# European Economic Integration:
# An Empirical Study in Factor Trade

Federal Republic of Germany
and
France

by
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It is not the years in your life,
but the life in your years that counts!

Adlai Stevenson

INTRODUCTION

European integration is not new. Since the time of Julius Caesar (100-50 BC) Europe has been the object of historical conquest. In the 9th century Charles the Great extended the Holy Roman Empire across Central Europe. A millennium later under the reign of Napolean Bonaparte the French dominated Continental Europe both politically and culturally. Just a little more than a century later Adolf Hitler sought in partnership with Benito Mussolini of Italy, Francisco Franco of Spain to extend German dominance over the continent once again. Since the close of World War II and the subsequent division of Europe into East and West Europeans have been struggling to reunite. With the recent dismantlement of the Iron Curtain and the introduction of Glasnost and Perestroika the movement toward European integration has been revived. Cast adrift in a sea of popular dissent the governments of Eastern Europe are looking to the West for guidance in their struggle to overcome the economic, cultural and political impoverishment of the Stalinist era. Between them and the United States stands the newly forming European Economic and Monetary Union. To what extent Europe will succeed in the restoration of social, economic and political order largely depends on the success of the European Economic Community in its effort to bring together the diverse political, economic, social and cultural institutions of 12 disparate nations into a single world power.

The monumental character of this undertaking is the multilateral approach by which it is being achieved. Twelve nations with historical traditions, some of which extend more than two millennium into the past, all of which are many centuries old, are voluntarily joining hands. For the first time in European history, Europe is coming together not by force from an external political, or military power, nor by the unilateral decree of a monarchal or dictatorial ruler from within; rather, through a mutual willingness on the part of its contributing members to share in the fruits of mutual political and economic cooperation. Never before in the history of human kind has an undertaking of such imagination and grandeur been achieved. Only today in a world of mass markets, mass communication and intense world political and economic competition are the ability and motivation requisite to such an undertaking sufficiently present. The Single Act is much more than a symbolic salute to 50 consecutive years of European peace and prosperity. Though political in form, the substance of this agreement is economic and promises therefore to be of greater historical consequence than either of the two World Wars which preceded it. Political agreements are subject to the will of governments; economic agreements are subject to the will of the people and to market forces of which government is only a part. These economic agreements are myriad in nature and voluntarily undertaken. They are desired rather than imposed and thus more virile and enduring. They infuse all manner of human interaction from the squalor of the human brothel to the artistic magnificence of the Papal See. They tend to be self-enforcing. They are the stitches of the social fabric upon which the political embroidery is woven. During the past 50 years we have witnessed the power of Eastern European governments in the determination of market structure. Clearly it has been substantial. Governments however come and go; human behavior is largely constant. Fundamental to this behavior are the Laws of Supply and Demand. Where the line between public and private ownership should be drawn is not clear. That at some point public ownership becomes a net burden to governments and the

people whom they are purported to serve is undisputed. Moreover the burden of public ownership is also an important source of social conflict, both within, as well as between nations. Post-war Eastern Europe stands witness to this burden. The Economic and Monetary Union of Western Europe provides us with a means to set this burden down.

The majority of trade between nations takes place at the intermediate goods level. When the American consumer goes into his local department store he is likely to purchase a shirt whose pattern is French, whose cloth was fabricated in the U.S. , whose wool was grown in New Zealand and whose stitches were sewed in Taiwan. The same consumer may purchase a US automobile, whose motor was manufactured in Great Britain, whose tires were produced in the United States and whose transmission was made in Canada by an American automobile manufacturer located in Detroit. When the consumer learns that the automobile was assembled in Mexico, he begins to wonder what makes the car American. "Ah", he concludes, "It is the profits -- these are American!" What then do we mean by national product? What is meant by national factors of production? How do we measure these? What role do these play in the exchange of goods and services across national boundaries? How can we apply these questions to the understanding of European economic integration? It is in answer to these and other questions that I would like to direct your attention in this paper.

The paper is divided into several sections. In section one a formal presentation of the structural model is given. Variable descriptions and brief discussions of each of the major assumptions are included. In section two the mechanics of the model are presented. These include two equilibrium trade scenarios and the derivations of relevant comparative statics associated with each scenario. Section three is devoted to a discussion of the data. Brief explanations of the employment and peculiarities of each historical series are given. Section four examines the functional forms with which experimentation was performed. A brief discussion of the Cholesky transformation and its application is also entertained. In section five I review experimental procedures and discuss the results. A conclusion is provided at the end of this section. Appendices containing tables, graphs, mathematical proofs and derivations are also included.

European Economic Integration: An Empirical Study in Factor Trade[1]

Historically and economically European economic integration is a social phenomena with ancient roots. What is new about Europe 1992? The motivation for integration. For the first time in centuries Europe is contracting rather than expanding, and the driving force toward integration is no longer competition for world dominance; rather, consolidation in the struggle for world survival. An important aspect of this consolidation procedure in the dismantlement of political boundaries. Economic trade between countries takes place on many levels: monetary exchange, finished goods trade, intermediate goods trade and trade in factor endowments. Of these, intermediate goods trade and monetary exchange are the most important. With the dismantlement of political boundaries trade in factor endowments assumes increased importance. The economic ramifications of their removal is the subject of this paper.

Section 1 is devoted to presentation of the structural model and a fairly standard set of economics assumptions. Section 2 elaborates on the mechanics of the model. Equilibrium trade values are derived and comparative statics of particular relevance are mentioned. Like section 1, section 2 is entirely theoretical. In section 3 we examine the data. Section 4 is devoted to a thorough discussion of functional form and estimation procedures. Section 5 examines the results. Also a conclusion is provided in this section.

Section 1: The Structural Model

This is a two country, two factor model which allows for trade in one factor (scenario 1) and trade in both factors (scenario 2). The model consists of two national production functions: a home country production function (Germany) and a foreign country production (France). The assignment of names, home and foreign country is arbitrary and provides a basis for generalization to other country pairs. Theoretically, this model can be easily expanded to include $n^2$ different national economies. Empirically, however, this implies much additional work. The production functions are listed below.

[1]Special thanks is given to Kar-yiu Wong, Assitant Professor, University of Washington for his guidance and encouragement in this project.

(1) $Y_t = f(L_t, K_t)$ (home country)

(2) $Y^*_t = g(L^*_t, K^*_t)$ (foreign country)

where $Y_t$ = home country gross domestic product.

$L_t$ = home country employed labor force.

$K_t$ = home country net capital stock.

Home county and foreign country variable names differ only by the absence or presence of the asterisk, respectively. Each is measured in its own local currency. There are two categories of assumptions: production and trade.

1) Production Assumptions:
   a) Structural parameters are fixed over time.[2]
   b) Concave production function in both factors, or at least:
      (i) diminishing marginal products, and
      (ii) quasi-concavity in both factors.
   c) Positive marginal products.
   d) Full employment of both factors.

2) Trade Assumptions:
   e) No transactions costs.
   f) No trade in finished goods and services.
   g) No trade in intermediate goods and services or at least a fixed pattern of trade for both countries over time.
   h) Homogeneity in traded factors.
   i) Country specific factors are not traded.
   j) Perfect competition for factor inputs within and between countries.

Because net capital stock consists of both mobile (equipment) and immobile (structures) components, it is reasonable to consider two trade scenarios: one, in which capital is country specific and only labor is transferred; and two, in which no country specific factors exist and both factors are traded. The motivation for trade in either scenario is the difference in the marginal value products of similar factors in different

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[2]This assumption in particular can be justified by the interplay of technological advance and resource deterioration in an industrialized nation. What technological advance contributes to productivity resource and environmental deterioration takes away.

countries. When the barriers to factor trade are removed factor units are transferred between countries until the marginal value products of that factor in both countries are equal. Equilibrium is insured when marginal products are diminishing. Multiplying both sides of equations (1) and (2) by each country's gross domestic price index, $P_Y$ and $P_Y^*$, respectively, and differentiating each with respect to labor and capital, L and K for the home country, and L* and K* for the foreign country, respectively, yields the following pair of equations:

(3) $$P_Y \cdot f_L(L, K) = P_Y^* \cdot g_L(L,K) \cdot E$$

(4) $$P_Y \cdot f_K(L, K) = P_Y^* \cdot g_K(L,K) \cdot E$$

where E = the foreign currency exchange rate (DM/ff).

Equations (3) and (4) together with the appropriate sets of full employment conditions and currency conversion indices form the basis of analysis.

Section 2: Model Mechanics (Scenario 1: Country Specific Capital)

(3) $P_Y \cdot f_L(L, K) = P_Y^* \cdot g_L(L^*,K^*) \cdot E$

(5) $\bar{L} = L + L^*$ Pooled employed labor force.

(6) $K = K$ Home country specific capital.

(7) $K^* = K^*$ Foreign country specific capital.

(8) $\rho_Y = \frac{P_Y}{P_Y} \cdot E$ Currency conversion index (GDP).

Dividing equation (3) by $P_Y$ and rearranging terms on the right side yields:

(9) $$f_L(L, K) = g_L(L^*,K^*) \cdot \rho_Y$$

Substituting for L*, K and K* in equation (9) from equations (5), (6) and (7), respectively, and applying the implicit function theorem we solve for L in terms of $\bar{L}$, K, K* and $\rho_Y$. This yields the post-trade (post-integration ) home country equilibrium demand for employed labor.

(10) $$L_1 = L_1(\bar{L}, K, K^*, \rho_Y)$$

Substituting the home country demand function for labor, equation (10) into the full-employment condition for labor yields the post-trade foreign country demand for employed labor.[3]

$$(11) \qquad L_1^* = L_1^*(\bar{L}, K, K^*, \rho_Y)$$

Substituting equation (10) into equation (1) yields real post-trade (post-integration) domestic output for the home country. Substituting equation (11) into equation (2) post-trade foreign country domestic output.[4] These are given formally as:

$$(12) \qquad Y_1 = Y_1(\bar{L}, K, K^*, \rho_Y)$$
$$(13) \qquad Y_1^* = Y_1^*(\bar{L}, K, K^*, \rho_Y)$$

Factor incomes for each country are obtained by multiplying the marginal value product of each factor times the amount of that factor employed in each country. Formally,

$$(14) \qquad Y_L = L_1 \cdot f_L(\bar{L}, K, K^*, \rho_Y) \quad \text{Home country post-trade labor income.}$$
$$(15) \qquad Y_K = K_1 \cdot f_K(\bar{L}, K, K^*, \rho_Y) \quad \text{Home country post-trade return to capital.}$$
$$(16) \qquad Y_L^* = L_1^* \cdot g_L(\bar{L}, K, K^*, \rho_Y) \quad \text{Foreign country post-trade labor income.}$$
$$(17) \qquad Y_K^* = K_1^* \cdot g_K(\bar{L}, K, K^*, \rho_Y) \quad \text{Foreign country post-trade return to capital.}$$

From equations (10) and (11) we can generate comparative statics for each country's labor demand with respect to pooled and country specific factor endowments. From expressions (12) and (13) we can generate a similar set of comparative statics for real domestic product for each country. Empirical estimates for these comparative statics are listed in the form of elasticities in section 5.

Section 2: Model Mechanics (Scenario 2: Country Nonspecific Capital)

$$(3) \qquad P_Y \cdot f_L(L, K) = P_Y^* \cdot g_L(L^*, K^*) \cdot E$$
$$(18) \qquad P_Y \cdot f_K(L, K) = P_Y^* \cdot g_K(L^*, K^*) \cdot E$$

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[3] The subscript 1 represents the post-trade equilibrium value for scenario 1.

[4] Multiplying equations (12) and (13) by $P_Y^*$ and $P_Y^*$, respectively, yields nominal domestic product.

(5) $\bar{L} = L + L^*$ Pooled employed labor force.

(19) $\bar{K} = K + K^*\rho_K$ Pooled real net capital stock.

(20) $\rho_K = \frac{P_Y^*}{P_Y} \cdot E$ Currency conversion index (net capital stock).

Dividing expressions (3) and (18) by $P_Y$ and rearranging the right sides of each yields

(9) $f_L(L, K) = g_L(L^*,K^*) \cdot \rho_Y$

(21) $f_K(L, K) = g_K(L^*,K^*) \cdot \rho_Y$

Substituting for L* and K* in equations (3) and (18) from equations (5) and (19) and solbing for post-trade equilibrium employment levels of home country labor and capital in terms of cross-country pooled endowments yields:

(22) $L_2 = L_2(\bar{L}, K, K^*, \rho_Y)$

(23) $K_2 = K_2(\bar{L}, K, K^*, \rho_Y)$

A similar set of demand functions can be obtained for the foreign country by substituting for L and K from equations (22) and (23) into equations (5) and (19), respectively. Following the same procedure as was outlined for scenario 1, we can generate an appropriate set of comparative statics and post-trade equilibrium values. For reasons that will be discussed in section V estimated results for scenario 2 are not provided.

## Section 3: The Data

A tedious effort to obtain complete series from each country's national data base was eventually abandoned, and established series published by the OECD and IMF were obtained. The length of all series was determined by the shortest, which was French net capital stock -- 1965-1987. Nominal and real values for gross domestic products were obtained from the OECD series National Accounts, Main Aggregates. Nominal and real net capital stocks were obtained from the OECD. publication The Flows and Stocks of

Fixed Capital. 1960-87.[5] Included in this series are governmental equipment and structures; excluded are residential structures for each country. Employed labor was gathered from the OECD publication Labor Force Statistics. Included in this study are the series civilian employment and armed forces personnel. Nominal exchange rates were obtained from the IMF publication International Financial Statistics. The par rate/market (rf) series was selected. All price indices were obtained by dividing nominal values by real values and converting to a 1980 base year. When base year real values and same year nominal values did not coincide (This really happens!) adjustment was made with respect to nominal series.

## Section 4: Functional Form and Estimation Procedure

Four distinct functional forms were employed. Two were quite standard; unfortunately, reliable estimates for these were not obtainable for either country. Two nonstandard forms were also estimated. These latter forms satisfy the minimum conditions for well-behaved factor demans and outputs. (See Section 1: Production Assumptions.)

All forms are based upon the quadractic production function.[6]

$$(24) \qquad Y = \alpha_o + \alpha_L L + \alpha_K K + \frac{1}{2}\beta_L L^2 + \frac{1}{2}\beta_K K^2 + \beta_{LK} LK + \varepsilon$$

The quadtratic function has several important features:

(i) It is a Taylor series expansion of f(L,K).

(ii) First order marginal products are linear in both coefficients and inputs.

(iii) Second order marginal products are simply the coefficients of the second order terms.

(iv) It is theoretically easy to impose concavity using the Cholesky transformation (Wong, 1988), (Diewert and Wales, 1987) and (Lau,1978). See equation (25) below.

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[5]These series are also available for the United States, Canada, Japan, and Great Britain, as well as Finland, Norway and Sweden. This series is also provided for Greece.

[6]Time subscripts have been suppressed.

(v) The requisite number of parameters to satisfy a flexible production function are present.

(vi) The elasticity of substitution need not be constant.

(vii) It satisfies theoretically the minimum conditions established in section 1.

The second standard form examined in this study is very similar to the first; only the parameter specifications are different. The second order term parameters are obtained through application of the Cholesky transformation.[7] In addition the first order term parameters are squared in order to insure that these terms contribute positively in the calculation of marginal products.

$$(25)\quad Y = \alpha_o + a_L^2 L + a_K^2 K - \frac{1}{2} b_{11}^2 L^2 - \frac{1}{2}\left(b_{12}^2 + b_{22}^2\right)K^2 - b_{11}b_{12}LK + \varepsilon$$

Equations (24) and (25) differ importantly insofar as equation (25) is a nonlinear transformation of (24). Nonlinear estimation procedures are generally more difficult to employ than standard linear procedures. Notwithstanding, the lure of obtaining a strictly concave function is worth the additional effort. In the absence of satisfactory estimation results for equation (24) and (25), additional constraints can be placed upon equation (25). This allows the researcher sufficient maneuverability to obtain the minimum condition outlined in section 1 for production. Unfortunately many of these additional constraints are justifiable only in their contribution to convergence, reliable estimates of individual parameters and satisfaction of the minimum theoretical conditions required for well-behaved factor demands. Through repeated experimentation the following two models were found to satisfy these minimum conditions for all years.[8]

$$(26a)\quad Y = \alpha_o + a_L^2 L - \frac{1}{2} b_{11}^2 L^2 - \frac{1}{2} b_{12}^2 K^2 - b_{11}b_{12}LK + \varepsilon$$

and

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[7] The Cholesky transformation can be employed for any number of factors. it is not restricted to only two.

[8] In effect, the researcher stood before the choice of experimenting with different, less desirable climbing strategies on the same production hill (the quadratic production function), or switching to a new hill altogether (say, the CES or Translog function). Because of substantial temporal investment in the quadratic function and limited resources, the researcher decided to explore further on the same hill.

$$(27a) \qquad Y^* = a_L^* L^* - \frac{1}{2} b_{11}^* L^{*2} - b_{11}^* L^* K^* + \varepsilon^*$$

Equation (26a) was obtained by constraining equation (25) according to the following:

$$a_K = b_{22} = 0.$$

Equation (27a) was obtained from equation (25) by constraining $\alpha_o = a_K = b_{22} = 0$ and eliminating $b_{12}$ from the model.[9]

Section 5: Estimation and Results

The nonlinear estimation procedure employed was the Gauss-Newton method as provided by the SAS procedure SYSNLIN in Version V of the SAS/ETS User's Guide, 1984. The SYSNLIN procedure was employed in preference to the NLIN procedure because: one, derivative specification is not necessary; and two, autocorrelative correction procedures are easily introduced. The following functions were estimated:

$$(26b) \quad Y = \underset{[0.9684]}{(-1.76097)} + \underset{[0.0710]}{(-0.39922)}L - \frac{1}{2}\underset{[0.0085]}{(-0.08324)}L^2 - \frac{1}{2}\underset{[0.1171]}{(0.42808)}K^2 - (-0.08324)(0.42808)LK$$

Root MSE = 0.018
1st Order AR parameter: $\rho_1 = \underset{[0.4021]}{0.4962}$

$$(27b) \quad Y = \underset{[0.0094]}{(0.1996)}L - \frac{1}{2}\underset{[0.0016]}{(-0.03356)}L^2 - (-03356)LK$$

Root MSE =0.036
1st Order AR parameter: $\rho_1^* = \underset{[0.1357]}{0.8093}$

Convergence criteria for both equations (26b) and (27b) were set at 0.0000001. Various starting values were employed to test for global minimums.

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[9]Because equation (28) cannot be obtained from equation (26) through the application of simple constraints, standard goodness of fit tests cannot be applied in order to 1st for statistical significance between them. Because convergence was never obtained fro equation (26), this apparent short-coming is of little importance.

Having satisfied the pre- and post-trade requirements for well-behaved factor demands over the entire range of observed inputs and outputs. Factor trade was allowed to take place and post-trade equilibrium values were calculated for the year 1987.[10] Because of structural limitations in the estimated model, a reasonable set of results could only be obtained for trade scenario 1. These are presented in the appendix.

Discussion of Results

From the appendix we observe that the German post-trade elasticity of substitution is much lower than the French post-trade value. This suggests a higher degree of specialization in the German employment of factor inputs. Large changes in relative factor prices have little effect on the relative amounts of factor inputs employed in the German economy. Inversely, small changes in the relative amounts of German factor inputs introduced by lowering barriers to factor trade produce a larger swing in relative factor prices in Germany. A much smaller swing is observed for France. Further we note that Germany is capital intensive relative to France 83,467 DM/worker > 66,016 DM/worker.[11] If we assume similar levels of technological development in each country, we would expect a higher marginal product of labor ($f_L$) in the more capital intensive country. Evidence for this is obtained when we observe employed labor move from labor intensive France to capital intensive Germany. Because of the precipitous fall in the German real wage ($f_L$), German labor income ($Y_L$) falls relative to its previous level, despite an absolute increase in the number of workers (L). Similarly the slight increase in the French real wage ($g_L$) results in a fall in French labor income ($Y_L$) as French workers move to Germany. A significant drop in the French real rate of return ($g_K$) to capital accompanies this movement. This is attributable to the positive French marginal cross product of labor and capital ($b^*_{LK} = -b^*_{11}$) and the country specificity of capital. For a similar reason just the opposite occurs in Germany. Because capital is fixed in each country the percent changes in income to

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[10] The SAS SIMNLIN procedure is a handy tool for these kinds of calculations. It is also found in the SAS/ETS User's Guide.

[11] $$\frac{K^*}{L^*}\,(\text{DM/worker}) = \frac{K^*}{L^*}\,(\text{ff/worker}) \cdot \rho_K$$

$$66{,}016\ (\text{DM/worker}) = (166{,}581\ \text{ff/worker}) \cdot (0.3963\ \text{DM/ff}).$$

the owners of capital ($\%\Delta Y_K$ and $\%\Delta Y^*_K$) are reflected exactly in the percent changes in each country's real rate of return to capital ($\%\Delta f_K$, $\%\Delta g_K$). In summary both the French worker who remains in France and the French worker who moves to Germany stand to gain. The German worker loses. In contrast the German owners of capital are much better off -- much to the chagrin of their French counterparts who suffer substantial losses. Interestingly, there is a net loss in the joint production of both countries (-0.04%)[12]. Government is treated here as a social institution employed by optimizing economic agents, who vye for limited resources in pursuit of individual utility mzixmiation, in order to establish social and economic policy (Buchanan and Tullock, 1962). That policy decision can favor one economic agent over another at the expense of the joint polity suggests a weakness in the social insitution, not the economic reality upon which it is founded. We assume that the barriers to trade are removed in the service of optimizing economic agents who influence the collective decision making process of government. That some economic interests are better served than others, can be explained by the ability of each to manipulate this collective process.

We turn now to the post-trade demand and output elasticities. A one percent increase in German capital has about the same effect on German demand for labor (0.4%) and German output (1.1%), as does a 1 percent increase in French capital on French demand for labor (0.3%) and French output (1.1%). In contrast a one percent increase in German capital has dramatically different effects on German (0.4%) and French (-1.3%) demand for labor and German (.1%) and French output (-1.2%0. A similar contrast can be observed for a 1 percent change in French capital on French and German demands for labor and outputs. In summary, endogenous equilibrium values are most sensitive to exogenous changes in German capital and the employed labor pool. In particular France is more sensitive to changes in the joint employed labor pool. Although France and Germany are equally sensitive to changes in German capital, the change is extraordinarily large and in opposite directions. We may conclude from this discussion that recent immigration patterns including East Germans into West Germany and North Africans into France will have a much greater effect on the labor intensive French economy than on the capital intensive German economy.

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12 $\%\Delta Y = \left[ 1 + Y^*_1 \rho_Y \right] - \left( Y + Y^* \rho_Y \right) / \left( Y + Y^* \rho_Y \right)$

In addition new foreign investment in Europe will be politically more likely well received in France than in Germany after economic integration is completed.

APPENDIX: Pre-trade and Post-trade Factor Input and Output Levels. Marginal Products. Percent Changes. Labor Demand and Output Elasticities. Elasticity of Substitution. Germany (FRG) and France. 1987.[13]

| | Germany (FRG) | | | | France | | |
|---|---|---|---|---|---|---|---|
| Symbol | Pre-Trade | Post-Trade | %Δ | Symbol | Pre-Trade | Post-Trade | %Δ |
| $L$ (1000 workers) | 25,988 | 26,500 | 2% | $L^*$ (1000 workers) | 21,542 | 21,030 | -2.4% |
| $K$ (DM Billions) | 2,211.9 | n.a. | n.a. | $K^*$ (DM Billions) | 3,500.2 | n.a. | n.a. |
| $Y$ (DM Billions) | 1,634.3 | 1,670.2 | 2.2% | $Y^*$ (DM Billions) | 3,151.8 | 3,061.5 | -2.9% |
| $f_L$ | | | -6.1% | $g_L$ | | | 0.4% |
| $f_K$ | | | 3.5% | $g_K$ | | | -2.4% |
| $Y_L$ | | | -4.3% | $Y^*_L$ | | | -2.0% |
| $Y_K$ | | | 3.5% | $Y^*_K$ | | | -2.4% |
| $\varepsilon_{L\bar{L}}$ | | 0.11 | | $\varepsilon_{L^*\bar{L}}$ | | 2.12 | |
| $\varepsilon_{LK}$ | | 0.40 | | $\varepsilon_{L^*K}$ | | -1.28 | |
| $\varepsilon_{LK^*}$ | | -0.10 | | $\varepsilon_{L^*K^*}$ | | 0.31 | |
| $\varepsilon_{Y\bar{L}}$ | | 0.10 | | $\varepsilon_{Y^*\bar{L}}$ | | 1.95 | |
| $\varepsilon_{YK}$ | | 1.06 | | $\varepsilon_{Y^*K}$ | | -1.18 | |
| $\varepsilon_{YK^*}$ | | -0.08 | | $\varepsilon_{Y^*K^*}$ | | 1.09 | |
| $\sigma$ | | 0.29 | | $\sigma^*$ | | 0.96 | |
| $\frac{K}{L}$ (DM per worker) | | 83,467 | | $\frac{K^*}{L^*}$ (ff per workers) | | 166,581 | |

Conversion factors: $\rho_K$ = 0.3963 DM/ff, $\rho_Y$ = p.4082 DM/ff.

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