Free Trade and Income Redistribution in a Three Factor Model of the U.S. Economy*

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I. Introduction

The move toward free trade promises to alter the distribution of income in the U.S. Labor groups generally do not favor the move toward free trade, which can be characterized by the continuing decline in the price of manufactured goods relative to business services. The present study predicts that unskilled labor in the U.S. will lose under a program of free trade, using a general equilibrium model of production. Factor shares, industry shares, and estimates of substitution for skilled labor, unskilled labor, and capital are used to examine comparative statics.

The interplay of factor intensity and factor substitution in the three factor production structure has proven a considerable analytical challenge. Building on the textbook production model with two factors, the third productive factor allows technical complementarity and creates a more complex pattern of factor intensity. Both factor intensity and factor substitution affect the qualitative nature of the comparative statics. Little is known about the model's quantitative properties. A 3×3 model with outputs of the three major sectors (agriculture, manufacturing, services) is specified, and a 3×2 model without agriculture is also examined.

Factor substitution is estimated with production function across states. Skilled labor separated by various Census categories cannot be aggregated with unskilled labor in any sector, and constant returns to scale cannot be rejected as a null hypothesis. Additionally, the three inputs (capital, labor, skilled labor) are all technical substitutes.

Comparative static results follow a pattern suggested by factor intensity. Changing prices of goods generally have elastic effects on factor prices. Stolper-Samuelson results, in other words, have a quantitative weight. Price changes due to a program of free trade will significantly affect income distribution. Similarly, Rybczynski type results are quantitatively significant in that factor endowment changes have elastic effects on outputs. The implication is that output patterns will differ significantly across freely trading partners.

Elasticities of factor prices with respect to endowment changes, on the other hand, are very inelastic. This inelasticity suggests that there would only be small long run effects of international migration, capital flows, or endowment differences on the international pattern of factor income. This inelasticity is called near factor price equalization (NFPE).

Under NFPE, freely trading countries will experience a vector of factor prices nearly equal to each other. NFPE suggests that the qualitative effects of changing or different factor endowments

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will be quantitatively trivial in the long run when there is competition, full employment, and flexible output adjustment. Factor prices will be nearly equal even when FPE does not strictly hold.

Cobb-Douglas and constant elasticity of substitution (CES) technologies are also specified. A high degree of similarity is found across model specifications.

II. Summary of the General Equilibrium Model of Production and Trade

The long run competitive model of production developed by Jones and Scheinkman [14], Chang [9], and Takayama [24] assumes constant returns to scale, full employment, nonjoint production, competitive pricing, cost minimization, and perfect factor mobility across sectors. The model is summarized in matrix form by

$$\begin{bmatrix} \sigma & \lambda \\ \theta' & 0 \end{bmatrix} \begin{bmatrix} \hat{\mathbf{w}} \\ \hat{\mathbf{x}} \end{bmatrix} = \begin{bmatrix} \hat{\mathbf{v}} \\ \hat{\mathbf{p}} \end{bmatrix}, \tag{1}$$

where $\mathbf{w}$ represents (a vector of) endogenous factor prices, $\mathbf{x}$ endogenous outputs, $\mathbf{v}$ exogenous factor endowments, $\mathbf{p}$ exogenous world prices of outputs facing the open economy, $\boldsymbol{\sigma}$ a square matrix of price elasticities of the aggregate factor demand functions, $\boldsymbol{\theta}$ a matrix of factor shares paid each factor from the revenue of each industry, $\boldsymbol{\lambda}$ a matrix of industry shares of each factor employed in each industry, $\mathbf{0}$ a null matrix, and $\hat{}$ percentage changes.

The top equation in (1) is derived from the full employment condition for each of the three productive factors. Full employment captures the long run after transitory adjustments have occurred. The bottom equation in (1) is derived from competitive pricing and cost minimization. The economy is assumed to be a price taker in the international markets for finished goods. At the high level of aggregation in the present study, this assumption is warranted even for an economy as large as the U.S.

Comparative static results are local in nature and apply to small changes around an original equilibrium. The $\partial w/\partial p$ Stolper-Samuelson elasticities and the $\partial x/\partial v$ Rybczynski elasticities are symmetric in their signs due to Samuelson's reciprocity. Factor prices are affected by changes in endowments with prices of goods constant, as described by the $\partial w/\partial v$ elasticity matrix.

III. Factor Shares, Factor Intensity, and Industry Shares

Figures on employment are taken from a U.S. Census publication [27]. Skilled labor is specified as the two highest paid Census groups: managers and professionals, along with precision production, craft, repair. Translog estimation, tests of separability, and comparative static results of the model are insensitive to adding or deleting a Census group from the skilled labor category.

The yearly wage of each group of labor is found by dividing its portion of national income by the number of workers in the group. Imputed yearly wages are \$16,833 for skilled labor and \$9,971 for unskilled labor. The residual of national income is allotted to capital. Depreciable capital stock figures for manufacturing and agriculture are taken from U.S. Census publications [28; 29]. Based on the total capital stock, capital is paid an average of 15.2%.

Inputs and outputs are valued in dollars. Factor input is the dollar value of factor i used in sector j,

$$w_{ij} \equiv w_i v_{ij}, \tag{2}$$

where w_i is the price of factor i and v_{ij} is the quantity of factor i used in sector j. Index i runs across the three inputs capital (k), unskilled labor (u), and skilled labor (s). The share of factor i in sector j is calculated as

$$\theta_{ij} \equiv w_{ij}/y_j, \tag{3}$$

where y_j is the total revenue of sector j.

Let g represent agricultural output, m manufacturing, and c services. The derived factor share matrix $\boldsymbol{\theta}$ is

$$\begin{bmatrix} \theta_{kg} & \theta_{km} & \theta_{kc} \\ \theta_{sg} & \theta_{sm} & \theta_{sc} \\ \theta_{ug} & \theta_{um} & \theta_{uc} \end{bmatrix} = \begin{bmatrix} .598 & .216 & .256 \\ .146 & .317 & .358 \\ .256 & .467 & .386 \end{bmatrix}. \tag{4}$$

Factor intensity is described by ratios of these factor shares, since

$$\theta_{ij}/\theta_{ih} = (v_{ij}/y_j)/(v_{ih}/y_h) \equiv a_{ij}/a_{ih} \equiv a^i_{jh}, \tag{5}$$

where a_{ij} represents the cost minimizing amount of factor i used per unit of output in sector j. Factor intensity must be analyzed bilaterally across all three pairs of industries. The three sets of factor intensity rankings are:

$$\begin{aligned} a^k_{gm} &= 2.77 > a^u_{gm} = 0.55 > a^s_{gm} = 0.46 \\ a^k_{gc} &= 2.34 > a^u_{gc} = 0.66 > a^s_{gc} = 0.41 \\ a^u_{mc} &= 1.21 > a^s_{mc} = 0.89 > a^k_{mc} = 0.84. \end{aligned} \tag{6}$$

Capital, which implicitly includes land, is consistently used most intensively in agriculture, and least intensively in manufacturing. Skilled labor is the least intensive input in agriculture. The service sector uses both skilled labor and capital intensively.

Industry shares λ_{ij} are defined as v_{ij}/v_i, representing the portion of factor i employed in sector j. These industry shares are calculated as

$$\lambda_{ij} \equiv w_{ij}/y_i, \tag{7}$$

where y_i is the total income of factor i. Factors are assumed to be freely mobile and have equal prices across sectors. The model's derived industry share matrix $\boldsymbol{\lambda}$ in (1) is

$$\begin{bmatrix} \lambda_{kg} & \lambda_{km} & \lambda_{kc} \\ \lambda_{sg} & \lambda_{sm} & \lambda_{sc} \\ \lambda_{ug} & \lambda_{um} & \lambda_{uc} \end{bmatrix} = \begin{bmatrix} .103 & .217 & .680 \\ .019 & .247 & .734 \\ .006 & .340 & .654 \end{bmatrix}. \tag{8}$$

Although agriculture is consistently capital intensive, it employs only 10.3% of the capital stock. Agriculture employs very small percentages of labor. In the 3 × 2 model, agriculture is dropped from the specification. Services is the largest sector, employing more than 65% of every productive factor. The service sector employs about three times as much capital and skilled labor as does manufacturing, and about twice the unskilled labor.

IV. Translog Estimates of Technical Substitution

Estimates of aggregate factor price elasticities in the matrix σ complete specification of the model in (1). Little such technical work has been done in services, the predominant and growing sector of the U.S. economy.

Each sector's production function is specified as a translog Taylor series expansion,

$$\ln x = \ln \alpha_0 + \sum_i \alpha_i \ln v_i + 1/2 \sum_i \sum_h \gamma_{ih} \ln v_i \ln v_h, \tag{9}$$

where x is output, v_i's are inputs, α's and γ's are technical coefficients, and i, $h = k$, s, u.

A system of factor share equations is derived directly from (9),

$$S_i = \alpha_i + \sum_h \gamma_{ih} \ln v_h. \tag{10}$$

This system of factor share equations is estimated using iterative Zellner generalized least squares. Allen elasticities of substitution (S_{ih}) are found by inverting the bordered Hessian matrix of the production function, as described by Allen [1] and succinctly presented by Hamermesh and Grant [11].

Berndt and Christensen [4] point out that the estimation of the system in (10) assumes CRS and Hicks neutral technical change. As output expands along a linear expansion path, factor payments, unit inputs, and factor shares would all be unchanged, given homotheticity and constant returns. These assumptions can be tested by including an output coefficient in the estimation. The system

$$S_i = \alpha_i + \sum_i \gamma_{ik} \ln v_k + \delta_i x \tag{11}$$

is estimated, and the null hypothesis $\delta_i = 0$ is tested. A Chi square test reveals that this null hypothesis cannot be rejected in any sector at a 90% confidence level.

Another preliminary test concerns the separability of inputs. A consistent aggregator function for any pair of the three inputs across sectors would indicate that the model could be simplified by reducing the number of inputs. The null hypothesis of nonlinear separability is, however, rejected at a 99% level of confidence except for (i) skilled labor and labor in services, and (ii) capital with both types of labor in agriculture. There is no evidence of separability in manufacturing, where the data is more detailed and estimation results strongest.

Because of a lack of data in the service sector, a Department of Commerce [30] estimate of the total capital stock in services is split among states assuming each employs the same ratio of capital to labor in services as in manufacturing. Estimates of each sector's factor share equations in (10) are presented in Table I. Factor share equations for skilled labor and unskilled labor are estimated in each of the three sectors. Capital's factor share equation is redundant since $\gamma_{ik} = \gamma_{ki}$, $\sum_k \gamma_{ik} = 0$, and $\sum_k \alpha_k = 1$.

Estimated technical coefficients along with observed factor shares and industry shares are used to construct Allen elasticities and aggregate cross price elasticities. Jones and Easton [13] summarize properties of aggregate "super bowl" factor price elasticities σ_{ih}, which represent the percentage change across the economy in the input of factor i for a 1% increase in the price of factor h. A positive (negative) σ_{ih} indicates aggregate technical substitution (complementarity).

The σ_{ih} are derived from the Allen elasticities of substitution S_{ih}. Let E^j_{ih} represent the fac-

Table I. Translog Factor Share Estimates (t-values)

	α_s	α_u	γ_{su}	γ_{sk}	γ_{uk}	R_s^2	R_u^2
g	.02147	.01279	−.00328	.03657	−.04759	.311	.022
	(0.66)	(0.26)	(0.33)	(−2.37)	(−2.41)		
m	.22306	.12063	−.09778	−.01001	−.01670	.442	.224
	(8.23)	(3.38)	(−14.1)	(−1.21)	(−1.55)		
c	.25068	.13792	−.10065	−.01481	−.01440	.012	.088
	(3.98)	(1.90)	(−8.54)	(−0.76)	(−0.65)		

tor cross price elasticity in sector j. Sato and Koizumi [22] show that cost minimizing behavior implies

$$E_{ih}^j = \theta_{hj} S_{ih}^j. \tag{12}$$

Sectoral elasticities are weighted by industry shares to derive the super bowl elasticities in matrix $\boldsymbol{\sigma}$:

$$\sigma_{ih} \equiv \sum_j \lambda_{ij} E_{ih}^j. \tag{13}$$

Homogeneity implies that rows of the negative semidefinite matrix $\boldsymbol{\sigma}$ sum to zero. Estimated own elasticities σ_{ii} in the present data turn out to be negative, which means the undering cost functions are concave in factor prices.

Three sets of sectoral elasticities are calculated from Table I using (12). In agriculture, the derived factor price elasticities are

$$\begin{bmatrix} E_{kk}^g & E_{ks}^g & E_{ku}^g \\ E_{sk}^g & E_{ss}^g & E_{su}^g \\ E_{uk}^g & E_{us}^g & E_{uu}^g \end{bmatrix} = \begin{bmatrix} -.621 & .246 & .374 \\ 1.01 & -1.26 & .255 \\ .847 & .145 & -1.02 \end{bmatrix}. \tag{14}$$

The matrix of factor price elasticities in manufacturing is

$$\begin{bmatrix} -.931 & .367 & .564 \\ .250 & -1.43 & 1.18 \\ .261 & .798 & -1.06 \end{bmatrix}, \tag{15}$$

and in services

$$\begin{bmatrix} -.879 & .431 & .448 \\ .308 & -1.39 & 1.08 \\ .297 & 1.00 & -1.30 \end{bmatrix}. \tag{16}$$

There is noticeably less substitution between unskilled and skilled labor in agriculture than in the other two sectors. There is no complementarity in any sector. The largest own elasticities consistently occur for skilled labor, and the smallest for capital. Weighting these sectoral factor cross price elasticities as in (13) leads to the estimated matrix $\boldsymbol{\sigma}$ of aggregate super bowl translog elasticities:

$$\begin{bmatrix} \sigma_{kk} & \sigma_{ks} & \sigma_{ku} \\ \sigma_{sk} & \sigma_{ss} & \sigma_{su} \\ \sigma_{uk} & \sigma_{us} & \sigma_{uu} \end{bmatrix} = \begin{bmatrix} -.864 & .398 & .465 \\ .307 & -1.40 & 1.09 \\ .288 & .929 & -1.22 \end{bmatrix}. \tag{17}$$

V. Comparative Statics in the 3 × 3 Model

The 3 × 3 model, constructed from (4), (8), and (17), has the same number of productive factors and exogenous prices. The FPE result thus holds: $\partial w/\partial v = 0$.

Changing prices of goods affect factor prices in the 3 × 3 Stolper-Samuelson matrix:

$$\begin{bmatrix} 1.99 & -1.57 & 0.58 \\ -1.61 & -7.35 & 9.95 \\ 0.17 & 7.85 & -7.02 \end{bmatrix} \begin{bmatrix} \hat{p}_g \\ \hat{p}_m \\ \hat{p}_c \end{bmatrix} = \begin{bmatrix} \hat{w}_k \\ \hat{w}_s \\ \hat{w}_u \end{bmatrix}. \tag{18}$$

These $\partial w/\partial p$ effects follow a pattern suggested by the underlying factor intensity. The comparative static effects of a changing price run down each column. Every 1% increase in service prices, for instance, would create a 0.58% increase in the return to capital, a 9.95% increase in the wage of skilled labor, and a 7.02% decrease in unskilled wages. Every 1% decrease in manufacturing prices would raise skilled wages by 7.35%, while lowering unskilled wages by 7.85%.

Wages are very sensitive to changing prices in manufacturing and services. The large wage elasticities suggest that the move toward free trade in the U.S., characterized by a falling price of manufactured goods relative to business services, will noticeably hurt unskilled labor and help skilled labor. The return to capital would rise to a much smaller degree in the move toward free trade.

Rybcynski effects of changing factor endowments on outputs are

$$\begin{bmatrix} 11.9 & -12.0 & 1.17 \\ 1.08 & -8.53 & 8.45 \\ -0.67 & 4.54 & -2.87 \end{bmatrix} \begin{bmatrix} \hat{v}_k \\ \hat{v}_s \\ \hat{v}_u \end{bmatrix} = \begin{bmatrix} \hat{x}_g \\ \hat{x}_m \\ \hat{x}_c \end{bmatrix}. \tag{19}$$

Again, results mirror factor intensities. Capital is strongly and positively tied to agriculture, unskilled labor to manufacturing, and skilled labor to services.

With prices constant, immigration of unskilled workers amounting to 1% of the current total supply of unskilled workers would raise manufacturing output by 8.45% and agricultural output by 1.17%, while service output would fall 2.87%. Wages would not be affected by immigration of unskilled workers, but these effects are examined in a 3 × 2 model in the next section. Education would presumably convert unskilled workers to skilled workers, raising output of services and decreasing manufacturing output.

A curious property of even models, those with same number of productive factors and exogenous prices is that the $\partial w/\partial p$ and $\partial x/\partial v$ elasticities are completely free of influence from the pattern of substitution. This property is not noted in the literature. No matter how the production functions are specified and whether complementarity or substitution dominates, the reported $\partial w/\partial p$ and $\partial x/\partial v$ comparative static elasticities would occur. These important comparative static results depend only on factor shares and industry shares.

VI. Near Factor Price Equalization in a 3 × 2 Model

The literature on the 3 × 2 model includes Jones [12], Burgess [6; 7], Batra and Casas [27], Ruffin [20], Suzuki [23], Jones and Easton [13], and Thompson [25]. A 3 × 2 model is created by dropping agriculture out of the present 3 × 3 specification. There is some justification for such a move. Agricultural production is also tightly controlled and subsidized by government policy. Labor and capital may not readily move between agriculture and the rest of the economy. Also, agriculture is very small relative to the other sectors in the U.S. economy.

Factor shares in the 3×2 model are taken directly from the last two columns of (4). Factor intensity in the 3×2 model is exactly that of the last inequality in (6). Unskilled labor is the "extreme" input in manufacturing and capital is the extreme input in services, while skilled labor is the "middle" factor. Ruffin [20] shows that extreme factors are migration "enemies" in the 3×2 model, regardless of the pattern of technical substitution. An increase in the endowment of unskilled labor, in other words, will lower the return to capital, and vice versa. The middle factor skilled labor is a migration "friend" of both extreme factors.

The 3×2 industry share matrix can be derived directly from (8) by disregarding the share of inputs employed in agriculture:

$$\begin{bmatrix} \lambda_{km} & \lambda_{kc} \\ \lambda_{sm} & \lambda_{sc} \\ \lambda_{um} & \lambda_{uc} \end{bmatrix} = \begin{bmatrix} .242 & .758 \\ .252 & .748 \\ .342 & .658 \end{bmatrix}. \tag{20}$$

The dominance of the service sector is again very apparent. The 3×2 system in (1) under the assumption of translog production functions is constructed from (4), (14), (15), (16), and (20). The resulting matrix of substitution elasticities is

$$\begin{bmatrix} \sigma_{kk} & \sigma_{ks} & \sigma_{kn} \\ \sigma_{sk} & \sigma_{ss} & \sigma_{su} \\ \sigma_{uk} & \sigma_{us} & \sigma_{uu} \end{bmatrix} = \begin{bmatrix} -.892 & .416 & .476 \\ .294 & -1.40 & 1.11 \\ .285 & .931 & -1.22 \end{bmatrix}. \tag{21}$$

The substitution elasticities in (21) are very similar to those in (17), due to the small agriculture industry shares.

The $\partial w/\partial v$ elasticities of the 3×2 model are

$$\begin{bmatrix} -.341 & .378 & -.038 \\ .275 & -.305 & .031 \\ -.029 & .032 & -.003 \end{bmatrix} \begin{bmatrix} \hat{v}_k \\ \hat{v}_s \\ \hat{v}_u \end{bmatrix} = \begin{bmatrix} \hat{w}_k \\ \hat{w}_s \\ \hat{w}_u \end{bmatrix}. \tag{22}$$

These elasticities of factor prices with respect to factor endowments are small, suggesting international capital flows and labor migration have little long run impact on factor prices. The own skilled labor effect, for instance, implies that every 1% increase in the endowment of skilled labor would lower the wage of skilled labor by only 0.305%. A 50% difference in the endowment of unskilled labor between two such freely trading countries would result in an estimated differences of only 0.15% in the wages of unskilled labor, 1.55% in capital returns, and 1.9% in skilled wages.

The inelasticity of these $\partial w/\partial v$ terms is called near factor price equalization (NFPE). The assumption of complete output adjustment and free factor mobility between sectors contributes to NFPE. In this long run model with full employment, outputs adjust freely with changing factor endowments, while factor prices would be fairly stable due to NFPE. The economy is assumed to be a price taker in international markets, importing any excess demand and exporting any excess supply as factor endowments change.

While the 3×2 model does not lead to the FPE property between freely trading competitive countries, factor prices would not be far apart in the international equilibrium. Furthermore, NFPE is robust under different aggregation schemes. Econometric studies such as Butcher and Card [8] and LaLonde and Topel [16] find little empirical evidence that immigration has any impact on income distribution.

VII. Cobb-Douglas and CES Production

Estimates of aggregate substitution elasticities can be formulated under the assumption of Cobb-Douglas (CD) or constant elasticity of substitution (CES) production using only factor shares and industry shares. These specifications allow a comparison of comparative static properties between the translog model and a production technology with well known properties.

Under the CD assumption, the Allen elasticity of substitution S^j_{ih} is equal to 1. Then $E_{ih} = \theta_{hj}$ from (12), and $\sigma_{ih} = \sum_j \theta_{ij}\lambda_{hj}$. The derived CD substitution matrix in the three sector model is

$$\sigma_{CD} = \begin{bmatrix} -.739 & .336 & .403 \\ .260 & -.661 & .400 \\ .261 & .335 & -.596 \end{bmatrix}. \tag{23}$$

The degree of substitution in the CD model is less than in the translog model in (7), especially for skilled labor and unskilled labor. For capital, the $\sigma_{Ki}(i = k, s, u)$ terms are about 85% as large as those in the CD model. Similarly, the σ_{iK} elasticities of adjustments to a changing price of capital are 85% to 91% of those in the translog model. In contrast, the skilled and unskilled labor substitution are less than half (36% to 49%) of those in the CD model.

The $\partial w/\partial v$ elasticities in the 3×2 CD model are uniformly slightly larger in absolute magnitude than those reported for the translog model in (22). The CD production isoquants are less convex, and changing endowments within the production cone require slightly larger adjustment of the supporting isocost hyperplane.

Arbitrarily reducing the degree of substitution further with CES production increases the size of the $\partial w/\partial v$ elasticities proportionately. For instance, an Allen elasticity of substitution of 0.5 causes the $\partial w/\partial v$ terms to increase $(0.5)^{-1} = 2$ times. Over short time periods when there is little opportunity for substitution among factors, migration and international capital flows may thus have elastic effects on factor prices.

The $\partial w/\partial p$ and $\partial x/\partial v$ elasticities in the 3×2 CD model are also similar to those reported in the 3×3 translog model. Under CES or CD technology, these elasticities are identical in any model with one more type of factor than good. The $\partial x/\partial v$ CES elasticities are similar in value to those in the 3×3 translog model, except for larger effects associated with skilled labor. In the CD model, there are more convex production isoquants and more output adjustment with changes in the endowment of skilled labor. Comparative static effects associated with a changing capital endowment are about 60% as large as those in the translog model. All models are generally insensitive in the comparative static adjustments associated with unskilled labor.

VIII. Conclusion

As the U.S. economy opens to free international trade with newly industrializing and developing countries, the relative price of manufactures will fall. The U.S. economy will continue its shift toward specialization in business services. Unskilled labor can expect to suffer in this move toward free trade, with capital and skilled labor projected winners. Leamer [18] makes this point quite clearly.

There is some disagreement in the literature over the empirical issue of free trade and falling wages. Lawrence and Slaughter [17], Krugman and Lawrence [15], and Bhagwati and Dehejia [5] attribute most of the recent wage decline to changing technology rather than increasing trade. On the other hand, Sachs and Shatz [21], Batra and Slottje [3], and Leamer [19] believe increasing trade is significantly contributing to falling wages in the U.S.

The present line of investigation can be extended to include more types of labor as well as energy inputs. Clark, Hofler, and Thompson [10] find that none of the nine labor skill groups in manufacturing can be aggregated, and studies with disaggregated labor yield more detailed results. Complementarity between energy and capital has been uncovered in some applied studies, at least over periods of falling energy prices. An important long term issue will be the shifting pattern of international production and trade due to rising energy prices.

Analysis is greatly simplified if all factors are weak substitutes. Qualitative comparative static results can then largely be anticipated from the pattern of factor intensity. Quantitative results in the general equilibrium economics of production are relatively insensitive to the degree of substitution.

The inelasticity of the effects of changing factor endowments on factor prices, near factor price equalization, emerges as a powerful conceptual tool. Factor prices would not differ much between competitive trading economies, even if some of the conditions leading to complete factor price equalization do not hold. Just as importantly, changes in the prices of goods are found to have elastic effects on factor prices.

There are two important quantitative lessons in this paper. First, the move toward free trade in the U.S. has the potential to substantially distribute income away from unskilled labor. Second, free trade will serve as a strong substitute for international migration and investment.

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