Policy relevance of applied economist: Examining sensitivity and inferences

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Policy relevance of applied economist:
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Résumé/abstract

Il est d'avis général que la recherche empirique produit des résultats factuels qui peuvent servir à l'élaboration de politiques publiques. Par contre, le chercheur est sujet à spécifier ses modèles, ainsi qu'à faire des hypothèses susceptibles de refléter ses a priori, influençant potentiellement, du fait, les résultats obtenus. Dans ce papier, nous suggérons qu'une plus grande rigueur tout au long du processus de recherche serait nécessaire afin de communiquer les faiblesses et limitations des résultats. Pour démontrer ce propos, nous considérons deux papiers publiés qui visaient à influencer des politiques agricoles. Pour chacun des papiers, nous identifions des hypothèses associées aux a priori des auteurs et comment ces derniers peuvent influencer les résultats. Par la suite, nous vérifions ces mêmes résultats sous des hypothèses alternatives. Bien que les deux papiers considérés apportent une certaine contribution, la non-divulgation d'hypothèses fortes susceptibles d'affecter les résultats réduit considérablement leur relevance pour les preneurs de décisions. Pour terminer, des suggestions pour améliorer l'objectivité des recherches empiriques sont brièvement discutées.

It is assumed that research based on empirical data produces factual insight that can be used to guide evidence based policies. However, researchers may tend to specify models based on prior beliefs and construe results accordingly. In this paper, we argue that greater scrutiny is needed along the research process to acknowledge and communicate the limitations of research findings. To illustrate, we review two empirical papers from applied economists aimed at influencing policy. Each paper is analysed to identify how inferences based on prior beliefs are used to specify models and how this impacts the result. Additionally, consideration is given to the sensitivity of results under alternative assumptions. While we do find that the considered papers provide valuable knowledge to the field of agriculture economics, they fail in disclosing the limitations of their results to decision makers, thus undermining considerably their policy relevance. Finally, approaches to increase objectivity in empirical research are considered.

Mots-clés/Key words : Empirical economics, agricultural economics, sensitivity analysis, supply management, research bias.

Codes JEL/JEL codes: B41, C18, Q18

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Introduction

Since the 2008 financial crisis, economists have been heavily criticized for their theoretical models that seemed to be detached from how real markets work (Krugman 2009). The Statement by Robert Solow (2010) in front of a congress committee bluntly admits this shortcoming when discussing dynamic stochastic general equilibrium (DSGE) model: "DSGE model has nothing useful to say about anti-recession policy because it has built into its essentially implausible assumptions the "conclusion" that there is nothing for macroeconomic policy to do."

To address these concerns Lawson (2013) calls on economists to scrutinize more closely the failings of the economic field. In response, Hardt (2016) offers a philosophical analysis that addresses the common criticism in regards to economics producing unrealistic models, excessive mathematization and over confidence into theoretical claims. He suggests that these models are useful; the unrealistic assumptions are not a problem because they allow insight into the working of the economy. But he cautions that applying such models wrongly is the culprit, since considerations of the assumptions are needed to aptly extend the results into the real world.

To resolve controversies in theoretical debates and validate models, economists often turn to empirical studies. One would assume that empirical analysis, using real-world data, is objective and that it narrows the gap between the real world and economic theory. Data based research should help inform researchers while providing guidance for evidence-based policies. The access to rich databases from national surveys, financial databases and consumer data, should provide for a factual assessment of trends and projections. However, this abundance of data has drawbacks since it allows a large number of model specifications. Consequently, researchers can, conscientiously or not, select a specification that supports prior beliefs. This issue is not new, it was previously raised by Leamer (1983) who illustrated how prior beliefs can lead to contradictory

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results. Leamer (1983) considers a model to measures the deterrent effect of capital punishment using two models specification from a set of 14 variables based on a prior belief. In one specification, each capital punishment is shown to deter approximately 23 murders. Using alternative priors, a different specification from the same set of variables finds that each capital punishment would contribute to 12 additional murders. Leamer (1983) shows that it is possible to obtain opposing results using two plausible sets of variables that cannot be objectively determined.

Similarly, Paldam (2016) simulates the process an economist uses to produce an empirical paper. He assumes that the researcher will choose the 'best' estimate of J regressions according to some selection rule. This rule is based on a weighted consideration for both the fit (statistical significance) of the model and the size of the parameter of interest. Paldam (2016) simulates over 70 million regressions using this decision rule. He finds that the selected regression will always be biased, irrespective of the distribution weight given to fit and size of the parameters. These results from simulation have also been observed in a review of the empirical economics literature (Doucouliagos and Stanley 2013). The implications of Paldam (2016) results are that replicability of results is not sufficient to assure credibility, because they are not empirically wrong, but greatly exaggerated (Doucouliagos and Stanley 2013). Economists may in fact be victims to their own assumptions when model specification is chosen to maximize the researcher's personal utility. What is needed, according to McCloskey (1991), is a replicability that tests the sensitivity of the conclusion under alternative assumptions.

Recently, it has been argued that agricultural economists need to improve their policy relevance by taking advantage of insight gained from empirical work (Doyon 2015; Herberich, Levitt and List 2009). In the same spirit, to increase the credibility of research from applied economist and to positively contribute to public debate closer scrutiny needs to be placed on assumptions and inferences made by researchers. To illustrate

this, we analyze two published papers in agricultural economics that provide empirical results aimed at influencing policy and who were either cited in the popular press or have been used for policy review. We proceed by analysing each paper under the angle of inferences and sensitivity of the results. We find that although the results could provide interesting insight, they are tainted by inferences and their results are not robust to different assumptions. Thus, policy makers should be informed of the limits of such results and authors should fully disclose the sensitivity of their empirical results. A few ideas towards accomplishing this goal are discussed in the final section of this paper.

Paper 1.

The first paper for analysis is by Cardwell, Lawley and Xiang (2015) titled; *Milked and Feathered: The Regressive Welfare Effects of Canada's Supply Management Regime* (referred to as MF in the remainder of this article). The authors of the MF paper have created a demand model from Canadian Food Expenditure survey to estimate consumer responses to price changes for dairy and poultry products; items under supply management in Canada. The objective of the paper is to measure the regressive effect of Supply Management (SM) on Canadian consumers. They conclude that "*…SM policies are highly regressive, imposing a burden of approximately 2.3 percent ($339) of income per year on the poorest households, compared to 0.5 percent ($554) for the richest households.*"

MF is of interest for this analysis since it has practical implications that may impact policy outcomes. Furthermore, the paper is published in Canadian Public Policy, a Journal that describes itself as aimed towards a "…readership including decision makers and advisers in business organizations and governments, and policy researchers in

private institutions and universities."[1] The paper has also been used in the public debate, being the subject of articles in The Globe and Mail (McKenna 2015) and The National Post (Csanady 2015). Recently, Joe Oliver, former finance minister, used the findings in MF to argue in favor of dismantling supply management in a piece that appeared in the Financial Post (Oliver 2016). Similarly, the Montreal Economic Institute (MEI) released research papers, based on the findings in MF, indicating that the cost of SM on consumers is responsible for pushing over a hundred thousand Canadian families into poverty (Dumais and Chassin 2015; Geloso and Alexandre 2016).

This paper is also of interest because it deals with a topic with a clear dichotomy of opinions. On the one hand, opponents believe that SM is an implicit tax on consumers with the benefit being transferred to wealthy farmers. On the other hand, proponents of SM defend that it provides stability to farmers and consumers, with farmers receiving a larger share of the consumer dollar with little effect on retail prices. The authors' objective in MF paper is to show that SM is a regressive tax, suggesting that the authors adhere to the former opinion.

Note that this analysis does not deal with the inner workings of the empirical model, but rather deals with the assumptions and inferences made to obtain price premiums used in the model to calculate welfare estimates.

In MF, consumer welfare lost to SM is calculated using price premiums that represent the difference between actual prices under SM and a fictitious scenario without SM. Specifically, the authors assume that Canada would be a price taker if SM was dismantled. Therefore, they construct counterfactual prices using a series of cross-border price comparisons between Canada and the United States (Table 1 reports these prices and the premiums). The price premiums are pivotal variables that determine, with elasticities obtained from their model, the size of the estimated consumer burden.

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[1] From the Journal's web site. https://www.utpjournals.com/Canadian-Public-Policy.html, last retrieved 2016-09-16

Table 1. Cross-Border 2011 prices used to calculate premiums reproduced from Cardwell, Lawley and Xiang (2015)

			Milk and Feathered	
		Canada	US[1]	Premiums
Milk (whole)	$/4litres	5.48	4.01	37%
Butter	$/kg	4.34	3.56	22%
Yogurt	$/500grams	2.36	1.53	54%
Cheese (processed)	$/250 grams	2.8	2.11	33%
Ice cream	$/2 litres	5.38	4.74	14%
Chicken (weighted aggregate)	$/kg	7.58	4.72	61%
Chicken (leg)	$/kg	3.65	3.12	17%
Chicken (breast)	$/kg	11.75	7.18	64%
Chicken (whole fresh)	$/kg	5.51	2.92	89%
Turkey (whole frozen)	$/kg	3.33	2.97	12%
Eggs (large)	$/dozen	2.52	1.47	71%

[1]Values converted to CAD currency using exchange rate of 1.011CAD/USD

Inferences

The first issue raised regarding MF empirical results relates to the inferences made to construct the alternative price scenario. Leamer (1987) believes that the fundamental problem facing econometrics is how to account for inferences that are based on economists' opinion. He tells the following story that clearly illustrates this difficulty:

> "*The econometrician is like a farmer who notices that the yield is somewhat higher under trees where birds roost, and he uses this as evidence that bird droppings increase yields. However, when he presents this finding […], another farmer in the audience objects that he used the same data but came up with the conclusion that moderate amount of shade increase yields. A bright chap in the back of the room then observes that these two hypotheses are indistinguishable, given the available data.*" Leamer (1983) p. 31

What distinguishes the conclusion of each farmer is the prior beliefs of the farmer; the first being that bird droppings are good for yield and the second being that some shade may be beneficial. These priors cannot be resolved on the basis of the available data alone, but are rather inferred from opinion. How does this apply to our analysis of MF?

MF makes the inference that the price difference observed between food products in Canada and US are caused by SM. From this same data others may infer that the price differential is caused by other variables that distinguish each country. Some may believe that the US has stronger market competition at the retail level or better farm programs. Others may believe that the distribution networks in each country have different efficiencies. Similar to Leamer's example, it is not possible to determine that the price premium is caused by SM without making an inference based on opinion. The inference in MF is rationalized by the authors under the assumption that Canada will be a price-taker, at the retail level[2], for products under SM. Since Canada is a relatively small player this assumption seems reasonable. However, the authors could verify this assumption with the data. Leamer suggests "…*at least a partial solution to this problem [of inferences] has already been formed by practicing econometricians. A common reporting style is to record the inferences implied by alternative sets of opinion.*" (p. 38)

In this regard, comparing price for food items not under SM could provide insight into the true influence SM has on prices. If Canada is a price-taker at the retail level in absence of SM, then other farm products not under SM in Canada should be found to have little price differences in a cross-border comparison. On the other hand, if premiums are observed in food products not under SM, than this sheds doubt on the underlying assumption.

We consider some food products widely produced in Canada but not under a SM system. This includes prices for beef cuts, pork cuts, carrots and apples. The 2011 Canadian prices are calculated from average monthly food retail prices taken from

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[2] In the case of Pork, not under SM, Canada is in fact a price taker at the farmgate. However, by time the pork product is on the retail shelf the prices do not match those found in the US retail stores.

CANSIMS database Table 326-0012 (Statistics Canada). US prices represent year 2011 averages for all US cities calculated from US Bureau of Labor Statistics Average monthly consumer price. Similar to MF, the exchange rate of 1.011(CAD/USD) was used to convert values to Canadian currency. The results are found in table 2. All food items have a positive premium including pork, beef and fruit and vegetables. This premium is at 50 percent on ground beef, above 30 percent for cuts of beef steak and at 12 percent for stewing beef. The pork chops have a 25 percent premium and Bacon 11 percent. The carrots have a premium of 11 percent and apples 13 percent. Finding positive premiums on farm food products not under SM suggest that other market conditions in Canada may be influencing prices upwards. Therefore, what can be *factually* concluded from the data is that numerous food prices at the retail level, at near-parity rates, are higher in Canada, and this independently of whether or not they are under SM.

Table 2: Cross-border price comparison for non-supply management food items under two exchange rate scenarios. (Calculated from US Bureau of Labor Statistics average monthly consumer prices 2011, all US cities).

		Cross Border price comparaison 2011		
		Canada	US[1]	Premium
Beef				
Sirloin Steak	$/kg	16.17	11.73	38%
Round Steak	$/kg	13.43	10.03	34%
Stewing Beef	$/kg	10.26	9.2	12%
Ground Beef(regular)	$/kg	8.21	5.47	50%
Pork				
Bacon	$/500g	5.05	4.55	11%
Pork chops	$/kg	10.1	8.1	25%
Fruit and Vegetables				
Carrots	$/kg	1.87	1.68	11%
Apples	$/kg	3.37	2.97	13%

[1]Values converted to CAD currency using exchange rate of 1.011CAD/USD

Sensitivity

Exogenous market effects can modify the results of empirical results and should be considered when running a model (Leamer 1982). The cross-border price comparison used to calculate the premiums in MF is based on the average yearly exchange rate of 1.011 (CDN/USD)[3]. It would be reasonable to examine the sensitivity of the premiums by considering different exchange rates, an exogenous variable with high variability. Historically, the Canadian-US exchange rates have been volatile, reaching a high of 1.103 CAD/USD in November 2007 and a low of 0.618 CAD/USD in January 2002.[4] Variation in exchange rates have little impact on observed crossed border prices, since prices of products under supply management are only marginally influenced by US prices. Therefore, changing exchange rates will not change observed prices but will change the estimated premiums, and by consequence, will change the welfare estimates from the MF model. To illustrate, consider two alternative scenarios; an exchange rate of 0.811 CAD/USD which represents the average rate from 1990 to end of 2015; and the rate of 0.757 CAD/USD observed in September 2016. Table 2 reports the premiums of these rates against those calculated in MF for 2011, using the same cross-border prices previously mentioned (Table 3).

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[3] We consider, for the purpose of this paper the most recent prices available, the cross border prices of 2011 (table1). The authors claim to have converted the prices using the average yearly exchange rate of 2011 on these prices (at 1.011 CAD/USD .)

[4] From the Bank of Canada Web site, http://www.bankofcanada.ca/rates/exchange/cad-usd-rate-lookup/, last retrieved 19 September 2016.

Table 3. Estimated premiums for items under supply management calculated using different exchange rate scenarios based on cross-border prices reported in Cardwell, Lawley and Xiang (2015)

Product		Estimated price premiums per exchange rates		
		Milked and Feathered **Average 2011** 1.011 (CAD/USD)	**Scenario 2** **1990-2015 Average** 0.811 (CAD/USD)	**Scenario 3** **September 2016** 0.757 (CAD/USD)
Milk (whole)	$/4litres	37%	12%	4%
Butter	$/kg	22%	0%	-7%
Yogurt	$/500grams	54%	26%	18%
Cheese (processed)	$/250 grams	33%	9%	1%
Ice cream	$/2 litres	14%	-7%	-13%
Chicken (wgt aggregate)	$/kg	61%	32%	23%
Chicken (leg)	$/kg	17%	-4%	-11%
Chicken (breast)	$/kg	64%	34%	25%
Chicken (whole fresh)	$/kg	89%	55%	44%
Turkey (whole frozen)	$/kg	12%	-8%	-14%
Eggs (large)	$/dozen	71%	40%	31%

Using a 25-year historical average, we find that most products premiums are greatly reduced. The average premium across all products is 43 percent under the MF exchange rate. However, the average premium is reduced to 17 percent on the historical average and to 9 percent on the most recent exchange rate. With the most recent exchange rate, four products have a negative premium, keeping the assumption made in MF, this would imply that SM is beneficial to consumers for some common products like butter, turkey, and ice cream. Under this rational, for these products SM is no longer a tax, but a subsidy that mostly benefits the poor.[5] The exact consumer welfare estimates would have to be determined by running the model with these values, but is beyond the objectives of this paper. Nevertheless, it can safely be stated that estimated consumer

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[5] A recent currency rate minimum of 0.70 was observed in January 2016. At this rate, the majority of products have a negative premium..

burden reported in the MF is sensitive to the currency conditions. The three years chosen for analysis in the original paper, 2009 to 2011, are not representative of the long-term exchange rate in Canada. Sensitivity testing to exchange rate is warranted in this study since SM is a system that has persisted over many decades and under many exchange rate conditions. Consideration of alternative exchange rates provides the readership, consisting of politician and decision makers, important information regarding the sensitivity of consumer burden estimates over time.

Rhetoric.

To inference and sensitivity potential problems we would also caution on rhetoric. McCloskey (1983) suggest that arguments need to be scrutinized to see how they are formulated to convince the reader. The authors of MF apply the results in a setting that suggest that SM is a regressive implicit tax. A tax is said to be regressive if it taxes the poor at a higher percentage relative to income. However, any fixed cost calculated as percentage of income will be higher for lower earners. In this sense, the cost of an apple is regressive. Similarly, any public policy that will not discriminate by income is regressive. The authors use this tautology as an appealing argument that presents the poor as victims of SM. Furthermore, as discussed above the estimated consumer burden is not caused solely by SM, therefore portraying this burden as an implicit tax is misleading and omits to mention any benefit SM might have.

Second paper

The second paper analysed is by Katz, Bruneau and Schmitz (2008) titled: *Identifying and Applying a Comparative Advantage Framework in Canadian Supply-Managed Agriculture*. This paper is of interest for our analysis because it uses empirical results to prescribe action of Canadian agricultural policy. Specifically, it uses the comparative advantage (CA) of each province to determine what should be the fair quota allocation of supply management agricultural products.

The authors concede in the introduction that "…*the concept of CA is not well understood by practitioners and can be difficult to apply empirically."(*p.130). Despite these words of caution, Katz, Bruneau and Schmitz (2008) prescribe a policy action, based on their empirical results, suggesting that SM quota allocations be shifted to the prairies. The paper has been cited by the Province of Saskatchewan to justify a demand for more egg production quota, which demonstrates its use by policy makers.

In this paper, CA is measured using relative comparative advantage (RCA) as defined by Ballasa (1965) and amended by Bowen (1983). They calculate the RCA[6], as the share of agriculture production in national agricultural production divided by share of gross provincial production in national gross production (Table 4).

Table 4. Canadian provinces agriculture revealed comparative advantage (RCA) (reproduced from Katz, Bruneau and Schmitz, 2008)

	RCA per province of Canada									
	NF	PEI	NS	NB	QU	ON	MN	**SK**	AB	BC
RCA* based on sector gross output relative to total goods output										
Agricultural	0.24	3.71	0.71	0.68	0.68	0.41	3.60	**5.53**	1.73	0.84
Grains	0.00	0.92	0.03	0.07	0.22	0.22	5.43	**17.7**	2.05	0.08
Other	0.30	4.34	0.87	0.82	0.80	0.45	3.22	**3.67**	1.66	1.03
RCA* based on sector gross output relative to total goods output and service output										
Agricultural	0.23	3.16	0.56	0.68	0.69	0.42	3.10	**6.15**	2.02	0.66
Grains	0.00	0.78	0.03	0.07	0.23	0.23	4.67	**19.6**	2.39	0.07
Other	0.28	3.70	0.68	0.82	0.80	0.47	2.76	**4.08**	1.94	0.80

*Calculated on outputs, authors refer to this as Revealed output advantage (ROA).

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[6] While the original RCA is calculated on exports, the revised version proposed by Bowen(1983) is based on output.

Inferences

The results reported in Table 4 show that Saskatchewan has the highest value RCA, and suggest that Saskatchewan has an agricultural CA relative to all other provinces. The inference made by the authors is that high RCA for agricultural output in Saskatchewan, at the aggregated level, suggest that similar RCA exist for specific agricultural subsectors, including egg production. Using the same logic, one can infer that Saskatchewan has a CA for producing tomatoes. The rational of the authors for inferring a CA in feather production is that agricultural resources are fully mobile, in the sense that producers can reallocate capital and labor across sectors given that 'many if not most' livestock operations also produce some feed crops. The authors do not provide any evidence to support this substitution assumption. For instance, the authors could have provided data on animal production in Saskatchewan not under SM to illustrate the natural allocation of animal production in an open market. To illustrate, consider farm cash receipts of hog farms, which are not under SM, for Manitoba, Québec, Ontario and Saskatchewan (Table 5). Saskatchewan produces significantly less hogs compared to other provinces. In 2005, Saskatchewan hog farm cash receipts represents 8 percent of the national total, compared this to 26 percent for Québec, 25 percent for Ontario, and 24 percent for Manitoba. Furthermore, in 2015 hog farm cash receipts diminished for Saskatchewan while they rose in Ontario and Québec. If Saskatchewan had a CA in animal production relative to other provinces we would expect that its share of hog farm receipt to increase over time. The data suggest otherwise, it does not support the substitution assumption made by the authors and raises doubts that Saskatchewan's CA for agriculture can be interpreted as CA for agricultural animal production including feather and eggs.

Table 5: Farm Cash Receipt for hog farmers for selected provinces and Canada, for 2005 and 2015.

| | Farm Cash Receipts* | | | |
| | 2005 | | 2015 | |
	Cash receipt	%[a]	Cash receipt	%[a]
Canada	**3 933 471,00 $**	**100%**	**4 224 744,00 $**	**100%**
Quebec	1 031 916,00 $	26%	1 322 506,00 $	31%
Ontario	965 702,00 $	25%	1 123 857,00 $	27%
Manitoba	956 158,00 $	24%	1 018 425,00 $	24%
Saskatchewan	314 091,00 $	8%	288 664,00 $	7%

*Statistics Canada Farm cash receipts, CANSIMS Table 002-0001

[a] Percentage of total national hog cash receipt.

Sensitivity.

The calculation of RCA is sensitive to assumptions. A commentary on this paper by Mussell, Oginskyy and Oemke (2009) discusses alternative specification for the RCA calculation and shows that results are highly sensitive to changes made in the aggregation of sectors. Mussell, Oginskyy and Oemke (2009) suggest that CA should be calculated relative to agricultural output, not relative to the whole provincial output. Specifically, the share of a specific agricultural industry should be set as the numerator and the denominator be the share of gross agriculture output. The rational for this approach is that farmers cannot convert their production to manufacturing but rather to other agricultural practices. The estimates of two alternative specifications of RCA measures are given. First, aggregated animal production on gross agricultural production and second, grain production on total gross production (Table 6). The specification provides estimates that lead to conclusions much different than those of Katz, Bruneau and Schmitz (2008). The alternative assumption shows the sensitivity of CA to the specifications chosen by the authors.

Table 6. Comparison of relative comparative advantage with differing subsector specification (reproduced from Mussell, Oginskyy and Oemke 2009)

	RCA per province of Canada									
	NF	PEI	NS	NB	QU	ON	MN	**SK**	AB	BC
RCA* Meat, fish and dairy with respect to Crop Animal production										
Meat fish and dairy	5.18	3.60	2.75	5.10	0.55	0.56	1.27	0.52	0.83	2.83
RCA* grains with respect to Crop Animal Production										
Grains	N.A.	0.26	N.A.	0.11	0.48	0.70	1.44	2.04	1.23	0.10

*RCA Based on Gross Output.

Our objective is not to identify the best specification of RCA to reveal provincial CA in agriculture, but to question the rhetoric used by agricultural economist when presenting empirical data. In the above example, two possible specifications lead to different conclusions. Bruneau and Schmitz (2009) suggest a calculation of RCA that interprets CA as an opportunity cost at the provincial level. In other words, it is assumed that provinces must make an allocation choice between agriculture and manufacturing. The alternative measure provided by Mussell, Oginsky and Oemke (2009), considers CA to be determined by the opportunity cost faced by farmers, such that the farmer must choose the type of agricultural production to engage in. Both views cannot be resolved empirically since it relies on a subjective interpretation of CA. Mussell, Oginsky and Oemke (2009) summarize this difficulty as follows; "*There are conceptual arguments to be made in favor of various means of aggregating and indexing data to measure comparative advantage, but the issue of which is the best measure is rather moot."* By consequence, empirical results of this type must be discussed prudently, avoiding to prescribe policy actions on sensitive empirical results. Ideally calculating CA using

different assumptions provides the policy maker a better understanding of the sensitivity of the result, and provides the basis to make well informed decisions.

Discussion.

The two papers discussed illustrate the problems of inference and sensitivity. This discussion is by no means aimed specifically or restricted to the chosen articles. In fact, the presence of such bias is widespread in the empirical literature (Doucouliagos and Stanley 2013; Randazzo and Haidt 2015).

A solution to improve the process and avoid these problems is to challenge empirical findings prior to publication. This can be done at several steps in the research process. The ideal situation is that research be conducted in collaboration with economists of diverse ideologies (Ioannidis 2012). This solution can sometimes be difficult to attain since researchers may not want to collaborate since it adds to the complexity of research and can be logistically impractical. Some economists may want to keep monopolies on datasets until their paper is published and may not want to share resources. These difficulties may be amplified when economist have different beliefs.

A more practical solution may be, as suggested by Leamer (1983), that researchers consider running models with inferences that would be made by a variety of opinions. This approach is challenging since some researchers may have ideological blind spots that prevent them from seeing valid opinions. Sharing preliminary papers, or presenting to researchers with opposing views will help raise inferences that the researcher may have overlooked. Booth (1967) said, "*We believe in mutual persuasion as a way of life; we live from conference to conference*."

The review process offers another opportunity to assure that a paper has adequately addressed inferences and tested alternative assumptions. However, editorial boards can sometime serve specific ideologies and have a confirmation bias towards certain results

(Ioannidis and Doucouliagos 2013; Nelson 2011), or may be limited in their choice and the availability of referees.

The elements raised in our discussion of Paper 1 could have been dealt with in the review process. A referee with different views could have suggested adding a brief statement that discusses the limits of attributing all price discrepancies on SM, and noting that exchange rates may alter results. Similarly, for Paper 2, one could have highlighted the sensitivity of CA results to alternative specification, while suggesting toning down the 'prescriptive' nature of the concluding remarks.

To this effect, Berk, Harvey and Hirshleifer (2017) provide important guidelines to improve the review process. We would add to these observations that it would be best to have at least one reviewer who is not perfectly aligned with the opinions expressed in the submitted paper. While this may make the submission process more difficult, it will help identify inference, sensitivity and rhetoric problems. These improvements are especially important for journals aimed at decision makers, since information regarding the limitation of assumptions is required (Hardt 2016). Sensitivity of empirical results should be transparently conveyed and measurable, since policy makers need this information to make decisions.

McCloskey (1983) argues that economist must not strip themselves of their ideology and beliefs to conduct research. In fact, these things are useful in guiding the researcher and provides valuable intuition. She quotes Booth (1967): "Rhetoric must not be to talk someone else into a preconceived view; rather it must be to engage in mutual inquiry" (p. 137). Empirical economics needs to be challenged and this can only be done by engaging in communication between economists with different ideologies. Analysis of empirical data will never be free of subjectivity, but scrutiny all along the research process can provide an honest view of the economic realities at work, and help guide policy to better decisions.

References

Balassa, B. 1965. **"**Trade liberalization and revealed CA." *The Manchester School of Economics and Social Studies* 33: 99–123.

Berk, J., Harvey, C. R., and Hirshleifer, D. A. 2017. "How to Write an Effective Referee Report and Improve the Scientific Review Process." *Journal of Economic Perspectives* 31(1): 231-244.

Booth, W.C. 1967, *Modern Dogma and the rhetoric of assent*, Chicago, IL: University of Chicago Press.

Bowen, H. P. 1983**. "**On the theoretical interpretation of indices of trade intensity and revealed comparative advantage." *Weltwirtschaftliches Archiv* 119: 464–72.

Bruneau, J. F. and Schmitz, A. 2009. "Identifying and Applying a Comparative Advantage Framework in Canadian Supply-Managed Agriculture: Response." *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* 57(1): 165-168.

Cardwell, R., Lawley, C., and D. Xiang. 2015. "Milked and feathered: The regressive welfare effects of Canada's supply management regime." *Canadian Public Policy* 41(1): 1-14.

Csanady, A. 2015. "Supply management costs poor families five times more relative to household income." *National Post.* 26 Feburary 2015. Accessed 13 september 2016.

Doucouliagos, C., and T.D. Stanley. 2013."Are all economic facts greatly exaggerated? Theory competition and selectivity." *Journal of Economic Surveys* 27(2): 316-339.

Doyon, M. 2015. "Can Agricultural Economists Improve Their Policy Relevance?", *Canadian Journal of Agricultural Economics* 63(1): 1-5.

Dumais M., and Y.Chassin. 2015, *Canada's Harmful Supply Management Policies*. Montreal Economic Institute.

Geloso, V., and M. Alexandre. 2016. *Supply Management Makes The Poor Even Poorer.* Montreal Economic Institute.

Hardt, L. 2016. "The Recent Critique of Theoretical Economics: A Methodologically Informed Investigation." *Journal of Economic Issues* 50(1): 269-287.

Herberich, D. H., Levitt, S. D., and List, J. A. 2009. "Can field experiments return agricultural economics to the glory days?" *American Journal of Agricultural Economics* 91(5): 1259-1265.

Ioannidis, J., and C. Doucouliagos. 2013. "What's to know about the credibility of empirical economics?" *Journal of Economic Surveys* 27(5): 997-1004.

Ioannidis, J. 2012. "Scientific inbreeding and same-team replication: type D personality as an example." *Journal of Psychosomatic Research* 73: 408–410.

Katz, M., Bruneau, J. F., and A. Schmitz. 2008. "Identifying and Applying a Comparative Advantage Framework in Canadian Supply-Managed Agriculture." *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* 56(2): 129-143.

Krugman, P. 2012 "How Did Economists Get It So Wrong?" *The New York Times*, 6 September. Accessed 28 Feburary 2017. http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html

Lawson, T. 2009 "The Current Economic Crisis: Its Nature and the Course of Academic Economics." *Cambridge Journal of Economics* 33(4): 759-777.

Leamer, E. E. 1983. "Let's take the con out of econometrics." *The American Economic Review* 73(1), 31-43.

McCloskey, D. 1983. "The Rhetoric of Economics." *Journal of Economic Literature* 11: 481-517.

McCloskey, D. 1991. "Economics Science: A Search Through the Hyperspace of Assumptions?" *Methodus* 3: 6-16.

Mckenna, B. 2015. "Tories did lousy job explaining TPP to Canadians." *The Globe and Mail.* Accessed 13 September 2016. http://news.nationalpost.com/news/canada/canadian-politics/supply-management-costs-poor-families-five-times-more-relative-to-household-income-study

McNeill, M. 2014. "Canadians paying more for dairy, poultry." *Winnipeg Free Press.* 30 September. Accessed 13 September 2016. http://www.winnipegfreepress.com/business/canadians-paying-more-for-dairy-poultry-277548751.html

Mussell, A., Oginskyy, A., and Oehmke, J. F. 2009. "Identifying and Applying a Comparative Advantage Framework in Canadian Supply-Managed Agriculture: A Comment." *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* 57(1): 159-163.

Nelson, J.P. 2011. "Alcohol marketing, adolescent drinking and publication bias in longitudinal studies: a critical survey using meta-analysis." *Journal of Economic Surveys* 25(2): 191–232.

Oliver, J. 2016. "Supply management is milking the poor — and no party will stop it." *Financial Post*. 13 April. Accessed 13 september 2016. http://business.financialpost.com/fp-comment/joe-oliver-supply-management-is-milking-the-poor-and-no-party-will-stop-it

Paldam, M. 2016. "Simulating an empirical paper by the rational economist." Empirical Economics, 50(4):1383-1407.

Randazzo, A., and Haidt, J. 2015. "Are Economists Influenced By Their Moral Worldviews? Evidence from the Moral Foundations of Economists Questionnaire", Available at SSRN (https://ssrn.com/abstract=2700889)

Romer, P. 2016. "The Trouble with Macroeconomics." Working Paper, Stern School of Business, New York University.

Solow, R. 2010. "Building a science of economics for the real world." *House Committee on Science and Technology Subcommittee on Investigations and Oversight*, 20.