ANATOMY OF OUTSOURCING

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In international trade, there is nothing more controversial than an outsourcing event where a manufacturing plant is closed in high-wage Country A and reopened in low-wage Country B, often with the same equipment, and where output is imported back into Country A by the corporate owner. Moreover, there seems to be considerable confusion about the macroeconomic impacts of such an event. Yet there should be no confusion because the math is simple and straightforward.

For simplicity, assume that the plant utilizes only labor and capital, i.e., we ignore energy and raw materials. Let W_A and W_A' respectively denote the pre-closing and post-closing annual levels of wages and benefits of plant workers in high-wage Country A, both in USD. Let W_B and W_B' respectively denote the pre-opening and post-opening annual levels of wages and benefits of plant workers in low-wage Country B, both in USD. Normally, $W_A' < W_A$ and $W_B' > W_B$. Let C denote the annual level of wheels-turning capital expenditures in USD, assumed to carry through the transition. Finally, let T denote the annual level of *incremental* transportation cost associated with shipping product from Country B to Country A in USD; we assume that T accrues to some other country. If $W_B' + T < W_A$, there is obvious motivation to outsource. The issue is what happens to national output (GDP) in high-wage Country A.

In terms of macroeconomic impacts, Country B has gained $G_B = W_B' - W_B + C$ in national output by virtue of the new plant. Country A has lost $W_A + C$ in national output directly by virtue of the plant closing, but this is mitigated by re-employment compensation W_A' and also by reduced cost $W_A - W_B' - T$ which accrues to the owner/importer or to consumers via reduced prices. The net gain to Country A is therefore $G_A = W_A' + (W_A - W_B' - T) - (W_A + C) = W_A' - W_B' - T - C$, total gain across both countries is $G_A + G_B = W_A' - W_B' - T - C + W_B' - W_B + C = W_A' - W_B - T$, and the difference of gains between the two countries is $G_B - G_A = W_B' - W_B + C - W_A' + W_B' + T + C = 2(W_B' + C) - W_A' - W_B + T$.

If Country A displaced workers remain unemployed, there is negative total gain. Normally, $W_A' > 0$, but if $W_A' < W_B' + T + C$, then $G_A < 0$ and outsourcing is a negative event for Country A. Moreover, if $W_A' < 2(W_B' + C) - W_B + T$, then $G_A < G_B$ which implies imbalanced gains in favor of Country B. If $G_A < G_B$, cooperative game theory (*Shapley Value*) suggests ongoing annual payments of $(G_B - G_A)/2 = W_B' + C - (W_A' + W_B - T)/2$ from Country B to Country A in order to equalize gains at $(G_A + G_B)/2 = (W_A' - W_B - T)/2$ each. After all, Country A has no real obligation to trade with Country B. In principle, two trading nations should share overall gains from trade equally.

Now assume that Country A is the US and consider some figures from the 2015 US National Income and Product tables at www.bea.gov . Tables 6.2D and 6.5D show total compensation of $1,002.617 billion across 12.076 million full-time equivalent employees in manufacturing, or about $83,026 per worker. Table 6.22D shows total capital consumption of $502.591 billion in manufacturing, or a capital consumption to compensation ratio of $C/W_A = 502.591 / 1002.617 = 50.13\%$. (This ratio varies

somewhat between durable and nondurable manufacturing, but we use the average for illustration.) Note that capital consumption is much higher than ten years ago and moreover that historical figures have been revised upward. Remaining plants in the US are increasingly capital-intensive and hence the loss of ongoing capital expenditures is larger when we are left with a hole in the ground. This alone indicates that many outsourcing events are negative for the country.

Assume further that average annual compensation in the new Country B plant is \$12,000 so that W_B' / W_A = 12000 / 83026 = 14.45%, assuming the same number of able plant workers, and that average annual compensation for the general Country B labor pool is \$8,000 so that W_B / W_A = 8000 / 83026 = 9.64%. Moreover, assume that T / W_A = 10%. Hence, if W_A' / W_A < 14.45% + 10% + 50.13% = 74.58%, the outsourcing event is negative for the US. If W_A' / W_A < $2 \times (14.45\% + 50.13\%)$ - 9.64% + 10% = 129.52%, the US gain is less than the Country B gain, which will be true in virtually all cases. Anecdotal evidence suggests W_A' / W_A < 74.58% since many displaced workers must resort to low-wage retail employment in depressed communities with no benefits. In any event, gains to the US, if any, will be dominated by gains to Country B. Suppose that the post-closing average annual compensation for US displaced workers is \$40,000 so that W_A' / W_A = 40000 / 83026 = 48.18%. Without reimbursement, there is negative gain to the US, namely 48.18% - 14.45% - 10% - 50.13% = -26.40%, compared to positive gain to Country B of 14.45% - 9.64% + 50.13% = 54.94%. In order to equalize gains at (48.18% - 9.64% - 10%) / 2 = 14.27% each, Country B would have to pay the US $(54.94\% - (-26.40\%))/2$ = 54.94% - 14.27% = 40.67% of the original compensation bill W_A annually. Although the foregoing calculations aren't meant to be indicative of any particular outsourcing event, we believe that they clearly illustrate the main effects and issues.

When we did these calculations about nine years ago, results indicated that the US was being taken to the cleaner in terms of both lost wages and overall national output. Because of the dramatic increase in the capital consumption ratio, outsourcing now looks even worse for the US. The only recourse is reimbursement, one way or the other, to equalize trading gains. Economic theory supporting unfettered free trade, particularly comparative advantage, is vacuous. The appropriate theoretical lens for *fair* trade is cooperative game theory (*aka rational negotiation theory*) which suggests equal sharing of total gain between two essential parties to a trading agreement. In other words, nations should negotiate rational trade agreements for the benefit of their citizens. Gains from trade should be shared equitably between nations. That is obviously not the case with free trade, and it is particularly not the case with outsourcing.