and β_i is a positive distribution parameter implied by the CES utility function assumption. Using 1993 data, they estimate the following theoretical gravity equation in the context of Canada-USA trade (two country model):

$$\ln z_{ij} = \ln\left(\frac{x_{ij}}{y_i y_j}\right) = k + (1-\sigma)\rho \ln d_{ij} + [(1-\sigma)\ln b](1-\delta_{ij}) - \ln p_i^{1-\sigma} - \ln p_j^{1-\sigma} + \varepsilon_{ij}$$

(iii)

where $(b-1)$ represents the ad-valorem tariff-equivalent of the USA-Canada border barrier, and δ_{ij} is the same variable as in equation (i) above.

To take into account the fact that the U.S. and Canada also trade with other countries, A&W also estimate a multi-country model that includes a total of 22 industrialized countries. A&W estimate a border effect of 10.2 and 10.7 for the two-country and multi-country mode respectively. They also re-estimated the McCallum gravity equation border effect for the same year, which as expected yielded a considerably larger estimate of 16.4. After estimating the tariff equivalents of the border barriers for bilateral trade, A&W also consider the implications for bilateral flows. Their estimated ratios of trade flows with border barriers to that under borderless trade (BB/NB) for the multi-country model is reproduced below

Ratio BB/NB					
USA-USA	CAN-CAN	USA-CAN	USA-ROW	CAN-ROW	ROW-ROW
1.25	5.96	0.56	0.40	0.46	0.71

Source: Anderson & Wincoop, 2001

In this paper we have used these ratios to produce "predicted" trade flows on the base of actual trade flow dataset 1999. In a world without unobserved trade costs (UTCs), trade between Canada and the U.S. would be 1.78 (1/0.56) times larger than actual trade flows where UTCs are present.