A Corporate Buy-American Subsidy and Firm Location Decision

Mallory Mahan
Advisor: Professor Joel Rodrigue

A Corporate Buy-American Subsidy and Firm Location Decision

This paper investigates the impact of two Wal-Mart buy-American initiatives implemented in 1989 and abolished in 1992. Utilizing the data of a hat firm facing the choice of domestic production or losing all Wal-Mart sales, we formulated a model of the firm location decision given a subsidy. From this model, we were able to determine the necessary subsidy amount to induce a firm to produce domestically given various initial conditions. Given the market power of Wal-Mart, we then considered the possibility that the Wal-Mart buy-American initiatives had an aggregate effect on United States imports. We formulated many regression models considering the possibilities of autocorrelation, cross sectional variation in growth rates spuriously correlated with the policy, aggregate shocks across all products, and all cases occurring simultaneously. Overall, the regressions yielded negative coefficients of the buy-American policy suggesting a decline in the growth rates of imports; however, all results were statistically insignificant.

I. Introduction

Due to the size of Wal-Mart, Wal-Mart controls a large degree of the policies of any Wal-Mart supplier. For example, the exercise of Wal-Mart control over suppliers can be seen through the buy-American initiatives issued under the guidance of Sam Walton. In this paper, we will be concerned with those policies instituted in 1989 and abolished in 1992. Furthermore, buy-American policies toward some products were more flexible than others; however, one fact remained constant throughout: those firms unable to meet Wal-Mart demands within the buy-American initiatives were discontinued as suppliers. Firms complying with Wal-Mart demands were rewarded with increased sales volumes along with additional incentives. Consequently, we intend to investigate the impact of the unique trade policy implemented by Wal-Mart on United States imports, as well as the strategic interaction between hat suppliers in the wake of the Wal-Mart "buy-American" policy and the corresponding chosen location of production.

To analyze the interaction between Wal-Mart supplier firms, we utilized the exclusive rights to Outdoor Cap Co., Inc. data for the years 1989 to 2000. At the time of the implementa-

tion of a buy-American policy for hats, Outdoor Cap Co., Inc. and Paramount headwear, two firms of similar size and structure, competed for the Wal-Mart business of domestically produced baseball hats. We investigated the costs absorbed by the firms when creating a plant in the United States in comparison with the costs associated with foreign production. From our observation of firm behavior, we developed two models of production location when the buy-American policy is in place. We first considered the location decision with constant returns to scale, and then formulated a model allowing for varying returns to scale.

To address the question regarding the existence of an aggregate impact of the Wal-Mart buy-American policies on imports, we interviewed Wal-Mart executives of the 1980s and early 1990s to solidify a sample of buy-American goods and buy-American policies. We then compiled a data set of United States imports of the specified goods, which encompassed sporting goods, health and beauty items, and baseball hats, and a control variable, hardware goods. Included in our regression were the number of Wal-Mart stores, United States GDP, and a dummy variable representing the buy-American policy. Initially, we ran an ordinary least squares regression. Due to the limited size of the data set and time dependence, endogeneity bias may be particularly severe. We ran subsequent regressions controlling for the possibility of autocorrelation, spuriously correlated cross sectional variation in growth rates, aggregate shocks to all products not considered elsewhere, and all instances occurring simultaneously. While the buy-American variable was not statistically significant in any of our tests, the coefficient was consistently negative suggesting the implementation of the buy-American policy had a negative effect on imports.

In *Section II* of this paper, we introduce previous findings discussing Wal-Mart. *Section III* introduces the different Wal-Mart buy-American policies. *Section V* proposes a

model of the hat firm production location when the Wal-Mart buy-American policy is not in place based on the data source presented in *Section IV*. *Section VI* then presents the model of production location when the Wal-Mart buy-American policy is in place. In *Section VII*, we relax the constant returns to scale assumption presented in *Section V* and *Section VI* and present a model of firm location decision with varying returns to scale. We will discuss the history of the various buy-American policies, as well as the two types of policies implemented in *Section VIII*. In *Section IX*, we investigate how the degree of market power possessed by Wal-Mart contributes to the feasibility of a buy-American corporate policy, and present a group of specified buy-American goods, which includes sporting goods, health and beauty products, and baseball hats. The data sources utilized in our regressions are introduced in *Section X*. In *Section XI,* we present the regression results. The conclusions are then specified in *Section XII*.

II. A Glance at Wal-Mart

Despite it's emergence into the discount retailing sector in small town America as recently as 1962, Wal-Mart has become the largest retailer in the world,[1] and correspondingly, the world's largest private employer and largest grocery retailer. With more than one-third of the United States population shopping in Wal-Mart stores on a weekly basis[2], Wal-Mart maintains significant market power.

Wal-Mart has developed this market power through the strategic exploitation of economies of scale, or more specifically, an economy of density. Wal-Mart was first located in Rogers, Arkansas set in the center of the United States, and then diffused outwards until it reached all areas of the United States. The importance of economies of density in the case of Wal-Mart ex-

---

[1] "Fortune Global 500." CNN/Fortune. 2007.

[2] Zimmerman, Ann; Hudson, Kris. "Managing Wal-Mart." April 17, 2006.

ists in the location of distribution centers, as well as store locations. As stores are packed in tightly in an area with a distribution center, Wal-Mart is able to save on transportation costs, as well as respond quickly to demand shocks.[3] Correspondingly, Thomas Holmes, a Professor of Economics at the University of Minnesota, estimates that if all U.S. Wal-Mart stores were located at least 100 additional miles from their distribution centers, costs due to transportation inefficiencies would increase by a minimum of one billion dollars.[4] Furthermore, locating stores in close proximities allows Wal-Mart to take advantage of splitting advertising costs or employee training costs with adjacent stores, or sharing knowledge about the local market structure.[5] Although high store density can prove problematic when stores are too closely located, resulting in overlapping market areas and the consequent reduction of sales of the adjacent stores, the benefits of this model have led it to become the key component of the Wal-Mart business structure.[6]

Furthermore, Wal-Mart's size ensures that when Wal-Mart alters company policies, these new Wal-Mart policies will impact suppliers upstream. Wal-Mart's well-known bargain pricing and resultant bargain purchasing, squeezes the profit margins among major brands by offering high volumes in return for low per product pricing. Correspondingly, often times Wal-Mart is able to issue a "take-it of leave-it" offer to suppliers.[7] Thus, suppliers who choose not to comply with Wal-Mart demands are merely discontinued. Similarly, only the most efficient small-scale

[3] Holmes, Thomas J. "The Diffusion of Wal-Mart and Economies of Density." Working Paper 13783.

[4] Ibid, pg. 29.

[5] Jia, Panle. "What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the Discount Retailing Industry." July 2007.

[6] Holmes, Thomas J. "The Diffusion of Wal-Mart and Economies of Density." Working Paper 13783.

[7] Javorcik, Beata Smarzynska, Wolfgang Keller, and James Tybout. "Openness and Industrial Responses in a Wal-Mart World: A Case Study of Mexican Soaps, Detergents and Surfactant Producers." *National Bureau of Economic Research*. August 2006.

and large-scale producers survive as suppliers to Wal-Mart, providing incentives for firms to adopt innovative, cost-reducing technologies. Consequently, less-efficient firms exit the industry, and competition between suppliers is enhanced by Wal-Mart's presence. Thus, the presence of Wal-Mart drives down retail prices by increasing industry-wide efficiency.[8]

From the perspective of the firm, Wal-Mart is a key client for whom the firm adopts most regulations. In the early 1990s, suppliers typically located their production facilities overseas. As long as communication costs remain low, offshoring remains common, yet the product produced is generally of less quality.[9] By locating production overseas, the domestic focus shifts to management and the productivity of the production workers is increased as they are matched with more efficient managers.[10] Furthermore, the labor cost associated with particular overseas countries is considerably less than that associated with the United States due to minimum wage laws, workman's compensation insurance, and other insurance benefits required in the U.S.

Wal-Mart controls a large degree of the policies of any supplier as a result of the extensive market power possessed by Wal-Mart. The exercise of Wal-Mart control over suppliers can be seen through the buy-American initiatives issued under the guidance of Sam Walton. While Wal-Mart's size is of great interest in the existing economics literature, no one has yet investigated the Wal-Mart buy-American policies, nor has any other corporation endeavored to create a company trade policy.

---

[8] Javorcik, Beata Smarzynska, Wolfgang Keller, and James Tybout. "Openness and Industrial Responses in a Wal-Mart World: A Case Study of Mexican Soaps, Detergents and Surfactant Producers." *National Bureau of Economic Research*. August 2006.

[9] Antras, Pol, Luis Garicano, Esteban Rossi-Hansberg. "Offshoring in a Knowledge Economy." *The Quarterly Journal of Economics*, February 2006.

[10] Ibid.

III. The History of Wal-Mart Buy-American Policies

Sam Walton established Wal-Mart with a notion of the importance of sustaining United States manufacturing jobs as these low-wage employees were characteristic Wal-Mart customers.[11] The emphasis on American-made products began in the apparel industry. Textile manufacturing plants were typically located in small-town America, as were the initial Wal-Mart stores. Hence, by safeguarding the careers and salaries of textile manufacturing workers, Wal-Mart protected their business endeavors.[12] Over time, the Wal-Mart Stores, Inc. company policy stipulated that Wal-Mart buyers consider the American-made product first. According to Richard Mahan, Wal-Mart Sportswear and Apparel Executive during the 1970s and 1980s, the price differential between import and domestic prices was required to exceed 20 percent before buyers could consider purchasing the import. Additionally, certain products were restricted to those domestically produced.[13]

When Wal-Mart buy-American initiatives were implemented, most imports were arriving through second and third parties. Each of these middlemen also had profits encompassed in the prices quoted to Wal-Mart buyers. During the 1970s and 1980s, the price differences between imported and domestic products were relatively small. In regards to quality comparison of the imports and domestically produced goods, minimal differences existed. In most cases, Wal-Mart did not surrender profit margins in exchange for the American-made product but instead instituted minor price markups. Furthermore, Wal-Mart executives challenged buyers to pinpoint American manufacturing companies and provide incentives to manufacturers to lower their

---

[11] Walton, Sam. Made in America. Random House: New York, NY. June 1993.

[12] Mahan, Richard. Personal Interview. Wal-Mart Sportswear and Apparel Executive. 2 January 2009.

[13] Garner, Brent. Telephone Interview. Wal-Mart Cap Buyer 1989. 3 February 2009.

prices. For example, buyers would commit to American manufacturers further into the future, allow American manufacturers extra lead time, guarantee Wal-Mart would purchase any excess production from American manufacturers, challenge American manufacturers to lower their overhead expenses and any other unnecessary production expenses. In the case an import product was discovered to be 30 to 40 percent cheaper than a domestically produced item, then this product would be selected over the American-made option in order to pass that value along to the customer. Nevertheless, Sam Walton reiterated the importance of a Wal-Mart buy-American initiative to buyers and executives on a weekly basis.[14]

In 1989 the import environment of Wal-Mart hat suppliers received a shock when at the annual company-wide meeting, Sam Walton declared he would never again purchase a foreign-made hat and theatrically threw his Korean-made "Wal-Mart" baseball hat into the crowd. The buy-American campaign became effective immediately, motivated by either an effort to save manufacturing jobs in the United States, a group who tended to be Wal-Mart customers, or potentially increase customer loyalty among manufacturing workers. The composition of cap suppliers for Wal-Mart consisted of two chief suppliers, producing primarily foreign-made caps interspersed with a few domestically manufactured caps. Wal-Mart agreed to purchase hats for an additional $1.00 per hat, from $2.50 to $3.50, while continuing to sell hats in stores for $5.00 apiece to induce producers to meet the new domestic standards set by the policy.[15] In order to generate domestic production, Wal-Mart endured substantial profit reductions in the hat sector of the store. Suppliers that complied with the buy-American policy were granted preference for

---

[14] Mahan, Richard. Personal Interview. Wal-Mart Sportswear and Apparel Executive. 2 January 2009.

[15] Garner, Brent. Telephone Interview. Wal-Mart Cap Buyer 1989. 3 February 2009.

other novelty hat items as well, to offset the expenses endured by domestic manufacturers.[16]

The shift from a buy-American emphasis to imported products occurred with the death of Sam Walton in 1992. Before importing reached its current level of popularity, the only companies producing oversees were large importing corporations which produced an extensive range of products in all categories.   The corresponding products were subject to large mark-ups. In 1974, Sam Walton made his first trip to the Orient on a mission to lower costs incurred by Wal-Mart. With this trip, Wal-Mart importing policies were transformed. Wal-Mart buyers began to directly approach the oversees producers, cutting out middlemen. Without the middlemen, costs fell and it became more difficult for domestic producers to come within a 20 percent price differential of corresponding imported goods. American manufacturers could no longer lower their costs to meet these expectations.   After the death of Sam Walton in 1992, the buy-American initiative was removed from the Wal-Mart mission statement and is no longer a pressing issue.[17]

IV. Data

The data utilized in this study comes from the exclusive use of Outdoor Cap Co., Inc. domestic production data. This data provides not only a detailed view of the prices and costs the firm faced in domestic production, but also a comprehensive look at the origin of the costs incurred by the firm.

V. The Buy-American Policy as it Effects the Supplier

Due to the difficulty and high start-up costs of developing a factory in the United States, only the two largest Wal-Mart suppliers were able to comply with the buy-American policy, Out-
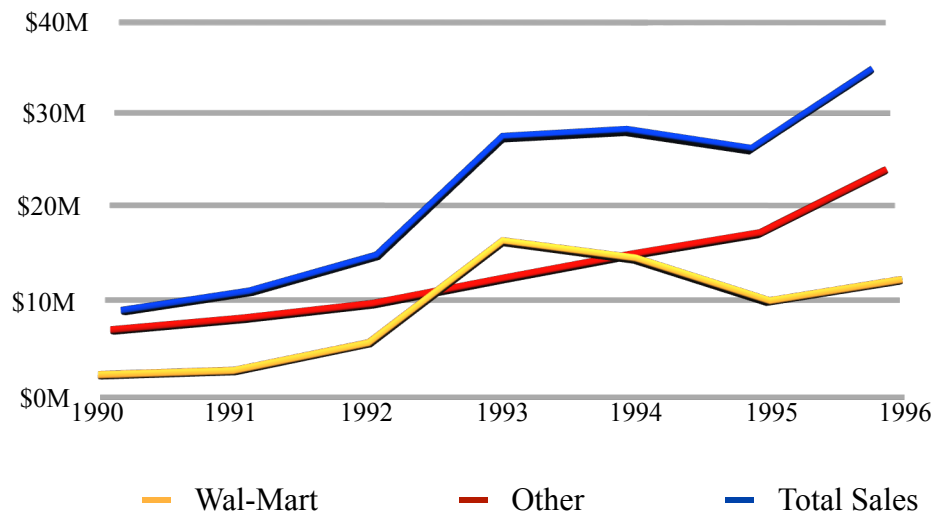
---

[16] Garner, Brent. Telephone Interview. Wal-Mart Cap Buyer 1989. 3 February 2009.

[17] Mahan, Richard. Personal Interview. Wal-Mart Sportswear and Apparel Executive. 2 January 2009.

door Cap Co., Inc. and Paramount Headwear Inc.[18] The remaining two suppliers were structured

similarly. As indicated in *Figure I,* Wal-Mart sales constituted between 24 and 56 percent of

Outdoor Cap Co., Inc. total sales, which can be assumed to be indicative of the percentage of

Paramount Headwear total sales as well according to Wal-Mart Cap Buyer, Brent Garner.

Figure I

Sales Over Time

SOURCE: Outdoor Cap Co., Inc.

Both Paramount Headwear Inc. and Outdoor Cap Co., Inc. had domestic factories dedi-

cated to Wal-Mart buy-American business, as well as an import sector contributing to their Wal-

Mart and other sales. The small number of firms created a structure, in which the two firms stra-

tegically interacted. For example, Paramount Headwear Inc. closed a domestic factory in late

1998, which was followed by the subsequent halt of manufacturing in the Outdoor Cap Co., Inc.

plant and the reorganization to solely cap embroidery in the domestic plant.[19]

---

[18] Mahan, Richard. Personal Interview. Wal-Mart Sportswear and Apparel Executive. 2 January 2009.

[19] Mahan, Paul. Personal Interview. Outdoor Cap Co., Inc. President.

Initially, the "Made in the USA" label was loosely interpreted due to the sudden change in policy and lack of necessary machines, capital, and labor in U.S. plants. Landed hats that were ¾ completed when they arrived in the United States from overseas and then sewn together in the U.S. qualified as "Made in the USA." Gradually, the shift to complete U.S. manufacturing was made. After the death of Sam Walton in 1992, another shift to domestically embroider imported hats occurred as Wal-Mart relaxed its emphasis on domestic production.[20] In *Figure II*, we see the shift from ¾ line, or B line, to full manufacturing, or A line, and the later shift from full manufacturing to embroidery.

Figure II

Daily Production
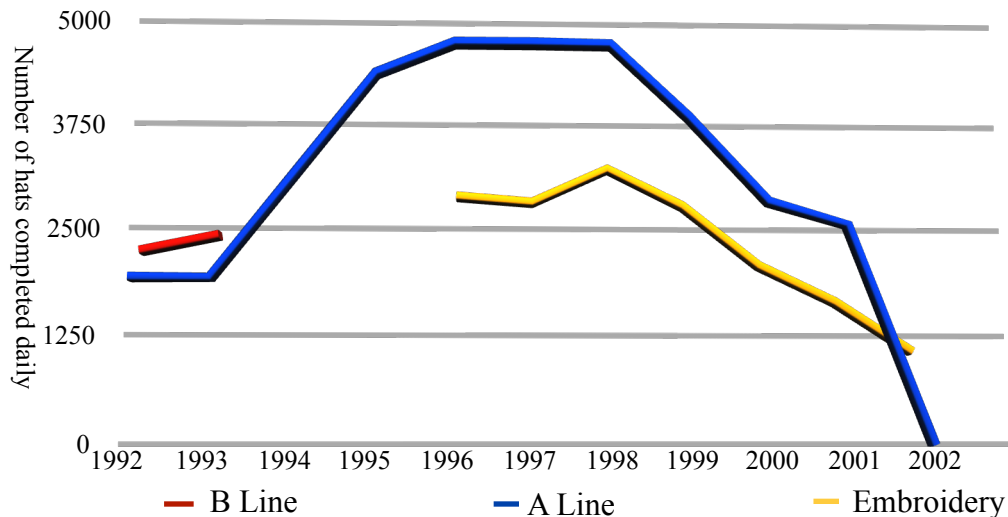
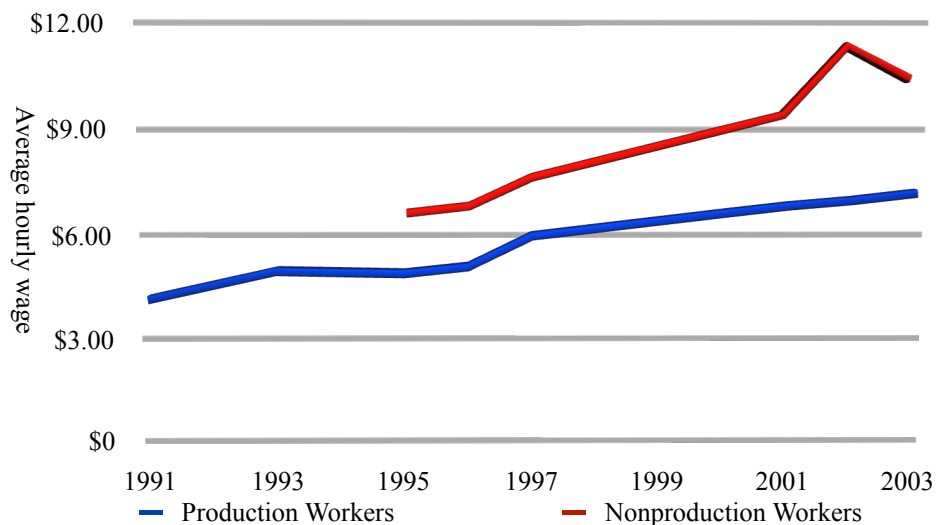SOURCE: Outdoor Cap Co., Inc. Data

The main inputs into the production of hats include the raw materials, such as fabric and thread, and labor. Over time, domestic hat manufacturers experienced increasing costs, while

_____

[20] Mahan, Paul. Personal Interview. Outdoor Cap Co., Inc. President.

prices maintained a stable level. The greatest cost variations occurred in the wage rate over time. U.S. hat manufacturing wages consistently increased over time, creating larger differentials between domestic wages and wages of outsourced labor. *Figure III* depicts the increasing growth trajectory of wages for production and nonproduction employees of Outdoor Cap Co., Inc.

Figure III

Hourly Wages

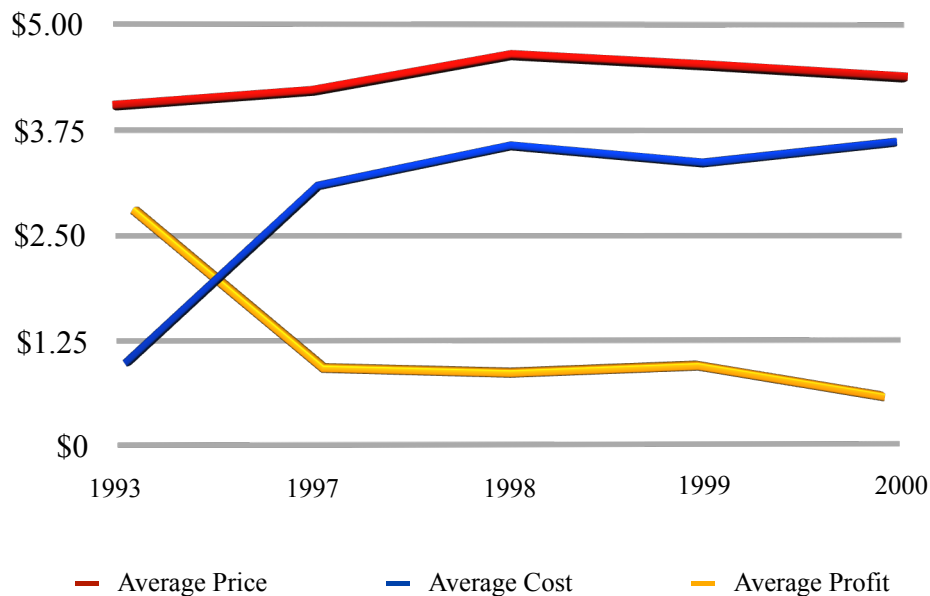

SOURCE: Outdoor Cap Co., Inc. Data

For Outdoor Cap Co., Inc., manufacturing workers accounted for two-thirds of health insurance claims and one-third of the workforce. Workman's compensation accounted for over $200,000 annually. Meanwhile, the average prices per hat remained relatively constant over time due to competition between Paramount Headwear Inc. and Outdoor Cap Co., as well as the price ceilings set by Wal-Mart.[21] Clearly, average cost per hat was increasing over the 1990s, while the average price per cap remained relatively constant, as shown in *Figure IV*. According to

[21] Mahan, Paul. Personal Interview. Outdoor Cap Co., Inc. President.

Figure IV, Paramount Headwear Inc. and Outdoor Cap Co., Inc. experienced declining average profits per hat, which were largely attributable to rising wage rates in domestic facilities.
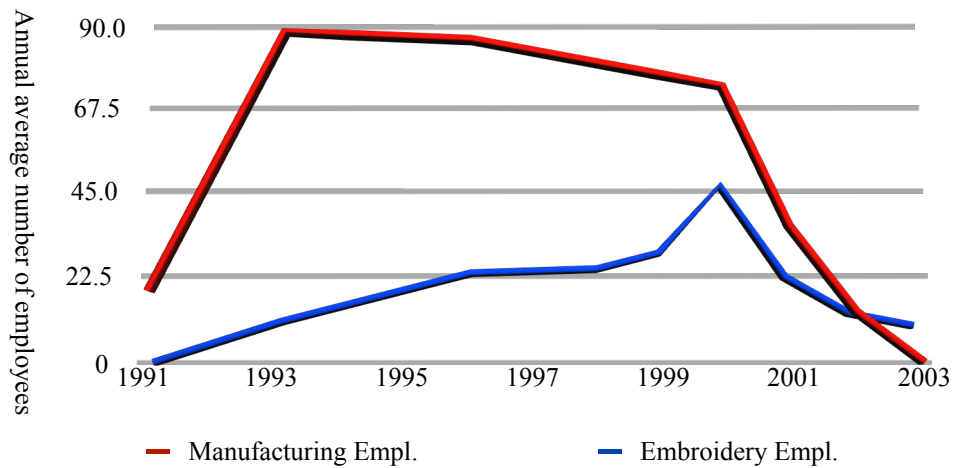
Figure IV

Profits, Costs, and Prices Over Time

SOURCE: Outdoor Cap Co., Inc. Data

The labor force of a hat factory can be divided into three distinct types of workers: highly skilled managers, semi-skilled embroidery workers, and low-skilled manufacturing work- ers. As the corresponding wages reflect the hierarchy of skill, some of the increase in costs due to wages is attributable to the shift from manufacturing to embroidery, while increases in the minimum wage over this period also have an affect. Correspondingly, *Figure V* demonstrates the decline of the manufacturing sector of the Outdoor Cap Co., Inc. domestic factory, particularly from 2000 to 2001, as well as the rise in embroidery employment.
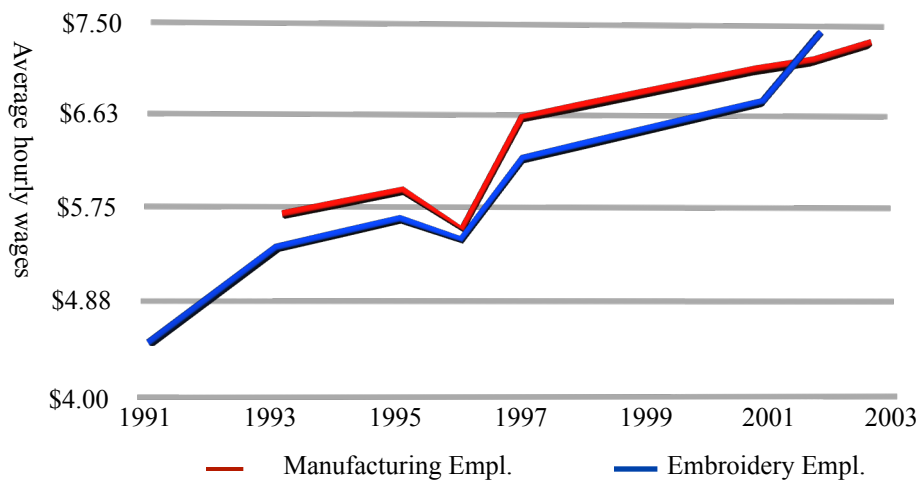
Figure V
Production Employment

Annual average number of employees

90.0
67.5
45.0
22.5
0

1991   1993   1995   1997   1999   2001   2003

— Manufacturing Empl.   — Embroidery Empl.

SOURCE: Outdoor Cap Co., Inc. Data

From *Figure II*, we see a steady increase in the average production worker's hourly compensation from around $4.50 to approximately $7.25. Furthermore, the wage differential between manufacturing and embroidery workers remains relatively constant throughout the 1990s, with embroidery workers earning slightly less than $1 per hour more than their manufacturing counterparts, as depicted in *Figure VI*.

Figure VI
Production Employee Wages

Average hourly wages

$7.50
$6.63
$5.75
$4.88
$4.00

1991   1993   1995   1997   1999   2001   2003

— Manufacturing Empl.   — Embroidery Empl.

SOURCE: Outdoor Cap Co., Inc. Data

VI. A Model of Production Location without Buy-American

As there were ultimately two main firms serving as hat suppliers after the implementation of the buy-American policy and one relatively small firm, American Needle Co. We will assume Outdoor Cap Co., Inc. and Paramount Headwear Inc. are the two hat suppliers of Wal-Mart. In accordance with the existing evidence, we will assume these suppliers are of equal size and structure.[22] Furthermore, we will presume the two firms have the choice of either domestic or foreign production location. Thus, before the implementation of the Wal-Mart buy-American initiative, we develop the firms' profit functions under the assumption that the principle costs incurred are labor costs. Therefore, the profit equation $\pi = pq - c(q)$, $c(q)$ becomes a function of labor, in which $c(q) = wl = wq$, as $q = l$. Hence, we begin with a linear inverse demand curve,

$$Q = \alpha - \beta p = q_1 + q_2 \tag{1}$$

such that $p = (\alpha - (q_1 + q_2))/\beta$. We substitute price into the profit equation,

$$\pi_1 = [(\alpha - (q_1 + q_2))/\beta] \, q_1 - wq_1 \tag{2}$$

which captures profits of domestic production for firm one. To signify marginal costs deducted from marginal revenues, we take the partial derivative with respect to q_1 and set the result equal to zero, which yields the equation

$$q_1 = (\alpha - q_2 - \beta w)/2 \tag{3}$$

and we repeat the process for q_2. Now we substitute the value of q_2 into the equation of q_1 such that $q_1 = \alpha/2 - 1/4(\alpha - q_1 - \beta) - \beta w/2$ and solve for q_1. Hence,

$$q_1 = (\alpha - \beta w)/3 = q_2 \tag{4}$$

as we repeated the same process solving for q_2. We then substitute the values of q_1 and q_2 into

---

[22] Garner, Brent. Telephone Interview. Wal-Mart Cap Buyer 1989. 3 February 2009.

the profit equation and find

$$\pi_1 = (1/\beta)(\alpha - \beta w)^2/(n+1)^2 = \pi_2 \tag{5}$$

with *n* representing the number of firms in the industry. An analogous process is repeated to find

the profit function for firm two when both firms choose to produce domestically.

In regards to foreign production by both firms, we replace domestic wages *w* with *w**, or

foreign wages. Duplicating the process demonstrated above, we find

$$\pi_1 = (1/\beta)(\alpha - \beta w^*)^2/(n+1)^2 \tag{6}$$

Furthermore, there exists the possibility of one firm producing domestically and one firm pro-

ducing abroad. Corresponding to the aforementioned process,

$$q_1 = (\alpha - \beta w^*)/2, \quad q_2 = (\alpha - \beta w)/2. \tag{7}$$

Thus, the equations in *Table I* predict the plant locations based on profits for Paramount Head-

wear Inc. and Outdoor Cap Co., Inc. without the Wal-Mart "buy-American" initiative.

Table I		**Paramount Headwear Inc.**	
		United States	**Foreign**
	United States	$\pi_{PH}=(1/\beta)(\alpha-\beta w)^2/(n+1)^2$	$\pi_{PH}=(1/\beta)(\alpha+\beta(w^*-nw))^2/(n+1)^2$
		$\pi_{ODC}=(1/\beta)(\alpha-\beta w)^2/(n+1)^2$	$\pi_{ODC}=(1/\beta)(\alpha+\beta(w-nw^*))^2/(n+1)^2$
Outdoor Cap Co., Inc.	**Foreign**	$\pi_{PH}=(1/\beta)(\alpha+\beta(w-nw^*))^2/(n+1)^2$	$\pi_{PH}=(1/\beta)(\alpha-\beta w^*)^2/(n+1)^2$
		$\pi_{ODC}=(1/\beta)(\alpha+\beta(w^*-nw))^2/(n+1)^2$	$\pi_{ODC}=(1/\beta)(\alpha-\beta w^*)^2/(n+1)^2$

Thus, it is apparent the location decision of the two hat suppliers is entirely dependent

upon wages in this model. When the foreign wage *w** is less than the domestic wage *w*, costs of

producing overseas are less than the costs incurred producing domestically, and producing

abroad is a dominant strategy for both firms before the subsidy. Prior to the Buy-American pol-

icy, a significant portion of hat manufacturing occurred in Korea; however, offshore production

shifted to Bangladesh in the 1990s.[23] *Figure VII* demonstrates the average wage differential be-

tween Korean manufacturers and their American counterparts corresponds to 40¢ on the dollar in

1991.

Figure VII

Manufacturing Hourly Compensation Index
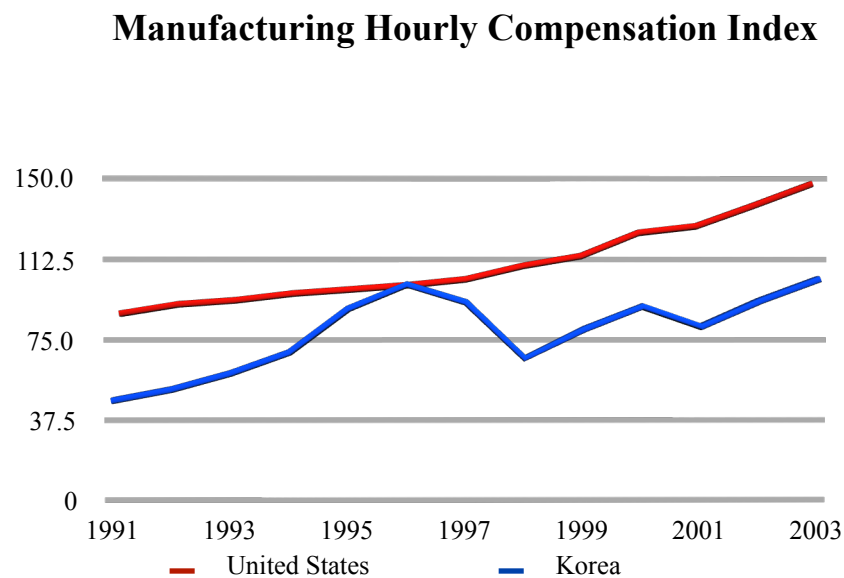
SOURCE: Bureau of Labor Statistics

If Paramount Headwear Inc. chooses to locate in the U.S., Outdoor Cap Co., Inc. will de-

cide to locate its production facilities overseas as $\pi_{Foreign} > \pi_{US}$. The opposite is also true, if Out-

door Cap Co., Inc. selected to locate its plant in the U.S., Paramount Headwear Inc. would

choose to locate overseas due to the larger profits to be earned from overseas production.   In

this model, the interaction between the two firms is not crucial in the production location

_____

[23] Mahan, Paul. Personal Interview. Outdoor Cap Co., Inc. President.

decision, as foreign production will always be the optimal choice.

VII. A Model of Production Location with Buy-American

The Wal-Mart buy-American policy, however, altered the dominant strategies for the

suppliers by offering an additional dollar per hat produced in the United States, as well as Wal-

Mart "good will" on other transactions. Thus, the average price paid per non-embroidered hat

was allowed to increase from $2.50 per hat prior to the implementation of the policy to $3.50 per

hat after the implementation of the policy for all complying producers. Only two firms complied

with these terms and began domestic production, Paramount Headwear Inc. and Outdoor Cap

Co., Inc. Thus, the buy-American policy further fostered a duopolistic environment between

Wal-Mart hat suppliers, reducing the well-known competition incurred by Wal-Mart's bargain

prices between potential suppliers. In accordance with the concept of a $1 price increase for do-

mestically produced hats, we derive the following image of the industry as presented in *Figure*

VIII.

Figure VIII
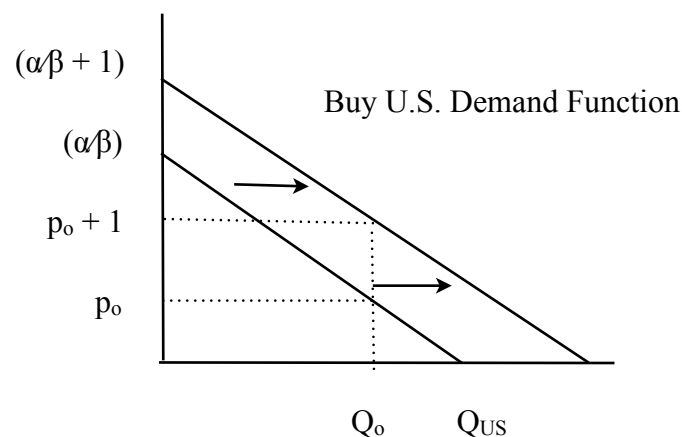
Correspondingly, the demand function for domestically produced hats is transformed

from $Q_{US}=\alpha-\beta p$ to $Q_{US}=\alpha+\gamma\beta-\beta p$, as γ represents the price increase of domestic hats. In this

instance $\gamma = 1$ in accordance with the $1 increase in hat prices to be paid by Wal-Mart, and the equation is simply $Q_{US}=\alpha+\beta-\beta p$. Wal-Mart maintains roughly half of Outdoor Cap Co. Inc. business during this time period, and we assume Paramount Headwear Inc. is of identical structure. As Wal-Mart is offering this increased purchase price for domestically produced hats, we we inferred that any other domestic demand would exist at a cost disadvantage.[24] We also incorporate the possibility that firms may choose to produce both domestically and abroad, due to demand from other customers. Thus, we derive the following equations to predict the plant locations of Outdoor Cap Co., Inc. and Paramount Headwear Inc. under the Wal-Mart "buy-American" policy.

The total demand for hats is equal to $Q_{Wal\text{-}Mart}+Q_{Other}$. Hence, Q_{Other} is analogous to the linear inverse demand curve represented in *Section VI*. To compensate for the subsidy received by Wal-Mart suppliers producing domestically, we consider the equation

$$Q_{Wal\text{-}Mart} = \alpha+\gamma\beta-\beta p \qquad (8)$$

Thus, we see the total demand likely increases with the policy due to the added $\gamma\beta$, as long as firms choose to produce both domestically and abroad. If a supplier chose not to produce in the United States, we could assume $Q_{Wal\text{-}Mart}=0$. Thus, the demand facing the firm would be $Q=\alpha-\beta p$. If a firm were to choose to produce solely in the United States, we can assume $Q_{Other}=0$. So, the demand facing the domestic producing firm would be $Q=\alpha+\gamma\beta-\beta p$. The equations representing the firm production location decision when the subsidy is in place are depicted in *Table II*.

_____

[24] For simplicity, we assume fixed costs are equal to 0.

Table II

Paramount Headwear Inc.

		United States	**Foreign**
Outdoor Cap Co., Inc.	**United States**	$\pi_{PH}=(1/\beta)(\alpha+\gamma\beta-\beta w)^2/(n+1)^2$ $\pi_{ODC}=(1/\beta)(\alpha+\gamma\beta-\beta w)^2/(n+1)^2$	$\pi_{PH}=(1/\beta)(\alpha+\beta(w^*-nw))^2/(n+1)^2$ $\pi_{ODC}=(1/\beta)(\alpha+\gamma\beta+\beta(w-nw^*))^2/(n+1)^2$
	Foreign	$\pi_{PH}=(1/\beta)(\alpha+\gamma\beta+\beta(w-nw^*))^2/(n+1)^2$ $\pi_{ODC}=(1/\beta)(\alpha+\beta(w^*-nw))^2/(n+1)^2$	$\pi_{PH}=(1/\beta)(\alpha-\beta w^*)^2/(n+1)^2$ $\pi_{ODC}=(1/\beta)(\alpha-\beta w^*)^2/(n+1)^2$

To determine the necessary subsidy amount to induce firms to produce domestically, we consider the inequality $\pi_{US}>\pi_{Foriegn}$. While the Nash equilibrium of the model presented without a subsidy always resulted in both firms producing abroad, the model allowing for the subside effectively changes the Nash equilibrium of the game. Firms will choose to produce domestically when $\gamma > w\text{-}w^*$, or the amount of the subsidy is greater than the wage differential. Hence, the Nash equilibrium will indicate either both firms producing domestically or both firms producing abroad depending on the subsidy amount in relation to the wage differential. According to *Figure VII,* the wage differential between Korea and United States manufacturing labor was 40 cents in 1991. Hence, the Wal-Mart subsidy of $1, which is greater than 40 cents, would actuate both Paramount Headwear Inc. and Outdoor Cap Co., Inc. to produce in the United States as depicted in *Figure VIII*.

Figure VIII
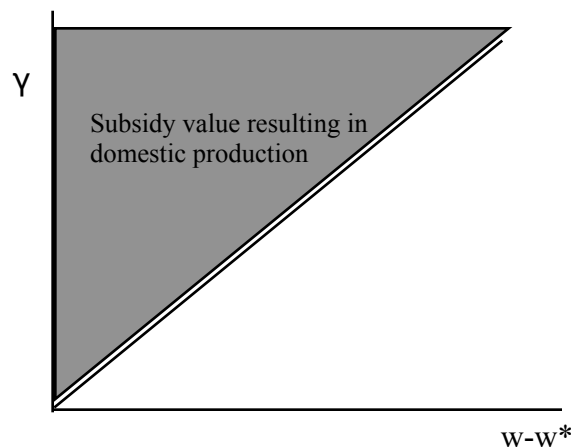
Now, we consider the possibility of multiple domestic sources of United States demand, rather than Wal-Mart functioning as the sole source of domestic demand. Hence, United States demand will now be represented by the two demand functions, $q_{Wal\text{-}Mart}=\alpha+\gamma\beta-\beta p$ and $q_{Other}=\alpha_0-\beta_0 p$. Hence, total U.S. demand becomes

$$Q_{US}=(\alpha+\alpha_0)+\gamma\beta-(\beta+\beta_0)p \tag{9}$$

The resulting formulas describing the firm production location decision are presented in *Table III*.

	Paramount Headwear Inc.		$\alpha^0=\alpha+\alpha_0 \quad \beta^0=\beta+\beta_0$
Table III		**United States**	**Foreign**
Outdoor Cap Co., Inc.	**United States**	$\pi_{PH}=(1/\beta^0)(\alpha^0+\gamma\beta-\beta^0 w)^2/(n+1)^2$	$\pi_{PH}=(1/\beta^0)(\alpha^0+\beta^0(w^*-nw))^2/(n+1)^2$
		$\pi_{ODC}=(1/\beta^0)(\alpha^0+\gamma\beta-\beta^0 w)^2/(n+1)^2$	$\pi_{ODC}=(1/\beta^0)(\alpha^0+\gamma\beta+\beta^0(w-nw^*))^2/(n+1)^2$
	Foreign	$\pi_{PH}=(1/\beta^0)(\alpha^0+\gamma\beta+\beta^0(w-nw^*))^2/(n+1)^2$	$\pi_{PH}=(1/\beta^0)(\alpha^0-\beta^0 w^*)^2/(n+1)^2$
		$\pi_{ODC}=(1/\beta^0)(\alpha^0+\beta^0(w^*-nw))^2/(n+1)^2$	$\pi_{ODC}=(1/\beta^0)(\alpha^0-\beta^0 w^*)^2/(n+1)^2$

Again, we consider the inequality such that $\pi_{US}>\pi_{Foriegn,}$ which induces firms to produce in the United States when $\gamma > (1+\beta^0/\beta)(w\text{-}w^*)$. If β^0 and β are approximately equal, the model implies that the subsidy value needed for the two firms to produce domestically would be approximately twice the wage differential. Hence, according to *Figure VII*, the subsidy value required to compel Paramount Headwear Inc. and Outdoor Cap Co., Inc. to produce in the United States would be greater than $0.80 as shown in *Figure IX*.

Figure IX
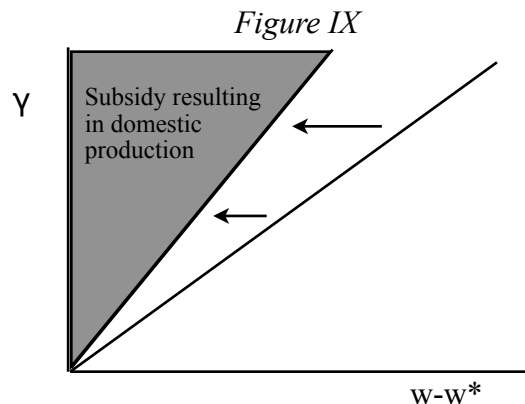
As one domestic demand source is not offering a subsidy for production, the Wal-Mart subsidy would need to be large enough to compensate the supplier for production for the other domestic demand source as well.

VIII. A Model of Production Location with Buy-American and Varying Returns to Scale

As the linear demand curve presented in *Section IV* and *Section V* does not admit closed form solutions when we deviate from constant returns to scale, we begin with a nonlinear demand curve to consider the possibility the two firms experience varying returns to scale. We begin with the nonlinear inverse demand curve

$$Q = \alpha\gamma p^{-\lambda} \tag{10}$$

such that the subsidy, γ is now recorded as a percentage price increase. The profit equation $\pi = pq - wl$ is considered such that $l = q_1^{1/\eta}$. In this model, η is representative of returns to scale. Thus, a value of $\eta > 1$ signifies increasing returns to scale, $\eta < 1$ signifies decreasing returns to scale, and $\eta = 1$ signifies constant returns to scale. Substituting $p = (\alpha/(q_1 + q_2))^{1/\lambda}$ and $l = q_1^{1/\eta}$, we investigate the profit equation

$$\pi_1 = (\alpha/(q_1 + q_2))^{1/\lambda} q_1 - c q_1^{1/\eta} = \pi_2 \tag{11}$$

We subsequently take the partial derivative with respect to q_1 and set the result equal to zero. By symmetry $q_1 = q_2$ such that

$$q_1 = [((2\lambda-1)/2\lambda)(\alpha\gamma/2)^{1/\lambda}(\eta/w)]^{\lambda/(\lambda(1-\eta)+\eta)} = q_2 \tag{12}$$

Now, plugging this result into the profit equation $\pi_1 = [(2\lambda/(2\lambda-1)) - \eta](c/\eta)q_1^{1/\eta-1}q_1$ yields the result

$$\pi_1 = [(2\lambda/(2\lambda-1)) - \eta](w/\eta)[((2\lambda-1)/2\lambda)(\alpha\gamma/2)^{1/\lambda}(\eta/w)]^{\lambda/(\lambda(1-\eta)+\eta)} = \pi_2 \tag{13}$$

We repeat an analogous process to solve the profit equations describing two firms producing offshore. Furthermore, we were unable to solve for a closed form solution of the occurrence

when one firm produces abroad and the other firm produces domestically; however, according to the results presented in *Section IV* and *Section V* and our intuition regarding the symmetry of each firm, we will proceed by examining symmetric equilibria such that,

$$\pi_{US}=(2\lambda/(2\lambda-1)-\eta)w/\eta[((2\lambda-1)/2)(\alpha Y/2)^{1/\lambda}(\eta/w)]^{\lambda/(\lambda(1-\eta)+\eta)} \tag{14}$$

$$\pi_{Foreign}=(2\lambda/(2\lambda-1)-\eta)w^*/\eta[((2\lambda-1)/2)(\alpha/2)^{1/\lambda}(\eta/w^*)]^{\lambda/(\lambda(1-\eta)+\eta)} \tag{15}$$

Hence, we consider the inequality $\pi_{US}>\pi_{Foriegn,}$ which concludes firms will choose to produce in the United States if $\gamma > (w/w^*)^{\lambda\eta-\eta}$. *Figure X, Figure XI,* and *Figure XII* compare the necessary subsidy values to actuate Paramount Headwear Inc. and Outdoor Cap Co., Inc. to produce in the United States given varying returns to scale.
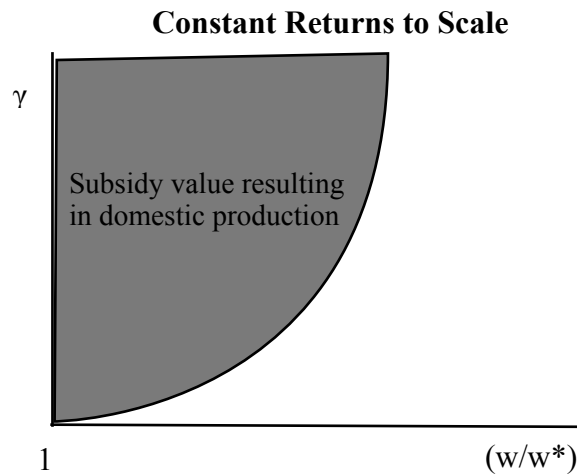
Figure X

Constant Returns to Scale

Figure XI
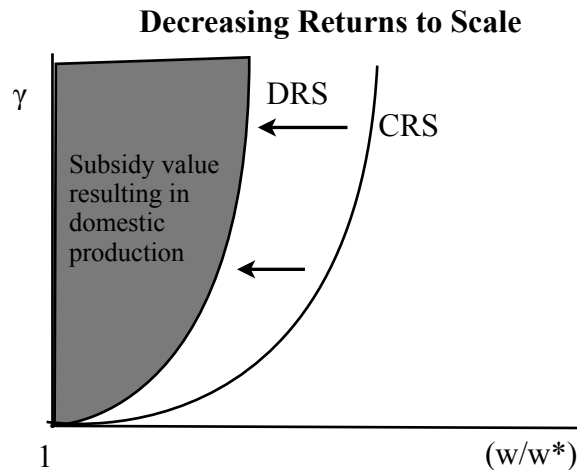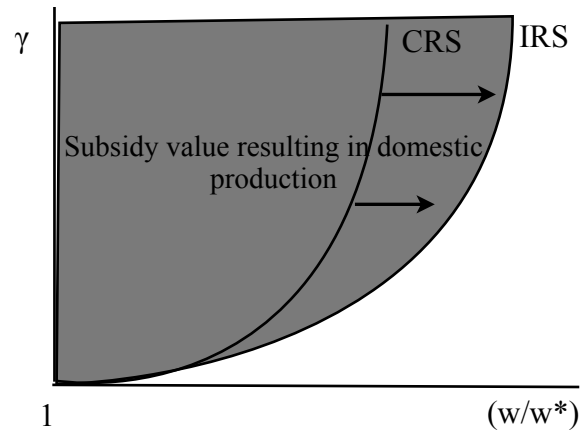
Decreasing Returns to Scale

Figure XII

Increasing Returns to Scale

When firms are subject to decreasing returns to scale, output increases by less than a proportional increase in inputs. Thus, a greater proportion of inputs is required to produce the same output as a firm experiencing constant returns to scale or increasing returns to scale. Thus, a larger subsidy value is required to compel firms to produce domestically when firms experience decreasing returns to scale as depicted in *Figure XI*. Similarly, a firm subject to increasing returns to scale necessitates a smaller subsidy value to choose to produce domestically as shown in *Figure XII*. According to Martin Neil Baily, Charles Hulten, and David Campbell of the University of Maryland, constant returns to scale is a typical finding in manufacturing industries, and *Figure X*, as well as *Section V*, depict this occurrence.[25]

IX. The Aggregate Impact of the Buy-American Initiative

Due to the extensive market power of Wal-Mart, we now investigate the aggregate impact of the Wal-Mart buy-American policies. While certain hats were enumerated buy-American,

---

[25] Baily, Martin Neil; Charles Hulten, David Campbell, Timothy Bresnahan, and Richard E. Caves. *Brookings Papers on Economic Activity. Microeconomics*, Vol. 1992, (1992), pp. 187-267.

other goods fell into the category of the 20 percent price differential criterion, and still others were always imported. According to Jim Woodruff, Wal-Mart Buyer in Sporting Goods, Divisional Manager over Sporting Goods, Automotive, Hardware and Paint, Vice President and Divisional Manager over Health and Beauty, health and beauty goods and sporting goods were domestically produced under the policy regarding price differential.[26] While the exact market share of Wal-Mart in the categories of Health and Beauty, Sporting and Athletic Goods, Baseball Caps, and Hardware is unobservable, the percentage of Wal-Mart business for their two principle cap suppliers provides an indication of the market share Wal-Mart possessed within this industry.

Figure XIII

Wal-Mart Market Share of ODC Caps
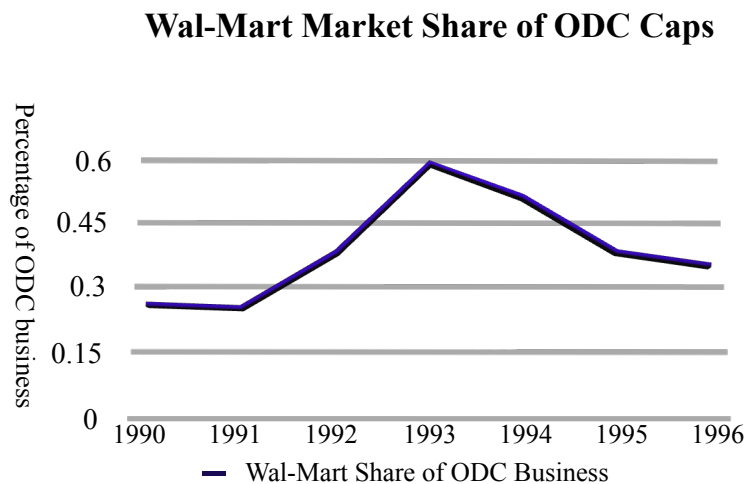
SOURCE: Outdoor Cap Co., Inc. Data

As seen in *Figure XIII*, Wal-Mart maintains an increasing percentage of Outdoor Cap Co., Inc. market share until 1993. Through the recorded buy-American years, Wal-Mart maintains a 24 percent market share of Outdoor Cap Co., Inc. total business. Overtime, records show that the Wal-Mart market share of Outdoor Cap Co., Inc. supply hovers around 45 to 50 percent. Similarly, Paramount Headwear, Inc., also a major supplier of Wal-Mart baseball caps, maintained

---

[26] Woodruff, Jim. Personal Interview. Buyer in Sporting Goods, Divisional Manager over Sporting goods automotive hardware and paint, Vice President and Divisional Manager over health and beauty. 28 August 2009.

similar levels of Wal-Mart business.[27] Furthermore, we can suspect Wal-Mart had significant

market power within the buy-American goods as this unique policy would not likely be imple-

mented if it were expected to have no effect. Additionally, it is plausible the buy-American ini-

tiatives were instituted to generate customer loyalty by appealing to the small town manufactur-

ing workers typical of Wal-Mart towns. As the United States economy shifted from a

manufacture-based economy to a service-based economy, the jobs of these manufacturing work-

ers, who tended to be typical Wal-Mart customers, were in jeopardy. Wal-Mart widely publi-

cized buy-American items within stores, which actualized an image of a corporation on the side

of small town America.

As a measure of Wal-Mart's effect on the aggregate economy, we will investigate total

United States imports of health and beauty products. We expect the general growth trajectory to

be increasing, as the United States economy grows overtime; however, the effect of the buy-

American policy is potentially viewed through the spike of imports in 1992 at the commence-

ment of the Wal-Mart buy-American initiative as seen in *Figure XIV.*

Figure XIV

Health and Beauty Imports
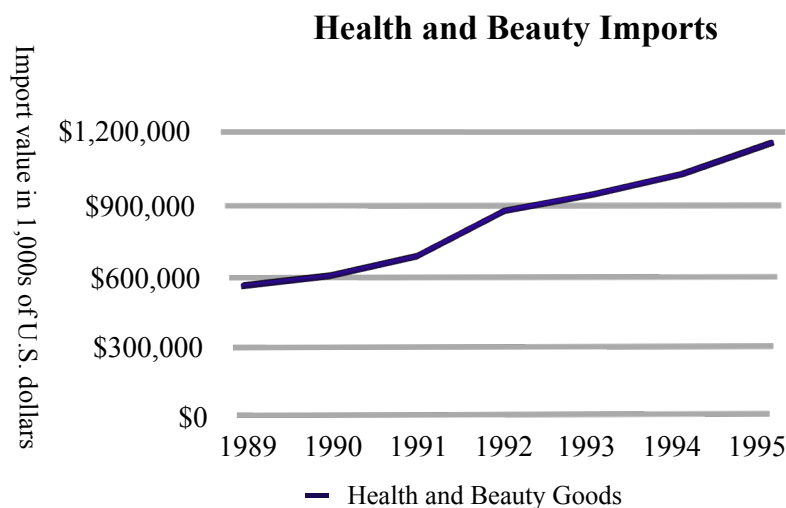
SOURCE: US Department of Commerce and the US Trade and Tariff Data

[27] Garner, Brent. Telephone Interview. Wal-Mart Cap Buyer 1989. 3 February 2009.

Additionally, Mr. Woodruff specified Sporting and Athletic goods as domestically pro-

duced products with regards to the 20 percent price differential policy. As shown in *Figure XV*,

the general growth trajectory is again increasing, yet a spike of imports in 1992 is suggestive of

the impact of the Wal-Mart buy-American policy on Sporting and Athletic Goods.

Table XV

Sporting and Athletic Goods Imports
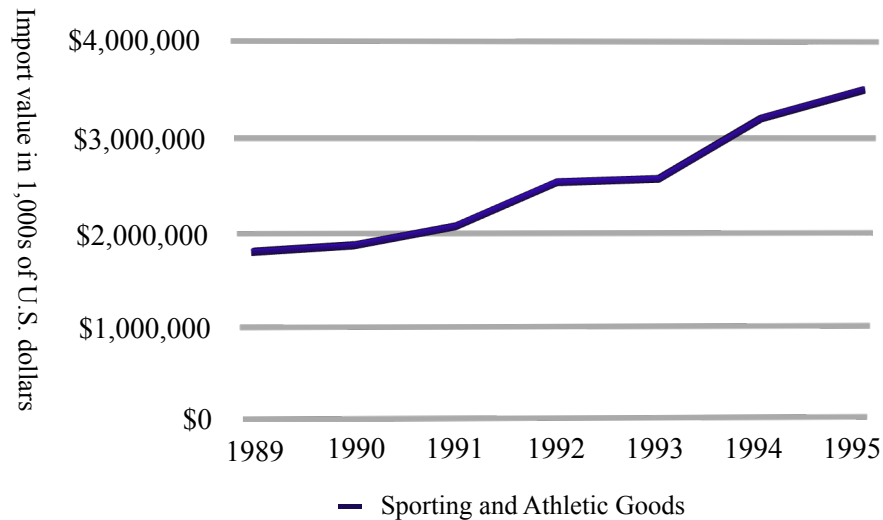
SOURCE: US Department of Commerce and the US Trade and Tariff Data

On the other hand, baseball caps were enumerated a buy-American item, rather than sub-

ject to the price differential buy-American policy. The Wal-Mart company trade policy went into

effect immediately in 1989 and was not completely alleviated until 1992. Yet again, as demon-

strated in *Figure XVI*, a spike in the growth trajectory of U.S. cap imports occurs in 1992, imply-

ing the Wal-Mart buy-American policy did in fact impact the baseball cap industry.

Figure XVI

US Cap Imports
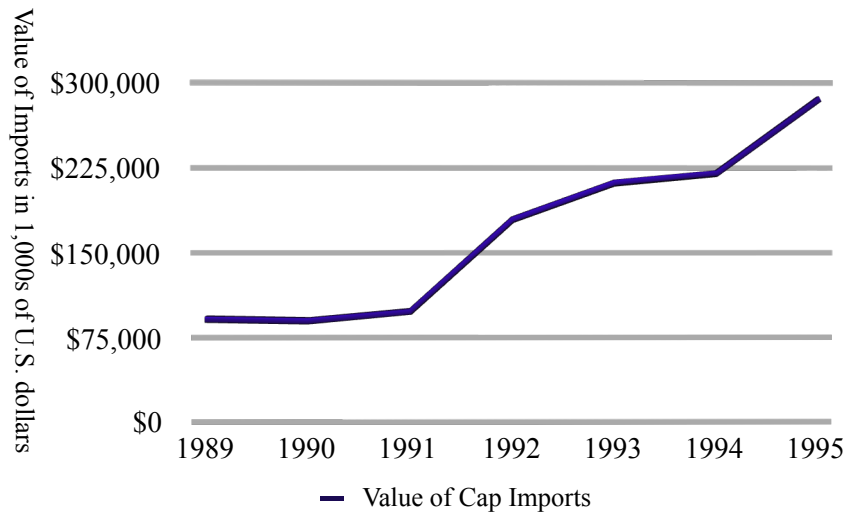
SOURCE: US Department of Commerce and the US Trade and Tariff Data

Certain other goods were either not produced in the United States or American producers were unable to meet the required price differential. Hardware products fell into this category and were continually purchased abroad by Wal-Mart buyers. The growth trajectory of hardware imports, as shown in *Figure XVIII*, reflects this notion as it maintains an increasing slope; however, there is no spike in 1992 with the death of Sam Walton and the abolition of the Wal-Mart buy-American policy.

Figure XVIII

Hardware Imports
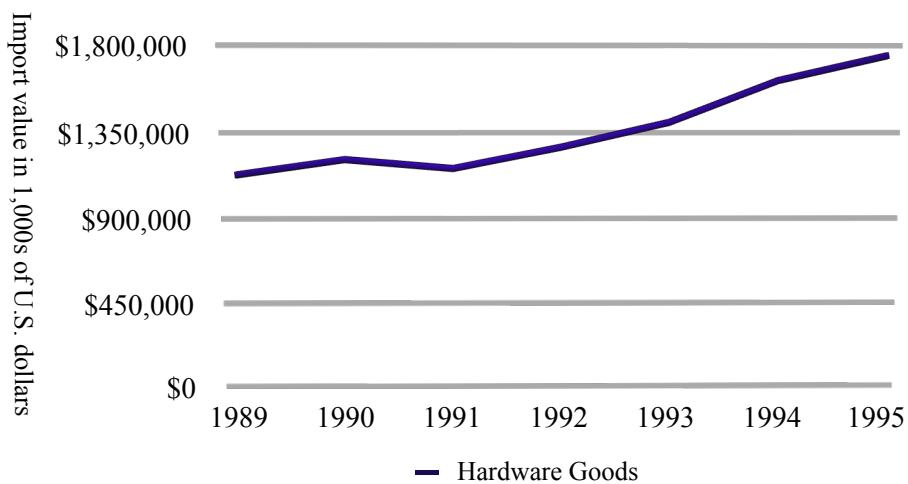
SOURCE: US Department of Commerce and the US Trade and Tariff Data

X. Data

The aggregate United States import data for health and beauty products, sporting and ath-letic goods, baseball caps, and hardware products are compiled from the U.S. Department of Commerce and the U.S. Trade and Tariff data. Import statistics will be utilized to indicate the buy-American impact on the specified products.[28] Imports in our study signifies the summation of the dollar value of baseball hats, health and beauty goods, sporting and athletic goods, and hardware goods, respectively. Additionally, United States GDP data is compiled from the U.S. Bureau of Economic Analysis and will be included in the regression as an indicator of general economic conditions.[29] *Table IV* presents the descriptive statistics of the data set, which is representative of the year 1980 to 1995.

Table IV	**Descriptive Statistics of Variables**				
Variable	**Number Obs.**	**Mean**	**Standard Deviation**	**Minimum Value**	**Maximum Value**
Imports	64	$876 M	$828 M	$43 M	$3,660 M
Health and Beauty Imports	16	$571 M	$332 M	$114 M	$1,157 M
Baseball Hat Imports	16	$268 M	$235 M	$43 M	$667 M
Sporting and Athletic Imports	16	$1.874 M	$1,047 M	$511 M	$3,655 M
Hardware Imports	16	$789 M	$235 M	$433 M	$1,179 M
GDP	64	$5,000,000 M	$1,430,000 M	$2,790,000 M	$7,140,000 M
Number of Wal-Mart Stores	64	1201.813	608.524	312	2211

---

[29] Apparel also fell under the category of the buy-American 20 percent price differential policy; however, the Wal-Mart executives interviewed in this regard revealed this sector was diluted in terms of which apparel goods were domestically produced. Also, it can be inferred that Wal-Mart does not possess as significant market power in the apparel industry due to the stigma associated with discount clothing.

We also attempted to collect U.S. production data for the given goods to provide a more direct measure of the buy-American policy's affect on domestic production; however, the data was unavailable.[30]

XI. Regression Model

Case I

First, we consider estimating the following linear equation by an Ordinary Least Squares Regression with the equation:

$$y_{it} = \beta_{it} + \beta_{GDP} X_{GDPt} + \beta_{WM\ BuyUSA} X_{WM\ BuyUSA} + \beta_{WM\ Stores} X_{WMStores\ t} + \varepsilon_{it} \tag{16}$$

X_{GDPt} represents the logarithm of United States GDP in year t, in order to capture the general movement of the United States economy from the years 1980 to 1995. Furthermore, $X_{WM\ BuyUSA}$ signifies a dummy variable which takes a value of one when the buy-American policies were in place, from 1989 to 1991, and zero otherwise. This policy was applied to health and beauty imports, baseball hat imports, and sporting good imports. We include $X_{WMStores\ t}$ to indicate the number of Wal-Mart stores in the United States in year t. This variable is included to capture the increase in number of Wal-Mart stores and correspondingly the increase in Wal-Mart market power. The variable y_{it} captures the logarithm of total imports for the included industries in year t. The error term ε_{it} is initially assumed to to be independently and identically distributed so the OLS estimation is unbiased and consistent.

---

[30] We attempted to collect United States production data of baseball hats, health and beauty goods, sporting and athletic goods, and hardware. We worked with Government Librarian Frank Lester and found Vanderbilt does not own this data. We also contacted Ernest Wilson at the Bureau of the Census; however, the price of the data was $900.00.

Table V		**I. Ordinary Least Squares Regression**				
Log Import	**Coefficient**	**Standard Error**	**t**	**P > | t |**	**95% Confidence Interval**	
Log GDP	2.731	2.124	1.29	0.203	-1.517	6.980
Buy American	-0.096	0.327	-0.29	0.771	-0.751	0.559
Walmart Stores	0.000	0.001	-0.26	0.795	-0.002	0.002

The results are presented in *Table V*. the Wal-Mart buy-American policy resulted in a 9.6 percent decrease in imports of the stipulated goods when in effect as shown in *Table V*. However, a p-value of 0.327 indicates this coefficient lacks statistical significance. Due to the small sample size, an Ordinary Least Squares regression may prove inadequate due to the potential for autocorrelation. There is potentially time dependence in the aggregate data not captured by an OLS regression. Additionally, aggregate shocks to all products simultaneously may not be appropriately controlled by the OLS regression. Also, without the United States production data of the buy-American goods, there may exist omitted variable bias.

Case II

We control for autocorrelation in this estimation of equation (16). We proceed with an error term such that $\varepsilon_{it} = \rho \varepsilon_{it-1} + u_i$. The following equation describes the regression:

$$y_{it} = \beta_{it}(1-\rho) + \beta_{GDP}(1-\rho)X_{GDPt} + \beta_{WM\,BuyUSA}(1-\rho)X_{WM\,BuyUSA} + \beta_{WMStoes}(1-\rho)X_{WMStores\,t} + \rho y_{it-1} + u_{it} \qquad (17)$$

where u_{it} is independently and identically distributed. If no autocorrelation is present in the sample, ρ will take on a value of 0 and the resulting model will be analogous to that presented in *Case I*. To simulate the equation, we will apply the Prais Winston AR(1) regression. The Prais

Winston AR(1) regression controls for autocorrelation by utilizing the generalized linear regression to account for serial correlation in the error terms. The errors are then assumed to follow a first order autoregressive process.

Table VI		**II. Control for Autocorrelation**				
Log Import	**Coefficient**	**Standard Error**	**t**	**P > | t |**	**95% Confidence Interval**	
Log GDP	2.183	0.770	2.83	0.006	0.642	3.724
Buy American	-0.087	0.065	-1.32	0.191	-0.218	0.444
Walmart Stores	0.000	0.000	-0.20	0.841	-0.001	0.001
	Durbin Watson Statistic (original) 0.027			*Durbin Watson Statistic (transformed)* 1.664		

According to *Table VI*, when the Wal-Mart buy-American policy is in effect, growth of imports of the enumerated buy-American goods declines by 8.7 percent. Nevertheless, a p-value of 0.191 indicates this coefficient lacks statistical significance. As the value of the Durbin Watson statistic is less than 1.346 with a value of 0.027, we conclude that positive autocorrelation is present at the one percent significance level.

Case III

Subsequently, we consider the possibility of cross sectional variation in growth rates being spuriously correlated with the Wal-Mart buy-American policy. Hence, we investigate the error term $\varepsilon_{it} = \Lambda_i + u_{it}$ such that Λ_i captures the correlation in cross sectional variation in growth rates and the buy-American policy and u_{it} signifies the remaining independently and identically distributed error term. We utilize the following equation:

$$y_{it} = \beta_{it} + \beta_{GDP} X_{GDPt} + \beta_{WM\ BuyUSA} X_{WM\ BuyUSA} + \beta_{WMStores} X_{WMStores\ t} + \Lambda_i + u_{it..} \tag{18}$$

Table VII	III. Control for Cross Sectional Growth Rates Spuriously Correlated with Buy-American					
Log Import	**Coefficient**	**Standard Error**	**t**	**P > | t |**	**95% Confidence Interval**	
Log GDP	5.935	10.607	0.56	0.579	-15.486	27.356
Buy American	-0.059	0.124	-0.48	0.636	-0.309	0.191
Walmart Stores	0.001	0.005	0.28	0.782	-0.008	0.012

Henceforth, the Wal-Mart buy-American policy when controlling for spurious correlation between cross sectional variation of growth rates and the policy itself demonstrates a 5.9 percent decrease in import growth among specified buy-American products when the policy is active, as shown in *Table VII*. However, the p-value 0.191 suggests the coefficient is not statistically significant.

Case IV

Additionally, it is necessary to acknowledge the possibility of aggregate shocks to all products not captured elsewhere, such as the NBER recorded recession from 1990 to 1991. To consider aggregate shocks in the regression, we create a dummy variables for six of the seven years of the policy. Then, we run an Ordinary Least Squares Regression. This can be represented by the error term $\varepsilon_{it}=\eta_t+u_{it}$ such that η_t signifies any aggregate shock occurring in year t and u_{it} captures the remaining error, which is independently and identically distributed. Thus, the regression is represented by the following equation:

$$y_{it}=\beta_{it}+\beta_{GDP}X_{GDPt}+\beta_{WM\ BuyUSA}X_{WM\ BuyUSA}+\eta_t+u_{it.} \tag{19}$$

Table VIII		IV. Control for Aggregate Shocks to All Products				
Log Import	**Coefficient**	**Standard Error**	**t**	**P > | t |**	**95% Confidence Interval**	
Log GDP	*(omitted)*					
Buy American	-0.162	0.646	-0.25	0.802	-1.462	1.137
Walmart Stores	0.001	0.000	2.91	0.005	0.000	0.001

When controlling for aggregate shocks to the economy, the buy-American coefficient suggests that when the policy is intact, imports of stipulated buy-American products grow 16.2 percent slower than those which were not effected, as depicted in *Table VIII*. Once again, a large p-value of 0.802 yields the results statistically insignificant.

Case V

Finally, we consider the case such that autocorrelation, spurious correlation of cross sectional growth rates with the policy, and aggregate shocks across all products occur simultaneously. Hence, we now run a regression controlling for all of these possibilities occurring simultaneously, which is represented by the following equation:

$$y_{it} = \beta_{it}(1-\rho) + \beta_{GDP}(1-\rho)X_{GDPt} + \beta_{WM\,BuyUSA}(1-\rho)X_{WM\,BuyUSAt} + \beta_{WMStores}(1-\rho)X_{WMStorest} + \rho y_{it-1} + \eta_i + u_{it.} \quad (20)$$

Table IX		V. Control for Cases I-IV Simultaneously				
Log Import	**Coefficient**	**Standard Error**	**z**	**P > | z |**	**95% Confidence Interval**	
Log GDP	1.279	4.604	0.28	0.781	-7.746	10.304
Buy American	-0.426	0.133	-0.32	0.748	-0.303	0.218
Walmart Stores	0.000	0.002	0.08	0.935	-0.004	0.004

As depicted in *Table IX*, the Wal-Mart buy-American policy results in a 42.6 percent decline in growth of imports of the designated buy-American products when controlling simultaneously for autocorrelation, spurious correlation of cross sectional growth rates with the policy, and aggregate shocks across all products. The p-value of 0.379 indicates the coefficient is statistically insignificant.

XII. Conclusions

We have investigated the Wal-Mart buy-American trade policy from the viewpoint of the supplier. In doing this, we developed a simple model describing the strategic interaction between two firms given a change in policy that affected the baseball cap industry demand from 1989-1992. This model demonstrates the importance of Wal-Mart, due to its share of market power amongst suppliers. Furthermore, this model exhibits the significance of compensation and additional incentives to induce firms to comply with a buy-American type policy, as Wal-Mart purchased hats for an additional dollar per item. If Wal-Mart did not exhibit such market power and comprise such a large proportion of supplier revenue, such a policy would not be plausible. Furthermore, without significant compensation, supplying firms would suffer revenue losses due to high costs associated with producing domestically, and thus, the firms may not choose to move their production plants to the United States. We also relaxed the constant marginal returns assumption presented in the initial model, and presented the symmetric equilibria when considering the possibility of varying returns to scale. Again, we determined the necessary subsidy value to indue firms to produce domestically.

Additionally, we empirically assessed the aggregate impacts of the Wal-Mart buy-American policy in four cases. In Case I, we investigate the policy utilizing an Ordinary Least

Squares regression. Due to the small sample size and limited scope of an OLS regression, Case

II controls for autocorrelation; Case III considers the possibility of cross sectional variation in

growth rates being spuriously correlated with the Wal-Mart buy-American policy; Case IV ac-

knowledges the potential for aggregate shocks across all products simultaneously; and Case V

explores the case such that the three proceeding situations occur concurrently. While the coeffi-

cients of the Wal-Mart buy-American policy suggest the initiative caused a decline in United

States import growth for the specified buy-American goods, each test proved to be statistically

insignificant. Hence, we allow the possibility that the buy-American policy may have been insti-

tuted to generate customer loyalty rather than to generate greater domestic production.

References

Antras, Pol, Luis Garicano, Esteban Rossi-Hansberg. "Offshoring in a Knowledge Economy."

  The Quarterly Journal of Economics, February 2006.

Baily, Martin Neil; Charles Hulten, David Campbell, Timothy Bresnahan, and Richard E. Caves.

  Brookings Papers on Economic Activity. Microeconomics, Vol. 1992, (1992),

  pp. 187-267.

"Fortune Global 500." CNN/Fortune. 2007.

Garner, Brent. Telephone Interview. Wal-Mart Cap Buyer 1989. 3 February 2009.

Holmes, Thomas J. "The Diffusion of Wal-Mart and Economies of Density." Working Paper

  13783.

Javorcik, Beata Smarzynska, Wolfgang Keller, and James Tybout. "Openness and Industrial Re

  sponses in a Wal-Mart World: A Case Study of Mexican Soaps, Detergents and

  Surfactant Producers." *National Bureau of Economic Research*. August 2006.

Jia, Panle. "What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the

  Discount Retailing Industry." July 2007.

Mahan, Paul. Personal Interview. Outdoor Cap Co., Inc. President.

Mahan, Richard. Personal Interview. Wal-Mart Sportswear and Apparel Executive.

  2 January 2009.

Woodruff, Jim. Personal Interview. Buyer in Sporting Goods, Divisional Manager over Sporting

  goods automotive hardware and paint, Vice President and Divisional Manager over health

  and beauty. 28 August 2009.

US Department of Commerce and the US Trade and Tariff Data.

Walton, Sam. <u>Made in America</u>. Random House: New York, NY. June 1993.

Zimmerman, Ann; Hudson, Kris. "Managing Wal-Mart." April 17, 2006.