NOT FOR PUBLICATION

Theory Appendix for "The China Syndrome"

Small Open Economy Model

In this appendix, we develop a general equilibrium model of how increased import competition from China affects employment and wages in a U.S. commuting zone, which we treat as a small open economy. Productivity growth in China and global reductions in trade barriers facing China cause the country's exports to expand. As a commuting zone faces greater competition from China in the U.S. market and in other markets in which its firms sell goods, demand for CZ output contracts, causing CZ wages to fall. As long as the CZ is running a current-account deficit, there is a resulting shift in employment out of traded goods and into non-traded goods. Initially, we ignore the impact of changes in China on wages and income levels outside of a CZ, focusing on the *direct effects* of rising productivity/falling trade costs in China on a commuting zone, which operate through making the CZ's goods less competitive in its export markets. Below, we consider a two-economy model (e.g., for the U.S. and China), in which the same qualitative results obtain. Hsieh and Ossa (2012) model the effects of productivity growth in China in full global general equilibrium.

The total supply of labor in CZ i is L_i, where labor may be employed in traded goods or in non-traded goods. We assume that there is no migration between commuting zones (making the model short to medium run in nature). Allowing CZ labor supply to be an elastic function of the wage is a simple extension of the model. Demand for goods is given by a Cobb-Douglas utility function, with share γ of expenditure going to traded goods and share $1-\gamma$ going to non-traded goods. There is a single non-traded good which is manufactured under the production function,

$$X_{Ni} = L_{Ni}^{\eta}, \tag{1}$$

where L_{Ni} is labor employed in non-traded goods and the coefficient $\eta \in (0,1)$ indicates there is diminishing marginal returns to labor in production (due, e.g., to short-run constraints on expanding production capacity). Profit maximization in the non-traded good implies that

$$W_i = \eta P_{Ni} L_{Ni}^{\eta-1}, \tag{2}$$

where W_i is the wage and P_{Ni} is the price of the non-traded good in commuting zone i. Because of diminishing returns in non-traded production, any shock that expands employment in the sector will tend to push down wages in the commuting zone. (Alternatively, we could consider (1) as an implicit function for the production of leisure and (2) as arising from utility maximization, requiring that wages equal the marginal utility of leisure.)

Market clearing for the non-traded good requires that,

$$P_{Ni} X_{Ni} = (1-\gamma)\left(W_i L_i + B_i\right), \tag{3}$$

where B_i is the difference between expenditure and income in commuting zone i (i.e., $B_i > 0$ implies that CZ i is running a current-account deficit).[1] We treat the trade imbalance as given (due to US macroeconomic conditions) and investigate how its magnitude affects CZ labor-market adjustment. With balanced trade for a commuting zone, a positive shock to productivity in one of China's export sectors generates changes in the CZ wage and non-traded good price that re-equilibrate imports and exports. These adjustments keep total CZ employment in the traded sector from declining (although employment shifts out of the traded sector with positive Chinese productivity growth and into other traded sectors). With imbalanced trade a positive shock to Chinese export productivity reduces employment in CZ traded goods and increases employment in non-traded goods.[2]

Traded goods are produced by firms in a monopolistically competitive sector (Helpman and Krugman, 1985).[3] There are two traded-good sectors, indexed by j, where consumers devote a share of spending $\gamma/2$ on each. It is straightforward to extend the model to multiple traded-good sectors (as in Hanson and Xiang, 2005); doing so does not change the qualitative results. Each of the M_{ij} firms in sector j is the unique producer of a differentiated product variety. The labor used to produce any individual variety in sector j is given by,

$$l_{ij} = \alpha_{ij} + \beta_{ij} x_{ij}, \tag{4}$$

where for sector j α_{ij} is the fixed labor required to produce positive output, β_{ij} is the labor required to produce an extra unit of output, and x_{ij} is the quantity of the variety produced. α_{ij} and β_{ij} (which are identical across firms within CZ i) reflect sectoral productivity in a commuting zone and therefore determine comparative advantage. For each traded sector j, demand for product varieties is derived from a CES sub-utility function, such that total demand for output of an individual variety, x_{ij}, is the sum over demand in each destination market k, x_{ijk}, given by,

$$x_{ij} = \sum_k x_{ijk} = \sum_k \frac{P_{ijk}^{-\sigma_j}}{\Phi_{jk}^{1-\sigma_j}} \frac{\gamma E_k}{2}, \tag{5}$$

where P_{ijk} is the delivered price in market k of a variety in sector j produced in commuting zone i, E_k is total expenditure in market k, and the term $\Phi_{jk}^{1-\sigma}$, which is a function of the price index, Φ_{jk}, for traded goods in sector j and market k, captures the intensity of competition in a particular market. The parameter $\sigma_j > 1$ is the elasticity of substitution between any pair of varieties in j. Under monopolistic competition, the price of each variety is a constant markup over marginal cost,

$$P_{ijk} = \frac{\sigma_j}{\sigma_j - 1} \beta_{ij} W_i \tau_{ijk} \tag{6}$$

where $\tau_{ijk} \geq 1$ is the iceberg transport cost of delivering one unit of a good in sector j from commuting zone i to market k. We assume that free entry in each sector drives profits to zero,

[1] Implicitly, China's non-traded good is the numeraire.

[2] The invariance of non-traded employment to trade shocks under balanced trade is due to the assumption of Cobb-Douglas preferences (similar results hold in a two-country model, meaning that the small-country assumption is not driving this outcome).

[3] Our results generalize to other settings that have a "gravity" structure, as in Arkolakis, Costinot, and Rodriquez-Clare (2011).

implying that the level of output of each variety is $x_{ij} = \alpha_{ij}(\sigma_j - 1)/\beta_{ij}$ (adjustment in sectoral output and employment occurs at the extensive margin, through changes in the sector number of varieties/firms, M_{ij}). The final equilibrium condition is that labor supply equals labor demand:

$$L_i = L_{Ni} + L_{Ti}, \tag{7}$$

where $L_{Ti} = \sum_j M_{ij} l_{ij}$ is total employment in traded goods.

The sectoral price index plays an important role in the analysis for it is the channel through which competition from China affects a CZ. For each sector j, this index is given by,

$$\Phi_{jk} = \left[\sum_h M_{hj} P_{hjk}^{1-\sigma_j}\right]^{\frac{1}{1-\sigma_j}}, \tag{8}$$

where M_{hj} is the number of varieties produced by region h and P_{hjk} is the price of goods from region h sold in market k. Log differentiating (8), and defining $\hat{x} \equiv \Delta \ln x = \Delta x / x$, we obtain for each sector j,

$$\hat{\Phi}_{jk} = -\frac{1}{\sigma_j - 1} \sum_h \phi_{hjk} \hat{A}_{hjk}, \tag{9}$$

where $\phi_{hjk} \equiv M_{jh} P_{hjk} x_{hjk} / \sum_l M_{lj} P_{ljk} x_{ljk}$ is the share of region h in purchases of sector j goods by market k and $\hat{A}_{hjk} \equiv \hat{M}_{hj} - (\sigma_j - 1)\left(\hat{W}_h + \hat{\beta}_{hj} + \hat{\tau}_{hjk}\right)$ is the log change in the "export capability" of region h in market k, determined by changes in the number of varieties region h produces ($\hat{M}_{hj}$), its wages ($\hat{W}_h$), its labor productivity ($\hat{\beta}_{hj}$), and its trade costs ($\hat{\tau}_{hjk}$). The price index for sector j goods in market k declines if China has an increase in the number of varieties that it produces, a reduction in its marginal production costs, an increase in its factor productivity, or a reduction in its trade barriers (each of which causes $\hat{A}_{Cjk}$ to rise, where C indexes China).

To solve the model, we plug (1) into (3), and (for each j) (4) and (6) into (5), which produces a system of five equations in five unknowns, W_i, P_{Ni}, L_{Ni}, and M_{ij} for $j = 1, 2$.[4] After performing these substitutions and log differentiating the five equations, we end up with the following system:

$$\hat{W}_i = \hat{P}_{Ni} - (1-\eta)\hat{L}_{Ni},$$

$$\eta \hat{L}_{Ni} = \rho_i\left(\hat{W}_i + \hat{L}_i\right) + (1-\rho_i)\hat{B}_i - \hat{P}_{Ni},$$

$$\hat{L}_i = \left(1 - \sum_j \delta_{ij}\right)\hat{L}_{Ni} + \sum_j \delta_{ij}\hat{M}_{ij},$$

$$\sigma \hat{W}_i = \sum_k \theta_{ijk}\left[\hat{E}_k + (\sigma_j - 1)\hat{\Phi}_{jk}\right] = \sum_k \theta_{ijk}\hat{E}_k - \sum_k \theta_{ijk}\sum_h \phi_{hjk}\hat{A}_{hjk}, \; j = 1, 2 \tag{10}$$

[4]For simplicity, we exclude the equation for adjustment in imported varieties. Because of the small-country assumption, changes in imports are determined by the outcomes of other equations in the system and do not affect other variables.

where for commuting zone i $\rho_i \equiv W_i L_i / (W_i L_i + B_i)$ is the initial share of labor income in total expenditure, $\delta_{ij} \equiv M_{ij} l_{ij} / L_i$ is the initial share of traded sector j in total employment, and $\theta_{ijk} \equiv x_{ijk} / \sum_l x_{ijl}$ is the initial share of market k in the total shipments of sector j goods. Because the output of each variety is fixed, labor used in each variety, l_{ij}, is fixed; all adjustment in sectoral employment occurs through changes in the number of firms, M_{ij}, as seen in the third line of (10).

By assumption, for commuting zone i the only changes in the $\hat{E}_k$ terms in (10) occur in China, where we treat $\hat{E}_C = \rho_C \hat{W}_C + (1-\rho_C)\hat{B}_C$ as exogenous, and in CZ i itself, where $\hat{E}_i = \rho_i \hat{W}_i + (1-\rho_i)\hat{B}_i$ and we treat $\hat{W}_i$ as endogenous and $\hat{B}_i$ as exogenous. As a trade shock causes wages in a commuting zone to change, the CZ's demand for its own goods will change, which will in turn generate further adjustments in wages. Relatedly, for commuting zone i the only changes in the $\hat{A}_{hjk}$ terms in (10) are for China, where for each sector j we treat $\hat{A}_{Cj} = \hat{M}_{Cj} - (\sigma_j - 1)\left(\hat{W}_C + \hat{\beta}_{Cj} + \hat{\tau}_{Cj}\right)$ as exogenous, and in CZ i itself, where for each sector j, $\hat{A}_{ij} = \hat{M}_{ij} - (\sigma_j - 1)\hat{W}_i$ and we treat $\hat{M}_{ij}$ as endogenous, in addition to $\hat{W}_{ij}$. As a China trade shock causes a CZ's wage and number of firms to change, price indexes in the markets that the CZ serves will change, generating further adjustments in its wages and number of firms.[5]

Imposing the zero migration assumption that $\hat{L}_i = 0$ and rearranging the first two expressions in (10), we obtain the following representation of the system of equations in (10):

$$\begin{aligned}
\hat{P}_{Ni} &= \hat{W}_i + (1-\eta)\hat{L}_{Ni}, \\
\hat{L}_{Ni} &= (1-\rho_i)\left(\hat{B}_i - \hat{W}_i\right), \\
\hat{L}_{Ni} &= -\tilde{\delta}_{i1}\hat{M}_{i1} - \tilde{\delta}_{i2}\hat{M}_{i2}, \\
\hat{W}_i &= a_{i1}\hat{\Gamma}_{i1} + b_{i1}\hat{B}_i - c_{i1}\hat{M}_{i1}, \\
\hat{W}_i &= a_{i2}\hat{\Gamma}_{i2} + b_{i2}\hat{B}_i - c_{i2}\hat{M}_{i2},
\end{aligned} \tag{11}$$

where for sector $j = 1, 2$ we employ the following notational definitions: $\tilde{\delta}_{ij} \equiv \delta_{ij} / (1 - \sum_n \delta_{in})$ is the initial ratio of employment in traded sector j to employment in non-traded goods, the quantity $\hat{\Gamma}_{ij} \equiv \theta_{ijC}\left[\rho_C \hat{W}_C + (1-\rho_C)\hat{B}_C\right] - \sum_k \theta_{ijk}\phi_{Cjk}\hat{A}_{Cj}$ is the China trade shock facing CZ i in industry j, and a_{ij}, b_{ij}, and c_{ij} are each positive constants that are functions of the model parameters or initial sectoral employment or expenditure shares ($a_{ij} \equiv [\sigma_j (1 - \sum_k \theta_{ijk}\phi_{ijk}) + \sum_k \theta_{ijk}\phi_{ijk} - \theta_{iji}\rho_i]^{-1}$, $b_{ij} \equiv a_{ij}\theta_{iji}(1-\rho_i)$, and $c_{ij} \equiv a_{ij}\sum_k \theta_{ijk}\phi_{ijk}$). In the first two lines of (11), we see that wage shocks affect non-traded employment and non-traded prices only if trade is imbalanced ($\rho_i \neq 1$). This outcome depends on the first two equations in (10), which applies to the model even if we allow the country to be large enough to affect world prices, as is done below.

For CZ i, the China trade shock in sector j ($\hat{\Gamma}_{ij}$) is the difference between increased demand by China for the CZ's exports, given by $\theta_{ijC}\left[\rho_C \hat{W}_C + (1-\rho_C)\hat{B}_C\right]$, and increased import competition

[5] For notational simplicity, we assume that changes in China's trade costs are common across its destination markets–due,e.g., to its accession to the WTO–and that CZ i has no changes in its productivity or trade costs.

from China in the markets in which the CZ sells goods, given by $\sum_k \theta_{ijk}\phi_{Cjk}\hat{A}_{Cj}$. Growth in China's demand for CZ i's exports will be smaller the smaller is the share of CZ output that is destined for China (θ_{ijC}) and the more wage growth in China ($\hat{W}_C > 0$) is offset by growth in China's current-account surplus ($\hat{B}_C < 0$). Import competition from China will be more intense the larger is the increase in China's export capabilities ($\hat{A}_{Cj}$) and the larger is China as a source of supply for the markets that CZ i serves (captured by the term, $\sum_k \theta_{ijk}\phi_{Cjk}$).

Solving the system in (11), we obtain changes in the endogenous CZ variables ($\hat{W}_{Ni}, \hat{L}_{Ti}, \hat{L}_{Ni}, \hat{P}_{Ni}$) as functions of model parameters and the exogenous shocks ($\hat{\Gamma}_{i1}, \hat{\Gamma}_{i2}, \hat{B}_i$), where we show results for the change in total employment in traded goods (rather that for individual traded sectors), given by $\hat{L}_{Ti} = \sum_j \tilde{\tilde{\delta}}_{ij}\hat{M}_{ij}$, where $\tilde{\tilde{\delta}}_{ij} \equiv \delta_{ij}/\sum_l \delta_{il}$ is the share of sector j in total traded-good employment for CZ i. The solutions for the endogenous variables are:

$$\hat{W}_i = \frac{1}{g_i}\left[a_{i1}c_{i2}\tilde{\delta}_{i1}\hat{\Gamma}_{i1} + a_{i2}c_{i1}\tilde{\delta}_{i2}\hat{\Gamma}_{i2} + \left(b_{i1}c_{i2}\tilde{\delta}_{i1} + b_{i2}c_{i1}\tilde{\delta}_{i2} + (1-\rho_i)\, c_{i1}c_{i2}\right)\hat{B}_i\right],$$

$$\hat{L}_{Ti} = \frac{1-\rho_i}{g_i}\left[a_{i1}c_{i2}\tilde{\tilde{\delta}}_{i1}\hat{\Gamma}_{i1} + a_{i2}c_{i1}\tilde{\tilde{\delta}}_{i2}\hat{\Gamma}_{i2} - \left((1-b_{i1})c_{i2}\tilde{\tilde{\delta}}_{i1} + (1-b_{i2})c_{i1}\tilde{\tilde{\delta}}_{i2}\right)\hat{B}_i\right],$$

$$\hat{L}_{Ni} = \frac{1-\rho_i}{g_i}\left[-a_{i1}c_{i2}\tilde{\delta}_{i1}\hat{\Gamma}_{i1} - a_{i2}c_{i1}\tilde{\delta}_{i2}\hat{\Gamma}_{i2} + \left((1-b_{i1})c_{i2}\tilde{\delta}_{i1} + (1-b_{i2})c_{i1}\tilde{\delta}_{i2}\right)\hat{B}_i\right],$$

$$\begin{aligned}\hat{P}_{Ni} \quad &= \quad \frac{1}{g_i}[(1-f_i)\left(a_{i1}c_{i2}\tilde{\delta}_{i1}\hat{\Gamma}_{i1} + a_{i2}c_{i1}\tilde{\delta}_{i2}\hat{\Gamma}_{i2}\right) \\ &\quad + \left((b_{i1} + (1-b_{i1})f_i)\, c_{i2}\tilde{\delta}_{i1} + (b_{i2} + (1-b_{i2})f_i)\, c_{i1}\tilde{\delta}_{i2} + (1-\rho_i)\, c_{i1}c_{i2}\right)\hat{B}_i]\end{aligned} \tag{12}$$

where $g_i = c_{i2}\tilde{\delta}_{i1} + c_{i1}\tilde{\delta}_{i2} + (1-\rho_i)\, c_{i1}c_{i2} > 0$, $f_i = (1-\rho_i)(1-\eta) > 0$, and $1 - b_{ij} > 0, j = 1, 2$. To summarize how trade shocks in China affect a CZ, we present the following comparative statics:

$$\frac{\partial\hat{W}_i}{\partial\hat{\Gamma}_{ij}} = \frac{a_{ij}c_{il}\tilde{\delta}_{ij}}{g_i} \geq 0, \quad \{j,l\} = \{1,2\},\{2,1\},$$

$$\frac{\partial\hat{L}_{Ti}}{\partial\hat{\Gamma}_{ij}} = \frac{(1-\rho_i)a_{ij}c_{il}\tilde{\tilde{\delta}}_{ij}}{g_i} \geq 0, \quad \{j,l\} = \{1,2\},\{2,1\},$$

$$\frac{\partial\hat{L}_{Ni}}{\partial\hat{\Gamma}_{ij}} = -\frac{(1-\rho_i)a_{ij}c_{il}\tilde{\delta}_{ij}}{g_i} \leq 0, \quad \{j,l\} = \{1,2\},\{2,1\},$$

$$\frac{\partial\hat{P}_{Ni}}{\partial\hat{\Gamma}_{ij}} = \frac{(1-f_i)a_{ij}c_{il}\tilde{\delta}_{ij}}{g_i} \geq 0, \quad \{j,l\} = \{1,2\},\{2,1\}. \tag{13}$$

In traded sector j, productivity growth in China or a fall in China's trade barriers imply that $\hat{\Gamma}_{ij} < 0$. In (13), we see that the consequence of such a shock is a reduction in CZ nominal wages, a reduction in CZ employment in traded goods, an increase in CZ employment in non-traded goods, and a reduction in CZ prices of non-traded goods. The impact on wages is due to the decreased demand for CZ goods in its export markets (including the broader U.S. economy). The impacts on traded and non-traded employment depend on $\rho_i < 1$, meaning the CZ is running a current-account deficit. Regardless of the shift in employment between traded and non-traded goods, within traded goods there is a reallocation of employment out of sectors in which China's productivity is expanding.

Why does the impact of productivity growth in China on CZ traded and non-traded employment depend on the CZ's trade balance? With balanced trade, productivity growth in China merely reallocates CZ employment between traded sectors based on which sectors face a net increase in import competition from China (CZ employment contracts) and which experience a net increase in export demand by China (CZ employment expands). With imbalanced trade, increases in import competition are not offset by increases in export demand. The excess of imports over exports pushes employment out of exports (relative to balanced trade), with non-traded goods being the residual sector. The logic for a CZ also applies to the United States as a whole, meaning that a U.S. current-account deficit vis-a-vis China implies that greater import competition from China can cause U.S. employment in traded-good sectors to contract on net.

In (12), changes in wages, traded-good employment and non-traded good employment are each weighted averages of changes in trade shocks in each traded-good sector, where these weights are functions of the share of each traded sector in total employment. These expressions motivate our measure of trade exposure in the empirical analysis.

Two Economy Model

A small open economy is a non-standard application of the monopolistic competition model. Typically, in such models all goods prices are endogenous, which is not the case in the application above where we have arbitrarily shut down price adjustment in all economies except CZ i. To verify that the results we obtain are not special to this setting, we solve a two-economy model, in which we compress CZs into a single aggregate U.S. region. We then examine the impact of productivity growth in China on U.S. wages, traded employment, and non-traded employment. To keep the analysis simple, we ignore trade barriers between the countries and assume the traded sector consists of a single industry (producing many varieties). No qualitative results depend on these restrictions.

Following equations (1)-(3), (6), and (7), we have the following equilibrium conditions for the U.S.:

$$\begin{aligned} W &= \eta P_N L_N^{\eta-1}, \\ P_N L_N^{\eta} &= (1-\gamma)(WL+B), \\ P &= \frac{\sigma}{\sigma-1}\beta W, \\ L &= L_N + Ml, \end{aligned} \tag{14}$$

where we take China's wage to be the numeraire (such that W is the U.S. wage relative to China's wage) and B is the difference between U.S. aggregate expenditure and U.S. aggregate income (equal to the difference between China's aggregate income and expenditure–i.e., $B + B^* = 0$) and is dominated in units of China's wage. The final equilibrium condition is that supply equals demand for each variety of traded goods:

$$x = \frac{P^{-\sigma}\gamma\left(WL + L^*\right)}{M\Phi^{1-\sigma} + M^*\Phi^{*1-\sigma}}. \tag{15}$$

We implicitly treat l, labor used to produce each variety, as exogenous given that its value is pinned down by the zero-profit condition (i.e., $l = \alpha\sigma$); zero profits also imply that x is fixed ($x = \alpha\left(\sigma - 1\right)/\beta$). For China, there are a corresponding set of equilibrium conditions, where we dominate China values using an $(*)$. Because trade costs are zero, $x/x^*{=}\left(P/P^*\right)^{-\sigma}$, which together with the price-equals-marginal cost conditions in the U.S. and China imply that $W = \left(\beta^*/\beta\right)^{(\sigma-1)/\sigma}$, or that the U.S.-China relative wage is a function of relative labor productivities in the two countries.

Combining the conditions in (14) with the corresponding ones for China and incorporating the solutions for W, P, and P^*, we have a system with six equations and xi unknowns (P_N, P_N^*, L_N, L_N^*, M, and M^*). We assume that the only shocks to the system are productivity growth in traded-good production in China ($\hat{\beta}^* < 0$) and an increase in the U.S. trade deficit/China trade surplus ($\hat{B} > 0$). Log differentiating, we have that $\hat{W} = \bar{\sigma}\hat{\beta}^*$, where $\bar{\sigma} \equiv \frac{\sigma-1}{\sigma}$, implying that the U.S. relative nominal wage declines in proportion to productivity growth in China.[6] The other equilibrium conditions are that:

$$\hat{P}_N = \bar{\sigma}\hat{\beta}^* + (1-\eta)\,\hat{L}_N,$$

$$\hat{P}_N^* = (1-\eta)\,\hat{L}_N^*,$$

$$\hat{P}_N = \rho\bar{\sigma}\hat{\beta}^* + (1-\rho)\,\hat{B} - \eta\hat{L}_N,$$

$$\hat{P}_N^* = -\left(1-\rho^*\right)\hat{B} - \eta\hat{L}_N^*,$$

$$\hat{L}_N = -\frac{\delta}{1-\delta}\hat{M},$$

$$\hat{L}_N^* = -\frac{\delta^*}{1-\delta^*}\hat{M}^*, \tag{16}$$

where $\rho = WL/\left(WL + B\right)$ is the initial share of labor income in total U.S. expenditure, $\left(1-\rho^*\right) = B/\left(L^* - B\right)$ is the initial ratio of China's trade surplus to its aggregate expenditure, $\delta = Ml/L$ is the initial share of U.S. employment in traded goods, and $\delta^* = M^*l^*/L^*$ is the initial share of China's employment in traded goods. Solving the system in (16) we obtain,

$$\hat{L}_N = (1-\rho)\left(\hat{B} - \bar{\sigma}\hat{\beta}^*\right) \geq 0,$$

$$\hat{L}_N^* = -\left(1-\rho^*\right)\hat{B} \leq 0,$$

$$\hat{M} = -\frac{1-\delta}{\delta}\,(1-\rho)\left(\hat{B} - \bar{\sigma}\hat{\beta}^*\right) \leq 0,$$

[6] U.S. real wages may of course rise owing to lower prices for and increased numbers of Chinese varieties produced.

$$\hat{M}^* = \frac{1-\delta^*}{\delta^*}\left(1-\rho^*\right)\hat{B} \geq 0,$$

$$\hat{P}_N = \hat{\beta}^* + (1-\eta)(1-\rho)\left(\hat{B} - \bar{\sigma}\hat{\beta}^*\right) \lesseqqgtr 0,$$

$$\hat{P}_N^* = -(1-\eta)(1-\rho^*)\hat{B} \leq 0. \tag{17}$$

It is again the case that productivity growth in the traded sector in China lowers U.S. employment in traded goods ($\hat{M}<0$) and raises U.S. employment in non-traded goods ($\hat{L}_N > 0$), where these results are conditional on the U.S. running an aggregate trade deficit. There is an ambiguous effect on U.S. non-traded prices. Increases in the magnitude of the U.S. trade deficit reinforce these changes.

References

Arkolakis, Costas, Arnaud Costinot, and Andres Rodriguez-Clare. 2012. "New Trade Models, Same Old Gains?" *American Economic Review*, 102(1), 94-130.

Hanson, Gordon, and Chong Xiang. 2004. "The Home Market Effect and Bilateral Trade Patterns." *American Economic Review*, 94: 1108-1129.

Helpman, Elhanan, and Paul Krugman. 1985. *Market Structure and Foreign Trade*. Cambridge, MA: MIT Press.

Hsieh, Chang-Tai, and Ralph Ossa. 2011. "A Global View of Productivity Growth in China." NBER Working Paper No. 16778.