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Exploring the Consumer welfare effects of MCOOL

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Abstract

Imposing MCOOL in the United States was anticipated to affect demand by providing customers with additional, valuable information. Advocacy groups for MCOOL pointed to studies suggesting that consumers would prefer U.S. meat products and would be willing to pay premiums for confirmation of U.S. origin. MCOOL detractors, including Canada and Mexico, argued that the increased burden from record keeping would favor domestic meat. The subsequent lawsuits and WTO hearings have called into question the relative value of MCOOL to consumers as compared to costs faced by both domestic meat processors and North American trading partners promoting the idea that MCOOL imposes restrictions on imports and acts as a de facto trade barrier. To measure consumer welfare effects on MCOOL, we develop a measure by approximating Hicksian compensating variation as a function of three imported meat product prices and compensated price elasticities. The results show a mild consumer welfare and decrease in demand when MCOOL was implemented.

(2) Introduction

Public Law 107-171 of the U.S. Farm Security and Rural Investment Act of 2002 required country-of-origin labeling (COOL) for beef, lamb, pork, fish, perishable agricultural commodities (fresh and frozen fruits and vegetables) and peanuts. While a goal of this law was to benefit domestic consumers by allowing them to make informed consumption decisions, the effects of COOL on the interest groups involved have been the subject to a heated on-going debate. Advocates of COOL argue the existence of an "overwhelming" consumer support for country of origin information and benefits that substantially outweigh the costs of this labeling regime. Opposing groups have responded by pointing out that if COOL were beneficial, the market would have provided it voluntarily. Opposing groups have also expressed concerns about the potential competitive disadvantage that non-integrated producers might face due to higher record-keeping costs, as well as about the possibility of. In addition to being scrutinized by the interest groups involved, mandatory COOL (MCOOL) has received considerable attention in agricultural

economics literature, with the focus being on estimating consumers' willingness-to-pay for labeled products, and to a lesser extent, the costs associated with its implementation.

It is important to note that COOL is not a food safety or animal health measure since it "Does not provide the traceability required to permit the government to rapidly respond to a contamination or disease outbreak" (Federal Register 2003, p. 61945). Both imported and domestic food products must meet the same food safety standards determined by the Food Service Inspection System (FSIS) and/or the Food and Drug Administration (FDA) Agency.

(2) Literature Review

Advocates of mandatory COOL have argued that consumers would prefer meats from domestically raised animals, and numerous willingness-to-pay studies suggest these preferences would drive premiums for U.S. meat over products from other countries (Gao & Schroeder, 2009). Umberger (2003) studied U.S. consumers' perception of COOL of beef products using a survey conducted from Chicago and Denver in 2002 and an experimental auction. The result shows that about 73% of consumers are willing to pay a premium of 11% for COOL of steak and 24% for hamburger and 19% premium for steak labeled "U.S.A. GUARANTEED". Schupp and Gillespie (2001) conducted a survey to investigate Louisiana's consumers, processors, and producers' attitudes towards mandatory COOL of beef in 1991. The results of the survey show that, 93% of consumers supported mandatory labeling of both fresh and frozen beef in retail stores, 86% of the consumers rated U.S. beef to be of superior quality than imported beef based on issues of safety of imported beef. Opponents of mandatory COOL also contended that the cost adhering to mandatory COOL is too high. Meyer (2008); Peel (2008), assert that beef and pork producers incur additional costs for tracking and separating live animals from different origins. However, some livestock producers are in favor of mandatory COOL because the costs incurred are dependent upon the region and type of livestock. But Meyer (2008), contends that implementing mandatory COOL in the beef and pork sectors would be challenging and very dear as compared to the poultry industry. Several researchers have estimated the additional cost burden on producers and consumers through the implementation of mandatory COOL. Sparks Company, Inc (2003) estimated that mandatory COOL would increase the annual cost of the beef industry about $1.6 billion and $452 million for pork industry. The United States Department of Agriculture also reported about $2 billion for the beef sector (USDA 2003). Vesicle, McEowen, Taylor, Harl, and Connor (2003) estimated that it would increase the cost of the beef industry from $36 million to $132 million and $25 million to

$32 million for the pork industry. VanSickle et al. (2003) also estimated a record keeping cost associated with mandatory COOL between $69.86 million to 193.43 million. Hayes and Meyer (2003), also estimated that implementation of mandatory COOL would raise farm-level production to about $1billion that will result in about 7% decrease in retail pork demand. Studies conducted on the welfare impacts focused on estimating the effects of mandatory COOL on the meats or livestock industry. It includes a study by Chung, Zhang, and Peel (2009). They analyzed the effects of mandatory COOL on the U.S. meat industry with imperfectly competitive processors. The study reveals that as the own price elasticity becomes more inelastic, consumers are inclined to bear the cost of mandatory COOL. However, producer surplus will increase as the domestic demand becomes more elastic. Brester et al. (2004) and Lusk and Anderson (2004) reveal that producer surplus decreases due to the cost associated with COOL. They also indicated that 2% to 4.5% increase in aggregate demand for pork and beef would offset the cost associated with COOL to make the producers welfare neutral. Saak (2011) also indicated that COOL decreases the producers' welfare when relative inputs cost is volatile, and varieties are similar in overall quality. They also showed that mandatory COOL might worsen the distortion in the allocation of the market shares across varieties. These studies were conducted prior to mandatory COOL's final ruling and relied on preliminary cost estimates. The United States Department of Agriculture, Agricultural Marketing Service (AMS,2002) published a "Notice of Request for Emergency Approval of a New Information Collection." In this notice, AMS reported its estimate for the record-keeping costs associated with MCOOL. This estimate for all industries covered by MCOOL was $1.968 billion. United States Department of Agriculture. Agricultural Marketing Service (2003) estimated these costs would be distributed as follows: $1 billion for producers, $340 million for food handlers and $627.75 million for retailers. Annual cost estimates for the beef industry range from $200 million to $6.4 billion, and from $20 million to $1 billion for the pork industry (D. P. Anderson, Davis, & Evans, 2003; Hayes & Meyer, 2003; Sparks Companies, 2003). Proponents of MCOOL argued that most of the larger cost estimates are overstated (Van Sickle et al., 2003). They also point to results of experimental auctions and surveys which suggested that some consumers may be willing to pay a premium for beef that has been labeled by country of origin (Maria L Loureiro & Umberger, 2003). Moreover, the United States Department of Agriculture, Agricultural Marketing Service (2003) found "little evidence that consumers are willing to pay a price premium for country of origin labeling" and that "estimated benefits

associated with this rule are likely to be negligible" (p. 49). Several livestock and food industry groups continue to oppose MCOOL as costly and unnecessary. These groups and the main livestock exporters to the United States; Canada and Mexico view the requirement as trade distorting. Twine and Rude (2012) found that MCOOL was more harmful to Canadian cattle producers than appreciation of the Canadian dollar and the recent global economic recession. Additional research suggested that MCOOL has reduced the competitiveness of Canada's hog and pork industry (Rude, Gravis, & Felt, 2010). According to United State Department of Agriculture, Food Safety Inspection Service (2000), opponents of the law have argued that the costs incurred by producers, importers, packers, wholesalers, and retailers to segregate and preserve the identity of meat products as well as the government expenditures that would be necessary to ensure compliance would outweigh the benefits of labeling. As in any market situation, the general impact of increased marketing costs will be borne in part by consumers as higher retail prices and in part by producers as increased production costs. Although country-of-origin labeling would give U.S. producers the opportunity to create a competitive niche market, if consumer's select U.S. beef over imported beef. As noted by Zago and Pick (2004), welfare effects of labeling regulation ultimately depend upon the perception of quality differences between imported and domestic products and the size of regulatory costs. Apart from the MCOOL debate, Caswell and Padberg (1992) contended in their analysis of the role of labeling information in consumer-good markets that food labels provide more than just "point-of-purchase" information. In today's food markets, information provided through required labeling disclosures "may change the attitude of consumers or consumers advocate (even if the consumers do not read or understand it) and may change the sellers" strategy"" (Caswell & Padberg, 1992). For U.S. farmers to benefit financially from mandatory labels, consumers would have to prefer domestic products to imports. If consumers do prefer domestic products, labels would allow consumers to discriminate between imports and domestic products. As a result, demand for domestic meat products in the U.S. would rise along with domestic meat prices. Further, domestic products would increase their market share at the expense of imports. However, if consumers do not generally prefer domestic products, labeling will not confer any financial benefits to domestic producers. Critics of MCOOL argued that large compliance costs will be more than offset any consumer benefits. The USDA/AMS (2002), the agency responsible for writing the final MCOOL rules, has stated self-certification is not sufficient, and a credible MCOOL program will require verifiable records and a system allowing products to

be traced back to the animal of origin. Others have argued that a domestic traced back system is not required to implement MCOOL, and that the least costly method for regulating MCOOL is presumption of U.S. origin unless the food product carries a label indicating it is a product of another country (Smith, 2003; Van Sickle et al., 2003). USDA"s analysis of its final rule estimated first-year implementation costs to be approximately $2.6 billion for those affected. Of the total, each commodity producer would bear an average estimated cost of $370,000 intermediary firms (such as wholesalers or processors) $48,219 each, and retailers $254,685 each. Some analysts argued that origin does not matter to U.S. consumers (Blank, 1998). Agricultural Marketing Service, 2003) cost estimate, others have developed their own estimates of the costs (both direct and indirect) associated with MCOOL. Hayes and Meyer (2003) similarly concluded the costs of MCOOL implementation would be significant. Based on their estimates, a system with full traceability would raise farm level production costs for pork by $10.22/head (or by a total of just over $1billion). Hayes and Meyer (2003) also explored the potential impacts of MCOOL resulting from a segregated system. Assuming an own-price elasticity of pork of about -0.70, their projected $10/head increase in costs would result in a 7% decrease in retail pork demand. Van Sickle et al. (2003) were decidedly more optimistic in their evaluation of the impacts of MCOOL. Extrapolating from willingness-to-pay estimates, Umberger et al. (2003), calculated an "aggregate willingness to pay" in the beef industry alone of almost $3 billion Van Sickle et al. (2003) also noted other potential benefits such as increased consumer confidence in the labeled product. Plain and Grimes (2003), questioned the relevance of using willingness-to-pay estimates to project benefits from MCOOL. They noted respondents in the study conducted by Umberger et al. (2003) indicated a willingness to pay a premium for beef labeled as a U.S. product. They argued that since almost 90% of muscle cuts of beef and about 75% of ground beef are already of U.S. origin, consumers will not have to pay a premium for U.S. beef even though a sizable percentage of them express a willingness to do so. According to the North American Meat Institute (2014), over the past 10 years, per capita expenditures for beef rose from $188.65 in 1998 to $287.65 in 2012. Pork expenditures also increased from $120.40 in 1998 to $160.06 in 2012. Consumers increased their spending on chicken products from more than $111 per capita in 1998 to $154.14 in 2012. Consumers spent an average of $3.03 per pound on hamburger in 2012 and $4.99 per pound for choice beef cuts. Choice beef cuts can include loins, rib eyes chuck and flank steaks. In 2012, meat and poultry expenditures accounted for 1.6 percent of disposable income per capita, and for 14.3

percent of total food expenditures. In 1998 approximately, 13 percent of the U.S. total beef supply was imported from 11 countries, primarily Argentina, Brazil, Canada, Mexico and New Zealand. While much of this imported beef is subsequently processed or mixed with U.S. beef to make ground products, in 1998, approximately 10.3percent of the total U.S. beef supply. Peel (2003) estimated that COOL would result in decreasing Mexican fed beef imports by 56,248 metric tons (12.2 percent decrease from the current imports) annually, lowering U.S. calf prices by $1.13/cwt., and decreasing feeder and fed cattle prices by 56cents/cwt. and 35 cents/cwt.`, respectively. According to Plain, (2003) U.S. cattle producers can benefit from COOL if the implementation costs are modest and if the process of labeling grocery store beef for country of origin results in a significant increase in the price of U.S. origin beef without a loss in market share. The price of U.S. beef needs to increase enough to offset the cost of COOL to producers, processors and retailers (if processors and retailers will pass-back their COOL related costs in the form of lower bid prices).

(3) Methodology

Measuring Consumer Welfare: Compensation Variation

Let an initial expenditure function before MCOOL be E (p, u), defined as the minimum amount of expenditure necessary to get to a given level of utility *u* and a vector of prices *p*. The compensating variation (CV) to reflect the change of expenditures necessary to compensate consumers for the effects of price changes moving to price level p^1 after MCOOL is given by:

$$CV = E (p^1, u^0) – E (p^0, u^0) \tag{1}$$

A positive CV implies a requirement of more spending to achieve the same utility level u after the price change from p to p^1, and thus there is a decrease in consumer welfare. On the other hand, while achieving the same utility level after the price change, a negative CV implies a drop in spending, and thus we regard it as a gain in consumer welfare. We regard p^1 as the price level after MCOOL is implemented and use the negative of CV as a welfare indicator to show the savings in consumer spending.

To develop a measure of compensating variation (CV), let $q^h (p^1, u^0)$ be a vector of Hicksian compensated demand at the given price p^1 and at the same initial utility level u^0. Given initial

quantities demanded q, the compensating variation can be expressed as the following inner products of price and quantity vectors:

$$CV = p^1 \cdot q^h (p^1, u^0) - p^0 \cdot q^0 \qquad (2)$$

By further defining $dp = p^1 - p^0$ as a vector of price changes, and $dq^h = q^h (p^1, u^0) - q^0$ as a vector of compensated quantity changes, the above equation is transformed into:

$$CV = p^1 \cdot dq^h + q^0 \cdot dp \qquad (3)$$

The compensated changes in quantity, dq^h: is represented by equation (4) below

$$dq_i = \sum_j (\partial q_i / \partial p_j)\, dp_j + (\partial q_i / \partial m)dm \qquad (4)$$

Where $e_{ij} = (\partial q_i / \partial p_j)(p_j/q_i)$ is a price elasticity and $\eta_i = (\partial q_i / \partial m)(m/q_i)$ is an expenditure (or income) elasticity. Where the subscripts of variables (I, j = 1,2, 3) represent beef, pork, and poultry.

Employing a double log form demand model is also used as an alternative model for comparison; that is:

$$\log q_i = \sum_j e_{ij} \log p_{jj} + n_i \log m$$
$$(5)$$

Given the estimated demand elasticities we can apply the Slutsky equation to derive the compensated price elasticity estimates as the following linkage condition:

$$e^*_{ij} = e_{ij} + w_j \eta_i \qquad (6)$$

We then approximate the change in compensated demand $dq^h = q^h(p^1, u^0) - q^0$, by applying the first order differential form as:

$$dq^h_i = \sum_j (\partial q_i / \partial p_j)\, dp_j \qquad (7)$$

Where $e^*_{ij} = (\partial q^h_i / \partial p_j)(p_j/q_i)$ is a compensated price elasticity and dq^h_i is a change in Hicksian demand for the ith meat product in equation (3)

We determined the relative change in domestic price dp, by simply employing the values premium prices of U.S. consumers' willingness-to-pay for beef which lies between 10% and 20% and applied to all the three meat products.

$$P^1 = p^0 (1+\theta)$$

$$\text{or} \tag{8}$$

$$P^1 = p^0 + dp$$

Where θ represents the price increase. In short given demand elasticities obtained from equations (5) including the compensated price elasticities from equation (6), the procedure for measuring the Hicksian compensating variation can be carried out into three steps. The price (p^0) and quantity (q^0) at the base period should be furnished at the beginning. We can now measure straightforwardly for:

$$CV = p^1 \cdot dq^h + q^0 \cdot dp \tag{9}$$

(4) Data and Estimation Procedures

Imported meat products (beef, pork, and poultry) in pounds with their prices from 1989 to 2017 and GDP were obtained from the Office of U.S. Trade Representative (USTR).

We specify a double-log form demand system and estimated by incorporating the parametric constraints of homogeneity, symmetry and Engel aggregation.

(5) Results and Discussions

Tables 2 present the own and cross price elasticities of the estimated demand system for beef, pork, and poultry imported from Canada and Germany, respectively. Using these demand elasticities and prices and quantities information provided in section 3, we are able to measure consumer welfare for each product by country. For the two countries, imports from Canada recorded the highest consumer losses with beef the highest, followed by pork, and then poultry. The losses from beef are as twice of that pork; while poultry is negligible. This result is consistent with literature- that beef packers and retailers will incur higher costs and they will pass them to consumers. Losses from meat imports from Germany are very negligible.

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Table 1. Elasticities of Beef, Pork and Poultry of Canada

	Beef	Pork	Poultry
Beef	-0.512	0.084	-0.413
Pork	-0.409	-0.747	0.645
Poultry	-0.036	-0.104	-0.801

Table 2. Elasticities of Beef, Pork and Poultry of Germany

	Beef	Pork	Poultry
Beef	6.817	13.425	-16.109
Pork	1.758	-1.139	-2.487
Poultry	-1.902	-0.597	-0.608

Table 3. CV of Beef, Pork and Poultry of Canada

	CV ($)	
	10%	20%
Beef	193,984.22	387,968.37
pork	101,324.69	202,649.35
Poultry	10,451.73	20,903.15

Table 4. CV of Beef, Pork and Poultry of Germany

	CV ($)	
	10%	20%
Beef	206.90	439.85
pork	276.73	553.28
Poultry	3328.11	6656.14