand precisely what type of duties comprise a given tariff schedule.

Smoot-Hawley resulted in an 8% increase in the number of specific tariffs, a 35% increase in the number of mixed tariffs, and a 12% increase in the number of ad valorem tariffs. Of course, these numbers simply represent new tariffs, neglecting increases in existing tariffs. Figures 1, 2 and 3 illustrate ad valorem duties, mixed duties and specific duties, respectively, before and after Smoot-Hawley. Clearly the Smoot-Hawley legislation increased both the breadth and depth of the existing tariff structure. Though it is difficult to graphically disentangle what fraction of the increase in specific duties is due to legislation and what fraction is due to changes in the price level, the very fact that these effects are confounded should illustrate the dangers associated with such duties. Table 1 contains descriptive statistics for each type of duty, both before and after Smoot-Hawley, as well as changes following the implementation of Smoot-Hawley. Not surprisingly, mean and median tariff rates increased for each type of tariff following the implementation of Smoot-Hawley. Further, there were large increases in variance for each type of tariff across Smoot-Hawley. This was likely due at least in part to the fact that the proportion of mixed and pure specific tariffs increased as a percentage of the total number of tariffs following Smoot-Hawley.

It is also instructive to look at the Smoot-Hawley tariffs at the 41-industry level. Figure 4 illustrates equivalent ad valorem tariff rates for each of the 41 industries from Leontief's input-output tables, and Figure 5 illustrates the change in final tariff rates for each of the industries. Tariffs were increased most dramatically for sugar and leather products, and fell most dramatically for tobacco products. It is imperative, however, to understand that the economic impact of these tariff changes generally depends on the production structure of the economy overall. For example, a tariff on imports of machines that use metal as an input in production may misrepresent the protection afforded to the machine industry when metal duties are taken into account. It is with this consideration in mind that I have constructed ERPs for a large sample of firms during the Great Depression.

III. Description of Data

In order to construct ERPs at the firm level, data is needed on company product lines, tariff rates, values imported for individual products, and cost-shares from Leontief's input-output tables.

Product Lines

Product line information for a wide variety of firms is available in the Commodity Index in *Moody's Industrial Manual* from 1930. The index provides a comprehensive list of approximately 1,000 different products, and page references for the companies producing each product. I have created a document with each company listed alongside its principal products in order to facilitate computation of the ERPs at the firm level.

Tariffs

Disaggregated tariff schedules for 1930 are documented in the "Foreign Commerce and Navigation of the United States," produced by the Department of the Treasury, Bureau of Statistics (FCNUS). This volume reports product descriptions, tariff rates (specific and ad-valorem), value imported, quantity imported, and unit of quantity for all items imported, both in the six months before and following the implementation of the Smoot-Hawley tariff schedule on June 17th, 1930. All of these data have been transcribed into an Excel document, with equivalent ad-valorem duties calculated for each item. Further, an 8-digit classification system[2] has been created to reconcile products across the

[2] Only items appearing in *both* the pre- and post-Smoot-Hawley tariff schedules are used in constructing the ERPs described below. Though some tariffs may have been lifted as a part of Smoot-Hawley, it is reasonable to expect that more tariffs were in fact added after the act was passed. Thus, the reconciled tariff schedule will tend to underestimate the breadth of the impact of Smoot-Hawley.

pre- and post-Smoot-Hawley tariff schedules.

Because the tariffs are more disaggregated than the firm-level products listed in Moody's Commodity Index, some aggregation is necessary in order to assign tariffs to each product line. For each product from the Commodity Index, I have created a weighted average of the corresponding individual items in the tariff schedule, weighted by the value imported. Thus, after some limited aggregation, each product from the Commodity Index is associated with one tariff. This will be the "final" tariff used in constructing the ERPs.

Leontief Tables

In his 1941 text, "Structure of the American Economy, 1919-1929," Wassily Leontief describes the input-output structure of the United States with a variety of tables of input-output coefficients. The Leontief table from 1929 reports a matrix of Leontief coefficients for each of 41 industries in the economy. The Leontief coefficient in the $(i,j)^{th}$ cell represents the cost share[3] or fraction of intermediate inputs used by output industry j from the output of industry i. For example, if the coefficient in cell (2,3) is 0.20, then 20% of industry 3's cost can be attributed to output from industry 2.

The Leontief table is an essential component in constructing ERPs. It provides an understanding of industrial inter-dependencies within the economy; the coefficient matrix represents the cost structure for each of Leontief's 41 industries. It should be noted that using the Leontief tables necessitates the assumption of fixed-proportions technology.

---

[3] It should be noted that, in its original form, the Leontief table from 1929 has "Imports" as a distinct sector of the economy. In order to overcome this, the total value of the "Imports" has been distributed across each industry's intermediate inputs proportionate to that industry's intermediate inputs. Further, the cost-shares from Leontief's tables are considered to be after-tax costs-shares.

That is to say, intermediate inputs must be used in constant relative proportions. This is limiting because it does not allow for substitution[4] between inputs resulting from some exogenous change—say, an increase in tariffs.

Stock Prices

Stock prices and book values of authorized capital for a large sample of firms between 1885 and 1928 are available in a dataset used by Jovanovic and Rousseau (2001), "Vintage Organization Capital." This dataset has been merged with CRSP data for the same firms from 1925 to 1940. The resulting merged dataset, which I will refer to as JR-CK, contains stock price data on 458 U.S. firms between 1885 and 1940. I will use these firm stock price data in conjunction with the ERPs described below.

IV. Effective Protection

The change in Effective Rate of Protection is defined as the percent change in the value added for an industry or firm resulting from a change in the tariff structure of an economy[5]. In essence, ERPs measure the *actual* protection that an industry (or firm, in this case) faces resulting from a change in the tariff structure, taking into consideration tariffs on the final product it produces *and* tariffs on the intermediate inputs it employs. Because the ERP captures both the benefits and the costs, it is a much more informative statistic than final tariffs for understanding the actual protection afforded to a particular

---

[4] An extension of this analysis could estimate substitution across inputs, thereby compensating for the fixed Leontief technology. This would yield more robust estimates of the impacts of the tariffs.

[5] There are two ways to define a "change in the tariff structure of an economy." The first is using a "free trade benchmark" against which to compare the tariff schedule. The second is comparing two non-zero tariff schedules. This issue will be discussed in more depth later in the paper.

firm.

Derivation

Consider a firm seeking to maximize profits given three input factors: labor, capital and intermediate inputs. Assume the firm is subject to constant returns to scale (CRTS) technology in capital and labor with a Cobb-Douglas production function, but Leontief (fixed-proportions) technology in intermediate inputs. Further, without loss of generality, assume that each firm only uses one intermediate input. The i[th] firm's value added post- and pre-Smoot-Hawley, respectively, are then given by

$$VA_i^{post} = P_i(1+T_i^{post})Y_i - p_i(1+t_i^{post})X_i = rK_i + wN_i$$
$$VA_i^{pre} = P_i(1+T_i^{pre})Y_i - p_i(1+t_i^{pre})X_i = rK_i + wN_i$$

Where T_i, t_i, P_i, p_i, Y_i and X_i are the final tariff, the input tariff, the final price, the input price, the output quantity and the input quantity, respectively. The percent change in the value added is then expressed as

$$\frac{VA_i^{post} - VA_i^{pre}}{VA_i^{pre}} = \frac{[P_i^{post}(1+T_i^{post})Y_i - p_i^{post}(1+t_i^{post})X_i] - [P_i^{pre}(1+T_i^{pre})Y_i - p_i^{pre}(1+t_i^{pre})X_i]}{[P_i^{pre}(1+T_i^{pre})Y_i - p_i^{pre}(1+t_i^{pre})X_i]}$$

Now, let the cost-share of intermediate inputs used by firm i be given by

$$\Theta_i = \frac{p_i(1+t_i^{pre})X_i}{P_i(1+T_i^{pre})Y_i}$$

where $X_i = a_i Y_i$. Assuming that the United States is a price-taker in world markets, then with some algebraic manipulation, it can be shown that the percent change in the value added can be re-expressed as

$$\frac{VA_i^{post} - VA_i^{pre}}{VA_i^{pre}} = \frac{[\frac{T_i^{post} - T_i^{pre}}{1 + T_i^{pre}}] - \Theta_i [\frac{t_i^{post} - t_i^{pre}}{1 + t_i^{pre}}]}{1 - \Theta_i}$$

Of course, the ERP is defined as the percent change in the value added resulting from a change in the tariff structure. This may be quickly generalized to the (more realistic) case in which firms have multiple intermediate inputs. In that case, the ERP is expressed as

$$ERP_i = \frac{[\frac{T_i^{post} - T_i^{pre}}{1 + T_i^{pre}}] - \sum_{j=1}^{41} \Theta_{ij} [\frac{t_j^{post} - t_j^{pre}}{1 + t_j^{pre}}]}{1 - \sum_{j=1}^{41} \Theta_{ij}} \qquad (1)$$

The above equation, which will serve as the workhorse for the remainder of the paper, warrants several comments. First, note that each of the variables in the equation is accounted for. All of the tariffs come from the FCNUS, and Θ_{ij} is the Leontief coefficient from Leontief's tables.

Further, note that the denominator serves to scale the ERP according to the composition of factors for the i[th] firm. If a certain firm uses a large percentage of intermediate inputs *vis-à-vis* labor and capital, $\sum \Theta_{ij}$ will approach 1, thereby inflating the value of the ERP. Conversely, as $\sum \Theta_{ij}$ approaches 0, the ERP equation reduces to

$$ERP_i = [\frac{T_i^{post} - T_i^{pre}}{1 + T_i^{pre}}]$$

Thus, if there are no intermediate inputs, the ERP is equivalent to the percent change in the tariff on the final product produced by firm i.

Finally, it should be noted that this is the first of two distinct measures of the ERP. To derive the second, consider the case of comparing both pre- and post-Smoot-Hawley tariff schedules with a free trade benchmark (zero tariff schedule). In this case, two ERPs can be computed: one comparing pre-Smoot-Hawley tariffs with free trade, and one comparing post-Smoot-Hawley tariffs with free trade, as illustrated below:

$$ERP_i^{pre} = \frac{T_i^{pre} - \sum_{j=1}^{41} \Theta_{ij} t_i^{pre}}{1 - \sum_{j=1}^{41} \Theta_{ij}} \quad \text{and} \quad ERP_i^{post} = \frac{T_i^{post} - \sum_{j=1}^{41} \Theta_{ij} t_i^{post}}{1 - \sum_{j=1}^{41} \Theta_{ij}}$$

Taking the difference of the pre- and post-Smoot-Hawley ERPs yields

$$ERP_i = \frac{(T_i^{post} - T_i^{pre}) - \sum_{j=1}^{41} \Theta_{ij} (t_i^{post} - t_i^{pre})}{1 - \sum_{j=1}^{41} \Theta_{ij}} \qquad (2)$$

I will refer to equation (1) as Method 1 and equation (2) as Method 2. Both equations represent a *change* in protection resulting from the Smoot-Hawley tariffs. The difference, subtle though it may be, is that the change in the tariffs in equation (1) is scaled by the pre-Smoot-Hawley tariffs, while the change in the tariffs in equation (2) is not.

Table 2 summarizes the Effective Rates of Protection as calculated above using the data discussed earlier for the majority of the firms in the original 400-firm sample, and the corresponding final tariffs. The only firms excluded are those for which there was insufficient data on product lines or stock prices. The difference between Method 1 and Method 2 of calculating changes in effective protection is one of magnitude, not direction. The sign on the ERP is different in only three cases. In each of these cases, the ERP is approximately equal to zero for both methods. Further, the two methods have a correlation of 0.97. In keeping with previous studies of effective rates of protection, I will use Method 2 for the remainder of this paper. Further, I have calculated ERPs both as weighted averages of each firm's product line (weighted by total value of each product imported into the United States) and as simple averages (SA) of each firm's product line. The correlation between the weighted average ERPs and the simple average ERPs is 0.88, so the values are reasonably similar. For the remainder of this paper I will use the ERPs computed as a simple average, primarily because it seems unlikely that the proportion of a product that the *nation* is importing is necessarily an accurate proxy for the proportion of that product that a given firm produces.

While the remainder of this paper will contain a more statistically rigorous analysis of the nature of these ERPs, it is worth briefly commenting on effective protection in some specific cases. The canonical example of effective protection during the Great Depression is that of Henry Ford going to Herbert Hoover to beg him to veto the tariff bill in order to protect his company. Ford understood that while automobiles would be protected by tariffs, so would a variety of *inputs* for automobiles, including rubber and metal. His calculus indicated that Ford (as well as other auto manufactures) would suffer from the Smoot-Hawley tariffs. This story is corroborated by the data. As a result of Smoot-Hawley, General Motors saw a 6.5% decline in effective protection, Hupp Motor Carr saw an 8.5% decline, and Packard Motor Car saw a 7.1% decline.

Figure 6 illustrates the change in ERPs and final tariffs across Smoot-Hawley for each product. On average, as expected, there was greater protection, both in the form of final tariffs and ERPs, following the Smoot-Hawley tariffs. More interestingly, as illustrated by Figure 7, there is considerably more variance in the change in effective protection than in the change in final tariffs. In Figure 6, the line representing changes in effective protection across Smoot-Hawley is considerably more volatile than the line representing the change in final tariffs across Smoot-Hawley. In a sense, this apparent difference in volatility represents the difference between the *intended* effects of the tariff policy (Δ final tariff) and the *actual* effects of policy (Δ ERP). Quantitatively, the variance of the change in effective protection (0.0371) is nearly five times greater than the variance in the change in final tariffs (0.0079) indicating that the effects of policy were more volatile than expected.

The greater variance in the change in ERPs serves to motivate the microeconomic aspect of this paper. If the degree of protection afforded to firms was reflected entirely in final tariffs, then policymakers would have a considerable amount of foresight into the distributive consequences of their decisions. For example, high tariffs levied on the steel industry would likely reallocate income from other sectors of the economy to the steel industry, all else equal. Clearly, however, final tariffs do *not* accurately reflect the actual protection afforded to a given industry. Rather, it is necessary to consider the effects of a tariff schedule through ERPs. Thus, what was originally perhaps an obvious relationship between policy objectives and outcomes becomes muddled, and it is not entirely clear how the effects of a given tariff schedule will be propagated through the economy. With the ERPs in hand, the next step is to try to understand how changes in effective protection affected firm performance.

V. Stock Prices and Effective Protection

The Smoot-Hawley Act was passed on June 17th, 1930, in the early months of the Great Depression. For this reason, one of the basic challenges in understanding the relationship between changes in effective protection and changes in stock prices is identifying what portion of the stock price changes resulted from Smoot-Hawley, and what portion resulted from the overall decline in the economy. A natural first step in distilling the effects of the Smoot-Hawley tariffs is to correlate the changes in effective protection with changes in stock prices immediately before and immediately after Smoot-Hawley. If information is disseminated quickly and firms react immediately to changes in legislation, then this correlation should be high relative to other combinations of years around Smoot-Hawley. Further, the correlation between stock price changes and changes in effective protection should be greater than the correlation between stock price changes and changes in final tariffs.

Correlations

Table 3 contains several variations on the preliminary correlations discussed above. The correlation between the changes in the final tariffs and stock price changes between 1929 and 1930 yields the highest correlation coefficient ($\rho = 0.16$), followed by the correlation between changes in ERPs and stock price changes in the same year ($\rho = 0.14$). As expected, the correlations for between 1929 and 1930 are significantly stronger than for either of the neighboring periods. Despite the partial consistency with the *a priori* predictions, the correlations are all relatively low. This is not surprising considering that these correlations are, by definition, bivariate linear associations that do not control for omitted variables that might also correlate with stock price changes, or potentially nonlinear relationships.

In order to try to isolate the effect of the changes in effective protection, Figures 8 and 9 contain plots of correlations, conditioned on various trims of ERPs about zero. The axis in Figure 8 is scaled by the trim about zero, and the axis in Figure 9 is scaled by the number of firms included in the sample at the corresponding conditioning threshold. As the number of firms in the sample approaches zero, the magnitude of the upper and lower bounds on the standard error blows up, illustrating the difficulty of working with the highly correlated samples. In general, the "highest" line represents the years between which the stock price movements correlate most effectively with ERP changes for different trims. These plots are particularly compelling and illuminate a key property of the data. In every period excluding 1928-1929, changes in effective protection correlate better with changes in stock prices as the trim about zero increases. Put differently, extreme changes in effective protection exhibit a significantly stronger relationship with stock price changes than moderate changes in effective protection. This is not surprising, as it is natural to expect large changes in protection to noticeably affect firm profits and thus stock prices. That being said, Figure 9 brings to light a potential difficulty in using regression analysis to gain a deeper understanding of the data. In particular, the correlations are only particularly strong with high trims which correspond to a small number of firms in the sample. This tradeoff will be discussed in more depth in the following section.

Interestingly, in the period from 1928-1929, the magnitude of the correlations between changes in effective protection and stock prices are consistently small. Since the correlation line for this year only fluctuates within a 0.20 window about zero (both above and below), it is difficult to assert that there is a strong negative or positive relationship between changes in effective protection and changes in stock prices. This fact seems only to provide weak evidence against the hypothesis that the stock market crash in 1929 was in fact caused by investors anticipating the passage of Smoot-Hawley. A possible, though unlikely[6], explanation for this anomalous line is that U.S. trade partners anticipated Smoot-Hawley and began retaliating preemptively in certain industries. As expected, the stock price change between 1929 and 1930 correlates most closely with ERP changes, so I proceed to a more advanced model using the 1929-1930 stock price data as the baseline.

---

[6] This is a difficult story to maintain; U.S. imports were at a high of $1,334 million in 1929, and only began to decline significantly in subsequent years. (U.S. Department of State, *Protectionism in the Interwar Period*)

Regression Analysis

The Smoot-Hawley legislation caused a drastic change in the structure of protection afforded to American firms between 1929 and 1930. As stock returns are a positive function of profits, and profits are a positive function of effective protection, it is natural to expect that *some degree* of stock price movements can be explained by changes in effective protection. But to what extent is this the case? It is clear from the analysis above that there are other factors that also cause changes in a firm's stock price. Because Smoot-Hawley occurred between 1929 and 1930, one approach to distilling the effects of the tariffs would be to isolate the idiosyncratic stock price variation unique to the period between 1929 and 1930, and ask whether or not the change in effective protection is able to explain that portion of the stock price variation.

To formalize this notion I use a simple linear regression model to estimate each firm's beta value between 1925 and 1940. I use the S&P 500 Index to proxy for the market return. The standard regression equation for computing betas is as follows:

$$\Delta \mathrm{R}_{\mathrm{i,t}} = \alpha_i + \beta_i \Delta R_{m,t} + \varepsilon_{\mathrm{i,t}} \qquad (3)$$

As required for linear regression, the estimated residuals $\hat{\varepsilon}_{\mathrm{i,t}}$ are uncorrelated with the explanatory variable, in this case $\Delta R_{m,t}$. The estimated betas as well as the corresponding estimated residuals from 1929-1930, $\hat{\varepsilon}_{\mathrm{i,29\text{-}30}}$ for each firm are provided in Table 4[7].

For each firm, the estimated beta identifies the sensitivity of the firm's stock price

[7] It should be noted that this equation was estimated with both absolute changes and log changes. For the remainder of this paper I use the beta residuals derived from the equation estimated with absolute changes, primarily because this method provided stronger regression results and correlations, ex post.

to the market, and the estimated residuals represent movements in a firm's stock in a given year that is unrelated to that firm's typical performance *vis-à-vis* the market. The estimated residuals yield another regression equation which can be used to try to distill the effects of effective protection on stock price movements.

Residual-ERP Regression

Naturally, a large fraction of a firm's stock price movement is due to its typical volatility relative to the market, i.e. its beta. Theoretically, since Smoot-Hawley occurred once between 1929 and 1930, the change in effective protection should be able to explain more of the estimated residuals than the overall change in the firm's stock price. To test this hypothesis, I estimate the following equation:

$$\hat{\varepsilon}_{\mathrm{i,29\text{-}30}} = \alpha + \beta(\Delta ERP)_i + \varepsilon_i'$$

Table 5 contains the output from the untrimmed regression. Clearly, the regression yields no statistically significant parameters. Moreover, the low R^2 indicates that changes in effective protection are only able to explain a small fraction (approximately 1%) of the idiosyncratic variation in a firm's stock price specific to the period between 1929 and 1930. Trimming the ERP changes about zero as before in order to isolate the more pronounced cases results in no significant improvement in the regression. It is not immediately clear why this is the case. To gain another perspective on the relationship between stock prices and effective protection, I take a step back and try controlling for the movements in the market as a whole.

Stock-ERP-Market Regression

Given the results from the previous regression, I now estimate a simpler model in which I regress firm stock price changes on market changes and changes in effective protection. By virtue of the fact that I have only computed ERPs immediately before and after Smoot-Hawley, the panel regression above will necessarily be unbalanced, but nevertheless possible to estimate as follows:

$$\Delta \mathrm{R}_{\mathrm{i,t}} = \alpha + \beta_1 \Delta ERP_{i,29-30} + \beta_2 \Delta R_{m,t} + \varepsilon_{\mathrm{i,t}}$$

The regression output will be found in Table 6. The model as a whole is significant, as are each of the estimated coefficients at the 0.05 level. The coefficient on the change in effective protection is 15.8, indicating that a 1% *absolute change* in effective protection (i.e. a firm going from an ERP of 3% to an ERP of 4%), controlling for changes in the stock market, will on average result in a 15.8% increase in a firm's stock price. Further, the model is able to explain approximately 19% of the variation in firm stock price movements, however much of this is due to changes in the stock market, as opposed to changes in effective protection. Herein lies the limitation of this regression model. Excluding d_ERP from the model only decreases the fraction of the variance explained by the independent variables minimally, while the F-statistic increases drastically due to the exclusion of a variable on the right-hand side. Nevertheless, the model offers a marked improvement from the original correlations.

In order to potentially improve on this analysis, I return to the betas estimated by the original regression equation in Table 4. If a histogram of the beta frequencies grouped into bins of length 0.05 yields any major deviations from normality (in particular, bimodality), there is cause to partition the firms into two sets: those with "high beta stocks" and those with "low beta stocks," with the division depending on the distribution of the histogram. Figure 10 contains the histogram of the betas. While the data are not exactly normally distributed, they appear to be unimodal and slightly skewed to the right. It is therefore difficult to find a natural partition of the stocks according to their beta values. Further, there are some limitations inherent to using annual stock price data to measure the effects of a one-time legislative change (such as Smoot-Hawley) in the middle of the year. Such incongruities between annual data and legislative changes make it difficult to isolate the impact of the legislative change in terms of stock prices, as desired.

VI. Discussion and Future Research

The research described in this paper—in particular, construction of ERPs for a large sample of firms during the 1930s—is unabashedly empirical. This empiricism has been the source of a variety of problems inherent to such work, but more importantly it is the source of a great deal of value added to the study of trade policy and the Great Depression, the scope of which extends well beyond the limits of this paper. Below are several compelling possible directions for future research.

Trade Dependence

One of the most important improvements that could be made to this research is the incorporation of a measure of trade dependence. Every firm differs in the extent to which it depends on international trade for business. Automobile manufacturers are likely extremely dependent on trade, whereas service industries such as barbers depend on trade very little. One way to estimate trade dependence would be to compute trade volume elasticities to tariff or ERP changes. Naturally, this would require considerable expansion of the dataset used for computing the ERPs in this paper, as data on trade volume are only available for two periods. Fortunately, expansion of the underlying dataset would have other tangential benefits for this line of research.

Expanded Intertemporal Data

The basic data structure used in the analysis of the ERPs was relatively limited. ERPs were only available for the periods immediately before and after Smoot-Hawley, thereby restricting the regression analysis to unbalanced panels. A next step would be to compute effective rates of protection for more periods surrounding Smoot-Hawley. This would immediately allow for more robust regression results and a more thorough understanding of how changes in effective protection affect stock prices through profits. As mentioned above, expanding the data into the 1920s and 1930s would provide more data points from which to calculate trade volume elasticities.

Fixed vs. Ad valorem Tariffs

As mentioned briefly at the beginning of this paper, specific and ad valorem tariffs may have drastically different implications when price levels are not constant. One way to parse out the effects of the different types of tariffs would be to attempt to aggregate line-item tariffs up to the product or firm level without losing data on relative proportions of ad valorem and specific duties. In a similar vein, it would be interesting to attempt to identify the extent to which the decline in the price level during the early 1930s magnified and distorted protection through the channel of specific and mixed duties. To be sure, this effect was nontrivial, and should therefore be of substantial interest to anyone attempting to understand precisely how the Smoot-Hawley tariffs distorted the distribution of income.

Retaliation

One of the key concerns of the economists signing the petition against the passage of Smoot-Hawley was international retaliation. The analysis conducted in this paper is primarily interested in tariffs on U.S. imports. In this case, at least for large countries with market power such as the United States, the effect of a large tariff act such as Smoot-Hawley can often be construed as having a positive net effect. Though tariffs are inherently distortionary as this paper has demonstrated, they also generally result in an improvement in the terms of trade which can offset the negative distortionary effects (at least for large countries). When retaliation is taken into consideration, however, the distortions remain (or might even be amplified) while there is a reversal in the initial improvement in the terms of trade. Thus, what was originally an ambiguous and potentially beneficial tariff schedule becomes unambiguously harmful in light of consideration of retaliation. Incorporating data on U.S. exports, also available in the "Foreign Commerce and Navigation of the United States," would be one way to account for such effects.

Research on the distributive effects of tariff policy during the interwar period will be of interest not only to economists, but also to political scientists and historians alike.

Future research should maintain the drive to uncover the true relationship between effective protection and stock prices, with the goal of providing policymakers with a better understanding of how tariff policy *actually* impacts the economy. This paper provides a foundation for achieving that goal.

Appendix

Table 1

	Ad valorem	Mixed	Specific
Mean (Pre-SH)	37.96%	52.80%	31.54%
Mean (Post-SH)	41.86%	61.64%	36.93%
% change	9.79%	15.48%	15.77%
Median (Pre-SH)	35.00%	46.96%	27.09%
Median (Post-SH)	40.00%	56.00%	27.57%
% change	13.35%	17.61%	1.73%
Variance (Pre-SH)	3.15%	12.94%	5.96%
Variance (Post-SH)	4.28%	22.08%	11.69%
% change	30.55%	53.43%	67.45%

Table 2

	Simple Average					
Company	**Final (Pre)**	**ERP (Pre)**	**Final (Post)**	**ERP (Post)**	**Δ ERP**	**Δ Final**
Advanced Rumely	30.84%	37.08%	28.82%	33.28%	-3.80%	-2.02%
Albany Perf Wrapping Paper	24.28%	41.32%	28.77%	49.28%	7.96%	4.48%
Allied Chemical & dye	16.80%	9.42%	18.20%	13.82%	4.40%	1.39%
Allis-Chalmers mfg	23.33%	23.76%	23.78%	24.68%	0.92%	0.45%
Amalgamated Leather	0.79%	-14.14%	15.30%	19.38%	33.52%	14.51%
Amerada Corp	0.00%	-8.11%	0.00%	-7.88%	0.23%	0.00%
American Agricul.Chemical	20.65%	27.26%	27.46%	45.25%	18.00%	6.82%
American Beet Sugar	66.82%	117.27%	119.84%	226.66%	109.39%	53.02%
American Bosch Magneto (no par)	29.14%	31.05%	32.05%	34.88%	3.83%	2.91%
American Brake Shoe & Fdy	17.13%	16.28%	19.18%	21.92%	5.64%	2.05%
American Brown Boverl El	24.13%	23.63%	24.62%	23.79%	0.16%	0.49%
American Car & Foundry	27.78%	35.65%	29.30%	38.63%	2.99%	1.52%
American Encaustic Tilling	18.01%	15.79%	22.21%	22.64%	6.86%	4.19%
American Hide & Leather	0.79%	-14.14%	15.30%	19.38%	33.52%	14.51%
American Home Product	25.00%	25.79%	25.00%	26.64%	0.85%	0.00%

American Machine & Foundry	30.00%	32.04%	27.50%	27.92%	-4.12%	-2.50%
American Metal	17.94%	39.68%	20.97%	49.20%	9.52%	3.03%
American Radiator (25)	38.25%	48.04%	36.21%	45.20%	-2.84%	-2.04%
American Republic	18.61%	20.33%	20.30%	23.28%	2.95%	1.68%
American Safety Razor (25)	88.21%	115.66%	79.32%	101.40%	-14.26%	-8.89%
American Seating	34.39%	44.65%	41.02%	53.57%	8.92%	6.63%
American Snuff	25.22%	23.98%	22.66%	20.26%	-3.72%	-2.56%
American Steel Foundries	23.25%	27.78%	23.47%	29.49%	1.71%	0.22%
American Sugar Ref. Co.	7.99%	-5.69%	7.20%	-8.79%	-3.11%	-0.80%
American Type Founders	15.01%	18.35%	12.52%	14.53%	-3.82%	-2.50%
American Woolen	64.66%	169.93%	67.85%	194.26%	24.34%	3.19%
Anaconda Copper (50)	10.31%	32.89%	13.12%	43.63%	10.74%	2.80%
Anchor Cap	46.51%	56.57%	58.80%	75.01%	18.45%	12.29%
Archer Daniels Mid	12.16%	-0.95%	20.35%	10.88%	11.83%	8.19%
Art Metal Construction (10)	25.31%	29.59%	29.02%	35.64%	6.05%	3.71%
Artloom	48.00%	100.22%	51.00%	114.48%	14.26%	3.00%
Associated Oil	0.00%	-9.19%	0.00%	-9.04%	0.15%	0.00%
Atlas Powder	24.22%	52.14%	26.91%	62.44%	10.30%	2.69%
Atlas Tack Corporation	18.56%	19.06%	22.62%	28.63%	9.57%	4.07%
Austin Nichols & Co	24.89%	26.85%	23.50%	17.75%	-9.10%	-1.40%
Baldwin Locomotive	33.35%	44.23%	31.72%	41.69%	-2.54%	-1.63%
Barnet Leather	0.79%	-14.14%	15.30%	19.38%	33.52%	14.51%
Bayuk Bros(Cigars)	49.78%	59.36%	43.13%	51.24%	-8.12%	-6.66%
Beacon Oil	0.00%	-12.53%	0.00%	-12.53%	0.00%	0.00%
Beech-Nut Packing	22.13%	27.81%	24.58%	30.56%	2.75%	2.46%
Best & Co	61.47%	107.71%	64.83%	118.30%	10.59%	3.36%
Bethlehem Steel Corporation	20.13%	19.78%	21.12%	22.68%	2.90%	1.00%
Briggs Manufacuring	46.39%	84.83%	44.14%	80.31%	-4.52%	-2.25%
Brunswick-Balke-Collender	50.00%	66.49%	50.00%	66.13%	-0.36%	0.00%
Buckrus-Erie Co	22.50%	21.06%	21.25%	19.18%	-1.89%	-1.25%
Burroughs Adding Machine	29.00%	30.61%	28.00%	28.63%	-1.97%	-1.00%
Butte & Superior Mining	0.83%	-2.67%	0.88%	-2.86%	-0.19%	0.05%
Butte Copper & Zinc vtc (5)	2.77%	-0.25%	3.02%	-0.17%	0.07%	0.26%
Butterick Co	9.19%	9.89%	7.38%	7.06%	-2.83%	-1.81%
Calif Packing Corp (The)	21.71%	22.67%	32.21%	41.03%	18.36%	10.50%
Calumet & Arizona (10)	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Calumet & Hecla	0.00%	-6.79%	0.16%	-7.65%	-0.87%	0.15%
Canada Dry Ginger Ale	29.23%	31.50%	29.08%	30.04%	-1.46%	-0.14%
Cannon Mills	41.33%	101.63%	44.94%	126.51%	24.88%	3.60%
Central Aguirre Associates	66.63%	116.87%	99.52%	184.19%	67.31%	32.89%
Cerro de Pasco Copper	4.38%	-1.99%	4.50%	-2.38%	-0.39%	0.13%

Chicago Pneumatic Tool	26.41%	27.62%	25.73%	26.49%	-1.14%	-0.67%
Chickasha Cotton Oil	5.79%	-3.46%	15.74%	22.26%	25.72%	9.95%
Chile Copper	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Chrysler Corp	31.31%	38.85%	29.49%	34.54%	-4.30%	-1.82%
Cluett, Peabody & Co	34.74%	69.95%	40.45%	90.68%	20.73%	5.71%
Coca Cola Co (The)	29.23%	31.50%	29.08%	30.04%	-1.46%	-0.14%
Collins & Aikman	53.33%	119.92%	55.68%	131.48%	11.56%	2.35%
Congoleum Co	44.06%	122.39%	49.28%	151.34%	28.96%	5.22%
Congress Cigar	24.10%	27.31%	30.11%	35.00%	7.69%	6.01%
Consolidated Cigar	24.10%	27.31%	30.11%	35.00%	7.69%	6.01%
Crex Carpet	48.00%	100.22%	51.00%	114.48%	14.26%	3.00%
Crown Zellebach	13.71%	19.88%	15.85%	23.86%	3.98%	2.14%
Crucible Steel of Amer	28.07%	37.63%	22.86%	29.08%	-8.55%	-5.22%
Cuban Dominican Sugar	37.31%	55.59%	53.36%	87.70%	32.10%	16.05%
Cuhady Packing	17.59%	44.65%	24.12%	73.22%	28.57%	6.53%
Davison Chemical v t c	4.92%	1.47%	4.61%	1.41%	-0.06%	-0.30%
Devoe & Raynolds A	37.85%	48.17%	41.50%	54.15%	5.98%	3.64%
Diamand Match	24.84%	26.61%	49.90%	55.34%	28.73%	25.06%
Dome Mines Ltd (The)	30.04%	65.83%	32.64%	71.21%	5.38%	2.59%
Dunhill Int'l	59.93%	72.02%	71.02%	86.05%	14.03%	11.09%
Eastman Kodak	25.95%	26.24%	26.96%	27.15%	0.91%	1.01%
Eitingon Schild	2.33%	-13.92%	33.86%	100.97%	114.88%	31.53%
Electric Boat	28.69%	30.16%	27.92%	28.51%	-1.65%	-0.78%
Electric Stor. Battery	40.00%	46.36%	38.67%	43.91%	-2.45%	-1.33%
Emerson Brantingham	31.37%	37.13%	33.58%	41.39%	4.26%	2.22%
Endicott Johnson	9.07%	11.12%	19.59%	27.17%	16.05%	10.52%
Eureka Vacuum Cleaner	30.00%	32.04%	35.00%	38.66%	6.62%	5.00%
Fairbanks Morse	29.65%	31.60%	29.81%	31.31%	-0.29%	0.16%
Federal Motor Truck	37.53%	54.32%	33.97%	47.58%	-6.74%	-3.56%
Florsheim Shoe class A	0.64%	-0.13%	21.68%	30.35%	30.48%	21.05%
Follansbee Bros	15.91%	20.71%	16.54%	22.22%	1.52%	0.62%
General Am Tank Car	25.69%	28.50%	23.61%	24.17%	-4.33%	-2.09%
General Asphalt	3.69%	-5.26%	4.57%	-3.70%	1.57%	0.88%
General Mills	11.67%	12.77%	19.03%	30.48%	17.71%	7.36%
General Motors Corp	30.76%	38.30%	27.73%	31.82%	-6.48%	-3.03%
General Refractories	11.71%	6.77%	16.99%	15.18%	8.41%	5.28%
General Ry Signal	2.02%	-8.03%	2.88%	-7.34%	0.69%	0.86%
Gillette Safety Razor	221.42%	306.19%	152.81%	207.38%	-98.81%	-68.62%
Glidden & Co	37.85%	48.17%	41.50%	54.15%	5.98%	3.64%
Gobel (Adolf)	11.25%	14.51%	10.01%	15.26%	0.75%	-1.24%
Goodrich (B F)	12.14%	17.55%	16.43%	37.19%	19.64%	4.29%

Gotham Silk Hosiery	57.17%	98.86%	63.03%	114.60%	15.74%	5.86%
Granby Cons Min Sm & P	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Greene Cananea Copp	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Guantanamo Sugar	37.31%	55.59%	53.36%	87.70%	32.10%	16.05%
Gulf States Steel tr ctfs	39.04%	49.68%	31.55%	38.63%	-11.05%	-7.49%
Hartman Corpn (The)	41.34%	55.40%	45.61%	61.47%	6.08%	4.27%
Hawaii Pinapple Co, ltd	15.17%	8.41%	24.56%	24.89%	16.48%	9.38%
Helme (G W)	50.43%	60.17%	45.32%	53.98%	-6.19%	-5.11%
Hershey Chocolate	8.89%	-6.35%	18.34%	9.67%	16.02%	9.45%
Holland Furnace	43.28%	123.45%	37.55%	107.28%	-16.17%	-5.74%
Hollander (A) & Son	2.33%	-13.92%	33.86%	100.97%	114.88%	31.53%
Homestake Mining	30.04%	65.83%	32.64%	71.21%	5.38%	2.59%
Houston oil of Texas	0.00%	-10.27%	0.00%	-10.20%	0.08%	0.00%
Howe Sound	20.19%	47.64%	22.80%	54.70%	7.05%	2.61%
Hudson Motor Car Corp	29.23%	33.69%	28.00%	30.20%	-3.49%	-1.24%
Hupp Motor Car	28.85%	34.51%	24.50%	25.97%	-8.54%	-4.35%
Industrial Rayon Corp	59.12%	171.56%	65.53%	204.40%	32.84%	6.41%
Ingersoll-Rand	28.10%	29.72%	27.05%	27.54%	-2.18%	-1.06%
Inland Steel	19.22%	20.47%	20.19%	23.58%	3.11%	0.97%
Inspiration Cons Copper	0.00%	-9.88%	0.16%	-12.03%	-2.15%	0.15%
International Agric Corp	0.83%	-4.63%	0.42%	-4.85%	-0.21%	-0.41%
International Business Machine	34.96%	38.17%	35.00%	38.31%	0.14%	0.04%
International Cement	0.74%	-8.93%	18.95%	17.98%	26.92%	18.21%
International Combus Eng	36.72%	70.09%	34.50%	63.60%	-6.49%	-2.22%
International Harvester	11.75%	6.92%	12.98%	9.44%	2.51%	1.23%
International Mercan Marine	37.53%	46.77%	33.97%	39.93%	-6.84%	-3.56%
International Printing Ink	17.53%	17.68%	17.14%	17.40%	-0.28%	-0.39%
International Salt	29.12%	31.68%	33.90%	39.38%	7.70%	4.78%
International Silver	56.49%	126.83%	61.00%	136.26%	9.43%	4.52%
Intertype Corp	30.00%	40.11%	25.00%	32.65%	-7.46%	-5.00%
Jewel Tea	8.30%	0.81%	7.83%	-3.05%	-3.86%	-0.47%
Johns-Manville Corp	18.52%	30.60%	23.81%	42.95%	12.35%	5.29%
Jordan Motor Car	29.42%	35.81%	20.80%	17.53%	-18.28%	-8.62%
Kayser & Co (Julius)	54.01%	109.80%	61.97%	134.27%	24.48%	7.96%
Kelly-Springfield Tire(25)	10.00%	10.17%	10.11%	11.97%	1.80%	0.11%
Kelsey Hayes Wheel	31.42%	49.28%	31.91%	51.12%	1.84%	0.49%
Kennecott Copper(no par)	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Kinney (G R)	0.64%	-0.13%	21.68%	30.35%	30.48%	21.05%
Kolster Radio Corp	30.00%	32.04%	35.00%	38.66%	6.62%	5.00%
Kuppenheimer	61.47%	107.71%	64.83%	118.30%	10.59%	3.36%
Lehigh Portland Cement	0.74%	-8.93%	18.95%	17.98%	26.92%	18.21%

Lehn & Fink	19.85%	20.92%	19.42%	20.91%	-0.02%	-0.43%
Liggett & Myers Tob	60.87%	73.20%	54.54%	65.48%	-7.72%	-6.34%
Lima Loco Works	24.37%	28.98%	23.51%	27.37%	-1.60%	-0.86%
Liquid Carbonic	30.00%	32.04%	27.50%	27.92%	-4.12%	-2.50%
Loft Incorporated	39.70%	60.59%	39.34%	58.40%	-2.19%	-0.36%
Lorillard (P)	60.87%	73.20%	54.54%	65.48%	-7.72%	-6.34%
Ludlum Steel	42.56%	54.68%	39.51%	49.39%	-5.29%	-3.06%
Mack Truck Inc	29.21%	37.62%	29.31%	37.61%	-0.01%	0.10%
Magma Copper	16.87%	36.68%	19.24%	43.02%	6.34%	2.38%
Manhattan El Supp	36.28%	44.14%	36.56%	44.67%	0.53%	0.28%
Manhattan Shirt	37.25%	57.86%	44.14%	75.72%	17.86%	6.89%
Marlin-Rockwell	59.15%	98.26%	58.28%	98.19%	-0.07%	-0.87%
Marmon Motor Car	31.20%	39.87%	24.64%	26.29%	-13.58%	-6.56%
Martin-Parry Corp	35.89%	50.57%	24.92%	26.93%	-23.64%	-10.97%
Mathieson Alkali Works	23.82%	30.57%	18.73%	23.58%	-6.99%	-5.09%
McAndrews&ForbesCo	24.51%	35.10%	37.88%	56.99%	21.89%	13.38%
McCall Corp	9.19%	9.89%	7.38%	7.06%	-2.83%	-1.81%
McIntyre Por Mines	30.04%	65.83%	32.64%	71.21%	5.38%	2.59%
McKeesport Tin Plate	8.34%	12.74%	8.92%	12.84%	0.10%	0.58%
Melville Shoe Corp	0.64%	-0.13%	21.68%	30.35%	30.48%	21.05%
Mengel co	27.19%	31.44%	28.54%	33.01%	1.57%	1.35%
Mexican Seab'd Oil	0.00%	-10.27%	0.00%	-10.20%	0.08%	0.00%
Mid-Cont'l Petrole'm	0.00%	-9.00%	0.00%	-8.81%	0.18%	0.00%
Montgomery Ward	25.12%	32.40%	31.53%	45.20%	12.79%	6.41%
Mother Lode Coali	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Motor Product	30.81%	58.69%	33.60%	65.73%	7.04%	2.79%
Motor Wheel tem ctfs	34.14%	47.05%	36.60%	53.34%	6.29%	2.46%
Munsingwear	51.93%	88.07%	61.63%	111.73%	23.65%	9.70%
National Acme	33.67%	42.86%	34.11%	42.86%	0.00%	0.45%
National Biscuit	0.00%	-9.05%	0.00%	-11.98%	-2.93%	0.00%
National Distill Product v t c	44.66%	54.28%	65.04%	83.94%	29.66%	20.38%
National Enameling & Stamp	35.49%	39.86%	38.70%	46.48%	6.62%	3.21%
National Lead Co.	29.97%	64.01%	29.97%	62.73%	-1.28%	0.00%
National Supply	25.29%	26.40%	25.92%	27.14%	0.74%	0.63%
Nevada Consol Copper	16.87%	36.68%	19.24%	43.02%	6.34%	2.38%
New York Air Brake	28.28%	38.03%	27.57%	38.28%	0.25%	-0.71%
Norwalk T & Rub	19.26%	23.56%	18.58%	23.99%	0.44%	-0.68%
Nunnally Co (The)	35.73%	52.29%	36.33%	52.10%	-0.18%	0.60%
Oil Well Supply	25.75%	25.95%	26.72%	26.80%	0.85%	0.98%
Oppenheim, Collins, & Co	39.06%	61.94%	41.73%	74.15%	12.21%	2.67%
Otis Steel	17.18%	11.40%	18.65%	15.72%	4.31%	1.47%

Owens Bottle(25)	19.58%	22.32%	27.78%	34.52%	12.20%	8.19%
Packard Motor Car	24.81%	26.14%	21.45%	18.99%	-7.14%	-3.35%
Park & Tilford	56.14%	74.70%	56.14%	74.46%	-0.24%	0.00%
Park Utah Cons Mines	17.33%	33.06%	18.83%	36.02%	2.96%	1.50%
Pathe Exchange, new	31.90%	34.76%	33.33%	36.27%	1.51%	1.43%
Patino Mines & Enterp cts	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Penick & Ford	14.50%	9.35%	24.59%	29.05%	19.70%	10.08%
Penn-Dixie Cement	7.90%	1.32%	13.09%	9.59%	8.27%	5.18%
Pet Milk	19.79%	49.44%	34.96%	122.50%	73.06%	15.18%
Phila. & Read C& I	0.85%	-19.59%	0.99%	-19.32%	0.27%	0.13%
Phillips Jones Corp	42.94%	87.02%	50.06%	109.77%	22.75%	7.12%
Phillips Petroleum	0.00%	-5.85%	0.00%	-5.54%	0.31%	0.00%
Phoenix Hosiery	51.93%	88.07%	61.63%	111.73%	23.65%	9.70%
Pierce Petroleum	0.00%	-12.53%	0.00%	-12.53%	0.00%	0.00%
Pillsbury Flour Mills	0.23%	-11.20%	0.33%	-10.12%	1.07%	0.10%
Pittsburgh Terminal Coal	13.03%	-0.82%	15.68%	4.64%	5.45%	2.64%
Producers & Ref Corp	0.00%	-11.40%	0.00%	-11.37%	0.04%	0.00%
Punta Alegre Sugar(50)	66.63%	116.87%	99.52%	184.19%	67.31%	32.89%
Pure Oil (The)	0.00%	-11.40%	0.00%	-11.37%	0.04%	0.00%
Radio Corp of Amer	34.02%	37.80%	39.96%	45.76%	7.96%	5.94%
Rand Mines Ltd	0.00%	-3.71%	0.00%	-3.95%	-0.25%	0.00%
Real Silk Hosiery	58.59%	136.68%	65.43%	163.26%	26.58%	6.83%
Reis (Robt) & Co	53.93%	114.59%	61.37%	137.53%	22.93%	7.45%
Remington Typewriter	15.00%	10.56%	18.69%	15.30%	4.74%	3.69%
Reo Motor Car	22.32%	26.79%	18.26%	17.96%	-8.83%	-4.06%
Republic Iron & Steel	12.40%	6.72%	13.99%	10.65%	3.94%	1.59%
Reynolds Spring Co	32.37%	38.09%	35.40%	42.19%	4.10%	3.03%
Richfield Oil of Calif	0.00%	-8.08%	0.00%	-7.87%	0.21%	0.00%
Seneca Copper Corp	14.83%	30.69%	17.15%	36.52%	5.83%	2.32%
Shattuck(G F)	39.70%	60.59%	39.34%	58.40%	-2.19%	-0.36%
Shell Union Oil	0.00%	-11.40%	0.00%	-11.37%	0.04%	0.00%
Simmons co	28.59%	43.82%	32.18%	50.92%	7.10%	3.60%
Simms Petroleum	0.00%	-8.08%	0.00%	-7.87%	0.21%	0.00%
Sinclair Consol Oil Corp	7.51%	3.77%	6.79%	2.62%	-1.15%	-0.71%
Skelly Oil Co	4.44%	3.36%	6.75%	12.85%	9.49%	2.31%
Sloss-Sheffleld Steel & I.	7.65%	-3.92%	9.42%	-1.01%	2.91%	1.77%
Spang Chalfante & Co	22.83%	27.40%	21.78%	26.99%	-0.41%	-1.05%
Spear & Co	47.71%	134.29%	51.81%	159.59%	25.30%	4.10%
Spicer Mfg co	26.81%	30.84%	25.63%	29.58%	-1.25%	-1.18%
Stand Commercial Tobacco	75.46%	91.40%	56.14%	67.48%	-23.92%	-19.32%
Standard Oil of Calf	4.44%	2.60%	6.75%	12.07%	9.47%	2.31%

Standard Oil of N J (25)	0.00%	-10.27%	0.00%	-10.20%	0.08%	0.00%
Standard Oil of N Y(25)	0.00%	-10.27%	0.00%	-10.20%	0.08%	0.00%
Studebaker Corp (The)	29.42%	35.81%	20.80%	17.53%	-18.28%	-8.62%
Sun Oil	0.00%	-10.27%	0.00%	-10.20%	0.08%	0.00%
Superior oil	0.00%	-8.08%	0.00%	-7.87%	0.21%	0.00%
Superior Steel	25.00%	31.63%	38.48%	59.56%	27.93%	13.48%
Sweets co of America	39.70%	60.59%	39.34%	58.40%	-2.19%	-0.36%
Tennessee Cop & chem	4.93%	8.15%	6.29%	13.41%	5.26%	1.36%
Texas Pacific Coal & Oil	0.43%	-15.16%	0.49%	-14.87%	0.28%	0.07%
Thatcher Mfg	19.60%	18.06%	59.74%	76.36%	58.29%	40.14%
Tidewater Associated Oil	1.78%	-3.64%	1.70%	-3.79%	-0.15%	-0.08%
Timken Roller Bear	59.15%	98.26%	58.28%	98.19%	-0.07%	-0.87%
Tobacco Prod Corp	60.87%	73.20%	54.54%	65.48%	-7.72%	-6.34%
Transcontinental Oil	0.00%	-10.27%	0.00%	-10.20%	0.08%	0.00%
Transue & Williams Steel	49.99%	101.15%	53.25%	108.58%	7.43%	3.26%
Truscon Steel	24.71%	37.36%	27.87%	43.13%	5.77%	3.16%
Underwood Typewriter	22.00%	20.58%	23.48%	22.15%	1.57%	1.48%
Union Bag & Paper	16.37%	24.62%	15.59%	23.40%	-1.22%	-0.79%
Union Carbide & Carbon	19.12%	15.80%	20.56%	17.81%	2.02%	1.44%
Union Oil, California	3.80%	1.09%	5.79%	9.22%	8.14%	1.98%
United Cigar Stores	60.87%	73.20%	54.54%	65.48%	-7.72%	-6.34%
United Electric Coal	1.71%	-22.78%	1.97%	-22.26%	0.51%	0.26%
United Fruit	33.32%	44.69%	49.76%	75.33%	30.63%	16.45%
United Paperboard Co	0.00%	-7.28%	0.00%	-6.90%	0.38%	0.00%
United States Hoffman Mach	24.88%	24.70%	30.51%	32.22%	7.52%	5.63%
United States Indust Alcohol	44.66%	54.28%	65.04%	83.94%	29.66%	20.38%
United States Rubber	5.30%	-4.68%	15.76%	36.15%	40.83%	10.46%
United States Smelt Ref & Mg(50)	19.67%	52.75%	23.65%	66.70%	13.95%	3.98%
United States Steel	28.07%	37.63%	22.86%	29.08%	-8.55%	-5.22%
United States Tobacco	75.46%	91.40%	56.14%	67.48%	-23.92%	-19.32%
Universal Leaf Tobacco	75.46%	91.40%	56.14%	67.48%	-23.92%	-19.32%
Universal Pipe & Radiator	28.49%	30.78%	28.41%	31.52%	0.74%	-0.08%
Vanadium Corporation	49.74%	58.47%	63.50%	75.42%	16.95%	13.76%
Virginia Iron Coal & Coke	4.30%	-17.85%	7.33%	-11.49%	6.36%	3.03%
Waldorf System	48.95%	62.93%	48.94%	62.46%	-0.47%	-0.01%
Walworth Co	33.17%	39.33%	33.76%	40.57%	1.24%	0.58%
Warren Brothers	17.08%	13.54%	21.89%	19.89%	6.35%	4.81%
Wesson Oil & Snowdrift	0.10%	-21.20%	23.15%	65.98%	87.18%	23.05%
Weston Elec Instr	29.70%	31.61%	32.07%	34.45%	2.84%	2.36%
White Sewing Machine	31.69%	38.59%	36.86%	45.41%	6.82%	5.16%
Wilcox Oil & Gas	0.00%	-5.85%	0.00%	-5.54%	0.31%	0.00%

Woolworth (F W)	35.04%	38.26%	34.26%	37.47%	-0.79%	-0.78%
Worthington Pump & March	35.54%	40.22%	36.23%	40.26%	0.05%	0.69%
Yale & Towne	41.81%	52.78%	39.75%	48.93%	-3.85%	-2.05%
Young Spring & Wire	27.58%	36.66%	31.01%	45.00%	8.33%	3.43%
Youngstown Sheet & Tube	18.52%	19.00%	20.42%	24.34%	5.34%	1.90%

Table 3

Correlation	**Δ ERP**	**Δ Final**
Δ R (28-29)	0.06	0.06
Δ R (29-30)	0.14	0.16
Δ R (30-31)	0.05	-0.02

Table 4

Estimated Beta	**Estimated Beta Residual (29-30)**
1.632846383	2.862934
0.323444514	1.412941
11.01677246	-20.59208
6.406739606	26.53482
0.134234366	0.4234305
2.771871162	14.10174
1.204832043	2.371473
0.92843579	3.056455
2.137709541	-11.57482
1.00416549	-0.605942
0.137428497	0.9868757
3.444122816	-23.75107
2.188051245	2.739551
0.269271988	-1.269992
1.811236383	1.437208
6.0258302	-138.6001
2.875222881	-9.22757
4.397550208	19.89826
1.455026326	-0.0023813
1.37625722	11.87631
1.171178534	-0.735612

4.308709985	26.39826
3.081800881	2.009805
1.873012257	-2.149284
3.609332019	3.457322
0.544237041	4.864817
4.954284183	-12.15081
1.132094711	0.8958367
3.141179834	11.79994
0.895154138	4.334246
0.347119774	-8.337102
0.552286834	2.800852
4.910614432	-9.405425
0.721770134	2.039551
0.177454506	-0.4784848
4.644739089	28.91015
-0.493545935	1.241135
3.051534844	-12.14617
0.224023494	-1.195782
2.994362389	3.993919
3.572517362	25.48711
4.109401335	-21.10163
2.843671484	19.93529
1.796272253	2.682924
1.618307149	1.993261
6.424757317	26.62056
0.181900755	-1.427246
0.36581757	0.728409
0.457987961	6.447004
2.410777913	-6.092312
4.368597815	-7.749676
1.913127432	-8.909503
3.137236854	-9.932016
2.410002074	3.013557
1.292884007	2.844894
4.509460415	-8.796803
3.953030211	18.42086
1.038329053	-5.881641
3.127424742	-18.05139
7.044377971	23.24086
3.462553112	10.75868
1.616104965	27.72532

1.708421176	13.00732
1.08386613	0.1120582
2.042728154	-9.296566
1.693815978	-3.349747
0.183375614	8.248287
1.203303853	-5.445462
2.697436645	-10.1327
-0.258500395	-0.17726
1.611460742	5.904729
2.019578797	2.487312
2.23991494	-4.466146
4.800566363	93.23904
0.006611935	2.290636
2.721085083	-11.58175
5.191258948	3.554422
0.843919971	2.781891
0.405793706	1.076787
2.177831517	-5.165494
0.349748833	-0.585831
1.890275829	-3.203402
0.556842789	-19.48621
3.0184457	8.275018
0.465892792	1.540828
1.985513991	5.78047
1.445057943	-11.17567
4.489686574	-11.93188
1.890343838	-8.24341
2.116734518	8.224423
5.231947661	35.40737
3.852988993	-1.36155
3.550932388	12.46283
2.614647644	-58.29829
2.059901804	-11.19483
0.760113907	-2.33586
3.543298815	-1.147018
1.438351977	-5.782879
2.906874779	-16.62713
6.565374656	-21.58589
0.044012816	-0.3915179
3.642213469	-6.182403
1.184351161	0.0054346

3.340494918	6.334719
2.060581133	9.282424
0.935811053	25.23778
3.198855731	22.26902
0.469593058	1.340439
10.35274228	69.17955
1.975440572	-32.23784
2.718697605	4.001627
2.622429346	-14.60563
2.360409328	3.118695
4.598136414	-25.72793
6.655614342	63.64768
4.684996326	18.13541
2.018837533	-4.753424
0.332585608	1.552408
6.162504559	21.15289
4.016489672	20.33403
1.560897244	13.19112
1.633090458	-13.49293
0.470139544	-7.292381
2.531233331	-19.52
0.8733051	-23.55476
2.087652204	-44.81379
1.126961587	1.296212
4.915720357	27.67253
9.483682951	-8.218936
0.075216476	2.973488
2.420271896	-3.704535
0.566908248	2.753645
1.102863163	11.21042
5.607023451	2.1163
1.239027458	3.933695
-11.30582212	9.79555
1.810755295	10.54871
2.53798166	-4.412544
1.534894537	3.511557
1.565694063	-1.708686
1.896686761	3.000122
3.671429799	11.06294
0.250342208	-0.2645143
0.258962659	-1.651337

2.844279026	-0.9681535
3.090174991	-10.0209
3.303961889	-3.628228
0.291970193	-18.21641
1.144908267	-4.678186
3.024596689	3.572906
0.89897937	0.8883414
0.42180819	2.891555
5.091931819	28.25333
0.843276394	-5.097136
1.99157789	9.501665
0.26985006	7.496784
3.215703823	32.98722
3.551534849	21.89569
1.02007106	-1.587435
3.051011179	11.49705
1.347297701	-3.305301
4.896357589	1.014384
0.100110738	-0.1790147
3.168790056	4.686883
1.754992621	-0.1682302
1.96234214	-6.252866
1.584669937	-5.062904
5.458352398	-61.86702
0.814694643	-5.437706
1.956926399	5.612192
-0.19164334	-10.82896
6.23395426	1.338406
1.712234619	-5.52989
3.058501179	-3.179872
0.156513186	0.9566083
-0.05678254	1.492554
0.404484165	9.612858
1.718008859	-7.144165
1.822940641	-11.20796
4.963222008	14.26371
4.480012747	22.82368
3.24606401	1.5394
0.35564048	0.6783956
0.075114602	1.349026
1.338315344	-7.954909

1.511470152	17.49048
0.194436977	1.180767
0.958120666	6.81551
0.051053204	-0.6464352
0.954854058	-2.109067
1.731690652	-9.087692
0.544778086	2.098852
0.247313958	1.248578
1.581268311	2.742781
0.324164648	-3.472547
0.493353886	-1.008067
-0.665321095	-1.37491
1.023737573	-7.796306
12.05764817	47.92962
1.035782478	15.70775
2.05743083	-1.953017
0.432638161	0.5914674
-0.168839344	-4.703062
0.609254515	1.789663
3.067942266	-42.36942
0.980324742	3.113561
1.852822228	-4.716574
0.226225258	0.4195003
3.30024107	8.725912
1.09329966	-7.828458
4.569941105	-48.13084
0.368774428	-15.63406
1.548684388	-3.504668
1.889707581	-8.483448
3.048735918	-9.037618
1.173346409	21.07647
0.743016736	1.834058
2.060601536	1.430389
0.829981338	6.956635
2.096689098	0.6861241
2.363363918	0.6630029
1.208696435	-1.514293
2.134130538	-0.8187479
2.584660463	-3.040281
0.429981297	-2.530718
2.049043118	0.9457493

0.37748329	6.633523
0.792508768	0.3414111
0.711639139	-0.4736571
1.412002955	4.96844
0.84863226	0.3938757
4.8349006	-1.717147
0.564748948	20.91611
0.576479102	12.22908
1.791879661	2.148147
2.13658741	2.049518
5.053279582	-14.48155
2.29569171	15.66619
6.284709738	20.88293
1.236075135	-12.6449
-1.502407958	3.996338
0.849596195	4.098274
3.760507295	-24.76447
0.604898331	0.3793479
0.887380586	-4.723204
4.260473843	-41.8028
1.868230505	2.951233
2.513179025	-1.777378
4.936742531	5.259717
1.074858785	7.33963
2.580054359	11.29069
0.105875791	3.237188
3.555210877	25.51309
-0.131369698	9.903393
0.644732404	3.05284
0.961895202	-8.801769
5.051560479	-67.85869
2.171168177	15.88811
1.224033857	-3.110551
0.843425684	3.351839
0.513636996	-2.827244
3.903962854	20.25526
2.624047947	7.510641
2.479308539	-30.24083
2.8158085	3.835802
5.049860267	-4.1395

Table 5

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.078272081
R Square	0.006126519
Adjusted R Square	0.002361846
Standard Error	18.51506859
Observations	266

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	557.8754341	557.8754341	1.627371056	0.203188361
Residual	264	90501.2499	342.8077648		
Total	265	91059.12533			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.064862166	1.203737579	-0.053883975	0.957068357	-2.435009948	2.305285617
D_ERP	7.477143935	5.86127971	1.275684544	0.203188361	-4.063659772	19.01794764

Table 6

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.439680382
R Square	0.193318839
Adjusted R Square	0.192838528
Standard Error	21.92612498
Observations	3362

ANOVA

	df	SS	MS	F	Significance F
Regression	2	386995.6089	193497.8044	402.4873832	2.0224E-157
Residual	3359	1614855.899	480.7549566		
Total	3361	2001851.508			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-1.696037203	0.380701211	-4.455034956	8.66154E-06	-2.442466808	-0.949607598
d_ERP	15.75988557	6.630029999	2.377045892	0.017507611	2.760581833	28.75918931
R_m	2.507616314	0.088464181	28.34612031	1.1462E-158	2.334167211	2.681065417

Figure 1

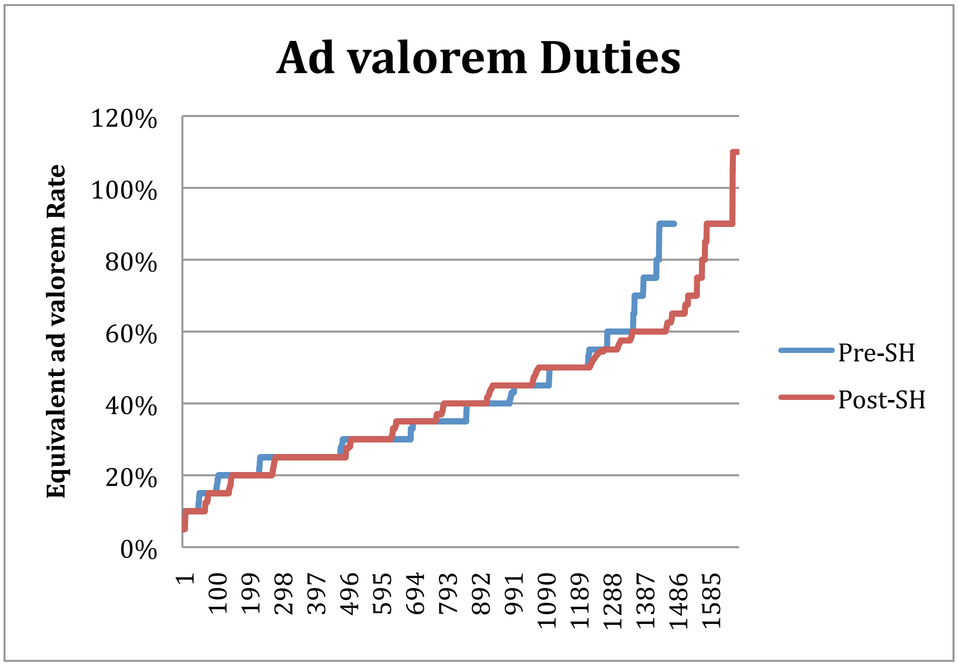


Figure 2

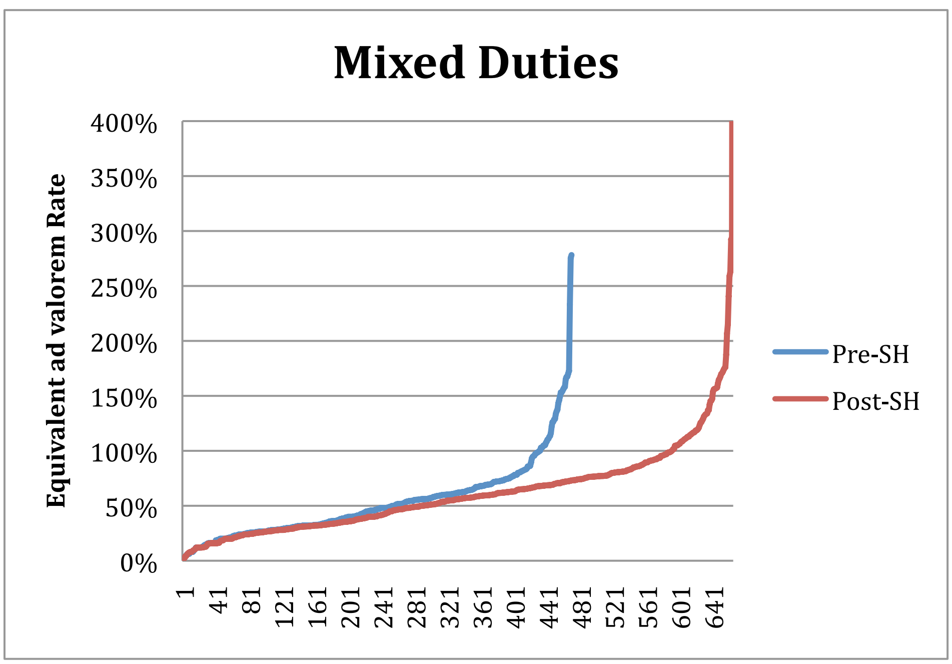


Figure 3

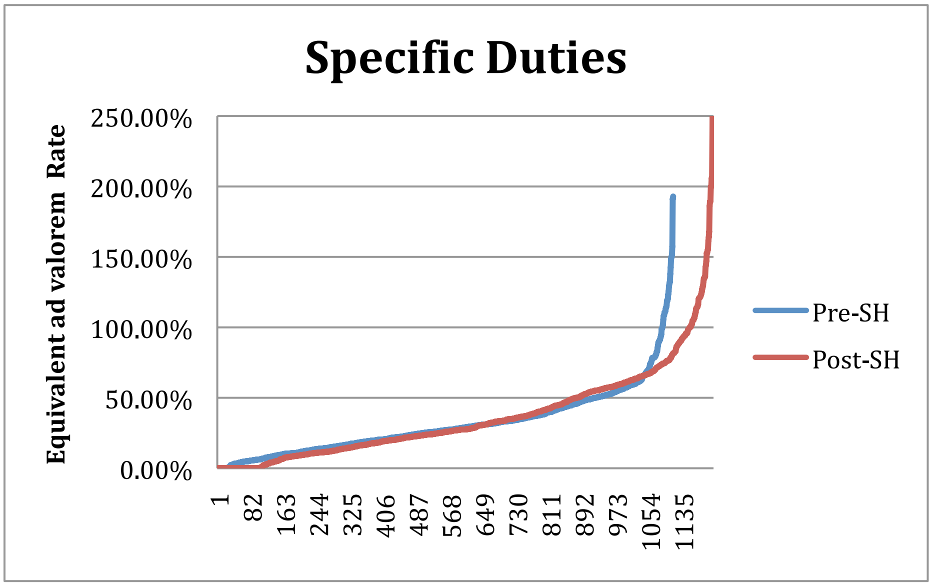


Figure 4

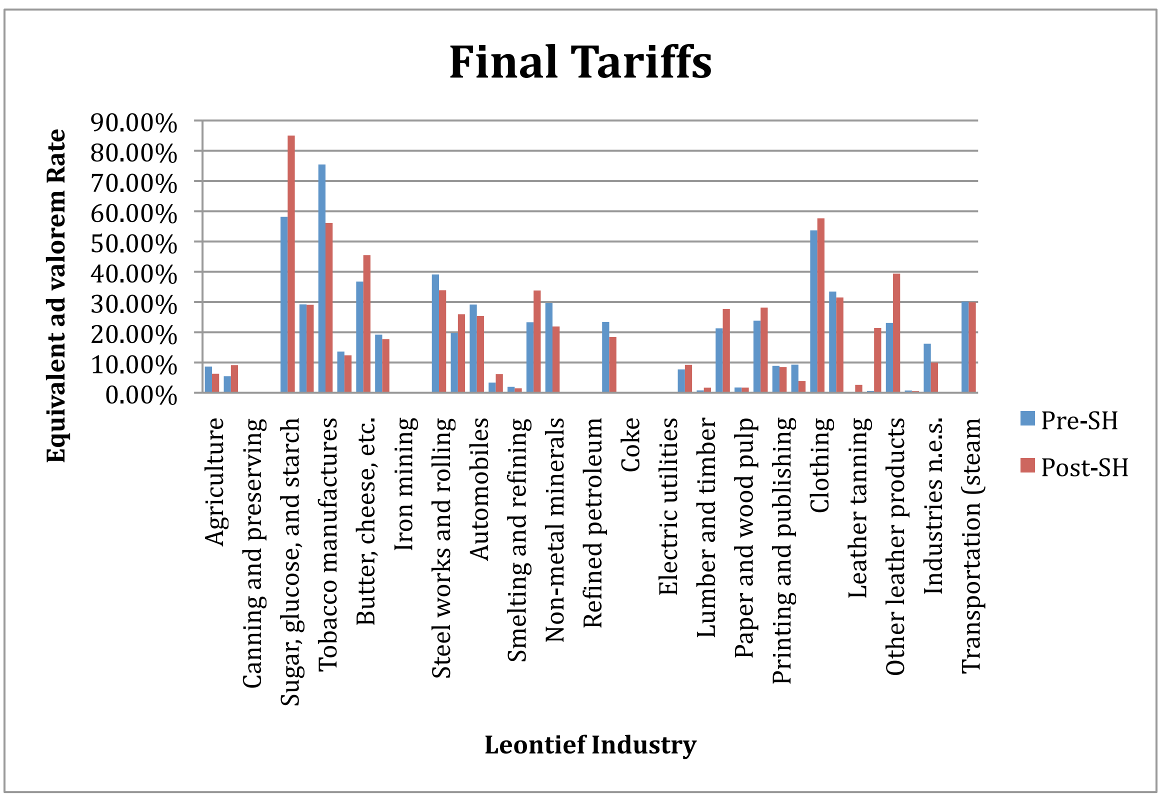


Figure 5

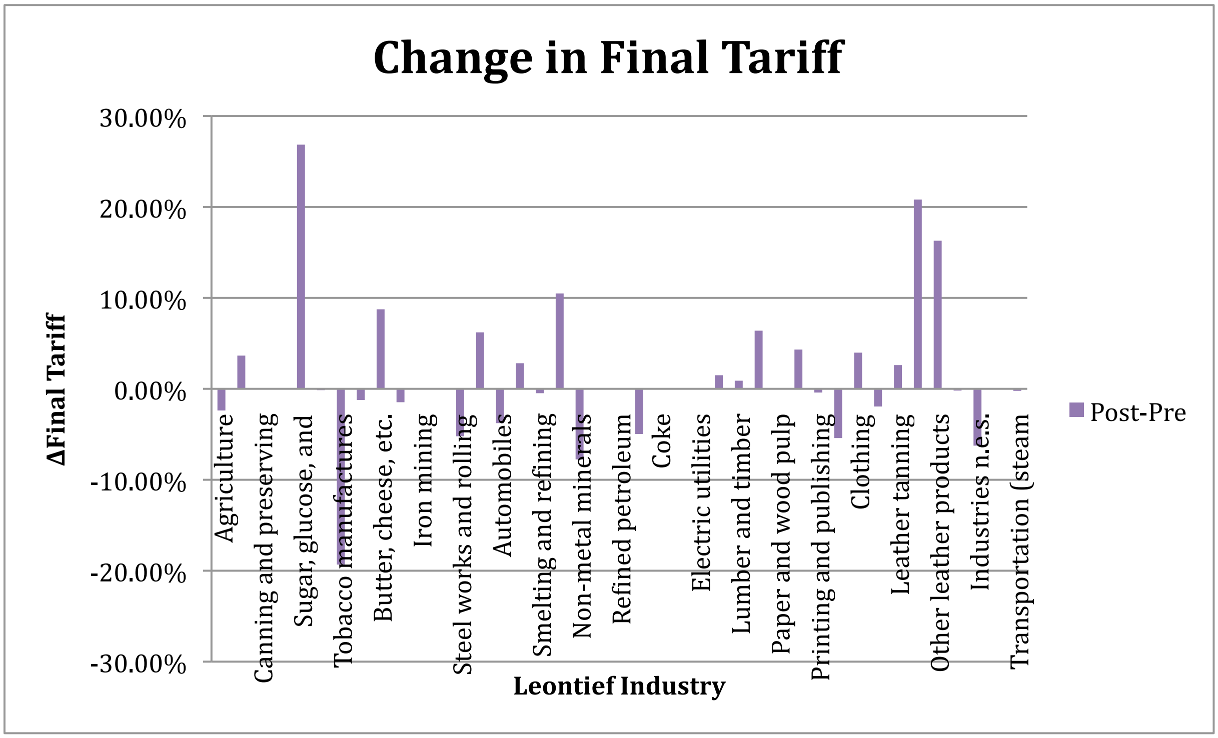


Figure 6

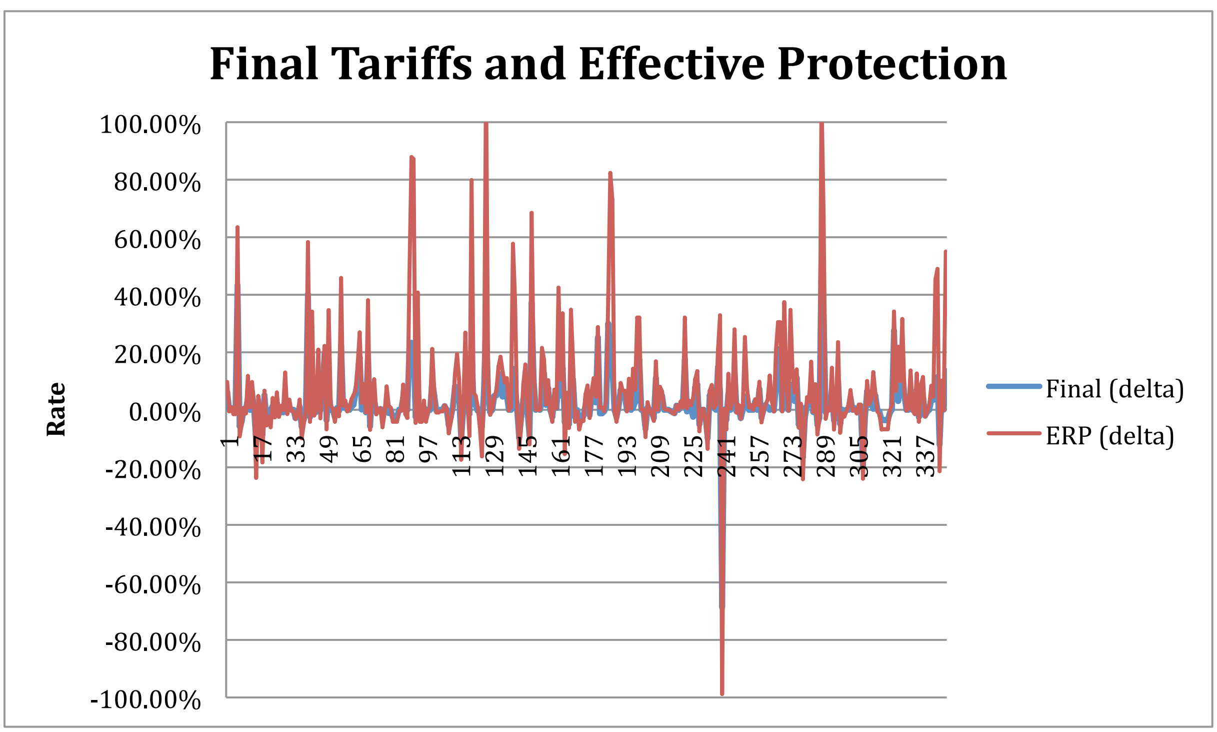


Figure 7

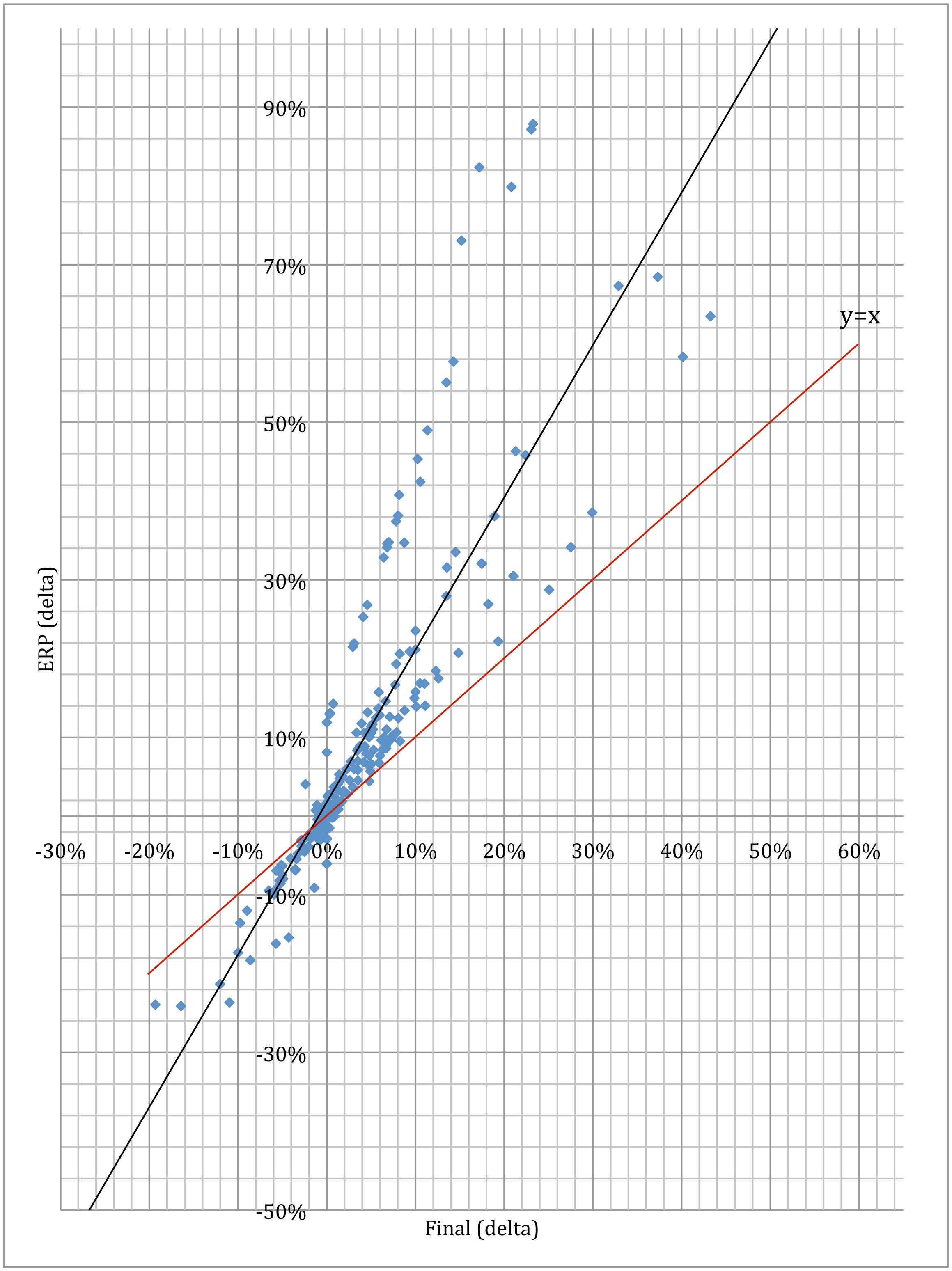

90%
70%
50%
30%
10%
-10%
-30%
-50%
-30%
-20%
-10%
0%
10%
20%
30%
40%
50%
60%
y=x
ERP (delta)
Final (delta)

Figure 8

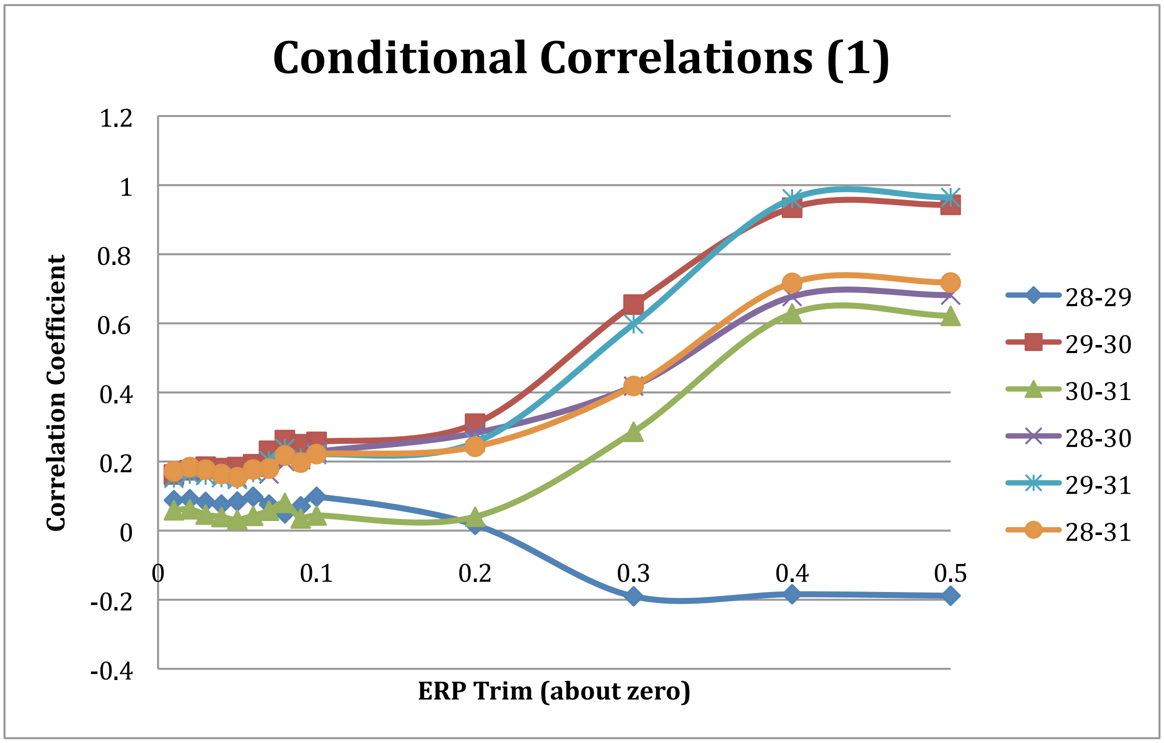


Figure 9

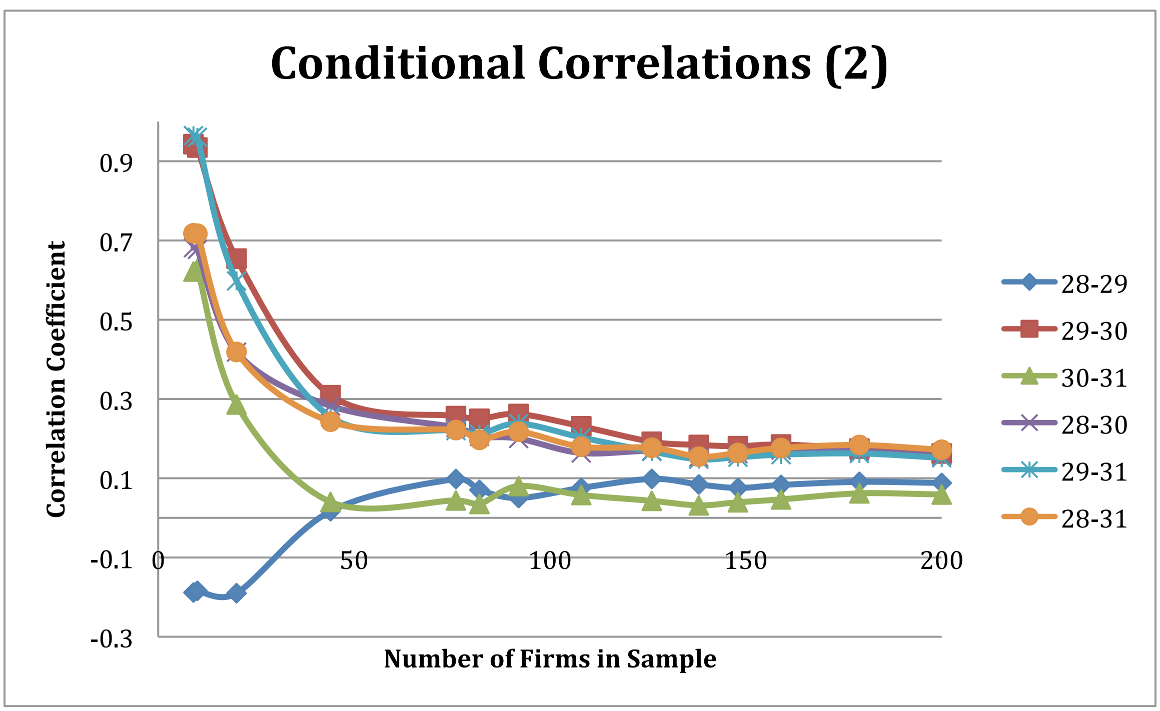
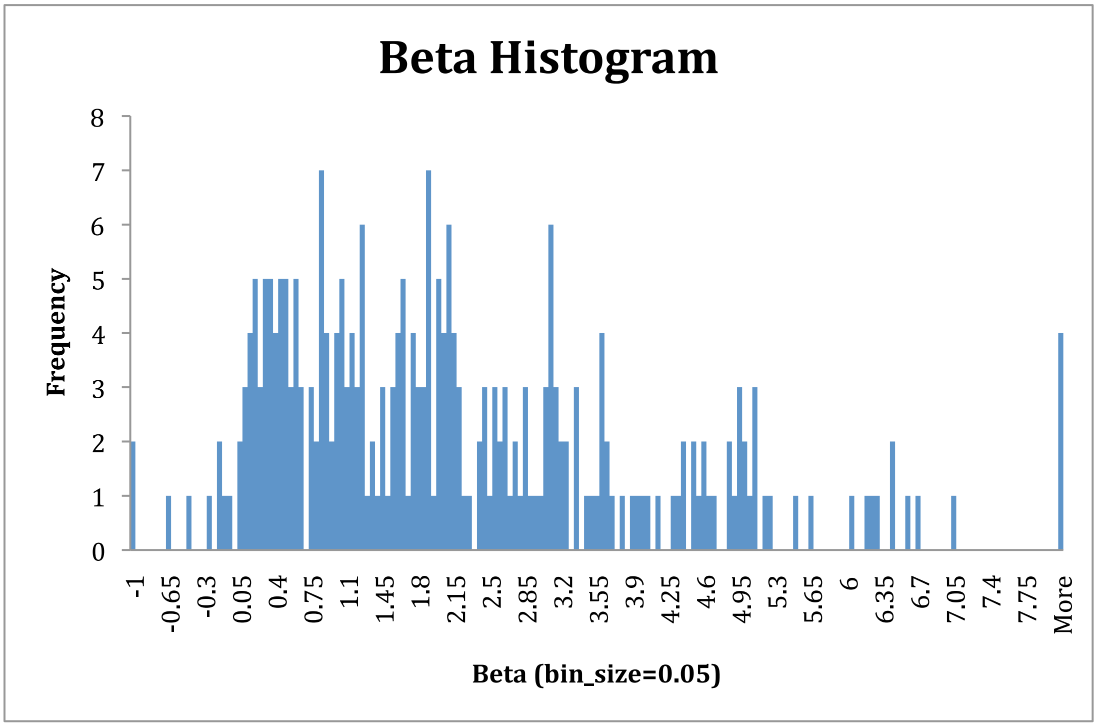


Figure 10



Beta Histogram
Frequency
8
7
6
5
4
3
2
1
0
-1
-0.65
-0.3
0.05
0.4
0.75
1.1
1.45
1.8
2.15
2.5
2.85
3.2
3.55
3.9
4.25
4.6
4.95
5.3
5.65
6
6.35
6.7
7.05
7.4
7.75
More
Beta (bin_size=0.05)

References

Archibald, Robert, David Feldman, Marc Hayford, and Carl Pasurka. "Effective Rates of Protection and the Fordney-McCumber and Smoot-Hawley Tariff Acts: Comment and Revised Estimates." *Applied Economics* 32 (2000): 1223-226. Print.

Crucini, Mario J., and James A. Kahn. "Tariffs and Aggregate Economic Activity: Lessons from the Great Depression." *Journal of Monetary Economics* 38.3 (1996): 427-67. Print.

Hall, Thomas E., and J. D. Ferguson. *The Great Depression: An International Disaster of Perverse Economic Policies*. University of Michigan. Print.

Jovanovic, Boyan, and Peter Rousseau. *Merged CRSP Stock Price Data*. Web.

Leontief, Wassily. *The Structure of the American Economy: 1929-1939*. 1941. Print.

Moody's Industrial Manual: 1930. Publication. Moody's Corporation, 1930. Print.

Prescott, Edward C. *Great Depressions of the Twentieth Century*. Ed. Timothy J. Kehoe. Federal Reserve Bank of Minneapolis. Print.

United States. Cong. Senate. Congressional Record. *Congressional Record, May 5, 1930*. S. Rept. Print.

United States. Department of Treasury. *Foreign Commerce and Navigation of the United States*. 1930. Print.

U.S. Department of State. Web. 10 Dec. 2009. <http://future.state.gov/when/timeline/1921_timeline/smoot_tariff.html>.