

A Nonparametric Examination of Capital-Skill Complementarity

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Abstract

This paper uses nonparametric kernel methods to construct observation specific elasticities of substitution for a panel of 73 developed and developing countries to examine the capital-skill complementarity hypothesis. The exercise shows general support for capital-skill complementarity when skilled labor is categorized according to one of the three lowest thresholds: some secondary education, completed primary education and attained some primary education. However, at the two highest thresholds: attained some college and completed secondary education, the elasticity of substitution between skilled labor and physical capital is often greater than that of unskilled labor and physical capital, possibly suggesting capital-skilled substitutability at high thresholds. In addition, the elasticities of substitution are found to vary significantly across countries, groups of countries and time periods.

Keywords: Capital-Skill Complementarity, Elasticity of Substitution,
Nonparametric Kernel

JEL Classification: C14, C23, D2

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1 Introduction

Rising wage inequality has been a key feature of the U.S. labor market since the late 1970s. This phenomenon, both in the United States and worldwide, has received much attention in the literature. One possible explanation given for this rise comes from the capital-skill complementarity (CSC) hypothesis. The hypothesis states that physical capital and skilled labor are more complementary than unskilled labor and physical capital. Assuming the hypothesis is true, an increase in physical capital, *ceteris paribus*, will increase the demand for skilled labor (and thus wages for skilled laborers). Capital-deepening seen across many economies in recent years combined with CSC could be one such explanation for rising wage inequality. Thus, if significant increases in physical capital have been made and CSC is shown to hold for a particular economy, policymakers could use this information to possibly find ways to decrease inequality.

Griliches (1969) finds empirical evidence that physical capital and skilled labor are less substitutable than are physical capital and unskilled labor and concludes that the CSC hypothesis holds using a data set of U.S. manufacturers. Since Griliches (1969), the CSC hypothesis has been empirically studied in great detail. While some authors argue on the specification of the model, others argue on the type of data which should be studied. Fallon and Layard (1975), and others, study the CSC hypothesis on an international scale. Specifically, they piece together data from 22 developed and developing countries for the year 1963. They find mild evidence in favor of the CSC hypothesis. Duffy, Papageorgiou, and Perez-Sebastian (2004 – hereafter DPP) extend the work of Fallon and Layard (1975) to a data set of 73 countries over a 25 year period (1965-1990). They use a two-level constant elasticity of substitution production function specification and use nonlinear estimation methods which allow them to relax the assumption of perfectly competitive markets. Further, they are able to categorize skilled (and thus unskilled) labor into five categories (or thresholds)¹ which allow them to find the greatest support for CSC when the threshold for skilled laborers is defined as those who have attained some secondary education, those who have completed primary education or as those who gained some primary education.

¹These thresholds will be described in greater detail in Section 3.

Part of their purpose for looking at an international panel was to find evidence of CSC over long periods of time and across countries at different stages of development. This strategy was partly influenced by Goldin and Katz (1998) who note that physical capital and skilled labor have not always been viewed as relative complements. In particular, they suggest that transitions between production processes change the relative demand for skill, thus different economies at different times may or may not possess CSC.

Therefore it seems desirable to view the elasticities of substitution for each country at each time period. Simply blanketing all countries under one estimate could prove to be detrimental. For example, suppose a researcher found that CSC exists in a panel of countries. Then if countries take that information as given, it may affect their policy. If CSC holds true for that economy, it could increase education to reduce the impact of advancing technology on inequality. However, if CSC does not exist, those resources spent on education may have been better allocated.

Although observation specific estimates seem logical, the aforementioned papers simply give a single estimate for each elasticity.² In general, an increasingly popular method to obtain observation specific estimates is to use nonparametric kernel methods. In addition to obtaining observation specific estimates, nonparametric methods have the luxury of not having to assume a specific functional form for the technology. This technique is extremely beneficial here because as DPP (pp. 331) note, “there is no consensus yet on the appropriate functional form to use to capture capital-skill complementarity.” Thus, if one chooses a specific technology, and that assumption is incorrect, estimation will most likely lead to biased estimates.

This paper will use nonparametric methods to study the CSC hypothesis. This approach allows for three contributions to the literature. (1) The nonparametric technique allows the model to be solved using a single-level production function. (2) It decreases the number of assumptions of the model, including the choice of functional form for the technology and (3) it allows for observation specific estimates of elasticities of substitution (for which we will showcase three different measures). These contributions will allow for estimates of elasticities of substitution which sidestep the

²There is, however, some work being done with translog cost functions (which require price data) that allow for observation specific estimates, e.g. see Bergström and Panas (1992) and Ruiz-Arranz (2002).

problem of specification choice which arises in the two-level production function approach. Further, no assumptions on the parametric form of the technology will have to be assumed, nor will it require additional restrictive assumptions such as specifying initial parameters or assuming neutral technological growth.

The main finding of the paper shows general support for the CSC hypothesis when skilled labor is categorized as one of the three lowest thresholds. However, for the highest two thresholds, there is some evidence of capital-skill substitutability (CSS). Also, as hypothesized by Goldin and Katz (1998), it is shown that the degree of substitutability varies significantly amongst countries, and across groups of countries. Further, it is found that for the three highest thresholds, that skilled labor (and to a lesser extent unskilled labor) is becoming more substitutable with physical capital over time.

The remainder of the paper is organized as follows: Section 2 describes the model, gives a brief history of elasticity of substitution measures, and describes the estimation procedure as well as a nonparametric testing procedure. The third section gives the data while the fourth describes the results. Finally, the fifth section concludes.

2 Methodology

2.1 Model

Consider the simple aggregate production model of the form

$$y = f(K, S, N), \tag{1}$$

where y is aggregate output, K represents physical capital stock, and S and N represent skilled and unskilled labor respectively. The CSC hypothesis states that capital and skilled labor are more complementary than capital and unskilled labor. Formally, denoting σ_{ql} as the elasticity of substitution between inputs q and l , CSC is said to hold if $\sigma_{KS} < \sigma_{KN}$. That is, K and S are less substitutable (or more complementary) than K and N . Perhaps a stronger characterization of the hypothesis (SCSC) would be to say that K and S are complimentary ($\sigma_{KS} < 0$) while K and N are substitutable ($\sigma_{KN} > 0$).

2.2 Elasticity of Substitution Measures

The elasticity of substitution measure, first developed by Hicks (1932), measures the percentage change in factor proportions due to a change in the marginal rate of technical substitution in a two-input world. It is, effectively, a measure of the curvature of an isoquant. Although this result is intuitive, complication occurs when one allows for more than two inputs. Several measures have since been created in order to combat this complication. Unfortunately, there is no one correct answer.

One such measure, which has fallen out of fashion in the literature, is the direct elasticity of substitution (DES) defined by Allen and Hicks (1934). The measure, which defines the elasticity of substitution between any two inputs as

$$\sigma_{ql}^D = \frac{x_q f_q + x_l f_l}{x_q x_l} \frac{H_{ql}}{|H|}, \quad (2)$$

where

$$H = \begin{bmatrix} 0 & f_1 & \cdots & f_P \\ f_1 & f_{11} & \cdots & f_{1P} \\ \vdots & & & \vdots \\ f_P & f_{P1} & \cdots & f_{PP} \end{bmatrix},$$

H_{ql} is the cofactor of the element f_{ql} in H , and f_q , f_{qq} , and f_{ql} represent the first partial, second partial, and cross-partial derivatives of the production function respectively, can be interpreted as $\partial \log(x_q/x_l) / \partial \log(f_l/f_q)$ for constant output and other input quantities. The downfall of this measure is that it is identical to the two-input case, effectively assuming that the other factors in the production function are fixed and can be ignored.

The most popular measure in the literature is the Allen-Uzawa (or the partial) elasticity of substitution (AES). This method, first suggested by Allen and Hicks (1934) and further studied by Allen (1938) and Uzawa (1962), has become a staple in the applied literature (and used by DPP). It was designed to combat the downfall of the DES measure (by attempting to examine changes in other inputs) and is formally defined as

$$\sigma_{ql}^A = \frac{\sum_p x_p f_p}{x_q x_l} \frac{H_{ql}}{|H|}. \quad (3)$$

Although the measure is continually used, it has met sharp criticism. Blackorby and Russell (1989) suggest that the Allen-Uzawa measure fails to preserve the relevant

properties of the original Hicksian notion (for the multi-input case). They further state (pp. 883) that “as a quantitative measure, it has no meaning; as a qualitative measure, it adds no information to that contained in the (constant output) cross-price elasticity. In short, the AES is (incrementally) completely uninformative.”

In its place they suggest the Morishima elasticity of substitution (MES): originally published in Japanese by Morishima (1967) and independently discovered by Blackorby and Russell (1975, 1981). Further, they prove that the Morishima measure preserves the salient characteristics of the original Hicksian concept, which are lacking in the Allen-Uzawa measure. This measure is usually employed when estimating cost functions (e.g., see Thompson and Taylor 1995), but is also used when estimating production functions (e.g., see Hoff 2004) and has a well-known relationship to the partial elasticity of substitution:

$$\begin{aligned}\sigma_{ql}^M &= \frac{f_l x_l}{f_q x_q} (\sigma_{ql}^A - \sigma_{ll}^A) \\ &= \frac{f_l}{x_q} \frac{H_{ql}}{|H|} - \frac{f_l}{x_l} \frac{H_{ql}}{|H|}.\end{aligned}\tag{4}$$

A detailed examination of this formula shows two important facts. First, a pair of goods can be complements in terms of the AES, but substitutes according to the MES. On the other hand, if two goods are substitutes according to the AES, they are always substitutes according to the MES. Thus, either the MES has a bias towards treating inputs as substitutes or the AES has a bias towards treating them as complements. However, this paradoxical result should not be too disturbing since it simply reflects the fluidity of the concept of the elasticity of substitution in a multi-input world. Second, the MES is asymmetric. Although some view this as an unusual property, Blackorby and Russell (1981, 1989) argue that this should be natural for the multi-input case.³

2.3 Generalized Kernel Estimation

Here, Li-Racine Generalized Kernel Estimation (see Li and Racine 2004, and Racine and Li 2004) is used to estimate the (single level) production function (1), which may

³It was found that the asymmetric property of the MES had little effect on the conclusions of the paper. For a more detailed discussion on elasticity of substitution measures, see e.g., Allen (1938), Allen and Hicks (1934), Blackorby and Russell (1975, 1981, 1989), Chambers (1988), Hicks (1932, 1946), and McFadden (1963).

be written as

$$y_i = m(x_i) + u_i, \quad i = 1, 2, \dots, NT. \quad (5)$$

m is the unknown smooth production function with argument $x_i = (x_i^c, x_i^u, x_i^o)$, $x_i^c = (K_i, S_i, N_i)$ is a vector of continuous inputs, x_i^u is a vector of regressors that assume unordered discrete values (in this case a single variable for country, whose estimate is allowed to vary over time), x_i^o is a vector of regressors that assume ordered discrete values (in this case a single variable for time, whose estimate is allowed to vary across countries), u is the additive error, N is the number of countries, and T is the number of time periods ($N = 73$, $T = 6$). Taking a second-order Taylor expansion of (5) with respect to x_j yields

$$y_i \approx m(x_j) + (x_i^c - x_j^c)\beta(x_j) + 0.5(x_i^c - x_j^c)'(x_i^c - x_j^c)\gamma(x_j) + u_i \quad (6)$$

where $\beta(x) (\equiv \nabla m(x))$ is the partial derivative of $m(x)$ with respect to x^c and $\gamma(x) (\equiv \nabla_2 m(x))$ is the Hessian.

The local-quadratic least-squares⁴ estimator of $\delta(x) \equiv (m(x), \beta(x), \gamma(x))'$ is given by

$$\widehat{\delta}(x) = \left(\widehat{m}(x), \widehat{\beta}(x), \widehat{\gamma}(x) \right)' = (X'K(x)K)^{-1} X'K(x)y, \quad (7)$$

where $X = (1, (x_i^c - x_j^c), (x_i^c - x_j^c)'(x_i^c - x_j^c))$ and $K(x)$ is a $NT \times NT$ diagonal matrix of kernel (weight) functions $K_h = \prod_{s=1}^q (\widehat{\lambda}_s^c)^{-1} l^c \left(\frac{x_{si}^c - x_{sj}^c}{\widehat{\lambda}_s^c} \right) \prod_{s=1}^r l^u \left(x_{si}^u, x_{sj}^u, \widehat{\lambda}_s^u \right) \prod_{s=1}^p l^o \left(x_{si}^o, x_{sj}^o, \widehat{\lambda}_s^o \right)$. K_h is the commonly used product kernel (see Pagan and Ullah 1999), where l^c is the (second order) kernel function with window width $\lambda_s^c = \lambda_s^c(NT)$ associated with the s^{th} component of x^c . l^u is a variation of Aitchison and Aitken's (1976) kernel function which equals one if $x_{si}^u = x_{sj}^u$ and λ_s^u otherwise, and l^o is the Wang and Van Ryzin (1981) kernel function which equals one if $x_{si}^o = x_{sj}^o$ and $(\lambda_s^o)^{|x_{si}^o - x_{sj}^o|}$ otherwise.⁵

Estimation of the bandwidths $h = (\lambda^c, \lambda^u, \lambda^o)$ is typically the most salient factor when performing nonparametric estimation. For example, choosing a very small

⁴It should be noted that the second-order Taylor expansion and thus estimation of the model by local-quadratic least-squares is not necessary here. For instance, estimation of (5) can be performed using local-constant least-squares (which estimates only the unknown function) and then separately obtaining the derivatives of $m(\cdot)$ (using methods outlined in, e.g. Pagan and Ullah 1999, Rilstone and Ullah 1989, Ullah 1988a,b, and Vinod and Ullah 1988). For further information on the benefits and relationships between local constant, linear and quadratic least-squares, see Fan and Gijbels (1996).

⁵See Hall, Racine and Li (2004), Li and Ouyang (2005), Li and Racine (2004, 2005) and Racine and Li (2004) for further details.

bandwidth means that there may not be enough points for smoothing and thus we may get an undersmoothed estimate (low bias, high variance). On the other hand, choosing a very large bandwidth, we may include too many points and thus get an oversmoothed estimate (high bias, low variance). This trade-off is a well known dilemma in applied nonparametric econometrics and thus we resort to automatic determination procedures to estimate the bandwidths. Although there exist many selection methods, one popular procedure (and the one used in this paper) is that of Least-Squares Cross-Validation (LSCV).⁶ In short, the procedure chooses $(\lambda^c, \lambda^u, \lambda^o)$ which minimize the least-squares cross-validation function given by

$$CV(\lambda^c, \lambda^u, \lambda^o) = \frac{1}{NT} \sum_{j=1}^{NT} [y_j - \widehat{m}_{-j}(x_j)]^2, \quad (8)$$

where $\widehat{m}_{-j}(x_j) = Hy_j$ is the commonly used leave-one-out estimator of $m(x)$.

A major benefit of nonparametric type estimators is that they give a separate estimate for each observation. This allows one to construct observation specific estimates of (2), (3), and (4), where observation specific values of $f_q = \frac{\partial m}{\partial x_q}$, $f_{qq} = \frac{\partial^2 m}{\partial x_q^2}$, and $f_{ql} = \frac{\partial^2 m}{\partial x_q \partial x_l}$ are retrieved from $\widehat{\beta}(x)$ and $\widehat{\gamma}(x)$. This result allows one to track elasticity of substitution estimates across countries and over time.

In addition to giving observation specific estimates and relaxing the functional form,⁷ the nonparametric model gives several other important benefits over the parametric models. First, the model does not require the elasticity of substitution between N and S to be the same as that between K and N (equation 1 in DPP) or K and S (equation 2 in DPP).⁸ Second, the model does not require Hicks-neutral technological

⁶Estimation with alternative bandwidth selection criteria was also performed. Specifically, the results of the experiment using the Expected Kullback Leibler criteria of Hurvich, Simonoff and Tsai (1998) or the Silverman (1986) rule of thumb bandwidth were not significantly different from those given in the paper. All bandwidths were calculated using N ©.

⁷It should also be noted here that the translog model allows for observation specific estimates and a partial relaxation of the functional form. However, there are a few downfalls to the second-order Taylor approximation of the constant elasticity of substitution production function. First, as compared to the nonparametric model, it is more restrictive. Second, some authors have found that the second-order Taylor expansion sometimes gives poor results (see Kmenta 1967, and Thursby and Lovell 1978 for further details). Results for this paper were also estimated using the translog production function. It was found that these results were less intuitive than the nonparametric model, but are available from the author upon request.

⁸In the estimation of the model it is found that the elasticities of substitution between N and S , and K and N or K and S are not equal. The results for elasticities of substitution between N and

growth (equations 5 and 6 in DPP). Finally, Li-Racine Generalized Kernel Estimation allows for fixed effects that vary over time (an assumption that is made when employing equations 7 and 8 in DPP). In addition, it allows for time effects which are allowed to vary across countries.⁹

2.4 Comparison of Unknown Densities

Comparing estimates in the parametric world is relatively simple. A researcher often obtains one estimate for each parameter for the entire sample. These type of estimates can be tested in a straightforward manner using standard testing procedures. DPP use a likelihood ratio test to test the null that the two elasticities (σ_{KS} and σ_{KN}) are equal. In the nonparametric framework, a separate estimate is obtained for each observation. It is often too costly to examine all NT estimates. Therefore, authors often resort to comparisons of the medians (or quartiles) of the estimates. Another attractive approach is to compare the estimated densities of the estimates (nonparametric kernel density estimates – which can essentially be thought of as smoothed histograms).

Li (1996) develops a test with the hypothesis being $H_0 : f(x) = g(x)$ for all x , against the alternative $H_1 : f(x) \neq g(x)$ for some x (for this example, the null will be of the form $H_0 : f(\sigma_{KS}) = g(\sigma_{KN})$).¹⁰ This test, which works with either independent or dependent data is often used, for example, when testing whether income distributions across two regions, groups or times are the same. The test statistic used to test for the difference between the two unknown distributions (which Fan and Ullah 1999 show goes asymptotically to the standard normal), predicated on the integrated square error metric on a space of density functions, $I(f, g) = \int (f - g)^2 dx$, is

$$T = \frac{NTb^{\frac{1}{2}}I}{\hat{\sigma}} \sim N(0, 1), \quad (9)$$

S (whose median values for each threshold range from -0.943 to 16.968) are not reported in the tables, but are available from the author upon request.

⁹It is also found that the time invariant fixed effects assumption is not appropriate for this particular data set, nor is the assumption of “country invariant” time effects, these results are also available from the author.

¹⁰The explanation that follows assumes that $\{x_i\}$ and $\{z_i\}$ are two equally sized samples of size N , taken from f and g respectively.

where

$$I = \frac{1}{(NT)^2 b} \sum_{i=1}^{NT} \sum_{\substack{j=1 \\ j \neq i}}^{NT} \left[K \left(\frac{x_i - x_j}{b} \right) + K \left(\frac{z_i - z_j}{b} \right) - K \left(\frac{z_i - x_j}{b} \right) - K \left(\frac{x_i - z_j}{b} \right) \right],$$

$$\hat{\sigma}^2 = \frac{1}{(NT)^2 b \pi^{\frac{1}{2}}} \sum_{i=1}^{NT} \sum_{j=1}^{NT} \left[K \left(\frac{x_i - x_j}{b} \right) + K \left(\frac{z_i - z_j}{b} \right) + 2K \left(\frac{x_i - z_j}{b} \right) \right],$$

K is the standard normal kernel and b is the optimally chosen bandwidth.¹¹

3 Data

The data used in this paper is identical to that of DPP and will only be briefly described here. Real GDP (y) and physical capital stock (K), which are both measured in constant U.S. dollars (1985 international prices), as well as skilled labor (S) and unskilled labor (N) were obtained from the Penn World Tables Mark 5.6. There are six annual observations for each of the 73 countries (both developed and developing), spaced 5 years apart, over the period 1965-1990. Five proxies are constructed for skilled and unskilled labor (because it is unclear how skilled labor should be defined in a cross-country analysis) based on the Barro and Lee (2001) international education data set (observations are available once every five years – thus explaining the nature of the sample). Specifically DPP obtain each of the skilled proxies by multiplying achievement rates for a particular cutoff criterion by the size of the labor force in each country at each point in time (within the sample). Specifically, the proxies for skilled labor are as follows: ($S1$) workers who have attained some college, ($S2$) workers who have completed secondary education, ($S3$) workers who have attained some secondary education, ($S4$) workers who have completed primary education, and ($S5$) workers who have attained some primary education. The remaining portion of the labor force in each category is considered unskilled labor, and is correspondingly labeled as $N1$, $N2$, $N3$, $N4$, and $N5$.¹²

¹¹For further details see Fan and Ullah (1999), Li (1996), and Pagan and Ullah (1999).

¹²It should be noted that $S1 \leq S2 \leq S3 \leq S4 \leq S5$ and that $N1 \geq N2 \geq N3 \geq N4 \geq N5$

4 Results

The results of this study are displayed in Tables 1-7. Table 1 presents the elasticities of substitution between physical capital, and skilled and unskilled labor. The table reports the elasticity of substitution at the 25th, 50th and 75th percentile (labelled Quartile 1, 2 and 3) for each of the elasticity of substitution measures along with the relevant standard error below each estimate in italics. Table 2 gives the Li-Tests for the difference between two unknown distributions, whereas Tables 3-5 give median elasticities for each country using the Direct, Allen and Morishima elasticities respectively. Finally, Table 6 presents the median results for groups of countries across the sample and Table 7 gives the median elasticities for each time period.

4.1 Comparison of Quartiles

Since estimates are given for each observation in the nonparametric framework, it is common to examine their results at their quartile values. Table 1 gives the individual elasticity of substitution estimates at their quartiles (denoted as Q1, Q2 and Q3 for the first, second and third quartiles respectively) for each of the proxy levels (thresholds).¹³ DPP found that when controlling for fixed effects (specification 7 in DPP), that there was significant evidence for CSC when skilled labor was defined as those who have attained some secondary education, completed primary education or attained some primary education. In the table it is shown that for the three lowest thresholds, the results at the median for each of the elasticity of substitution measures are similar to that of the non-linear least squares with fixed effects model in DPP (specification 7). These similarities at the median are not surprising. The nonparametric estimation used in this paper can be thought of (loosely) as a type of nonparametric fixed effects estimation (which controls for both country and time effects). Specifically, at the lowest three thresholds, the median values of σ_{KS} are less than σ_{KN} and we find some evidence of CSC.

¹³Although different from some previous papers, the large positive elasticities are still reasonable. Microeconomic theory simply states that if the elasticity of substitution is infinity, the two inputs are perfect substitutes. Thus, the large values for particular countries at particular time periods simply show a higher degree of substitutability than for other observations. However, it should be noted that the majority of the estimates lie within the “traditional” range and many of the large elasticities are accompanied by large standard errors.

On the other hand, at the two highest thresholds: attained some college and completed secondary education, the results are not as consistent. Whereas each elasticity of substitution measure shows some evidence of CSC at the median for the three lowest thresholds, at the two highest thresholds, the AES suggests CSC while both the DES and MES measures give results consistent with CSS. Specifically, the elasticity of substitution between skilled labor and physical capital is actually greater than that of unskilled labor and physical capital at the median for both the DES (significant) and MES (insignificant). This general result is also consistent with DPP. In their specification (7), they find insignificant evidence of CSS at the two highest thresholds.

These results pose two interesting questions: why do the results differ between the three measures and why does the model seemingly switch from CSC to CSS at the median when defining skilled labor according to one of the highest two thresholds? The first question is perhaps easier to answer. As noted in Section 2.2, the AES has a possible bias towards treating inputs as complements. This result may explain the difference between the results of the AES and the DES or MES. The latter question is more difficult. What can explain the shift from CSC to CSS when using one of the highest two thresholds? One possible explanation could be the presence of sheepskin effects (e.g. see Hungerford and Solon 1987, and Layard and Psacharopoulos 1974) at the high-school level. This theory suggests that individuals with more schooling do not earn more because schooling itself makes them more productive, but rather that graduating (in this case high-school) *credentiates* individuals as being more productive. Thus, in the cross-country case, it appears that perhaps the completion of secondary schooling increases wages to the extent that the (median) skilled individual is now substitutable with physical capital. These results perhaps suggest, that for the cross-country case, that skilled labor should be defined as those who have completed secondary education.

Solely looking at the median values is naive when employing nonparametric estimation techniques. Examination of the upper and lower quartiles often proves fruitful. When examining the lowest two thresholds for any measure in Table 1, one can see that the lower quartile on σ_{KS} is often negative.¹⁴ This implies that at least

¹⁴Many of these negative values come at or before 1975, thus suggesting an evolution over time.

twenty-five percent of the observations (in each of these cases) show physical capital and skilled labor to be complements. Note that often the corresponding estimates of σ_{KN} are positive, suggesting capital-unskilled substitutability. This shows that for a portion of the sample, we find insignificant evidence of the stronger CSC hypothesis suggested in Section 2.1. Also interesting is that for the DES, the lower quartile of σ_{KN} is sometimes negative. However, the traditional CSC hypothesis still holds here because $\sigma_{KN} > \sigma_{KS}$. On the other hand, the lower quartile for the MES is quite different from its median. In fact, the first quartile is negative for each threshold. Further, the stronger CSC is shown to hold in each scenario. At the same time, for the second and third quartiles, CSS appears to hold for the highest two thresholds. However, most of the results are generally insignificant for the MES at the quartiles.

Overall, although there appears to be little contradiction from the results of DPP, the first table is able to shed additional light. Specifically, DPP was able to find evidence of CSC when the threshold for skilled labor was defined as those who do not possess a high-school diploma and some evidence of CSS for those that do. In this study, for the lowest three thresholds, there is evidence for CSC across the three measures. This was not the case for the highest two thresholds. Whereas the AES shows evidence of CSC for most of the observations, the DES (and to a lesser extent the MES) shows evidence of CSS for a majority of the observations. However, if we follow the advice of Blackorby and Russell (1975, 1981, 1989) and use the MES, we see some evidence of both CSC and CSS in the highest two thresholds. The story told in Goldin and Katz (1998) appears to be relevant here. Not only do elasticities of substitution differ amongst countries and over time, it shows that CSC and CSS may both occur in the same data set.

4.2 Comparison of Unknown Densities

Examining quartiles can give an idea to differences between two distributions, but the question that remains is whether or not these differences are significant. To test the differences between the estimated densities, the Li-Test is employed. The null hypothesis states that the distribution (for all countries over all time periods) of the elasticity of substitution between physical capital and skilled labor (at a given

The time aspect of the paper will be examined in Section 4.4.

threshold) is different from the distribution of the elasticity of substitution between physical capital and unskilled labor (at the same threshold).

The results of the tests are reported in Table 2. The distributions appear to be most different for the extreme definitions of skilled labor; the test statistics are found to be very large when skilled labor is defined as those who have attained some college, those who have completed secondary education and those who have attained some primary education. In each of these tests, the null hypothesis is rejected at the 1% level of significance. For example, the greatest support for CSC is found when skilled labor is defined as the lowest threshold. The test statistic for the lowest threshold (for each measure), along with the respective quartile values, suggests that there is significant evidence of CSC.

The highest two thresholds also have large test statistics. However, the conclusions of these tests are not the same. The DES suggests CSS at the highest two thresholds and the test statistic rejects the null that the two distributions are equal. On the other hand, the AES evaluation at the quartiles generally suggests CSC. Here, again, the results between the distributions are significantly different from one another. If one were only to use the AES (which is common in the literature), then they might conclude that CSC is present in a majority of the observations. When the MES is employed, the results are somewhat mixed. It was found that both CSC and CSS existed in the same panel. The test statistic here simply reflects that the distributions are different from one another, but it cannot be determined whether CSC or CSS is predominant within the panel.

The distributions for the third and fourth thresholds are much closer (in a statistical sense) than those of the extremes. The DES fails to reject the null that the distribution of the elasticity of substitution between physical capital and skilled labor, where skilled labor is defined as those who attained secondary education, is different from the distribution of the elasticity of substitution between physical capital and unskilled labor. At the same time, both the AES and the MES fail to reject the null when skilled labor is defined as those who completed primary education. At least two explanations can be given for these test statistics. First, given that the extremes were significantly different from one another, it seems obvious that the distributions would be similar when examining one of the middle thresholds. This is partially due to the

way the data was designed. Specifically, the procedure takes a group of individuals and separates them according to their level of educational attainment. Thus, as one separates the group near the median education level, it should be expected that the distributions would be similar. A second explanation for the low test statistics is that the Li-Test is known to have low power, and failure to reject does not mean that the distributions are necessarily the same.

4.3 Comparison by Country

Aside from the greater flexibility afforded by the nonparametric approach, an additional benefit is the estimation of observation-specific elasticities. To further analyze the variation across observations, Tables 3-5 report the median elasticity for each country along with the associated standard error for the Direct, Allen and Morishima measures respectively. For countries across the sample, regardless of threshold, there appears to be significant variation in the elasticity of substitution with each measure. While some countries show strong evidence of CSC at each threshold, others show strong evidence of CSS at each threshold. Again, it is suggested that assigning a single parameter estimate for an entire panel is not correct for this particular data set. These results show the importance of obtaining observation specific estimates.

The results for the DES (Table 3) are more or less what is expected given the results at the quartiles. CSC appears to be present when examining the three lowest thresholds. The median result for each country appears to possess CSC nearly 80% of the time. At the same time, for the highest two thresholds, the median elasticity of substitution for each country shows evidence of CSS over 95% of the time. However, it should be noted that many countries break the cycle and show either CSC (e.g., Kenya, Mauritius, Singapore, and Uruguay) or CSS (e.g., Cyprus, Iceland, and Tanzania) for a vast majority of the thresholds.

Table 4 gives the results for the AES, but the results here are somewhat more surprising. Although the medians in Table 1 showed evidence for CSC at all thresholds, the results here are mixed. For both the upper and lower two thresholds, the median elasticity of substitution for each country between skilled labor and physical capital is generally smaller than that between unskilled labor and physical capital. In fact, the coefficients for each country on σ_{KS1} and σ_{KS2} are primarily negative while their

corresponding counterparts are positive. In fact we find significant evidence of the stronger CSC hypothesis here for many countries. At the same time, the results for σ_{KS4} and σ_{KS5} are primarily positive, but still smaller than σ_{KN4} and σ_{KN5} . The odd result is for the middle threshold. When skilled labor is defined as those who have attained some secondary education, the median elasticity of substitution between skilled labor and physical capital for nearly half of the countries is greater than that of physical capital and unskilled labor. In other words, for a large percentage countries, the table shows CSC when skilled labor is defined as either the highest two or lowest two thresholds, but concludes CSS for many countries in the middle threshold. This result does not seem intuitive to the author. This lack of consistency is troubling and perhaps shows empirical evidence of the problems of the AES as stated by Blackorby and Russell (1975, 1981, 1989).

The results for the MES (Table 5), as previously suggested, possess the most variation across thresholds. Again, CSC is predominant when skilled labor is categorized as one of the three lowest thresholds. More so than with the DES or AES, the stronger CSC hypothesis holds true for the MES measure in a majority of countries. The results for the highest two thresholds, however, are more mixed. While it is true that CSS holds true for a majority of the median elasticities, many countries show CSC even at the highest threshold. Roughly 40% of the countries suggest CSC when skilled labor is categorized as those who completed secondary education while nearly 30% of the countries suggest it when skilled labor is categorized as those who obtained some postsecondary education. Further, CSS is more prevalent at lower thresholds than with the previous two measures (e.g., Germany, Iceland and Korea). One possible explanation for the latter phenomenon is the possible bias of the MES measure towards treating inputs as substitutes.

Although results at the country level are extremely informative, one can always wonder how groups of countries behave together. Table 6 reports the median elasticity of substitution for specific groups of countries.¹⁵ The results from the DES and the MES are very similar. On the other hand, the results from the AES are sporadic. The AES shows CSC for most groups at most thresholds, except for Africa. The

¹⁵The median refers to the median elasticity of substitution for all countries in a specific group over all periods studied.

median elasticities of substitution from the group of countries in Africa are shown to possess CSS at each threshold. In addition, the magnitude of the CSS is increased greatly as the threshold is moved towards the middle (σ_{KS3} vs. σ_{KN3}). Furthermore, the median elasticity of substitution between physical capital and skilled labor for the OECD countries is negative and less than that of the non-OECD countries, but greater than that of the Latin American countries. These inconsistencies again cast doubt on the interpretation of the AES.

As stated previously, the results for the DES and MES measures are quite similar. For each of the groups, for the lowest three thresholds, the CSC hypothesis appears to generally hold at the median. Also, for the two highest thresholds, CSS generally holds for the median values. This should not necessarily be surprising. These results are consistent with those in the second quartile of Table 1. Another interesting result is the magnitude of the elasticities at the highest two thresholds. Whereas at the lower three thresholds the results do not appear to differ significantly across groups (other than Africa at the third threshold), at the highest two thresholds, patterns become quite prevalent. OECD countries have the smallest median elasticity of substitution between skilled labor and physical capital. This result is also true for the elasticity of substitution between unskilled labor and physical capital, although the magnitude is much smaller. Also, as with the AES, the elasticity of substitution is greatest within the continent of Africa. For example, the median elasticity of substitution between physical capital and skilled labor for Africa is over 32 times that of the OECD countries (for the MES at the highest threshold). Skilled labor in Latin America, on the other hand, appears to be slightly less substitutable at higher thresholds than that of non-OECD countries, but more substitutable on average than all countries in the sample.

As a comparison to other work in the literature, the results in this paper also compare alternative groups of countries. In a recent paper, Papageorgiou and Chemlarova (2005) find that a particular group of countries (“Regime 2” in Table 3 of their paper), who have a moderate income level but a low level of education, have a more pronounced level of CSC compared with countries with a high education (“Regime 1”) or countries with both a low income and low education level (“Regime 3”). In this sample (Table 6) it is found that their results do not hold. While it is true that

generally CSC is more pronounced in Regime 2 relative to Regime 3, this is not the case for Regime 2 relative to Regime 1. In fact, in most cases, Regime 1 has the most pronounced CSC relative to the other two Regimes. However, it must be noted that this does not necessarily discredit the results of Papageorgiou and Chemlarova (2005). Although the group of Regime 2 is the full sample of countries, data is missing for Hong Kong and Nicaragua from Regime 1, and for the Dominican Republic from Regime 3. Further, the aforementioned paper uses a cross-sectional data set with fewer countries than the panel data set of the current paper. In addition, the data in their paper is from 1988 while the data in the current paper is from 1965 to 1990. As will be shown in the next section, the elasticities of substitution have gone through major changes over the time period studied.

4.4 Comparison by Time Period

Perhaps the most striking results of the paper come from the final table. Table 7 presents the median elasticities by year for each elasticity of substitution measure.¹⁶ Although some of the results differ across the measures and thresholds, one fact remains. For the highest three thresholds (more so as the threshold rises), the elasticity of substitution between physical capital and skilled labor (and to a lesser extent unskilled labor) is dramatically increasing over time. For example, the median σ_{KS1} for the DES in 1990 is over thirty times larger than the median elasticity in 1965. Similarly for the MES, the median elasticity is over 17 times larger. At the same time, the median elasticities for σ_{KN1} are over five times greater for the DES and MES measures in 1990 than they are in 1965. These results suggests that not only are physical capital and skilled labor becoming more substitutable, CSS is becoming more prevalent over time.

Nowhere is this phenomenon more dramatic than with the AES. From 1965 to 1980 (except for one insignificant case), the AES suggests that CSC is present with the median country. However, in 1985 and 1990, the elasticity of substitution between physical capital and skilled labor is actually greater than that of physical capital and unskilled labor. In other words, as time passes in this particular panel, the

¹⁶The median refers to the median elasticity of substitution for all countries in a specific time period.

AES describes the scenario of countries going from CSC to CSS (at an overwhelming majority of the thresholds).

These results are important for at least two reasons. First, it reinforces the idea that assuming a constant elasticity of substitution across time periods is inappropriate for this particular data set. Second, it shows an evolution across time. It seems as if physical capital and skilled labor (at the highest three thresholds) are becoming more substitutable over time. Although this result is very interesting, the real question is why is this result occurring. One possible explanation is given in Ruiz-Arranz (2002). She argues (pp. 24) that “as time goes by, machines become more and more accessible or more user-friendly so that also the unskilled can handle them. That is, the complementarity between [technologically advanced capital] and skilled labor becomes less stringent as more people, not only skilled workers, learn how to use [technologically advanced capital] more effectively.”

Another interesting result of the table is that the lowest two thresholds do not appear to follow the same suit. It appears as if the median elasticity of substitution across time does not consistently increase or decrease. In other words, when we categorize skilled labor according to a low threshold, the time pattern of substitutability is not prevalent. Whereas it has been shown that technologically advanced capital can become more user friendly over time and thus skilled workers can become more substitutable with physical capital, this result does not appear to hold when defining skilled workers at low thresholds.

4.5 Skilled/Unskilled Wage Differential

As noted in the introduction, one of the main reasons for studying the CSC hypothesis is to attempt to explain the skilled/unskilled wage differential. Again, if physical capital and skilled labor are found to be more complementary than unskilled labor and physical capital, then an increase in physical capital, *ceteris paribus*, will increase the demand and thus wages for skilled laborers. However, this paper suggests that individuals who have completed secondary education are often considered substitutes with physical capital. This essentially rules out CSC as *the* factor behind the rise in the skilled/unskilled wage differential.

Taking this result as given, the question becomes, what explains the increased

college wage premium across many developed and developing countries? Several authors have recently pointed to alternative explanations. Ruiz-Arranz (2002) writes a follow up paper to the study by Krusell, Ohanian, Ríos-Rull, and Violante (2000) and examines the effect of CSC on the skilled/unskilled premium in the United States. In contrast to Krusell, Ohanian, Ríos-Rull, and Violante (2000), who argue that variations in factor inputs can account for most of the variation in the skill premium in the United States (by using a two-level CES function calibrated so that there exists CSC), Ruiz-Arranz (2002) finds that CSC can account for at most 40 percent of the increase in the skill/unskilled premium, with factor non-neutral technological change and other unobservable factors accounting for most of the rise in the premium. She concludes that changes in the wage structure cannot be explained simply by changes in observed inputs alone.

Papageorgiou and Chemlarova (2005) also look at this theory, but with an international data set. Specifically, they look at a cross-section of 46 countries in 1988 and find that CSC exists in the full sample. However, when they break the countries into OECD and non-OECD sub-samples, they find no evidence in favor of the hypothesis for the OECD sub-sample of countries, but strong evidence of CSC for the non-OECD sub-sample. They concur with Ruiz-Arranz (2002) and suggest that there must be alternative explanations for rising wage and income inequality in OECD countries. Specifically, they suggest that the rise must come from such sources as skill-biased technological change (e.g. also see Baltagi and Rich 2005 and Galor and Moav 2000).

5 Conclusion

This paper set out to study the CSC hypothesis in a panel of 73 developed and developing countries using nonparametric kernel techniques. This method allowed for three contributions to the literature. (1) The nonparametric approach allowed for the model to be solved using a single-level production function. (2) It did not require a specific functional form to be assumed for the technology, and (3) it allowed for observation specific estimates of elasticities of substitution. With regard to the first contribution, it was shown that the single-level production function side-stepped the problem of specification choice which arose in the two-level approach. Second, the nonparametric approach made no assumption on the functional form

of the technology, nor did it require additional restrictive assumptions such as neutral technological growth or time invariant fixed effects. Finally, as nonparametric estimates give parameter estimates for each observation, it was possible to obtain elasticity of substitution estimates for each observation in the sample. The inclusion of these techniques on the panel showed evidence of CSC for the lower three thresholds for defining a skilled worker, and some evidence for CSS for the highest two thresholds. These results appeared to hold when examining the quartiles of the elasticities as well as country and time medians.

Further, the observation specific estimates allowed for deeper analysis of individual countries, groups of countries as well as countries across time. It was found that the elasticities of substitution vary significantly across countries, groups of countries and time periods. Specifically, while it was shown that on average CSC existed for the lower three thresholds and there was some evidence for CSS for the highest two thresholds, some countries showed evidence of CSC for a majority of the thresholds and for others CSS appeared to exist for a majority of the thresholds. Further, it was found that there is strong evidence that physical capital and skilled labor are becoming more substitutable with time. These results were shown to be in line with the theories of Goldin and Katz (1998) who suggested that the elasticity of substitution between inputs varies with a country's stage of development and therefore is subject to change over time.

It should be noted here, that even though these estimators are consistent, (as with all kernel type estimators) they possess small sample bias. In a small sample such as this, 438 (73×6) observations, these results should be taken with a grain of salt. Whereas the overall picture may not change with increased observations (specifically filling in the four years between each observation – if the education data was available), some results for individual countries may change significantly (as well as seeing decreases in the standard errors). This should not, however, be seen as a discredit to the approach, but an occurrence which all applied nonparametric econometricians must be fully aware of.

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Table 1 -- Quartile Values for Nonparametric Estimates of Three Different Elasticity of Substitution Measures

	Direct Elasticity of Substitution			Allen-Uzawa Elasticity of Substitution			Morishima Elasticity of Substitution		
	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
σ_{KS1}	2.884	12.679 ¹	57.200 ¹	-9.734	0.018 ²²	14.594	-1.237	25.453	167.690
	<i>1.307</i>	<i>1.788</i>	<i>23.627</i>	<i>6.831</i>	<i>0.484</i>	<i>6.314</i>	<i>1.362</i>	<i>27.961</i>	<i>178.909</i>
σ_{KS2}	2.659	10.038 ¹¹	52.111 ¹	-19.898	0.441 ²	6.770 ²	-0.394	8.776	56.957
	<i>0.712</i>	<i>2.949</i>	<i>12.772</i>	<i>58.782</i>	<i>0.219</i>	<i>1.450</i>	<i>0.062</i>	<i>1.963</i>	<i>3.277</i>
σ_{KS3}	0.514 ²²	4.158	24.091	0.278	2.576	20.599	-2.839	1.425	16.639
	<i>0.308</i>	<i>1.515</i>	<i>6.481</i>	<i>0.776</i>	<i>0.917</i>	<i>15.883</i>	<i>2.739</i>	<i>0.698</i>	<i>4.034</i>
σ_{KS4}	-2.991	0.594 ²²	4.609	0.147	1.165	5.483 ²	-0.999	-0.104	0.987 ²
	<i>2.270</i>	<i>0.533</i>	<i>1.745</i>	<i>0.109</i>	<i>0.178</i>	<i>0.614</i>	<i>0.315</i>	<i>0.085</i>	<i>0.506</i>
σ_{KS5}	-0.487	1.226	6.898 ²	-0.082	0.640 ²²	3.773 ²	-1.833	0.087	2.861
	<i>0.663</i>	<i>0.403</i>	<i>1.755</i>	<i>0.079</i>	<i>0.246</i>	<i>0.959</i>	<i>0.492</i>	<i>0.419</i>	<i>1.019</i>
σ_{KN1}	1.249	2.950	8.354	0.865	2.352	6.812	0.009	7.627	26.220
	<i>0.170</i>	<i>0.921</i>	<i>0.729</i>	<i>1.695</i>	<i>0.743</i>	<i>2.309</i>	<i>1.011</i>	<i>3.839</i>	<i>12.080</i>
σ_{KN2}	1.655	4.112	11.020	1.536	4.243	14.098	0.877	7.341	29.304
	<i>0.264</i>	<i>0.499</i>	<i>0.128</i>	<i>0.551</i>	<i>0.922</i>	<i>2.037</i>	<i>0.732</i>	<i>1.587</i>	<i>13.807</i>
σ_{KN3}	2.209	7.033	22.665	0.091	3.483	11.633	-0.287	4.877	31.374
	<i>0.653</i>	<i>1.702</i>	<i>7.802</i>	<i>0.309</i>	<i>1.845</i>	<i>5.728</i>	<i>0.148</i>	<i>4.869</i>	<i>11.304</i>
σ_{KN4}	0.355	4.712	14.477	0.300	3.212	9.789	-0.285	0.693	6.105
	<i>0.058</i>	<i>1.909</i>	<i>6.197</i>	<i>0.306</i>	<i>2.658</i>	<i>1.414</i>	<i>0.419</i>	<i>0.992</i>	<i>1.453</i>
σ_{KN5}	-0.299	2.296	21.118	0.448	6.106	35.563	-3.644	0.294	5.332
	<i>0.217</i>	<i>1.403</i>	<i>4.741</i>	<i>0.555</i>	<i>2.651</i>	<i>10.495</i>	<i>2.804</i>	<i>0.342</i>	<i>3.099</i>

NOTES: In the regression function used to estimate each of these elasticities, the dependent and independent variables are in levels. State and time effects are also included. Q1, Q2 and Q3 refer to the first, second, and third quartile, respectively. S1-S5 and N1-N5 refer to the different categories for skilled and unskilled labor, respectively. LSCV used for bandwidth selection. Standard errors are listed in italics beneath each estimate. The superscript numbers 1 (11), 2 (22) and 3 (33) correspond to where the estimate shows significant evidence of CSS, CSC or SCSC at the 5% (10%) level, respectively.

Table 2 -- Li-Tests for the Difference Between Two Unknown Distributions

Null Hypothesis	Test Statistic	1% Level of Significance
Direct Elasticity of Substitution		
$f(\sigma_{KS1}) = g(\sigma_{KN1})$	24.636	Reject the Null
$f(\sigma_{KS2}) = g(\sigma_{KN2})$	5.217	Reject the Null
$f(\sigma_{KS3}) = g(\sigma_{KN3})$	1.159	Fail to Reject the Null
$f(\sigma_{KS4}) = g(\sigma_{KN4})$	3.609	Reject the Null
$f(\sigma_{KS5}) = g(\sigma_{KN5})$	12.309	Reject the Null
Allen-Uzawa Elasticity of Substitution		
$f(\sigma_{KS1}) = g(\sigma_{KN1})$	40.598	Reject the Null
$f(\sigma_{KS2}) = g(\sigma_{KN2})$	21.949	Reject the Null
$f(\sigma_{KS3}) = g(\sigma_{KN3})$	6.464	Reject the Null
$f(\sigma_{KS4}) = g(\sigma_{KN4})$	0.576	Fail to Reject the Null
$f(\sigma_{KS5}) = g(\sigma_{KN5})$	41.911	Reject the Null
Morishima Elasticity of Substitution		
$f(\sigma_{KS1}) = g(\sigma_{KN1})$	24.042	Reject the Null
$f(\sigma_{KS2}) = g(\sigma_{KN2})$	14.973	Reject the Null
$f(\sigma_{KS3}) = g(\sigma_{KN3})$	2.554	Reject the Null
$f(\sigma_{KS4}) = g(\sigma_{KN4})$	0.404	Fail to Reject the Null
$f(\sigma_{KS5}) = g(\sigma_{KN5})$	9.315	Reject the Null

NOTES: The test statistic was shown by Fan and Ullah (1998) to be distributed as a standard normal under the null. The Silverman (1986) rule of thumb bandwidth was used in each hypothesis test.

$f(\sigma_{KS1}) = g(\sigma_{KN1})$, for example, tests whether the distribution (for all countries over all time periods) of the elasticity of substitution between physical capital and skilled labor (those who attained college) is different from the distribution of the elasticity of substitution between physical capital and unskilled labor (those who did not attain college). The remaining tests can be explained in a similar fashion.

Table 3 -- Median Elasticity of Substitution Across Time for Each Country (Direct Elasticity of Substitution)

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
ALGERIA	2.342 ¹ 0.139	2.087 6.190	0.304 ² 0.125	-0.171 ³³ 0.102	-0.013 0.618	0.416 0.035	0.823 0.083	3.195 1.051	0.802 0.250	0.631 3.387
ARGENTINA	22.063 ¹ 7.175	3.166 1.535	0.360 ² 0.103	1.993 18.138	1.188 1.492	3.103 0.245	3.308 0.479	11.173 4.274	1.165 0.298	0.694 0.610
AUSTRALIA	6.054 9.429	5.960 ¹ 1.751	2.147 1.530	-0.769 3.951	-0.143 0.085	1.482 0.378	1.781 0.260	2.906 0.568	3.836 1.048	-0.021 7.639
AUSTRIA	5.102 ¹ 1.361	4.240 1.802	5.646 1.976	-1.823 0.166	1.097 0.402	1.766 0.164	2.496 0.321	3.202 1.747	2.532 2.678	1.146 0.441
BANGLADESH	0.987 1.615	0.995 0.231	3.392 0.897	0.170 0.057	0.004 0.053	0.611 0.202	0.581 0.095	1.404 0.710	1.962 4.964	0.008 1.160
BELGIUM	4.501 3.008	7.399 ¹ 1.352	1.193 0.470	1.637 6.443	0.957 0.277	2.244 0.204	2.782 0.286	4.800 2.027	5.738 10.591	0.887 0.204
BOLIVIA	17.999 14.090	11.646 2.044	12.247 14.655	-4.687 11.201	-0.035 0.526	5.612 0.623	6.885 0.868	16.104 6.645	3.381 6.223	-0.284 0.217
BRAZIL	22.610 39.031	24.917 13.628	2.268 1.121	-9.832 ³ 3.002	0.416 5.218	4.000 1.336	4.187 0.565	7.075 2.500	7.044 2.929	4.859 0.884
CANADA	16.936 11.855	2.725 0.632	1.985 2.488	0.140 0.378	0.047 0.087	1.281 0.115	1.802 0.165	2.429 0.698	0.313 0.111	-0.352 1.318
CHILE	4.919 4.344	4.776 ¹ 1.027	2.346 0.943	-1.824 3.333	0.825 0.447	1.211 0.316	2.166 0.262	3.645 1.903	0.923 0.317	4.632 2.821
COLOMBIA	5.738 12.250	8.334 ¹¹ 1.607	4.526 2.292	4.691 1.219	2.550 0.613	3.137 0.760	4.549 0.539	11.122 2.778	3.398 18.659	8.400 3.739
COSTA RICA	9.825 13.500	13.081 ¹ 4.527	2.527 1.146	-0.706 5.696	3.345 2.960	1.485 0.385	2.372 0.251	1.994 0.867	1.822 1.657	3.837 3.202
CYPRUS	6.602 35.195	5.879 ¹ 1.561	3.861 2.016	1.628 1.401	0.265 0.329	1.233 0.427	1.415 0.176	3.274 2.365	1.629 2.175	0.097 1.804
DENMARK	6.433 ¹ 1.992	4.488 1.135	3.579 0.782	0.756 ² 0.098	1.240 10.202	1.770 0.177	2.673 0.250	4.592 1.737	2.965 1.013	1.336 2.803
ECUADOR	15.751 13.130	11.101 ¹¹ 2.691	7.000 2.961	-4.296 23.480	0.683 2.098	5.209 0.827	5.208 0.662	7.639 1.476	4.671 4.531	7.352 272.190
EL SALVADOR	20.848 21.461	15.728 8.144	0.709 0.928	-16.308 25.858	1.480 2.650	3.759 0.914	5.247 0.630	4.914 1.701	7.590 9.187	6.332 8.773
FINLAND	7.791 ¹¹ 2.693	7.295 ¹ 1.875	1.534 1.212	0.544 1.822	-0.007 0.108	1.590 0.540	2.007 0.268	4.516 1.337	2.529 1.281	0.634 0.434
FRANCE	2.780 0.650	4.844 ¹¹ 1.212	1.660 1.098	0.313 0.688	-0.042 0.097	1.536 0.112	2.298 0.185	3.387 1.049	2.807 3.621	0.269 0.901
GERMANY, WEST	4.849 1.979	2.856 0.702	2.084 ²² 0.581	-0.064 1.063	0.452 ² 0.046	1.769 0.283	4.097 0.579	10.470 3.706	9.465 5.404	3.597 0.486
GHANA	6.700 24.852	4.300 6.737	4.275 ¹ 0.336	-0.582 ² 0.702	-0.050 0.842	3.025 0.340	4.092 0.483	2.189 0.476	3.678 1.262	1.897 1.067

Table 3 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
GREECE	20.018	15.518 ¹¹	1.489	-1.179	2.028	3.316	3.870	4.921	5.453	8.938
	22.340	6.589	0.745	7.263	0.897	0.348	0.448	2.126	1.884	4.355
GUATEMALA	10.783	7.882	2.672	-1.114	-1.993	2.843	4.425	9.260	8.794	-0.855
	28.021	2.115	2.013	10.568	1.508	0.227	0.473	9.065	7.835	3.490
HAITI	6.527 ¹	7.331 ¹	1.059 ²	-0.350 ³	0.725	1.056	1.643	2.748	2.936	0.341
	1.959	1.378	0.417	0.178	0.455	0.220	0.210	0.412	1.179	1.800
HONDURAS	8.681	9.113	3.310	-4.216	2.763 ²	3.234	5.055	10.441	16.034	13.113
	7.494	8.496	4.112	37.649	0.683	0.545	0.678	3.805	9.794	4.392
ICELAND	8.949 ¹	2.022	8.673	0.432 ¹	1.211	1.445	1.952	2.154	-0.526	1.076
	2.538	0.567	8.600	0.190	2.501	0.683	0.249	1.008	0.226	0.658
INDIA	4.002	3.896 ¹	1.886	0.432 ²²	0.265	1.555	1.082	0.997	1.197	0.623
	2.437	0.745	1.064	0.071	0.201	0.254	0.223	0.200	0.353	7.047
INDONESIA	1.199	2.188 ¹¹	0.232	1.226	0.430	1.251	1.072	3.087	1.236	1.407
	8.766	0.484	0.128	6.142	0.143	1.248	0.107	1.888	0.670	0.451
IRAN	19.862	16.374 ¹	18.105	0.764 ²	0.975	2.744	4.082	7.725	5.979	4.369
	32.329	3.617	6.112	0.109	0.173	0.978	0.483	2.499	1.709	2.603
IRAQ	11.897	9.121	3.739	-0.873	0.885	5.134	7.540	12.492	7.227	-0.119
	37.602	8.045	2.225	10.391	0.163	1.622	0.805	6.859	2.588	2.098
IRELAND	20.517	14.547 ¹	0.281	1.082	5.389	2.170	3.246	6.361	2.736	4.561
	15.705	3.635	0.110	2.389	1.103	0.553	0.359	4.354	0.425	2.349
ISRAEL	39.312 ¹¹	14.409 ¹	1.241	0.385	1.922	3.255	3.958	6.960	0.238	0.244
	20.230	2.639	1.125	1.650	0.367	0.349	0.428	3.240	0.898	2.042
ITALY	12.393 ¹¹	7.254	3.120	0.279	2.173	2.650	4.058	8.373	8.149	0.730
	3.983	1.474	2.769	5.188	0.438	1.232	0.579	2.714	6.546	0.463
JAMAICA	4.858	9.186 ¹	-0.086 ²	-0.511	-0.097	1.001	1.203	1.074	0.337	-0.314
	2.415	2.733	0.092	1.535	0.025	0.247	0.131	0.319	0.301	0.869
JAPAN	10.207	21.241	10.652	1.280	1.559	3.137	4.941	13.828	17.310	-2.062
	39.707	15.152	6.854	5.239	1.246	0.362	0.601	5.212	23.058	14.899
JORDAN	12.101	11.724 ¹¹	16.320	-4.811	4.723	3.778	5.671	9.743	5.300	7.652
	16.848	2.859	5.180	16.904	3.303	0.398	0.723	3.852	6.835	2.720
KENYA	1.398	3.280 ¹	0.765 ²	0.547 ²	0.454 ²	1.720	1.578	4.111	5.639	2.470
	0.873	0.673	0.502	0.087	0.430	0.088	0.116	1.455	2.170	0.308
KOREA, REP.	22.494	13.549 ¹	10.229	-10.659	0.128	2.581	3.761	9.579	0.242	0.303
	19.861	4.319	5.697	99.007	0.066	0.517	0.463	3.379	0.092	0.161
MALAWI	5.685	3.491	4.366	0.260	-0.170	2.298	2.974	2.985	0.281	0.815
	3.377	0.733	2.452	0.213	0.457	0.180	0.339	1.381	2.351	0.443
MALAYSIA	25.214	18.397	4.640	-2.216	0.170	3.771	6.153	5.304	5.172	1.073
	52.607	8.116	4.994	10.692	0.623	1.207	0.706	3.075	8.668	0.544
MALI	3.158	3.012 ¹	6.226	1.089	1.029	2.054	0.904	3.930	4.111	1.078
	1.021	0.601	1.389	0.346	0.995	0.488	0.124	0.769	5.672	0.279

Table 3 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
MAURITIUS	-0.802 0.983	0.481 ² 0.119	-0.633 ²² 0.340	0.721 1.513	0.058 1.142	1.037 0.213	1.453 0.374	1.907 1.162	1.676 0.406	0.013 0.353
MEXICO	14.770 11.063	5.532 5.220	10.555 5.020	0.278 0.069	0.111 0.061	2.640 0.945	3.975 0.552	5.580 2.435	3.892 2.494	0.243 0.168
MOZAMBIQUE	18.777 19.811	19.925 10.242	7.212 3.752	-6.182 45.715	0.729 ² 0.165	5.600 1.997	8.683 0.875	19.026 4.165	9.289 2.853	4.089 1.116
MYANMAR	2.527 2.310	3.654 0.984	0.923 0.251	1.311 0.706	2.222 0.652	2.127 0.332	1.657 0.264	1.325 1.819	1.153 0.214	2.604 1.091
NETHERLANDS	11.857 21.557	3.345 1.874	1.009 ²² 0.967	-0.888 3.256	3.654 4.239	2.293 0.696	4.041 0.530	10.480 4.265	13.797 30.086	5.170 5.189
NEW ZEALAND	13.045 11.401	5.775 1.557	1.033 ² 0.790	1.526 0.517	0.842 0.203	1.928 0.419	3.279 0.431	11.938 2.566	4.070 6.952	1.261 0.907
NORWAY	21.612 23.613	4.026 1.748	3.748 1.373	-0.334 0.106	22.253 6.928	2.147 0.568	3.766 0.460	14.983 5.842	1.523 1.143	6.177 2.987
PAKISTAN	1.771 1.315	1.931 0.988	1.109 ²² 0.399	0.233 0.084	0.534 0.115	1.259 0.845	1.019 0.074	6.014 2.109	2.111 3.111	0.385 0.422
PANAMA	47.580 ¹¹ 21.899	30.033 14.007	34.732 13.557	0.839 0.164	0.650 0.119	3.857 4.588	6.601 0.812	16.698 7.132	3.055 7.548	0.341 0.755
PARAGUAY	8.708 7.578	8.565 4.505	5.278 1.883	5.080 1.205	2.596 0.824	2.722 0.269	3.422 0.403	7.454 2.652	0.058 4.798	0.741 3.900
PERU	17.480 77.818	22.085 11.444	13.138 8.159	-2.676 27.074	-3.838 ² 3.250	2.950 2.522	4.052 0.530	4.318 2.084	8.861 8.887	14.186 4.209
PHILIPPINES	4.496 3.100	4.187 ² 1.878	1.175 1.569	-0.652 0.349	0.525 0.197	7.745 0.753	11.197 1.362	17.132 17.295	0.567 0.490	0.248 2.755
PORTUGAL	18.086 15.796	19.086 ¹¹ 6.793	7.669 2.274	0.828 0.735	4.236 0.921	3.880 1.962	5.820 0.472	4.862 2.260	2.834 0.619	13.225 4.870
SENEGAL	11.986 5.536	14.743 ¹¹ 5.902	4.147 3.350	-2.174 11.703	3.411 ¹ 0.650	2.779 0.836	3.860 0.448	8.589 3.082	5.856 3.843	-0.655 1.113
SIERRA LEONE	7.093 7.864	12.370 3.345	1.013 ² 0.640	-3.405 23.980	0.972 0.570	6.173 2.224	8.054 0.889	7.065 1.425	3.655 1.300	3.749 1.174
SINGAPORE	0.203 0.077	0.521 0.122	0.808 0.403	-0.025 0.199	-0.055 0.356	0.303 0.029	0.699 0.094	1.531 0.649	0.068 0.932	-0.033 0.506
SPAIN	18.117 31.779	20.776 11.538	2.167 1.539	-8.328 38.839	2.022 0.748	3.363 0.320	7.655 0.889	16.051 18.892	11.459 9.556	0.566 0.521
SRI LANKA	0.799 ²² 0.695	4.935 1.927	0.892 0.469	0.505 0.062	0.399 0.464	2.067 0.068	2.013 0.108	3.353 6.993	-1.084 0.902	1.079 8.509
SUDAN	7.374 3.860	5.851 ¹¹ 1.625	2.114 1.476	0.154 ²² 0.278	0.832 0.212	1.139 0.133	2.360 0.283	1.373 0.676	5.450 2.728	0.775 0.693
SWEDEN	4.924 ¹¹ 1.561	3.801 1.068	1.327 1.287	-11.093 121.618	0.416 0.049	1.972 0.151	4.970 0.769	6.714 3.342	5.914 2.411	-3.330 19.807

Table 3 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
SWITZERLAND	10.591	14.894 ¹	2.453	1.890	2.285	2.032	2.528	4.101	2.047	2.339
	<i>6.864</i>	<i>2.486</i>	<i>1.689</i>	<i>1.610</i>	<i>0.665</i>	<i>0.293</i>	<i>0.296</i>	<i>1.664</i>	<i>0.363</i>	<i>0.695</i>
TANZANIA	2.236	2.501	3.324	0.111 ¹	0.017 ¹	1.731	1.410	0.446	-2.806	-2.265
	<i>4.030</i>	<i>1.623</i>	<i>1.317</i>	<i>0.057</i>	<i>0.041</i>	<i>2.577</i>	<i>0.176</i>	<i>0.511</i>	<i>1.056</i>	<i>0.507</i>
THAILAND	2.576	5.525 ¹	2.673	1.583	0.626 ²²	1.306	1.459	4.178	2.213	2.326
	<i>0.920</i>	<i>0.933</i>	<i>1.646</i>	<i>5.381</i>	<i>0.322</i>	<i>0.130</i>	<i>0.208</i>	<i>0.867</i>	<i>1.364</i>	<i>0.663</i>
TUNISIA	12.381	11.410 ¹	3.332	0.748	-0.749	2.812	3.498	9.617	2.413	0.576
	<i>8.539</i>	<i>2.781</i>	<i>1.714</i>	<i>18.159</i>	<i>0.501</i>	<i>0.213</i>	<i>0.379</i>	<i>7.089</i>	<i>4.317</i>	<i>1.328</i>
TURKEY	23.903	4.265	13.131	4.260	2.084	3.148	5.038	11.257	5.544	5.997
	<i>95.833</i>	<i>6.737</i>	<i>6.503</i>	<i>10.242</i>	<i>1.158</i>	<i>1.482</i>	<i>0.631</i>	<i>3.337</i>	<i>7.089</i>	<i>1.393</i>
U.K.	4.848	4.943	1.550	-1.812	1.226	1.715	2.910	4.206	3.169	1.120
	<i>2.214</i>	<i>1.792</i>	<i>0.645</i>	<i>10.811</i>	<i>0.403</i>	<i>0.449</i>	<i>0.351</i>	<i>1.859</i>	<i>1.143</i>	<i>0.513</i>
U.S.A.	6.568	6.760 ¹	4.381	1.583	1.890	1.789	2.563	4.327	2.004	2.645
	<i>3.760</i>	<i>1.702</i>	<i>1.689</i>	<i>0.442</i>	<i>0.436</i>	<i>0.520</i>	<i>0.270</i>	<i>1.707</i>	<i>0.723</i>	<i>0.722</i>
UGANDA	5.613	13.843	27.257	-0.172 ²²	0.029 ²	5.584	8.550	16.881	1.931	4.389
	<i>5.212</i>	<i>2.646</i>	<i>7.330</i>	<i>0.178</i>	<i>0.229</i>	<i>0.906</i>	<i>1.158</i>	<i>8.543</i>	<i>1.046</i>	<i>1.285</i>
URUGUAY	0.317	0.557	0.264 ²	-2.840	-0.605	0.326	0.688	1.842	0.104	0.008
	<i>0.089</i>	<i>0.113</i>	<i>0.202</i>	<i>54.642</i>	<i>0.014</i>	<i>0.031</i>	<i>0.083</i>	<i>0.584</i>	<i>0.144</i>	<i>1.241</i>
VENEZUELA	38.319	8.567 ¹¹	0.001	0.594	3.124 ¹	3.970	3.979	5.880	-0.244	-1.092
	<i>30.556</i>	<i>2.146</i>	<i>0.170</i>	<i>0.533</i>	<i>0.811</i>	<i>0.526</i>	<i>0.552</i>	<i>4.484</i>	<i>0.726</i>	<i>0.786</i>
ZAIRE	7.552 ¹	2.718	0.560	-3.896 ²	-0.139 ²²	1.500	2.833	1.985	4.785	3.207
	<i>0.443</i>	<i>0.731</i>	<i>0.293</i>	<i>2.437</i>	<i>0.172</i>	<i>0.072</i>	<i>0.350</i>	<i>1.443</i>	<i>1.909</i>	<i>1.583</i>
ZAMBIA	12.679 ¹	5.203	0.494	-0.432 ³	0.669	1.002	2.022	2.447	1.129	0.694
	<i>1.788</i>	<i>1.779</i>	<i>0.260</i>	<i>0.213</i>	<i>0.235</i>	<i>0.248</i>	<i>0.237</i>	<i>1.386</i>	<i>0.167</i>	<i>0.709</i>
ZIMBABWE	7.793	8.664	5.164	-13.982	-0.166	7.212	10.233	5.979	-1.472	-3.003
	<i>3.866</i>	<i>2.535</i>	<i>2.139</i>	<i>116.334</i>	<i>0.254</i>	<i>0.847</i>	<i>1.351</i>	<i>7.581</i>	<i>0.562</i>	<i>24.090</i>

NOTES: In the regression function used to estimate each of these elasticities, the dependent and independent variables are in levels. State and time effects are also included. The median elasticity for each country over the six time periods (1965-1990) is given. S1-S5 and N1-N5 refer to the different categories for skilled and unskilled labor, respectively. LSCV used for bandwidth selection. Standard errors are listed in italics beneath each estimate. The superscript numbers 1 (11), 2 (22) and 3 (33) correspond to where the estimate shows significant evidence of CSS, CSC or SCSC at the 5% (10%) level, respectively.

Table 4 -- Median Elasticity of Substitution Across Time for Each Country (Allen-Uzawa Elasticity of Substitution)

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
ALGERIA	-3.784	0.196 ²²	0.402	0.168	0.202	0.890	0.911	0.073	0.021	1.507
	8.909	0.207	0.211	0.027	0.033	0.127	0.181	0.193	0.167	1.585
ARGENTINA	-6.249	-10.580	-0.032	0.671 ²	0.378	1.273	3.276	1.879	2.487	2.694
	16.417	9.750	0.369	0.326	0.049	1.512	0.810	3.629	0.529	2.240
AUSTRALIA	-2.085	0.758	2.498	1.223 ¹	-0.075 ²²	1.726	1.471	0.262	0.355	0.803
	2.553	2.590	1.798	0.172	0.277	0.962	0.485	0.660	0.155	0.202
AUSTRIA	-2.608 ³³	0.023	1.176	0.497 ²	0.385 ²	1.575	2.571	2.517	1.070	4.552
	1.413	1.682	2.526	0.133	0.167	0.787	0.197	1.234	0.128	0.829
BANGLADESH	-2.721	0.778	1.045	0.835	0.649	1.657	1.288	0.893	0.475	0.447
	6.290	0.296	1.090	0.187	0.212	1.451	0.366	0.654	0.093	0.622
BELGIUM	-0.523	0.040	1.075	1.422	0.459 ²²	1.704	4.040	3.944	1.115	2.512
	1.477	4.060	0.959	0.298	0.233	0.603	0.990	2.096	0.268	0.939
BOLIVIA	3.000	0.835	2.465	0.975 ²	-0.144 ²	1.814	10.117	1.648	2.875	1.706
	2.536	5.528	1.194	0.122	0.247	1.019	2.414	2.789	0.334	0.560
BRAZIL	-10.932	0.088	1.497	1.855	1.628 ²	5.107	2.096	-0.500	3.283	4.973
	11.057	0.311	0.668	1.753	0.434	2.011	1.991	3.516	0.521	0.987
CANADA	3.661	-0.587 ²	1.245	0.050 ²	0.025	0.120	2.277	0.811	1.132	6.390
	1.754	0.715	0.546	0.070	0.381	0.675	0.283	1.099	0.146	4.757
CHILE	-1.347	-0.034	1.364	0.180 ²	0.311 ²	3.169	1.989	0.138	0.834	2.390
	3.813	0.857	0.696	0.025	0.070	2.944	0.436	0.363	0.126	0.553
COLOMBIA	-58.083 ³³	-5.285 ³	2.495	0.860 ²	0.566 ²	2.601	4.243	11.333	6.328	36.435
	9.854	1.499	1.033	1.669	0.315	1.452	0.922	4.481	0.612	10.382
COSTA RICA	-0.009	4.104	4.205	0.075 ²	0.358 ²	1.547	1.053	-0.211	2.641	3.173
	2.447	1.724	4.286	0.020	0.165	0.695	2.976	0.044	0.282	0.476
CYPRUS	-1.363	3.739	5.281	0.120	0.300	1.776	1.566	-0.802	0.280	-0.085
	1.756	6.180	2.248	0.313	0.323	1.026	0.551	2.914	1.117	0.371
DENMARK	-4.413	0.705 ²	0.959	0.772 ²	1.570	1.398	2.472	3.102	1.348	4.183
	3.046	0.257	1.377	0.120	0.439	0.866	0.410	0.626	0.153	2.799
ECUADOR	1.154	3.373	1.146	0.752 ²	1.066	2.645	5.279	7.200	1.936	4.571
	3.266	3.199	2.159	0.105	0.447	1.124	1.034	2.164	0.337	14.715
EL SALVADOR	2.891	-22.797	2.054	0.819 ²	1.127 ²	1.995	5.330	5.791	3.850	5.901
	0.712	30.427	5.572	0.194	0.435	2.231	1.320	5.468	0.584	1.707
FINLAND	0.604	1.244	0.701	1.076	0.106 ²	-0.005	1.864	1.064	1.587	0.849
	0.332	0.867	0.239	1.007	0.143	2.050	0.533	0.563	0.185	0.218
FRANCE	0.514	0.318 ²	-0.848	0.313	0.366	0.282	2.434	2.345	0.881	0.539
	3.013	0.559	0.199	0.107	0.114	0.764	0.301	4.972	6.642	3.577
GERMANY, WEST	-0.489	-29.018	1.244	0.740 ²	0.301 ²	2.105	1.456	9.011	9.695	5.449
	1.351	78.608	0.739	0.088	0.086	0.635	0.360	4.648	1.840	0.887
GHANA	1.853	-0.777 ²	2.458	2.535 ¹	1.783	0.443	1.724	0.796	0.026	0.893
	1.076	0.864	0.416	0.497	0.615	0.509	0.229	0.845	0.093	0.979

Table 4 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
GREECE	11.776 7.104	0.676 0.447	0.476 0.590	0.527 ² 0.088	0.457 ² 0.184	2.243 0.847	1.775 0.822	1.455 1.970	4.271 0.483	20.813 7.632
GUATEMALA	-8.734 9.910	-2.721 12.348	4.586 1.692	1.521 ²² 0.214	0.480 ² 0.489	6.315 0.996	4.608 1.001	9.111 14.913	2.565 0.325	7.034 1.333
HAITI	-0.018 0.484	0.048 ² 0.043	1.908 0.885	0.080 ²² 0.034	-0.043 ² 0.069	0.032 0.066	1.892 0.344	1.314 0.544	3.439 1.831	0.100 0.219
HONDURAS	1.186 1.776	-4.562 ³ 1.410	1.862 0.973	0.101 ² 0.114	2.313 0.898	2.352 0.743	7.060 0.691	3.116 2.597	7.899 0.776	16.691 13.082
ICELAND	-8.080 ²² 4.343	-3.557 ³ 0.343	10.156 ¹¹ 5.260	1.992 ¹ 0.623	0.095 0.157	0.982 1.030	2.008 0.588	-5.431 2.982	0.225 0.137	-0.363 0.195
INDIA	-0.165 6.346	1.116 3.582	2.148 0.923	3.297 ¹ 0.307	0.674 ¹¹ 0.180	1.618 0.818	2.686 0.437	0.433 0.556	-0.131 0.128	0.132 0.102
INDONESIA	-3.485 4.720	0.286 0.270	0.715 0.217	1.281 ¹ 0.212	0.423 0.242	1.284 2.438	1.450 0.510	0.644 0.253	-0.183 0.128	0.806 0.270
IRAN	-8.662 11.824	-0.063 ² 0.226	3.967 7.136	1.238 ² 0.198	0.763 ² 0.217	2.234 2.045	4.031 1.049	2.509 5.073	2.711 0.397	3.548 1.079
IRAQ	0.194 0.673	0.131 ² 0.274	0.975 0.436	0.214 ² 0.185	0.884 ² 0.298	3.415 1.928	7.492 1.809	5.602 7.397	6.326 1.227	3.169 0.581
IRELAND	-14.351 11.508	3.638 2.681	0.881 3.293	0.568 ² 0.101	1.184 ² 0.181	2.050 1.032	3.079 0.667	6.195 1.719	1.991 0.415	9.439 3.587
ISRAEL	1.615 0.801	-0.787 ³ 0.141	4.050 18.172	1.374 ² 0.259	-0.039 ² 0.244	1.333 0.607	2.368 0.883	9.739 7.710	3.294 0.529	2.891 1.060
ITALY	0.927 1.340	3.601 2.378	1.858 0.657	3.081 ²² 0.580	2.819 0.864	2.552 1.735	3.768 1.199	3.599 4.185	5.085 0.496	0.288 0.730
JAMAICA	-0.565 6.892	-10.054 43.808	-0.097 0.086	0.223 ²² 0.054	0.093 0.395	1.048 0.981	1.029 0.251	-0.053 0.061	1.344 0.571	5.175 2.812
JAPAN	-0.322 ²² 1.250	-30.560 32.205	14.769 12.073	1.719 ² 1.264	1.043 ² 0.546	3.657 0.907	11.675 2.494	4.232 6.675	6.823 0.975	23.094 5.546
JORDAN	-1.937 2.033	-6.243 ³ 3.133	17.470 ¹ 3.089	0.645 ² 0.149	0.672 ² 0.211	5.106 5.360	8.469 1.029	5.816 1.785	8.066 1.001	22.967 5.143
KENYA	0.111 0.815	3.900 1.063	0.751 10.201	0.101 0.132	0.334 ¹¹ 0.155	1.166 1.665	2.175 0.351	2.859 0.823	-0.163 0.089	-0.074 0.084
KOREA, REP.	0.303 0.613	-8.141 105.174	13.749 7.940	0.340 ² 0.097	0.695 0.937	1.740 0.704	8.334 0.972	1.202 1.972	4.010 0.598	1.602 0.529
MALAWI	-2.896 3.861	0.268 ² 0.649	1.351 3.143	2.744 ¹ 0.925	-0.219 0.085	3.285 1.208	2.534 0.485	1.759 2.473	0.091 0.240	0.168 0.603
MALAYSIA	-5.592 4.010	-1.543 8.643	2.945 5.165	1.208 ² 0.244	0.761 0.346	2.837 1.120	7.335 1.165	5.718 3.089	7.147 0.837	8.629 4.612
MALI	-0.858 2.750	2.352 1.628	7.230 1.572	0.840 1.946	0.625 0.196	2.216 1.835	1.845 0.229	3.514 1.483	0.835 0.191	0.245 0.122

Table 4 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
MAURITIUS	0.437 <i>1.047</i>	-0.242 ²² <i>0.345</i>	0.483 <i>0.717</i>	0.037 <i>0.328</i>	-0.031 <i>0.150</i>	0.689 <i>0.783</i>	1.606 <i>0.629</i>	0.922 <i>1.170</i>	-0.043 <i>0.135</i>	0.211 <i>0.288</i>
MEXICO	-0.019 <i>1.227</i>	4.203 <i>0.474</i>	1.189 <i>6.893</i>	0.110 ² <i>0.064</i>	1.287 <i>0.636</i>	1.873 <i>0.819</i>	2.984 <i>1.218</i>	3.709 <i>2.216</i>	4.812 <i>0.725</i>	2.861 <i>1.008</i>
MOZAMBIQUE	-3.445 ³³ <i>1.500</i>	-7.181 ³ <i>1.980</i>	3.531 <i>23.501</i>	0.761 ² <i>0.214</i>	1.144 ²² <i>0.509</i>	4.284 <i>2.372</i>	9.047 <i>2.010</i>	17.529 <i>10.437</i>	11.150 <i>2.138</i>	7.041 <i>2.818</i>
MYANMAR	-3.844 <i>5.267</i>	-6.049 ³ <i>1.473</i>	0.562 <i>0.602</i>	1.857 ¹ <i>0.440</i>	0.539 <i>0.120</i>	2.392 <i>0.941</i>	2.927 <i>0.126</i>	1.350 <i>2.283</i>	0.644 <i>0.136</i>	1.027 <i>0.366</i>
NETHERLANDS	-2.116 <i>3.783</i>	-0.358 <i>2.062</i>	1.491 <i>2.246</i>	1.412 ² <i>0.312</i>	0.289 ² <i>0.067</i>	1.835 <i>5.374</i>	4.277 <i>0.849</i>	0.568 <i>2.061</i>	9.108 <i>1.384</i>	15.552 <i>5.680</i>
NEW ZEALAND	-3.594 <i>2.620</i>	-1.370 ³ <i>0.231</i>	0.938 <i>0.350</i>	0.159 ² <i>0.042</i>	0.040 ² <i>0.179</i>	1.718 <i>0.882</i>	2.755 <i>0.738</i>	1.596 <i>0.495</i>	7.959 <i>1.128</i>	26.968 <i>5.615</i>
NORWAY	-4.001 ²² <i>2.554</i>	0.044 ² <i>0.116</i>	1.137 <i>2.222</i>	0.287 ² <i>0.064</i>	0.055 ² <i>0.202</i>	2.403 <i>0.958</i>	3.867 <i>0.808</i>	2.087 <i>0.541</i>	7.965 <i>1.375</i>	17.286 <i>7.526</i>
PAKISTAN	-0.655 <i>1.224</i>	1.061 <i>1.092</i>	4.851 <i>2.295</i>	1.229 ¹ <i>0.200</i>	1.732 <i>0.501</i>	1.234 <i>1.822</i>	0.747 <i>0.392</i>	1.228 <i>0.459</i>	0.370 <i>0.096</i>	0.428 <i>0.335</i>
PANAMA	-169.282 ² <i>30.081</i>	1.613 <i>0.971</i>	8.678 <i>77.290</i>	0.171 ² <i>0.030</i>	0.273 ²² <i>0.132</i>	3.895 <i>6.715</i>	6.617 <i>3.457</i>	4.200 <i>7.746</i>	3.745 <i>0.596</i>	2.986 <i>1.335</i>
PARAGUAY	1.533 <i>2.047</i>	0.407 <i>3.148</i>	4.331 <i>1.636</i>	0.464 <i>0.090</i>	1.389 <i>0.469</i>	1.611 <i>1.603</i>	4.755 <i>0.598</i>	2.392 <i>1.407</i>	2.285 <i>1.468</i>	0.734 <i>1.533</i>
PERU	-6.241 ³ <i>2.640</i>	5.538 <i>0.723</i>	1.796 <i>11.982</i>	0.389 ² <i>0.050</i>	0.417 ² <i>0.234</i>	1.680 <i>0.488</i>	3.474 <i>2.479</i>	4.473 <i>2.264</i>	3.672 <i>0.551</i>	6.883 <i>2.153</i>
PHILIPPINES	2.476 <i>0.936</i>	1.852 <i>5.433</i>	0.871 <i>4.857</i>	5.921 ¹ <i>1.206</i>	0.238 <i>0.223</i>	4.297 <i>1.673</i>	7.441 <i>5.618</i>	14.893 <i>13.262</i>	-0.195 <i>0.038</i>	1.631 <i>1.715</i>
PORTUGAL	-3.374 ²² <i>2.142</i>	0.228 ² <i>0.831</i>	9.214 <i>4.396</i>	0.626 ²² <i>0.092</i>	0.091 ² <i>0.064</i>	2.164 <i>0.814</i>	5.717 <i>0.760</i>	-0.340 <i>3.444</i>	1.360 <i>0.345</i>	2.990 <i>0.655</i>
SENEGAL	-6.334 ²² <i>4.317</i>	0.764 ² <i>0.707</i>	2.130 <i>4.110</i>	1.165 ²² <i>0.178</i>	0.698 ² <i>0.157</i>	2.878 <i>1.150</i>	3.886 <i>0.876</i>	-0.039 <i>3.306</i>	2.031 <i>0.326</i>	5.479 <i>1.678</i>
SIERRA LEONE	-0.088 <i>0.298</i>	-1.962 ³ <i>0.453</i>	0.545 <i>0.369</i>	0.726 ² <i>0.166</i>	0.131 ² <i>0.109</i>	4.419 <i>5.649</i>	7.491 <i>2.232</i>	3.605 <i>4.449</i>	5.884 <i>0.891</i>	22.587 <i>5.338</i>
SINGAPORE	-2.713 <i>2.927</i>	-0.809 <i>3.830</i>	0.989 <i>0.261</i>	0.877 ² <i>0.120</i>	0.302 ² <i>0.092</i>	0.067 <i>0.529</i>	0.934 <i>0.200</i>	1.040 <i>16.620</i>	3.002 <i>0.725</i>	6.192 <i>2.518</i>
SPAIN	-0.257 ²² <i>1.201</i>	0.666 <i>0.650</i>	0.926 <i>1.857</i>	2.008 <i>0.371</i>	-0.612 ³ <i>0.200</i>	3.772 <i>0.752</i>	3.418 <i>4.346</i>	9.245 <i>13.704</i>	0.540 <i>3.368</i>	11.698 <i>3.688</i>
SRI LANKA	-6.601 <i>4.919</i>	-0.409 ³ <i>0.135</i>	0.188 <i>0.253</i>	2.649 ¹ <i>0.339</i>	0.547 <i>0.203</i>	0.648 <i>1.355</i>	2.933 <i>0.407</i>	3.585 <i>6.782</i>	0.319 <i>0.255</i>	0.553 <i>0.171</i>
SUDAN	-2.582 <i>1.793</i>	-0.722 <i>1.624</i>	2.093 <i>0.622</i>	0.416 <i>0.152</i>	0.475 <i>0.162</i>	-0.180 <i>0.600</i>	2.444 <i>0.665</i>	1.049 <i>0.541</i>	0.069 <i>0.069</i>	0.627 <i>0.388</i>
SWEDEN	-7.638 ³ <i>1.794</i>	0.441 ² <i>0.219</i>	0.691 <i>0.458</i>	3.538 ² <i>0.388</i>	1.581 <i>0.408</i>	2.589 <i>0.716</i>	21.611 <i>1.222</i>	3.563 <i>2.987</i>	9.216 <i>0.963</i>	6.366 <i>2.676</i>

Table 4 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
SWITZERLAND	-5.452	-0.092 ²	2.684	0.227 ²	0.541 ²	2.379	4.048	2.413	1.847	10.976
	<i>6.748</i>	<i>0.458</i>	<i>1.274</i>	<i>0.077</i>	<i>0.228</i>	<i>0.833</i>	<i>0.813</i>	<i>4.983</i>	<i>0.243</i>	<i>1.968</i>
TANZANIA	2.031	-0.082 ²	1.222	0.353	-0.021	1.663	3.199	0.500	0.461	0.649
	<i>4.053</i>	<i>0.067</i>	<i>1.462</i>	<i>0.258</i>	<i>0.077</i>	<i>3.441</i>	<i>0.371</i>	<i>0.736</i>	<i>0.173</i>	<i>0.581</i>
THAILAND	-42.624 ²	5.808	2.406	0.053	0.322 ¹	2.739	1.881	5.167	0.607	-0.117
	<i>5.577</i>	<i>15.109</i>	<i>11.660</i>	<i>0.032</i>	<i>0.096</i>	<i>1.991</i>	<i>0.340</i>	<i>1.448</i>	<i>1.297</i>	<i>0.112</i>
TUNISIA	2.673	-2.389 ²²	9.525	0.723	0.100 ²	2.034	3.798	2.614	-0.063	8.627
	<i>3.523</i>	<i>3.105</i>	<i>2.755</i>	<i>0.138</i>	<i>1.423</i>	<i>0.668</i>	<i>0.572</i>	<i>1.920</i>	<i>1.528</i>	<i>2.449</i>
TURKEY	-28.417	0.214 ²	2.937	0.238 ²	0.361	2.004	4.759	6.753	2.762	7.861
	<i>78.410</i>	<i>0.182</i>	<i>21.978</i>	<i>0.062</i>	<i>0.163</i>	<i>0.848</i>	<i>1.479</i>	<i>13.664</i>	<i>0.410</i>	<i>6.146</i>
U.K.	-1.747	4.771	1.734	0.362 ²	0.640	1.944	2.401	1.966	0.973	0.657
	<i>3.576</i>	<i>0.971</i>	<i>5.728</i>	<i>0.090</i>	<i>0.246</i>	<i>0.797</i>	<i>0.735</i>	<i>0.727</i>	<i>0.169</i>	<i>0.321</i>
U.S.A.	-2.723 ³³	0.493	1.832	0.334 ²	0.508 ²	1.595	3.610	0.218	1.569	6.229
	<i>1.625</i>	<i>1.316</i>	<i>0.130</i>	<i>0.083</i>	<i>0.157</i>	<i>0.667</i>	<i>0.784</i>	<i>1.709</i>	<i>0.196</i>	<i>1.325</i>
UGANDA	-5.239	-4.410 ³	-0.389 ²	0.228 ²	0.113 ²	4.082	9.467	7.480	12.070	12.720
	<i>6.824</i>	<i>2.235</i>	<i>0.253</i>	<i>0.159</i>	<i>0.111</i>	<i>1.991</i>	<i>2.200</i>	<i>2.148</i>	<i>1.796</i>	<i>2.877</i>
URUGUAY	0.001	0.159 ²	-0.324	1.172	0.423	0.705	2.684	0.198	1.442	2.850
	<i>6.267</i>	<i>0.170</i>	<i>0.095</i>	<i>0.074</i>	<i>0.076</i>	<i>0.862</i>	<i>0.147</i>	<i>0.266</i>	<i>0.107</i>	<i>1.425</i>
VENEZUELA	3.496	-2.031 ³	-0.145 ²²	1.553	-2.325	1.663	3.647	4.196	1.085	0.877
	<i>22.658</i>	<i>0.254</i>	<i>0.140</i>	<i>0.072</i>	<i>1.723</i>	<i>1.387</i>	<i>0.791</i>	<i>2.259</i>	<i>0.296</i>	<i>0.578</i>
ZAIRE	0.042	-0.675	0.629	1.311 ¹	0.171	1.762	1.991	1.783	0.034	2.010
	<i>0.569</i>	<i>4.615</i>	<i>0.941</i>	<i>0.246</i>	<i>0.187</i>	<i>0.723</i>	<i>0.228</i>	<i>1.431</i>	<i>0.088</i>	<i>1.722</i>
ZAMBIA	20.718 ¹¹	-0.049 ²	1.365	-0.098 ³³	0.007	2.150	2.384	0.658	4.815	0.159
	<i>8.948</i>	<i>0.112</i>	<i>1.521</i>	<i>0.054</i>	<i>0.179</i>	<i>0.925</i>	<i>0.389</i>	<i>0.642</i>	<i>0.632</i>	<i>0.313</i>
ZIMBABWE	-1.572	-27.950	6.014 ¹	3.407	1.960	0.145	23.060	-0.088	1.331	3.853
	<i>1.253</i>	<i>81.472</i>	<i>1.553</i>	<i>0.340</i>	<i>0.572</i>	<i>0.121</i>	<i>2.352</i>	<i>0.270</i>	<i>1.126</i>	<i>2.397</i>

NOTES: In the regression function used to estimate each of these elasticities, the dependent and independent variables are in levels. State and time effects are also included. The median elasticity for each country over the six time periods (1965-1990) is given. S1-S5 and N1-N5 refer to the different categories for skilled and unskilled labor, respectively. LSCV used for bandwidth selection. Standard errors are listed in italics beneath each estimate. The superscript numbers 1 (11), 2 (22) and 3 (33) correspond to where the estimate shows significant evidence of CSS, CSC or SCSC at the 5% (10%) level, respectively.

Table 5 -- Median Elasticity of Substitution Across Time for Each Country (Morishima Elasticity of Substitution)

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
ALGERIA	1.761 <i>0.131</i>	-0.031 <i>0.742</i>	0.075 <i>0.769</i>	0.063 <i>3.694</i>	0.895 <i>1.235</i>	0.011 <i>7.010</i>	0.338 <i>2.534</i>	0.130 <i>0.275</i>	0.074 <i>0.217</i>	0.259 <i>0.181</i>
ARGENTINA	-2.029 ³ <i>0.452</i>	-0.005 <i>0.284</i>	0.009 <i>0.176</i>	-0.009 ² <i>0.167</i>	-10.887 ² <i>0.018</i>	1.388 <i>0.196</i>	-0.012 <i>0.193</i>	0.572 <i>6.478</i>	1.110 <i>0.293</i>	-2.479 <i>3.147</i>
AUSTRALIA	7.049 ¹ <i>1.583</i>	6.424 ¹ <i>1.436</i>	-0.343 <i>0.192</i>	-0.331 ² <i>0.215</i>	-0.052 <i>0.056</i>	0.040 <i>1.691</i>	1.152 <i>0.405</i>	0.495 <i>0.477</i>	0.199 <i>0.054</i>	-0.055 <i>0.440</i>
AUSTRIA	10.905 <i>5.483</i>	7.997 <i>3.329</i>	-0.430 <i>2.372</i>	-0.588 ² <i>0.226</i>	-0.415 <i>0.579</i>	7.112 <i>4.942</i>	9.546 <i>2.394</i>	0.250 <i>7.615</i>	0.209 <i>0.180</i>	0.058 <i>0.448</i>
BANGLADESH	15.904 <i>11.032</i>	1.825 <i>0.517</i>	0.063 <i>0.472</i>	-1.344 <i>1.435</i>	0.009 <i>0.025</i>	2.662 <i>1.991</i>	2.168 <i>0.494</i>	1.206 <i>0.801</i>	0.002 <i>0.278</i>	-0.081 <i>0.074</i>
BELGIUM	16.000 <i>5.247</i>	4.020 <i>1.933</i>	-0.163 <i>3.080</i>	-0.108 <i>0.279</i>	-1.333 <i>1.073</i>	8.981 <i>5.388</i>	4.067 <i>0.556</i>	4.793 <i>1.933</i>	0.333 <i>1.146</i>	-1.993 <i>1.790</i>
BOLIVIA	25.363 ¹ <i>5.185</i>	22.441 <i>8.438</i>	-0.092 <i>5.591</i>	-0.310 ² <i>0.274</i>	-6.308 <i>9.377</i>	7.907 <i>3.086</i>	10.575 <i>1.110</i>	-2.360 <i>51.217</i>	0.675 <i>0.174</i>	0.017 <i>0.203</i>
BRAZIL	33.426 <i>14.029</i>	58.534 ¹ <i>16.154</i>	-3.287 <i>22.744</i>	-0.302 ² <i>0.306</i>	1.401 <i>0.931</i>	10.137 <i>4.276</i>	14.957 <i>1.260</i>	-0.437 <i>10.840</i>	2.908 <i>0.520</i>	1.008 <i>0.566</i>
CANADA	16.228 <i>25.574</i>	4.207 <i>9.046</i>	0.580 <i>1.469</i>	-1.137 ² <i>0.273</i>	0.022 <i>0.083</i>	0.302 <i>0.643</i>	1.934 <i>1.579</i>	-0.021 <i>0.644</i>	-0.145 <i>0.073</i>	0.008 <i>0.328</i>
CHILE	23.615 <i>12.109</i>	-0.037 ² <i>0.488</i>	-0.573 <i>2.974</i>	-5.518 ³³ <i>1.866</i>	-3.807 <i>0.149</i>	5.111 <i>3.817</i>	4.258 <i>0.753</i>	-1.199 <i>14.636</i>	0.333 <i>0.188</i>	-2.859 <i>2.322</i>
COLOMBIA	38.017 <i>97.877</i>	7.118 <i>4.061</i>	4.446 <i>4.252</i>	-0.835 <i>0.265</i>	-4.294 <i>1.728</i>	10.219 <i>38.503</i>	6.916 <i>1.629</i>	6.125 <i>3.311</i>	0.303 <i>1.132</i>	-27.984 <i>62.112</i>
COSTA RICA	20.456 <i>13.248</i>	0.570 ² <i>0.107</i>	-1.690 <i>12.122</i>	-0.340 <i>0.214</i>	-0.015 <i>0.413</i>	3.409 <i>3.215</i>	2.266 <i>0.584</i>	-0.103 <i>5.213</i>	0.836 <i>0.958</i>	-0.183 <i>0.501</i>
CYPRUS	1.515 <i>0.410</i>	10.414 <i>4.538</i>	2.002 <i>2.404</i>	-0.973 ² <i>0.257</i>	0.105 <i>0.156</i>	1.538 <i>2.623</i>	2.438 <i>0.379</i>	0.399 <i>0.452</i>	-0.013 <i>0.072</i>	-0.077 <i>0.481</i>
DENMARK	-0.768 <i>1.040</i>	46.032 <i>16.154</i>	-0.928 <i>0.710</i>	-0.259 <i>0.226</i>	0.783 <i>0.376</i>	2.350 <i>2.138</i>	30.279 <i>2.320</i>	-13.231 <i>304.967</i>	-0.024 <i>0.135</i>	2.476 <i>1.140</i>
ECUADOR	52.783 ¹ <i>13.312</i>	19.732 <i>9.586</i>	0.023 <i>3.261</i>	-0.561 ² <i>0.613</i>	-0.241 <i>0.942</i>	8.014 <i>3.447</i>	16.971 <i>1.402</i>	2.884 <i>4.480</i>	1.360 <i>0.200</i>	-1.792 <i>2.007</i>
EL SALVADOR	15.004 <i>13.950</i>	14.698 ² <i>10.574</i>	-0.185 <i>14.523</i>	0.117 ² <i>0.286</i>	0.374 <i>1.643</i>	6.833 <i>12.460</i>	48.956 <i>2.413</i>	12.670 <i>8.526</i>	1.753 <i>0.377</i>	-0.016 <i>0.909</i>
FINLAND	5.405 <i>4.036</i>	6.294 ¹¹ <i>2.859</i>	-0.519 <i>6.575</i>	0.048 ² <i>0.162</i>	-0.018 <i>1.061</i>	0.212 <i>2.471</i>	0.602 <i>0.489</i>	0.878 <i>0.625</i>	0.920 <i>0.104</i>	-0.043 <i>0.065</i>
FRANCE	-0.027 <i>0.172</i>	0.000 <i>0.147</i>	-1.709 <i>3.930</i>	-0.029 ² <i>0.032</i>	-0.017 <i>0.034</i>	-0.905 <i>2.062</i>	0.000 <i>2.890</i>	-2.159 <i>2.468</i>	1.541 <i>0.215</i>	-0.036 <i>0.083</i>
GERMANY, WEST	5.691 <i>5.713</i>	3.892 <i>3.362</i>	-0.636 <i>2.578</i>	-0.857 ¹¹ <i>0.469</i>	1.613 ¹ <i>0.570</i>	2.420 <i>2.653</i>	2.782 <i>0.886</i>	23.925 <i>98.390</i>	-5.333 <i>2.237</i>	-3.511 <i>1.908</i>
GHANA	0.946 <i>0.260</i>	17.471 <i>10.835</i>	-2.031 <i>1.701</i>	-0.004 <i>0.069</i>	-0.009 <i>0.083</i>	0.172 <i>1.433</i>	11.182 <i>7.930</i>	-0.271 <i>2.764</i>	0.005 <i>0.036</i>	0.896 <i>0.645</i>

Table 5 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
GREECE	26.665	-411.097 ³	-0.964	-0.364 ³³	0.177	4.650	2.506	2.906	0.285	-2.064
	38.415	67.657	3.489	0.221	0.458	3.479	1.081	3.381	0.124	2.094
GUATEMALA	62.796	4.107	1.167	-0.109	-1.701	8.794	7.344	4.877	2.315	1.656
	26.598	2.179	8.415	1.767	2.013	19.540	1.557	4.869	0.386	0.838
HAITI	-21.521 ²	0.072	0.096	-0.305	-12.477	-14.284	-0.023	-0.300	0.375	-31.775
	3.008	0.130	2.709	0.134	14.090	4.144	0.601	0.630	0.529	36.868
HONDURAS	31.955	-70.512 ²	-0.448	-0.037	-11.539 ²	13.078	-28.203	14.765	-0.834	-4.497
	38.967	5.410	3.696	1.909	1.647	4.921	2.786	10.688	1.474	1.032
ICELAND	-5.193 ³³	4.117	-0.974	1.570 ¹¹	-0.667	1.060	3.974	0.186	-0.001	-0.020
	2.321	1.956	1.275	0.673	0.621	0.592	0.803	3.980	0.152	0.554
INDIA	5.548	6.435	-0.317	1.065	0.019	3.704	6.106	0.242	0.441	0.456
	3.371	5.149	4.683	0.185	9.180	1.216	1.421	1.473	0.208	0.243
INDONESIA	3.091	5.481	1.501	-0.370	0.828	3.224	3.645	1.385	0.004	0.686
	40.330	1.635	0.900	0.169	0.943	8.958	0.962	0.428	0.160	1.842
IRAN	44.455	5.635	0.000	0.098 ²	0.014	5.327	9.291	9.202	1.900	0.530
	29.304	1.960	7.380	0.265	0.406	3.723	2.106	8.676	0.417	0.643
IRAQ	45.588	25.212 ¹¹	-1.512	-1.840	1.225	14.886	15.250	17.639	-2.537	1.116
	13.017	2.141	5.283	1.176	0.608	6.552	3.227	9.677	1.434	0.452
IRELAND	31.545	-7.155 ³	9.733	0.197	0.322	15.488	4.687	6.668	0.430	0.125
	7.363	2.874	2.822	0.107	0.671	5.256	1.281	3.972	0.127	0.263
ISRAEL	-0.393	4.112	0.311	-0.019	0.032	0.988	8.744	5.165	0.133	0.005
	0.370	1.956	16.609	0.317	0.312	2.895	2.160	3.670	0.300	0.179
ITALY	13.406	10.171	-6.035	-0.422 ²	3.705	9.066	4.684	10.758	1.463	0.960
	4.814	4.560	34.300	0.363	1.884	5.553	0.810	5.459	0.339	0.773
JAMAICA	0.004	0.016 ²	-10.835 ²	-0.053 ²	0.152	2.269	2.279	0.010	0.444	1.611
	1.337	0.147	2.692	0.042	0.160	2.729	0.468	0.021	0.073	1.405
JAPAN	19.336	6.952	2.981	-0.461 ²	-0.378	8.481	6.726	12.628	4.938	-0.071
	19.270	3.299	1.191	0.576	0.466	5.108	1.717	57.610	1.099	0.149
JORDAN	41.213	22.762	45.397 ¹	-0.995 ³	-0.780	10.954	11.591	3.936	3.152	-2.382
	14.731	8.235	5.739	0.315	0.750	6.007	2.680	5.155	1.018	32.415
KENYA	-1.007	5.514 ²²	-1.831	-2.517	-0.451	1.906	11.822	-0.050	-1.832	0.011
	3.043	1.573	1.387	7.196	1.491	4.358	2.246	1.245	1.145	0.063
KOREA, REP.	203.288	39.389	5.410	-0.263	2.769	17.023	33.736	3.778	-2.291	2.707
	232.384	16.154	1.564	0.345	3.878	3.999	6.922	3.895	2.193	5.059
MALAWI	20.665	5.756	-0.564	-0.155	-0.015	6.290	4.544	-0.101	0.255	-0.257
	13.456	3.466	1.930	0.020	0.084	4.315	2.462	5.261	0.458	0.150
MALAYSIA	26.648	-52.120 ³	-0.924	-0.795 ³³	-0.035	7.661	5.940	8.622	1.448	3.263
	7.330	5.654	6.844	0.429	0.605	5.409	1.348	4.270	0.245	11.341
MALI	8.508	8.225	11.196	0.041 ²²	-0.055	4.626	2.769	6.051	0.481	-0.076
	6.772	3.995	5.420	0.148	0.050	2.996	1.157	4.022	0.117	0.397

Table 5 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
MAURITIUS	-0.034 <i>0.255</i>	0.144 ² <i>0.418</i>	-0.039 <i>0.835</i>	-0.003 ¹ <i>0.004</i>	-0.012 <i>0.160</i>	0.957 <i>2.022</i>	2.726 <i>0.700</i>	0.698 <i>0.802</i>	-0.055 <i>0.018</i>	-0.315 <i>0.337</i>
MEXICO	48.486 ¹¹ <i>11.780</i>	42.109 <i>16.154</i>	10.535 <i>3.678</i>	-1.088 <i>0.871</i>	-1.241 <i>1.527</i>	18.649 <i>3.688</i>	14.234 <i>4.126</i>	10.665 <i>6.402</i>	-2.133 <i>0.856</i>	-20.284 <i>12.813</i>
MOZAMBIQUE	61.182 ¹ <i>16.232</i>	129.242 ¹ <i>16.154</i>	-4.404 <i>11.159</i>	-1.135 <i>0.219</i>	-0.491 <i>1.948</i>	11.328 <i>6.273</i>	18.878 <i>6.164</i>	20.848 <i>15.989</i>	-1.620 <i>2.578</i>	-14.089 <i>15.123</i>
MYANMAR	6.065 <i>2.339</i>	1.625 <i>1.246</i>	0.001 <i>1.549</i>	0.585 <i>0.113</i>	-0.196 <i>0.170</i>	4.802 <i>5.455</i>	1.532 <i>0.424</i>	2.462 <i>5.269</i>	0.294 <i>0.144</i>	-2.831 <i>2.648</i>
NETHERLANDS	10.959 <i>6.665</i>	-682.500 ³ <i>119.232</i>	-0.634 <i>3.353</i>	-0.063 ² <i>0.262</i>	0.723 <i>0.335</i>	3.014 <i>2.682</i>	2.212 <i>0.570</i>	28.075 <i>16.374</i>	3.264 <i>0.682</i>	1.222 <i>5.898</i>
NEW ZEALAND	18.302 ¹¹ <i>4.607</i>	13.650 ¹ <i>2.323</i>	0.019 ² <i>0.152</i>	-0.397 <i>0.203</i>	-0.785 <i>0.895</i>	5.976 <i>2.027</i>	5.074 <i>0.636</i>	2.668 <i>0.982</i>	0.324 <i>0.807</i>	-9.097 <i>15.256</i>
NORWAY	16.615 <i>3.909</i>	0.060 ² <i>0.130</i>	2.132 <i>1.353</i>	-0.346 ³³ <i>0.199</i>	-0.034 <i>0.510</i>	7.296 <i>3.694</i>	2.670 <i>0.584</i>	2.843 <i>1.013</i>	0.251 <i>0.088</i>	0.023 <i>1.861</i>
PAKISTAN	13.501 <i>18.096</i>	3.820 <i>1.235</i>	-1.272 <i>3.078</i>	-1.080 <i>0.694</i>	1.510 <i>1.905</i>	3.053 <i>8.504</i>	2.145 <i>0.494</i>	-0.823 <i>13.963</i>	-0.163 <i>0.544</i>	0.643 <i>1.436</i>
PANAMA	27.992 <i>9.478</i>	54.620 ¹¹ <i>16.154</i>	-2.949 <i>99.579</i>	-3.556 <i>116.883</i>	-0.442 <i>1.625</i>	7.627 <i>3.839</i>	24.707 <i>1.063</i>	0.671 <i>8.277</i>	-0.380 <i>0.826</i>	-11.954 <i>11.229</i>
PARAGUAY	7.292 <i>20.148</i>	0.219 <i>0.418</i>	12.090 ² <i>6.916</i>	-0.330 <i>10.098</i>	-0.423 <i>31.953</i>	-0.065 <i>0.995</i>	-0.021 <i>0.601</i>	53.263 <i>4.137</i>	0.036 <i>12.624</i>	-4.439 <i>30.058</i>
PERU	51.757 ¹ <i>12.167</i>	55.385 ¹¹ <i>16.154</i>	2.278 <i>2.340</i>	-13.755 <i>47.875</i>	2.252 <i>1.209</i>	11.687 <i>3.221</i>	22.570 <i>1.040</i>	10.226 <i>7.462</i>	-3.350 <i>1.184</i>	3.583 <i>1.391</i>
PHILIPPINES	3.031 <i>13.839</i>	0.003 ²² <i>0.147</i>	-3.166 <i>37.270</i>	0.005 ² <i>0.032</i>	0.078 <i>0.147</i>	38.732 <i>19.351</i>	1.628 <i>0.690</i>	4.197 <i>68.782</i>	10.300 <i>2.329</i>	0.482 <i>3.529</i>
PORTUGAL	19.932 <i>27.674</i>	4.908 <i>2.208</i>	4.835 <i>4.370</i>	-0.218 ² <i>0.140</i>	-5.635 <i>3.574</i>	4.785 <i>5.875</i>	3.401 <i>1.487</i>	-0.885 <i>14.331</i>	0.523 <i>0.217</i>	-6.929 <i>13.662</i>
SENEGAL	35.061 ¹¹ <i>13.161</i>	11.717 <i>5.705</i>	-0.443 <i>4.234</i>	0.010 ² <i>0.249</i>	0.395 <i>0.591</i>	6.942 <i>3.843</i>	7.497 <i>1.662</i>	-0.060 <i>13.461</i>	1.843 <i>0.320</i>	0.700 <i>0.843</i>
SIERRA LEONE	22.943 <i>22.509</i>	6.251 <i>1.957</i>	-0.868 <i>2.368</i>	-0.520 <i>0.468</i>	-0.639 <i>1.782</i>	10.858 <i>7.090</i>	17.593 <i>5.164</i>	1.487 <i>1.384</i>	1.090 <i>0.935</i>	0.140 <i>0.112</i>
SINGAPORE	1.132 <i>3.555</i>	2.514 <i>0.636</i>	0.636 <i>0.195</i>	0.329 <i>1.014</i>	0.190 ² <i>0.043</i>	1.810 <i>2.172</i>	3.919 <i>0.892</i>	0.640 <i>0.674</i>	2.064 <i>1.338</i>	3.365 <i>1.542</i>
SPAIN	45.416 ¹ <i>5.390</i>	3.094 <i>1.802</i>	-0.992 <i>4.447</i>	0.229 ² <i>0.404</i>	0.800 <i>0.705</i>	16.836 <i>8.821</i>	2.676 <i>0.784</i>	2.742 <i>2.578</i>	3.934 <i>0.844</i>	-0.052 <i>0.083</i>
SRI LANKA	0.019 <i>2.258</i>	4.228 <i>1.085</i>	-2.697 <i>5.369</i>	-0.070 <i>0.263</i>	1.110 <i>1.639</i>	-2.114 <i>4.597</i>	6.829 <i>1.558</i>	5.178 <i>31.388</i>	0.023 <i>0.361</i>	0.716 <i>0.346</i>
SUDAN	-3.997 ² <i>0.941</i>	-0.111 ²² <i>0.488</i>	-0.031 <i>0.282</i>	-0.091 <i>0.110</i>	-0.533 <i>0.325</i>	-3.002 <i>1.554</i>	2.759 <i>1.157</i>	2.101 <i>4.933</i>	-0.006 <i>0.204</i>	-0.311 <i>0.445</i>
SWEDEN	56.753 ¹ <i>10.248</i>	3.110 <i>1.054</i>	2.528 <i>2.977</i>	0.223 ² <i>0.062</i>	0.623 <i>0.644</i>	18.435 <i>4.358</i>	2.963 <i>0.834</i>	7.330 <i>4.556</i>	7.161 <i>1.581</i>	-10.259 <i>16.370</i>

Table 5 cont.

Country	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
SWITZERLAND	0.987	6.362	2.070	-0.488 ³³	-1.431	6.122	3.951	4.043	0.923	0.124
	<i>1.896</i>	<i>1.801</i>	<i>5.565</i>	<i>0.274</i>	<i>1.032</i>	<i>4.104</i>	<i>0.803</i>	<i>2.274</i>	<i>0.360</i>	<i>0.713</i>
TANZANIA	1.049	11.848	-0.043	-1.036	-0.035	1.332	7.797	-0.005	-3.634	-0.623
	<i>2.243</i>	<i>10.423</i>	<i>0.546</i>	<i>0.501</i>	<i>0.112</i>	<i>0.743</i>	<i>1.753</i>	<i>9.511</i>	<i>25.086</i>	<i>1.357</i>
THAILAND	2.251	9.093 ¹¹	6.512 ¹	-0.696	-4.303	2.233	1.966	-3.295	-0.716	-21.004
	<i>35.558</i>	<i>2.197</i>	<i>4.127</i>	<i>1.175</i>	<i>1.323</i>	<i>6.692</i>	<i>1.579</i>	<i>0.782</i>	<i>1.023</i>	<i>23.431</i>
TUNISIA	-32.082 ²	0.342	3.850	-0.628	-2.848	-3.986	-0.002	8.423	0.258	-4.792
	<i>3.563</i>	<i>0.534</i>	<i>1.328</i>	<i>0.748</i>	<i>4.977</i>	<i>2.061</i>	<i>0.193</i>	<i>2.916</i>	<i>1.053</i>	<i>9.481</i>
TURKEY	51.385 ¹	13.172	7.441	-0.674	-2.064	12.723	17.828	14.460	-0.066	-40.328
	<i>6.407</i>	<i>1.847</i>	<i>2.280</i>	<i>0.165</i>	<i>1.476</i>	<i>7.022</i>	<i>4.683</i>	<i>73.960</i>	<i>0.657</i>	<i>24.800</i>
U.K.	29.219 ¹	10.464	-0.898	-0.701	-0.120	7.657	6.152	0.454	0.269	0.294
	<i>3.940</i>	<i>4.337</i>	<i>4.698</i>	<i>0.333</i>	<i>0.074</i>	<i>3.248</i>	<i>0.701</i>	<i>0.635</i>	<i>0.809</i>	<i>0.342</i>
U.S.A.	40.188 ¹	4.586	-0.999	-1.008 ²²	1.148	8.832	3.127	-1.306	-0.026	4.314
	<i>8.444</i>	<i>1.411</i>	<i>4.824</i>	<i>0.206</i>	<i>0.245</i>	<i>2.652</i>	<i>0.878</i>	<i>16.921</i>	<i>0.308</i>	<i>3.258</i>
UGANDA	0.009 ²²	-0.260 ²	-2.918	-0.501 ²²	-1.626	13.723	16.268	0.692	0.832	2.537
	<i>0.118</i>	<i>0.220</i>	<i>1.833</i>	<i>0.534</i>	<i>0.843</i>	<i>7.818</i>	<i>3.412</i>	<i>7.620</i>	<i>0.185</i>	<i>5.296</i>
URUGUAY	2.000	2.636 ²	-0.071	1.097	1.260	2.072	9.917	0.382	0.933	4.770
	<i>5.936</i>	<i>0.826</i>	<i>0.077</i>	<i>5.307</i>	<i>0.297</i>	<i>3.086</i>	<i>0.491</i>	<i>0.331</i>	<i>0.426</i>	<i>4.126</i>
VENEZUELA	1.899	-138.064 ²	0.001	-0.548	-0.372	2.085	-0.227	5.285	-0.431	-0.556
	<i>0.202</i>	<i>8.551</i>	<i>0.228</i>	<i>1.074</i>	<i>3.583</i>	<i>5.241</i>	<i>0.111</i>	<i>3.373</i>	<i>0.439</i>	<i>2.134</i>
ZAIRE	0.125	4.469	-0.760	-0.530 ²²	-0.071	4.651	3.697	0.421	0.001	1.293
	<i>0.232</i>	<i>2.863</i>	<i>6.700</i>	<i>0.221</i>	<i>0.146</i>	<i>3.800</i>	<i>0.962</i>	<i>4.847</i>	<i>0.057</i>	<i>1.663</i>
ZAMBIA	0.482	-0.022	-0.589	-0.624 ³	0.009	10.494	1.130	1.893	1.945	-0.100
	<i>3.862</i>	<i>0.742</i>	<i>2.064</i>	<i>0.068</i>	<i>0.019</i>	<i>3.479</i>	<i>0.499</i>	<i>2.026</i>	<i>0.527</i>	<i>0.338</i>
ZIMBABWE	6.468 ¹¹	0.147 ²	4.706	1.557	2.864	-10.984	5.294	9.647	8.140	1.530
	<i>2.546</i>	<i>0.418</i>	<i>1.892</i>	<i>0.869</i>	<i>1.091</i>	<i>6.765</i>	<i>1.085</i>	<i>6.979</i>	<i>4.185</i>	<i>6.621</i>

NOTES: In the regression function used to estimate each of these elasticities, the dependent and independent variables are in levels. State and time effects are also included. The median elasticity for each country over the six time periods (1965-1990) is given. S1-S5 and N1-N5 refer to the different categories for skilled and unskilled labor, respectively. LSCV used for bandwidth selection. Standard errors are listed in italics beneath each estimate. The superscript numbers 1 (11), 2 (22) and 3 (33) correspond to where the estimate shows significant evidence of CSS, CSC or SCSC at the 5% (10%) level, respectively.

Table 6 -- Median Elasticity of Substitution Across Different Groups of Countries (Using Each Elasticity of Substitution Measure)

Year	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
Direct Elasticity of Substitution										
OECD	4.213	3.280	1.589	0.530	0.842 ²	1.639	2.763	4.339	3.892	14.685
	<i>4.417</i>	<i>0.073</i>	<i>2.042</i>	<i>1.484</i>	<i>0.494</i>	<i>0.430</i>	<i>0.335</i>	<i>0.883</i>	<i>2.494</i>	<i>2.255</i>
Non-OECD	29.477	23.366	9.644	0.619	1.383	5.202	6.601	10.441	5.172	1.120
	<i>27.128</i>	<i>17.917</i>	<i>2.837</i>	<i>0.484</i>	<i>2.424</i>	<i>0.575</i>	<i>1.984</i>	<i>3.805</i>	<i>8.668</i>	<i>0.513</i>
Latin America	19.535	20.000 ¹	9.179	1.038 ²	1.890	5.612	8.161	13.687	5.591	2.829
	<i>21.493</i>	<i>3.166</i>	<i>9.471</i>	<i>0.138</i>	<i>0.436</i>	<i>0.623</i>	<i>0.964</i>	<i>13.247</i>	<i>1.980</i>	<i>0.429</i>
Africa	108.493	68.639 ¹	34.691	1.280	2.028	8.220	11.082	15.854	8.725	0.623
	<i>147.831</i>	<i>15.359</i>	<i>11.598</i>	<i>5.239</i>	<i>0.897</i>	<i>2.412</i>	<i>1.280</i>	<i>7.623</i>	<i>8.626</i>	<i>7.047</i>
Regime 1	3.615	2.725	1.527	0.219 ²	0.726	1.536	3.118	4.921	3.407	6.033
	<i>2.643</i>	<i>0.632</i>	<i>0.512</i>	<i>0.067</i>	<i>0.143</i>	<i>0.112</i>	<i>0.466</i>	<i>2.126</i>	<i>1.055</i>	<i>9.434</i>
Regime 2	10.591	9.121	3.504	1.263	1.488	2.189	2.818	4.592	3.291	2.205
	<i>6.864</i>	<i>8.045</i>	<i>2.306</i>	<i>0.337</i>	<i>0.447</i>	<i>0.486</i>	<i>0.369</i>	<i>1.737</i>	<i>7.041</i>	<i>0.451</i>
Regime 3	19.535	9.113	3.310	0.437	0.097	3.111	3.721	3.164	0.465	-0.042
	<i>21.493</i>	<i>8.496</i>	<i>4.112</i>	<i>0.092</i>	<i>1.464</i>	<i>1.514</i>	<i>0.491</i>	<i>0.499</i>	<i>1.409</i>	<i>0.649</i>
All	12.679 ¹	10.038 ¹¹	4.158	0.594 ²²	1.226	2.950	4.112	7.033	4.712	2.296
	<i>1.788</i>	<i>2.949</i>	<i>1.515</i>	<i>0.533</i>	<i>0.403</i>	<i>0.921</i>	<i>0.499</i>	<i>1.702</i>	<i>1.909</i>	<i>1.403</i>
Allen-Uzawa Elasticity of Substitution										
OECD	-0.297	0.214 ²	0.831	0.223 ²	0.378 ²	1.663	2.543	3.287	3.850	26.968
	<i>1.949</i>	<i>0.182</i>	<i>1.651</i>	<i>0.054</i>	<i>0.049</i>	<i>1.387</i>	<i>0.530</i>	<i>4.388</i>	<i>0.584</i>	<i>5.615</i>
Non-OECD	0.791	1.116	7.411	2.531	1.287	3.186	7.095	3.599	2.681	3.165
	<i>2.474</i>	<i>3.582</i>	<i>3.770</i>	<i>0.369</i>	<i>0.636</i>	<i>1.177</i>	<i>2.192</i>	<i>4.185</i>	<i>0.336</i>	<i>0.761</i>
Latin America	-2.721	-0.085	4.452	2.065 ²	1.127 ²	3.489	8.469	5.305	5.137	9.969
	<i>6.290</i>	<i>8.139</i>	<i>1.006</i>	<i>0.586</i>	<i>0.435</i>	<i>2.399</i>	<i>1.029</i>	<i>10.672</i>	<i>0.919</i>	<i>2.162</i>
Africa	11.418	16.381	40.443 ¹	9.213 ¹	2.872	5.540	10.449	4.411	3.050	2.585
	<i>50.291</i>	<i>14.775</i>	<i>9.267</i>	<i>1.699</i>	<i>1.046</i>	<i>1.317</i>	<i>2.299</i>	<i>6.091</i>	<i>0.750</i>	<i>0.764</i>
Regime 1	-0.073	0.044 ²	0.691	0.228 ²	0.358 ²	1.790	2.684	3.646	4.138	15.368
	<i>0.173</i>	<i>0.116</i>	<i>0.458</i>	<i>0.159</i>	<i>0.165</i>	<i>1.659</i>	<i>0.147</i>	<i>3.999</i>	<i>0.554</i>	<i>2.241</i>
Regime 2	-1.937	1.349	3.936	1.238	0.798 ²²	2.003	3.079	2.509	1.518	2.099
	<i>2.033</i>	<i>0.480</i>	<i>5.465</i>	<i>0.198</i>	<i>0.170</i>	<i>0.968</i>	<i>0.667</i>	<i>5.073</i>	<i>0.205</i>	<i>0.536</i>
Regime 3	0.437	0.365 ²	3.531	1.750 ¹	0.106	1.865	2.571	0.700	0.221	0.450
	<i>1.047</i>	<i>0.816</i>	<i>23.501</i>	<i>0.544</i>	<i>0.143</i>	<i>1.000</i>	<i>0.197</i>	<i>0.221</i>	<i>0.180</i>	<i>0.555</i>
All	0.018 ²²	0.441 ²	2.576	1.165	0.640 ²²	2.352	4.243	3.483	3.212	6.106
	<i>0.484</i>	<i>0.219</i>	<i>0.917</i>	<i>0.178</i>	<i>0.246</i>	<i>0.743</i>	<i>0.922</i>	<i>1.845</i>	<i>2.658</i>	<i>2.651</i>
Morishima Elasticity of Substitution										
OECD	13.977	6.339	0.003	-0.263	0.020	4.386	5.965	1.776	0.184	0.001
	<i>2.611</i>	<i>3.216</i>	<i>0.037</i>	<i>0.345</i>	<i>0.458</i>	<i>4.170</i>	<i>1.374</i>	<i>4.104</i>	<i>0.730</i>	<i>0.021</i>
Non-OECD	44.340 ¹	12.306	2.801	-0.029 ²	0.190	11.328	9.044	5.583	1.150	0.532
	<i>8.923</i>	<i>5.665</i>	<i>1.608</i>	<i>0.076</i>	<i>0.043</i>	<i>6.273</i>	<i>2.832</i>	<i>3.266</i>	<i>0.272</i>	<i>1.071</i>
Latin America	42.587 ¹	7.780	2.132	0.062	0.747	12.575	5.620	8.968	1.856	0.806
	<i>11.992</i>	<i>2.963</i>	<i>1.352</i>	<i>3.694</i>	<i>0.707</i>	<i>3.285</i>	<i>1.101</i>	<i>5.470</i>	<i>0.674</i>	<i>0.862</i>
Africa	451.850 ¹	212.808	30.082	-0.353 ²²	0.020	27.081	48.693	20.515	3.734	0.952
	<i>76.904</i>	<i>208.256</i>	<i>99.979</i>	<i>1.399</i>	<i>0.212</i>	<i>11.571</i>	<i>27.039</i>	<i>9.665</i>	<i>0.759</i>	<i>0.705</i>
Regime 1	12.590	4.873	0.064	-0.094	0.376	3.806	5.553	4.303	0.294	-0.031
	<i>6.590</i>	<i>1.255</i>	<i>0.067</i>	<i>0.142</i>	<i>0.388</i>	<i>1.251</i>	<i>1.455</i>	<i>7.871</i>	<i>0.144</i>	<i>0.454</i>
Regime 2	29.219 ¹	8.568	2.070	0.085 ²	0.374	5.225	4.687	4.534	0.920	0.456
	<i>3.939</i>	<i>4.980</i>	<i>5.565</i>	<i>0.185</i>	<i>1.642</i>	<i>2.907</i>	<i>1.281</i>	<i>4.756</i>	<i>0.104</i>	<i>0.243</i>
Regime 3	7.156	5.062 ¹	0.024	-0.062	-0.012	6.146	2.076	0.882	0.255	0.076
	<i>3.292</i>	<i>0.994</i>	<i>0.479</i>	<i>0.262</i>	<i>0.159</i>	<i>0.617</i>	<i>0.336</i>	<i>0.820</i>	<i>0.458</i>	<i>0.290</i>
All	25.453	8.776	1.425	-0.104	0.087	7.627	7.341	4.877	0.693	0.294
	<i>27.961</i>	<i>1.963</i>	<i>0.698</i>	<i>0.085</i>	<i>0.419</i>	<i>3.839</i>	<i>1.587</i>	<i>4.869</i>	<i>0.992</i>	<i>0.342</i>

NOTES: In the regression function used to estimate each of these elasticities, the dependent and independent variables are in levels. State and time effects are also included. The median refers to the median elasticity for all countries over all periods for a particular group. S1-S5 and N1-N5 refer to the different categories for skilled and unskilled labor, respectively. LSCV used for bandwidth selection. OECD includes countries which were in the OECD as of 1990, whereas "Regime 1, 2, and 3" includes the countries of Regimes 1, 2 and 3 in Table 3 of Papageorgiou and Chmelarova (2005). Standard errors are listed in italics beneath each estimate. The superscript numbers 1 (11), 2 (22) and 3 (33) correspond to where the estimate exhibits significant evidence of CSS, CSC or SCSC at the 5% (10%) level, respectively.

Table 7 -- Median Elasticity of Substitution Across Countries for Each Time Period (Using Each Elasticity of Substitution Measure)

Year	σ_{KS1}	σ_{KS2}	σ_{KS3}	σ_{KS4}	σ_{KS5}	σ_{KN1}	σ_{KN2}	σ_{KN3}	σ_{KN4}	σ_{KN5}
Direct Elasticity of Substitution										
1965	3.127 <i>1.021</i>	2.485 <i>0.641</i>	1.305 <i>1.870</i>	0.539 ² <i>0.087</i>	1.090 ² <i>0.346</i>	1.431 <i>0.683</i>	2.649 <i>0.339</i>	4.388 <i>0.883</i>	4.494 <i>1.673</i>	35.007 <i>7.674</i>
1970	4.165 <i>2.768</i>	3.467 ¹¹ <i>0.733</i>	1.604 <i>0.977</i>	0.559 ² <i>0.088</i>	0.531 <i>1.484</i>	1.062 <i>0.076</i>	1.613 <i>0.245</i>	2.757 <i>0.412</i>	1.807 <i>0.533</i>	2.763 <i>0.841</i>
1975	19.067 ¹¹ <i>9.006</i>	18.008 <i>8.116</i>	8.322 <i>3.221</i>	0.811 ² <i>0.164</i>	2.066 <i>0.403</i>	3.226 <i>0.349</i>	5.131 <i>0.662</i>	9.856 <i>0.370</i>	5.665 <i>2.170</i>	3.488 <i>1.905</i>
1980	40.589 ¹¹ <i>18.188</i>	45.513 ¹¹ <i>20.539</i>	15.857 <i>7.054</i>	0.107 ² <i>0.057</i>	3.002 <i>0.702</i>	5.402 <i>1.334</i>	7.214 <i>1.160</i>	12.962 <i>6.549</i>	7.439 <i>1.716</i>	3.068 <i>1.030</i>
1985	15.869 ¹¹ <i>6.181</i>	6.880 ¹¹ <i>1.430</i>	4.777 <i>4.994</i>	0.200 <i>0.224</i>	0.221 <i>0.224</i>	3.267 <i>0.349</i>	3.738 <i>0.404</i>	3.408 <i>1.049</i>	0.280 <i>2.351</i>	-0.244 <i>0.238</i>
1990	98.086 <i>84.086</i>	55.648 ¹ <i>18.390</i>	18.017 <i>6.112</i>	2.236 <i>0.376</i>	3.404 <i>9.412</i>	8.410 <i>1.320</i>	11.423 <i>1.265</i>	20.289 <i>6.620</i>	12.642 <i>10.956</i>	1.632 <i>0.692</i>
Allen-Uzawa Elasticity of Substitution										
1965	-0.506 <i>1.477</i>	0.111 ² <i>0.142</i>	0.573 <i>0.308</i>	0.182 ² <i>0.025</i>	0.359 ² <i>0.108</i>	1.478 <i>0.865</i>	2.470 <i>0.410</i>	4.353 <i>2.264</i>	4.636 <i>0.569</i>	53.003 <i>7.649</i>
1970	-0.289 <i>1.949</i>	0.776 <i>0.296</i>	1.026 <i>3.079</i>	0.226 ² <i>0.077</i>	0.402 ² <i>0.234</i>	1.519 <i>0.447</i>	1.807 <i>1.178</i>	1.638 <i>2.958</i>	1.250 <i>0.250</i>	2.988 <i>0.654</i>
1975	-0.871 <i>2.750</i>	0.154 ² <i>0.170</i>	2.606 <i>0.659</i>	1.543 ²² <i>0.408</i>	0.824 ² <i>0.209</i>	3.171 <i>1.195</i>	4.709 <i>0.598</i>	5.209 <i>2.693</i>	2.839 <i>0.334</i>	11.651 <i>3.688</i>
1980	-0.918 <i>3.183</i>	-8.799 <i>34.667</i>	12.428 <i>18.466</i>	2.757 <i>0.925</i>	1.608 ² <i>0.434</i>	4.138 <i>0.832</i>	9.073 <i>1.740</i>	4.479 <i>2.264</i>	4.139 <i>0.554</i>	5.659 <i>1.196</i>
1985	5.409 <i>3.337</i>	5.456 <i>0.723</i>	6.002 ¹¹ <i>1.553</i>	2.691 <i>1.608</i>	0.744 ¹ <i>0.122</i>	1.638 <i>1.205</i>	3.237 <i>0.773</i>	1.121 <i>1.321</i>	0.003 <i>0.090</i>	0.140 <i>0.102</i>
1990	9.209 <i>8.474</i>	3.688 <i>2.681</i>	25.808 <i>21.048</i>	5.857 <i>1.206</i>	4.265 <i>1.622</i>	6.063 <i>4.100</i>	11.021 <i>2.366</i>	6.276 <i>1.338</i>	3.017 <i>0.725</i>	1.065 <i>0.366</i>
Morishima Elasticity of Substitution										
1965	11.056 <i>4.734</i>	5.943 <i>1.964</i>	0.019 ² <i>0.130</i>	-0.367 <i>1.977</i>	-0.002 <i>0.207</i>	3.898 <i>1.250</i>	8.077 <i>1.765</i>	2.406 <i>0.873</i>	0.334 <i>0.536</i>	-0.531 <i>6.425</i>
1970	10.055 <i>5.483</i>	6.186 <i>3.638</i>	0.010 ² <i>0.129</i>	-0.088 <i>0.026</i>	0.031 <i>0.312</i>	3.411 <i>3.302</i>	3.143 <i>0.877</i>	1.359 <i>0.428</i>	0.015 <i>1.650</i>	0.056 <i>0.448</i>
1975	38.824 <i>48.519</i>	6.989 <i>3.299</i>	0.018 ² <i>0.152</i>	-0.060 ² <i>0.262</i>	0.417 <i>0.288</i>	7.846 <i>4.358</i>	5.863 <i>1.289</i>	6.635 <i>2.586</i>	1.124 <i>0.153</i>	0.366 <i>0.086</i>
1980	75.495 ¹ <i>18.557</i>	15.361 <i>11.048</i>	3.039 <i>2.361</i>	0.020 ² <i>0.019</i>	1.092 <i>0.713</i>	14.030 <i>5.866</i>	8.900 <i>1.404</i>	10.068 <i>7.462</i>	2.689 <i>0.535</i>	1.081 <i>3.050</i>
1985	7.224 <i>20.148</i>	10.637 <i>4.337</i>	1.419 <i>0.698</i>	-0.069 <i>0.263</i>	-0.022 <i>0.357</i>	5.469 <i>3.723</i>	11.188 <i>10.936</i>	1.455 <i>0.255</i>	0.000 <i>0.031</i>	0.055 <i>0.448</i>
1990	191.530 ¹ <i>55.104</i>	33.518 <i>20.754</i>	8.380 <i>45.547</i>	-0.690 ² <i>0.433</i>	-0.035 <i>0.112</i>	22.690 <i>9.925</i>	26.050 <i>5.387</i>	16.958 <i>7.059</i>	1.968 <i>0.264</i>	0.619 <i>5.095</i>

NOTES: In the regression function used to estimate each of these elasticities the dependent and independent variables are in levels. State and time effects are also included. The median coefficient for each year over all countries is given. S1-S5 and N1-N5 refer to the different categories for skilled and unskilled labor, respectively. LSCV used for bandwidth selection. Standard errors are listed in italics beneath each estimate. The superscript numbers 1 (11), 2 (22) and 3 (33) correspond to where the estimate exhibits significant evidence of CSS, CSC or SCSC at the 5% (10%) level, respectively.