

## **Substitution of Imports for Domestic Labor, Capital and Materials in U.S. Manufacturing**

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There has been a well-known increase in the share of U.S. manufacturing inputs that come from overseas. In previous work we constructed measures of multifactor productivity (MFP) from data on the prices and quantities of output, capital, labor, and domestic and imported intermediate inputs. We were able to confirm, in a Solow growth accounting model, Susan Houseman's hypothesis that a substantial amount of the observed increase in manufacturing labor productivity reflects the substitution of imports for domestic labor. This same dataset can be used to estimate the parameters of production and cost functions. In this study we plan to examine several such models, but we are particularly interested in the factor-augmenting translog cost function, the "dual" form of the production model proposed by Jorgenson, Gollop and Fraumeni. Due to imports' rapidly increasing cost share from 1997 through 2006, we expect these types of models will produce strong "findings" that technology is "import-using". Houseman has suggested that there is a labelling problem with regarding the increased use of imports as "productivity." With this in mind, we will explore alternative but equivalent interpretations of the "import-using" finding. Taken literally, the production function is expanding most quickly in regions of input space with relatively more imports, creating the incentive to use more imports as time passes. Under this interpretation, rapid MFP change is a correct result, but only a local result. Alternatively, the technological bias toward imports can be viewed as a reflection of reductions in some unmeasured costs of using imports. For example, workers in India can be educated as to the fine points of U.S. markets, language and culture to better answer phone calls from U.S. clients. In other words, as U.S. firms learned to utilize overseas inputs more effectively, there may have been a unmeasured reduction in import costs. To correct this "bias" we will adjust import prices sufficiently to produce a fitted model which is neutral to imports, note the implied reduction in MFP, and discuss the interpretation. Also, we will use the estimated elasticities of substitution from these models to quantify the impact of imported intermediates on employment in U.S. manufacturing.