# ESTIMATING THE IMPACT OF BEEF IMPORT RESTRICTIONS IN THE US IMPORT MARKET: REPLY

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In discussing our recent paper (Chambers et al. 1981) in this *Journal*, Martin (1982, p. 233) claims that we 'have not incorporated the restraints on quantity' and then goes on to say that on an annual basis the supply of imports in the US beef import market is vertical'. This view of the market implies that the annual quota amount provides a strict upper limit on the amount that can be imported into the U.S.A. This is simply not the case. While the Beef Import Law required the President to invoke the quota when the level of annual imports was projected to exceed the trigger amount, the President always had the discretion to suspend the quota if he deemed such an action to be in the national interest. In the vast majority of times that the quota was invoked it was immediately suspended by the President. Hence, the quota was never a strict upper limit on the amount exporting nations could export to the U.S.A. In point of fact, the quota actually was the stick that encouraged exporting nations to voluntarily limit their imports to the U.S.A. This voluntary limitation of imports to the U.S.A. led to the inward shift of either the *ex ante* demand or supply curve outlined in our paper.

One reason that the supply curve may shift inward is persuasion on the part of the US Government; a second reason is the threat of future retaliation as a result of importing quantities that are too large, that is, invocation of the quota as a strict upper limit on the amount of imports. In discussing these shifts, it is important to note that the *ex post* supply curve, even on an annual basis, will have non-zero elasticity. That is, as the price in the market goes higher, the expected opportunity cost to the exporting country of remaining at the same level of imports increases; when the quota is voluntary there is a tendency to increase the quantity even though the probability of the US President invoking the quota may also increase.

Turning to the author's discussion of welfare calculations, one should note that, even though the graphical presentation shows the effects of a strict quota, the actual welfare computations are based on comparing the areas under the *ex ante* curves at the free trade and the restricted trade amount. Thus, the implicit free trade equilibrium is that associated with *ex ante* curves. As a matter of fact, the only demand and supply curves which we actually specify are *ex ante* curves.

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One must also realise that the process generating the observations on quantity traded and price in the CJMS model does not always correspond to the *ex post* supply curve as Martin suggests. To estimate the model, CJMS impose the usual 'MIN' condition of disequilibrium econometrics by equation (5). Thus, quantity traded is on either the *ex post* demand or *ex post* supply curves in every period. However, if all observations correspond to the *ex post* supply curve as Martin suggests, then according to the switching rule in equation (5), CJMS could not have estimated the demand parameters since $\Psi_2$ would have been an empty set. Hence, the likelihood function in equation (10) would have consisted of only the first right-hand term. Clearly, this was not the case. As a consequence, the omitted-variable problem raised by Martin is not actually a problem; consistency and other asymptotic properties remain intact.

Turning to Martin's comments on the maximisation routine, the likelihood function reported in equation (10) was maximised using the 'MINOPT' routine in the *Troll* econometrics package. The model converged to essentially the same parameter estimates regardless of our choice of starting values. This is not unexpected given the nature of the sample separation.

Martin's point that import supply is predetermined apparently results from a misinterpretation of the nature of the CJMS model. CJMS do not model only the beef trade between the U.S.A. and Australia. Their model is a model of the total beef import market in the U.S.A. There is not always a four to six-week lapse in transportation between all of the sources of imported beef into the U.S.A. Hence, it seems unreasonable to argue that imported beef in the U.S.A. does not depend upon the currently prevailing market price. Rather, both price and quantity are determined simultaneously by contracts during the six-week lag period, even though both are recorded as current price and quantity in the data.

Because of these arguments concerning the endogeneity of the level of imports to the U.S.A., Martin's equation (1) does not represent an equilibrium price model. To obtain an equilibrium price model using the techniques the author suggests would necessitate solving for the reduced form price consistent with CJMS *ex ante* import demand and supply, equations (6). Note that this price corresponds to the intersection of the *ex ante* curves and is the free trade price. Hence, if his equation (1) were appropriately specified, the equilibrium price would be the free trade price expressed as a function of all the predetermined variables in the model; this in turn implies that the estimation procedure used for equation (2) is incorrect. Even if Martin re-estimated the model for the appropriate equilibrium price, as specified in CJMS, the Bowden (1978) procedure simply corresponds to an alternative disequilibrium model for which there is no clear evidence of superiority. Nevertheless, it is comforting to note that, even given the apparently incorrect assumptions, there appears to be basic support for our findings.

In closing, we comment on references to the disequilibrium literature in our paper. Earlier drafts of the CJMS manuscript were replete with references to the disequilibrium literature. However, since the econometric estimation procedure is developed from scratch on pages 128-9 of the paper and the focus is application rather than econometric theory, further references seem superfluous.

## References

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Chambers, R. G., Just, R. E., Moffitt, L. J. and Schmitz, A. (1981), 'Estimating the impacts of beef import restrictions in the US import market', *Australian Journal of Agricultural Economics* 25(2), 123-33.

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