The Shifting Composition of U.S. Manufactured Goods Trade

by Susan Hickok

Finished goods are claiming an increasing share of U.S. imports while their share of U.S. exports has remained virtually unchanged in recent years. An examination of these divergent developments in the role of finished goods in U.S. trade suggests that U.S. comparative advantage may be moving away from finished goods and toward industrial supplies. This shift is somewhat disturbing since demand for finished goods appears to be growing rapidly while the outlook for industrial supplies is less dynamic. A declining U.S. comparative advantage in the finished goods sector is also of concern because a strong competitive position in this sector is a sign of an economy's technological sophistication and, to some extent, its market power in the world economy.

This article examines a number of factors that might explain the recent trends in U.S. trade composition. It finds that weak U.S. investment, as measured against the investment performance of U.S. trade partners, has lowered the relative supply of capital to U.S. industry, eroding the traditionally strong competitive position of the United States in the production of finished goods. To a lesser degree, wage restraint in the U.S. steel industry and U.S. steel import restrictions have encouraged shifts in the composition of U.S. trade more favorable to the U.S. industrial supplies sector than to the U.S. finished goods sector. Finally, demand developments have also supported a slightly greater rise in finished goods as a share of U.S. imports than as a share of U.S. exports. But because the differential impact of demand developments on the import and export sides has been small, these developments have contributed only modestly to the divergence in U.S. import and export composition trends.

The first section of this study details the trends in U.S. import and export composition during the 1980s. In the second section, the various potential determinants of changes in U.S. import and export composition are introduced and analyzed. The concluding sections discuss the implications of the analysis for the future course of the U.S. trade balance and U.S. competitiveness over time.

The changing composition of U.S. trade

Developments in the composition of U.S. manufactured goods trade during the last decade are fairly straightforward.[1] On the import side, U.S. purchases of both foreign finished goods and foreign industrial supplies have risen sharply, but purchases of foreign finished goods have risen much faster. In consequence, finished goods increased from slightly more than 66 percent to slightly more than 77 percent as a share of total U.S. manufactured goods imports between 1978 and 1989 (Chart 1).[2] The counterpart to this rise was an 11 percentage point fall in the import share of industrial supplies. These changes in import shares are traceable mainly to developments in the machinery and metals

[1]Manufactured goods are defined as Standard Industrial Trade Classification (SITC) categories 5 through 8, with industrial supplies making up categories 5 (chemicals) and 6 (leather, rubber, cork, wood, paper, textiles, and minerals) and finished goods categories 7 (machinery and transport equipment) and 8 (furniture, clothing, footwear, instruments, and other manufactured goods) This definition excludes processed food and fuels

[2]Because unusual silver bullion sales raised the share of industrial supplies in U S exports in 1979 and 1980, 1978 is used as the base year in this study.

industries.[3] Machinery accounted for almost all of the gain in finished goods' import share; primary and fabricated metals suffered most of the share loss for industrial supplies (Table 1).

While the composition of U S imports has been shifting, the composition of U.S. exports has remained stable. Finished goods were about 74 percent of total U S. manufactured goods exports in both 1978 and 1989. Furthermore, little composition change has been observable within either the finished goods or industrial supplies export category. In particular, the machinery and metals industries have shown only minor share movements.

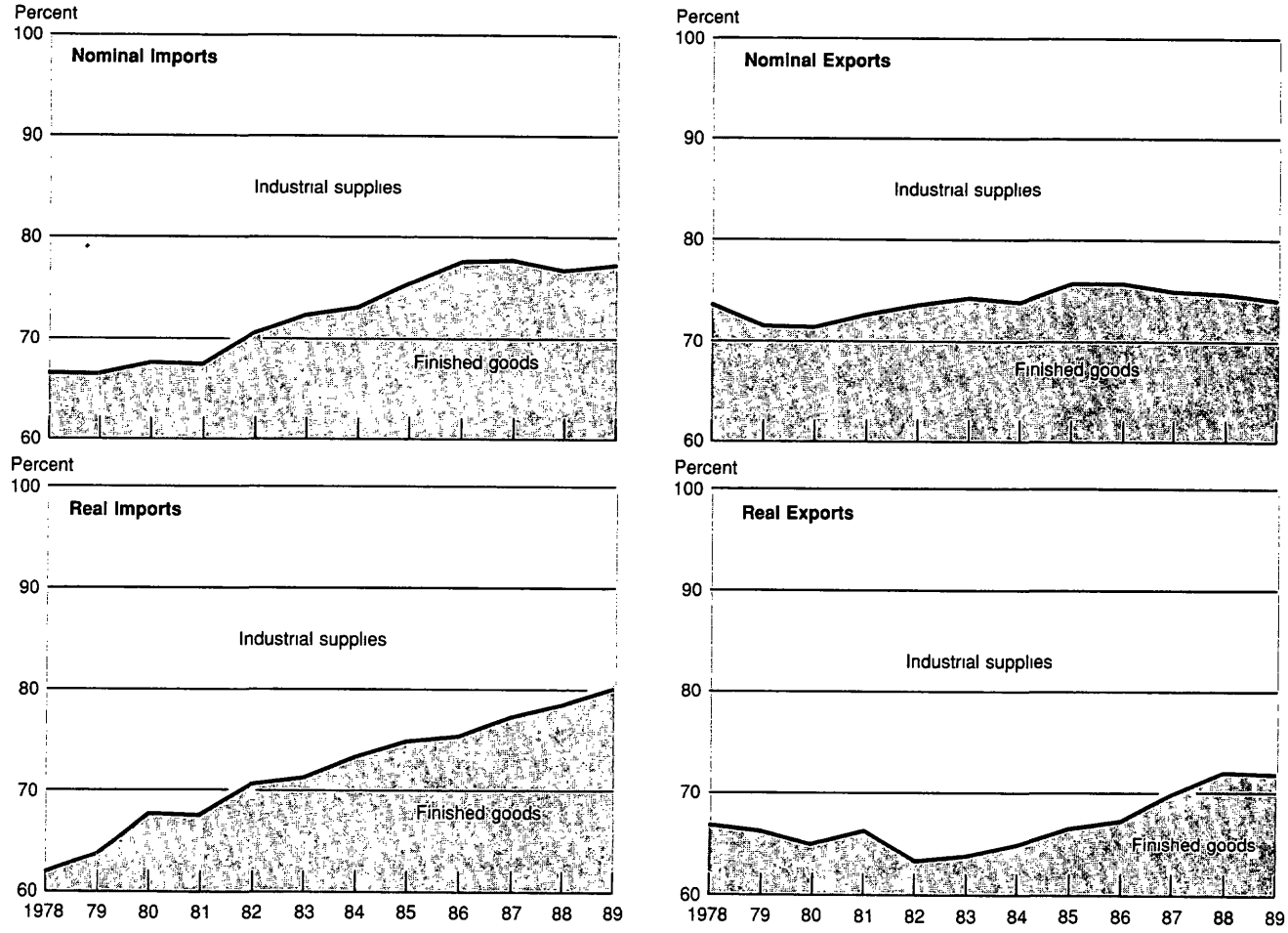
The distinct difference in import and export composition trends appears to have been even slightly larger in real terms than in nominal terms Although it is true that finished goods rose as a share of both real imports and real exports between 1978 and 1989, the rise in share was about 13 percentage points greater on the import

[3]Automotive products fell somewhat as a share of both U S imports and U S exports between 1978 and 1989 because of relatively slow growth in shipments by U S automobile companies across the U S - Canadian border U S automobile plants operate on both sides of the border under a free trade arrangement

Chart 1

Shifting Composition of U.S. Manufactured Goods Trade

Share of Finished Goods in U S Imports and Exports



Note Real imports and real exports refer to both manufactured and nonmanufactured goods excluding food, feed, beverages, petroleum, and unclassified products

side.[4] This finding suggests that the difference in the evolution of U.S. import and U.S. export composition has resulted from factors affecting real trade flows rather than just relative trade prices.

The tendency for finished goods to represent a rising share of U.S. imports while remaining static as a share of U.S. exports over the last decade has generally held across geographic areas (Table 2).[5] For every major trade partner except Germany, finished goods sales to the United States have increased substantially as a share of U.S. manufactured imports. At the same time, for all areas except Germany and the rest of Western Europe, U.S. sales of finished goods have shown no significant increase as a share of U.S. manufactured exports. In fact, Germany stands alone as the only major U.S. trade partner for which finished goods have gained more in U.S. export share than they gained in U.S. import share.

The broad similarity across regions in U.S. import and U.S. export composition trends—that is, the substantial rise in import share for finished goods and the lack of significant change in export share for these same categories of goods —suggests that these trends are more closely tied to developments in the United States than to developments abroad. In other words, their evolution appears to be linked to shifts in the ability of the United States to compete in different industries rather than to shifts in the competitiveness of foreign countries.

To be sure, the U.S. import share of finished goods has leveled off during the last three years. Nevertheless, it remains at the elevated level it reached in 1986, indicating that the 1980s developments marked a durable change in U.S. import composition. Overall, U.S. trade composition changes during the 1978-89 period suggest a significant shift in U.S. comparative advantage from finished goods, notably machinery, toward industrial supplies, especially manufactured metals products. This shift appears fundamental and widespread since it is evident in both nominal and real trade flows and in trade flows with almost every foreign country.

[4]Trade price indexes are not available for manufactured goods alone The estimate of real changes in the text is derived by deflating nominal U S imports and exports of finished goods plus raw materials excluding petroleum by comparable trade price indexes

[5]Data here and in the rest of the text are in nominal terms because data in real terms are not available

Table 1

Subcomponents of U.S. Manufactured Goods Trade Composition

(Percent Share)

	Imports		Exports	
	1978	1989	1978	1989
Finished Goods (SITC 7+8)	66.6	77.3	73.7	74.0
Machinery and transport equipment excluding automotive (SITC 70-77, 79)	25.3	35 9	48.6	50.3
Automotive products (SITC 78)	22.6	20 4	13 7	10.4
Other manufactured goods, primarily consumer goods (SITC 8)	18 7	21 0	11 4	13 3
Industrial supplies (SITC 5+6)	33.4	22.7	26.3	26.0
Metals (SITC 67-69)	15.6	8.3	6.2	5.1
Other industrial supplies (SITC 5+6, excluding 67-69)	17.8	14.4	20.1	20.9

Explaining developments in U.S. trade composition

Four factors are generally identified as affecting the composition of an economy's international trade. They are 1) changes in the composition of domestic and foreign demand, 2) changes in the supply of domestic and foreign production inputs (capital and labor), 3) differences across countries in inter-industry labor and other cost developments not directly related to changes in input supply, and 4) government trade policies restricting the import of certain products. These four factors appear to explain fairly well the evolution of U.S. import and export composition during the 1978-89 period.

The impact of these four factors may be summarized

Table 2

Shift in Composition of U.S. Trade toward Finished Goods by Region: 1978-89

(Percentage Point Increase in Finished Goods as a Share of Total U.S. Manufactured Goods Imports and Exports)

	Latin America	Asian NICS†	Japan	Other Asia	Germany	Other Western Europe	Canada	Rest of World	World
U.S. imports	15	5	12	30	1	9	5	−2	11
U.S. exports	2	−1	1	−5	4	7	1	−9	0

†Hong Kong, Singapore, South Korea, and Taiwan.

briefly. Demand developments in the United States contributed the most to the shift in the composition of U.S. imports toward finished goods Foreign demand developments also favored a substantial shift in U.S. exports toward finished goods Finished goods, however, did not gain in U.S. export share, an inconsistency explained by supply factors Although changes in production inputs tended to *boost* the share of finished goods in U.S. imports, they tended to *reduce* the share of such goods in U.S exports In fact, production input developments were probably the single most important factor behind the lack of change in finished goods' share of U.S exports. They also explain to some extent why finished goods rose more rapidly in U S import share than demand developments alone would have suggested The remaining two factors, changes in production costs and trade restrictions, contributed further to the rise in finished goods import share by cutting imports of industrial supplies. Consequently, they also explain some of the divergence in U.S. import and export developments, although their overall impact was significantly smaller than that of changes in production inputs

Shifting demand patterns

Changes in the composition of U S. and foreign demand are an obvious factor affecting the composition of U.S trade. As economies grow, demand for finished goods generally rises faster than demand for industrial supplies.[6] Unfortunately, because data are not available on the composition of world demand, it is impossible to calibrate directly the extent to which this expected shift occurred worldwide during the 1978-89 period Nevertheless, since the comparative advantage positions of individual countries do not affect the composition of world exports in aggregate, the shift in the composition of world exports may be taken as a proxy for the shift in the composition of world output and world aggregate demand.[7] Between the years 1979 and 1987 (the earliest and latest years, respectively, for which data is available on a consistent basis), world exports of finished goods grew 96 percent while world exports of industrial supplies rose only 55 percent. Given initial share levels in 1978, this difference in growth translates into a 5 percentage point rise in finished goods (from 63 percent to 68 percent) and a concomitant 5 percentage point decline in industrial supplies as shares of world manufactured goods exports over the course of this period

On the U.S. side, shifts in the composition of U.S. demand mirrored shifts in the composition of world demand U S demand for finished goods grew about 40 percentage points faster than U.S. demand for industrial supplies, a difference roughly equivalent to that between these same components in world demand The difference in U S. demand growth rates translates into a 7 percentage point rise (from 56 percent to 63 percent) in finished goods and a 7 percentage point fall in industrial supplies as shares of total U.S manufactured goods purchases.

The roughly similar world and U S demand developments could be expected to result in commensurate shifts of about 5 percentage points and 7 percentage points in favor of finished goods in the composition of U.S exports and imports, respectively[8] On the import side, U S demand shifts would thus appear to explain in aggregate somewhat more than half of the 11 percentage point increase in finished goods as a share of total U S. manufactured goods imports On the export side, in contrast, foreign demand shifts raise the question why there was no rise in the share of finished goods.

Changes in input supply

Changes in supply factors help explain this puzzle. They also offer some understanding of why the composition of U S imports shifted more toward finished goods than did the composition of total U.S. demand The most obvious change in supply factors has been the much stronger growth in capital investment abroad than in the United States over the last two decades Stronger foreign investment resulted in a significantly faster rise in the average foreign capital/labor ratio than in the U S capital/labor ratio during this period.

Capital investment and capital/labor ratio develop-

[6]If industrial supplies consisted solely of intermediate products used in the production of finished goods, the only reasons for an observable difference between the growth in demand for industrial supplies and the growth in demand for finished goods would be that a country's degree of vertical integration in manufacturing changed or that intermediate products accounted for a declining share of the total value of finished goods But in the product classification used here, "industrial supplies" includes pharmaceuticals, construction materials, paper products, fertilizers, floor coverings glassware, metal containers, and other products that are not direct inputs into finished manufactured goods production

[7]Differences in transport costs across products and similar factors could cause differences between world trade composition and world demand composition However, these differences are unlikely to have caused the *change* in world trade composition to differ significantly from the *change* in world demand composition, the focus of the analysis above, during the 1978-89 period

[8]Technically, U S demand developments should be excluded from world demand developments to calculate the impact of foreign demand shifts on U S exports Moreover, U S and world demand shifts should be weighted by the initial U S import and export compositions to assess the impact of the shifts on U S trade If these two corrections were made and the results extrapolated to 1989, the results would still suggest that demand developments alone boosted finished goods roughly 5 percentage points as a share of U S exports and 7 percentage points as a share of U S imports

ments are particularly relevant to the change in share of industrial supplies and finished goods in U.S. trade since finished goods generally require a higher level of capital input per employee for their production than do industrial supplies. Unfortunately, reliable capital/labor ratio estimates are not available internationally for different industries within the manufacturing sector to illustrate this point.[9] However, input/output measures showing the contributions of capital goods and value added (a measure of labor input) to production may be used to judge the amount of capital per employee in each industry Based on the U.S input/output table for 1983, a middle year in the period under consideration, the ratio of capital input to value added for the industrial supplies category was 0.07, or only about half of the 0 16 ratio for the finished goods category (Table 3) [10]

[9]U S capital stock data are available by industry However, these data are distorted because they include some factories that are no longer in operation Industries such as steel that have many closed factories included in their capital stock have unrealistically high capital/labor ratios since no labor is employed in these factories Using input/output flow measures as a substitute for capital/labor stock measures does implicitly assume that the average life of capital is the same across all industries

[10]These ratios reflect the composition of U S industrial supplies and finished goods output They give relatively low weight to the consumer goods sector of finished goods production compared with the weight consumer goods would receive in a global input/output table Consumer goods generally have a lower capital/labor ratio than other finished goods Relying on a U S input/output table rather than a (nonexistent) global input/output table does not seriously affect the analysis because U S trade in the most labor-intensive consumer goods category, apparel, is conducted under the Multi-Fiber Arrangement The impact of the Multi-Fiber Arrangement on U S trade composition is discussed later in the text Excluding clothing from the capital/labor ratio shown for other manufactured goods on Table 3 would raise this ratio to 0 12

Table 3

Capital/Labor Ratios by Industry

Industrial supplies	0 07
Metals	0 10
Finished goods†	0 16
Machinery and transport equipment† (excluding automotive)	0 17
Automotive products	0 21
Other manufactured goods (primarily consumer goods)	0 09

Source Annual input/output accounts of the U S economy, 1983, *Survey of Current Business*, Bureau of Economic Analysis, February 1989

Notes Capital goods input is measured as the sum of lines 43 to 63 in the input/output table, excluding line 53 (electronic components and accessories) Line 12 (repair and maintenance construction) is also included as a capital input

†This ratio excludes capital goods that are inputs in their own industry's output

During the 1977-87 period,[11] the U S. investment performance was weak relative to that of the rest of the world The net manufacturing sector capital/labor ratios of the major foreign industrialized countries grew on average about 1½ times as fast as the U S capital/labor ratio during these years (Table 4) Germany was the only major foreign industrialized country whose ratio grew more slowly than the U S. ratio. Although available data do not permit easy comparisons of the U S. ratio with the manufacturing sector capital/labor ratios of developing countries, rough estimates based on economy-wide investment flows and population growth suggest that here, too, the U.S. ratio generally grew more slowly than it did abroad. In fact, the average developing country ratio appears to have risen almost 1¾ times as much as the U S. ratio. All told, with an adjustment for the rise in the developing country capital/labor ratio in manufacturing that would be consistent with economy-wide investment and population changes, the trade-weighted average foreign capital/labor ratio in manufacturing for both industrial and developing countries is likely to have risen about 40 percent since 1977, or about 1⅜ times faster than the 25 percent rise in the U.S. ratio.

How important has this difference in foreign and U S capital/labor ratio growth been to the composition of U.S trade? The existence of a link between the relative size of capital/labor ratios and trade composition is a basic tenet of international trade theory Unfortunately, however, there is no satisfactory means to gauge accurately the quantitative impact of a change in relative capital/labor ratios on the composition of trade flows.

One tool from the discipline of international economics that could provide some quantitative insight into this problem is the Rybcyznski theorem [12] The Rybcyznski theorem links output growth rates across product sectors in a given country with the growth rates for that country's capital and labor supplies However, the Rybcyznski theorem relies on some very strong underlying assumptions—namely, that prices remain constant and that resources are fully employed—to establish its link. Consequently, estimated effects based on this theorem

[11]These calculations are for 1977-87 rather than 1978-89 to allow some time for investment to be put in place and for labor adjustment to occur before the effect on trade composition is measured Using the other time frames shown on Table 5 does not significantly change the results

[12]T M Rybcyznski first laid out his findings in "Factor Endowment and Relative Commodity Prices," *Economica*, vol 22, no 84 (November 1955), pp 336-41

are at best illustrative of what changing relative capital/labor ratios might mean for U.S. trade composition.

A rough application of the Rybcyznski theorem suggests that the 15 percentage point faster growth in foreign capital/labor ratios relative to growth in the U.S. capital/labor ratio could have led to growth in the ratio of foreign finished goods output to foreign industrial supplies output that would have been about 15 percentage points faster than growth in the ratio of U S finished goods output to U S industrial supplies output, if all other factors remained unchanged.[13] This relative change in output ratios may be traced through to the changes it implies for the growth rates of U.S. finished goods imports and U.S. finished goods exports and, subsequently, for changes in finished goods as a share of total U.S. manufactured imports and exports. The end result of these calculations would indicate that the more rapid growth observed in foreign capital/labor ratios compared with the U.S. ratio might have *raised* the share of finished goods in U S. imports by roughly 3 percentage points. In contrast, the more rapid growth in foreign capital/labor ratios might have *lowered* the share of finished goods in U.S. exports by roughly 3 percentage points. Combining these figures suggests that roughly 6 percentage points of the 11 percentage point difference between the evolution of U.S. import composition and U.S export composition—that is, the 11 percentage point gain in finished goods as a share of U.S. imports compared with the absence of any gain in finished goods as a share of U.S. exports—might be due to much stronger capital stock growth abroad relative to the United States.

Given the problems associated with use of the Rybcyznski theorem, however, it is useful to examine other evidence suggesting that changes in relative capital/labor ratios played a significant role in shaping the divergent trends in U.S. import and U S. export composition. This evidence comes from a comparison of capital/labor ratio developments and trade composition

[13] A detailed discussion of the Rybcyznski theorem and the calculations presented above is not provided in this article because of the tenuous nature of the results However, such a discussion is available in Susan Hickok, "Factors behind the Shifting Composition of U S Manufactured Goods Trade," Federal Reserve Bank of New York Research Paper no 9036, December 1990 The research paper presents estimates based on the Rybcyznski theorem that suggest that stronger foreign investment relative to U S investment has led to an increase of 2 percentage points to 4 percentage points in finished goods as a share of U S imports and a decrease of 2 percentage points to 4 percentage points in their share of U S exports These estimates are judged to be fairly plausible, particularly because they are robust to moderate changes in the strict assumptions underlying the Rybcyznski theorem

Table 4

Relative Growth in Capital/Labor Ratios by Region

(Cumulative Percent Growth, Ratio to U S Growth in Parentheses)

	Manufacturing Capital/Labor Ratios for Industrial Economies						
	United States	Canada	Japan	Germany	France	United Kingdom	Foreign Trade-Weighted Average
1977-87	25	32	53	18	41	43	37 (1 48)
1975-85	21	37	45	19	39	43	37 (1 76)
1970-80	32	28	86	34	45	39	46 (1 44)

	Economy-wide Capital/Labor Ratios for Developing Economies				
	United States	Asian NICs†	Other Asia	Latin America	Foreign Trade-Weighted Average
1977-87	151	400	250	152	259 (1 72)
1975-85	163	400	336	222	355 (2 18)
1970-80	153	815	302	296	469 (3 07)

Sources Organization for Economic Cooperation and Development, "Flows and Stocks of Fixed Capital, 1962-87," 1989, International Monetary Fund, *International Financial Statistics*, various issues

Notes Industrial country data are calculated from OECD estimates of real net capital stocks in manufacturing and the countries' own reported manufacturing employment levels Developing country data and the comparable U S series are based on the assumption that capital has a ten-year life span Capital growth is calculated as the sum of nominal gross fixed capital formation economy-wide for the period shown, divided by the sum of nominal gross fixed capital formation for the preceding ten-year period The growth in each economy's population over the period shown is then subtracted from this estimated growth in the nominal economy-wide capital stock

† Hong Kong, Singapore, South Korea, and Taiwan

shifts on both a region-by-region basis and a product subcategory-by-subcategory basis within the finished goods and industrial supplies categories. If weak U.S. investment relative to that abroad was a substantial factor in the composition changes in U.S. trade over the last decade, regions with faster growing capital/labor ratios would be expected to have experienced larger gains in finished goods as a share of their sales to the United States than regions with slower growing capital/labor ratios during this period. Similarly, if the issue is investigated at a more disaggregated product level, the goods requiring a larger capital/labor ratio for their production would be expected to have gained more in U.S. import share since 1978 than the goods requiring a lower ratio.

If allowance is made for some outside factors, both of these expectations are, in fact, borne out. More specifically, if one allows for the impact of a sharp fall in U.S. nonferrous metals demand on the composition of U.S. imports from the Latin American and other Asian regions and for the impact of clothing import restrictions on U.S. imports from the Asian newly industrialized countries (NICs), the regions with the strongest investment performances did show the largest gains in finished goods as a share of their exports to the United States. Furthermore, if one allows for the impact of the special U.S.-Canadian automobile free trade zone on automobile trade and the impact of clothing import restrictions on consumer goods trade, composition changes within the finished goods and industrial supplies categories indicate a strong correlation between a product's capital-intensity and that product's gain in U.S. import share.[14]

There is, consequently, fairly clear evidence that the relatively weak U.S. investment performance of the 1970s and 1980s contributed to the diverse evolution of U.S. import and U.S. export composition since 1978. Although a reliable quantitative estimate is not available, both theory and observation suggest that the impact was probably substantial. In particular, region-by-region and product subcategory-by-subcategory matches between U.S. trade composition shifts and capital/labor ratio factors strongly suggest that relative capital/labor ratio developments explain, to a substantial degree, why finished goods claimed an increasing share of U.S. imports while stagnating as a share of exports.

Other supply developments

A third factor affecting the composition of trade consists of those developments in the *cost* of production inputs across industries that are not directly related to changes in input supply. No available data suggest that the pattern of relative capital costs across U.S. industries has evolved substantially differently from the pattern of relative capital costs across foreign industries over the last decade.[15] However, data suggest such a distinction on the labor cost side. This distinction is the product of the restructuring in the U.S. metals industry or, more specifically, a reduction in the wage premium earned by employees of U.S. steel firms resulting from the industry's financial problems in the last decade.[16]

Analysts have estimated that workers in the heavily unionized U.S. steel industry earned a substantial wage premium, on the order of 40 percent, in the 1970s.[17] This premium was measured by comparing the ratio of U.S. steel wages to average U.S. manufacturing wages with the ratio of foreign steel wages to average foreign manufacturing wages. Although premium estimates are not available for the 1980s, a cross-country comparison of wage developments in the primary metals industry with wage developments in manufacturing in general suggests that the U.S. steel wage premium fell significantly during the 1979-89 period (Table 5). Neverthe-

[14]A detailed discussion of the regional and product subcategory comparisons is provided in Hickok, "Factors "

[15]The impact of U S and foreign subsidies and industrial targeting is judged to be insignificant in Hickok, "Factors "

[16]A wage premium is generally associated with the U S. automobile industry as well as the U S steel industry However, U.S automobile wages grew in line with average U.S manufacturing wages between 1978 and 1989, suggesting that automobile wage developments had no significant independent effect on the evolution of U.S trade composition

[17]See Robert W Crandall, *The U S Steel Industry in Recurrent Crisis* (Washington, D C Brookings Institution, 1981), and the General Accounting Office, *Report to the Congress, New Strategy Required for Aiding the Distressed Steel Industry*, Washington, D.C , January 8, 1981

Table 5

Primary Metals Compensation as a Percentage of Average Manufacturing Compensation

	1979	1988	Change from 1979 to 1988
United States	143	135	−8
Foreign average†	123	125	+2
Canada	128	134	+6
Japan	145	147	+2
France	116	119	+3
Germany	111	110	−1
Italy	116	122	+6
United Kingdom	119	117	−2

Source: Unpublished data provided by the U S. Bureau of Labor Statistics

† Simple average of foreign countries listed.

less, the U.S. steel wage premium appears to have remained positive in 1989. Consequently, its fall would not in itself have caused labor to shift away from the metals sector, and any impact on the composition of U.S. trade would depend on the extent to which the reduction was passed on to U.S. steel prices.

It is convenient to analyze the effect on trade composition of the reduction in the U S. steel wage premium by examining trade price movements. Once these movements are clearly identified, trade elasticities may be used to judge the impact on import and export composition. Although data on U.S. steel import and export prices do not go back to 1978, data on U S. import and export prices for industrial supplies as a group are available for the entire 1978-89 period. Developments in the price indexes for industrial supplies may be traced fairly directly to developments in their steel price components

U.S. export prices for all industrial supplies declined about 6 percent relative to U.S. import prices for all industrial supplies during the 1978-89 period (Chart 2). For finished goods products, in contrast, U.S. export prices on average rose relative to U.S. import prices over these years. The decline in the U.S. export price/import price ratio for industrial supplies of over 6 percent from the level it would have reached had it tracked the rising U.S. export price/import price ratio for finished goods matches fairly closely the difference in U.S. wage developments in these two sectors relative to wage developments abroad. Available data suggest that foreign wages in the finished goods sector in general (computed as the simple average of wage developments for eight major U.S. trade partners) rose about 40 percent relative to U S. wages over the last decade (Table 6). Foreign wages in the industrial supplies sector, however, rose almost 50 percent relative to U S. wages. The more rapid foreign wage increase in the industrial supplies sector was due entirely to an even sharper rise in foreign metals wages relative to U.S. metals wages Foreign wages in other industrial supplies industries rose at just about the same rate relative to U.S. wages as did foreign wages in the finished goods sector. Taken together, these developments suggest that the fall in the U.S. steel wage premium was probably the ultimate source of the 6 percent decline in U.S. export prices for industrial supplies relative to U S. import prices for industrial supplies during the 1978-89 period, a period when U.S export prices were rising relative to U.S. import prices for most other products.

How have these wage and price developments affected the composition of U S. trade? On the U S import side, the declining price of competing U.S. products has reduced the U.S. demand for industrial supplies purchases from abroad. A rough quantitative estimate of this reduction may be made by assuming a price elasticity of demand for imports of -1.[18] This elasticity would imply that the declining relative price of competing U.S. industrial supplies cut the growth in demand for industrial supplies imports by over 6 percentage points from what it would have been if the prices of U S. industrial supplies had risen at the same rate as the prices of U.S finished goods. Given the initial share of industrial supplies in total U.S manufactured goods imports, a cut in demand of slightly more than 6 percent would account for a fall of approximately 2 percentage points in the industrial supplies import share by the end of the 1978-89 period.

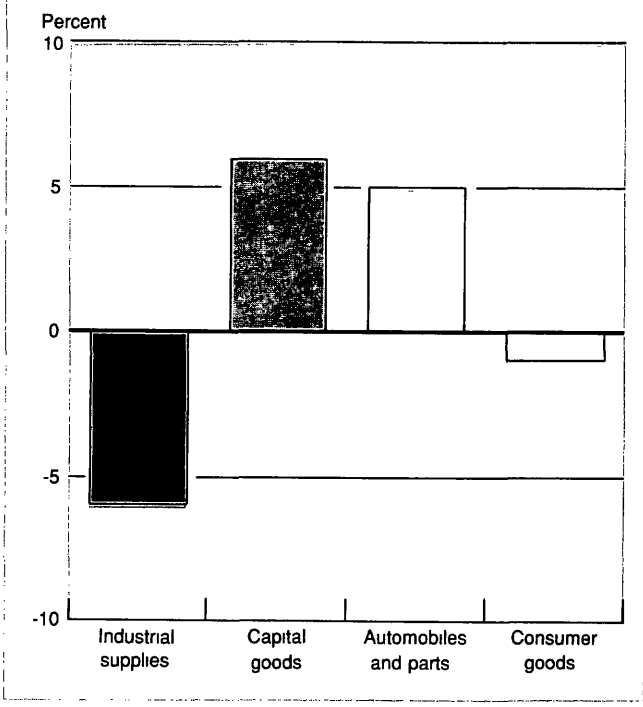
On the U.S. export side, the relative fall in U.S. industrial supplies price would increase the volume growth but reduce the price per unit of industrial supplies exports from what it otherwise would have been If

[18]Estimates are not available for the individual price elasticities of demand for U S imports and exports of industrial supplies or finished goods Overall U S trade price elasticity estimates are generally on the order of -1 The assumption of any price elasticity from a reasonable range centered around -1 would result in a trade composition impact not significantly different from that derived above

Chart 2

Change in U.S. Export Prices as a Percentage of U.S. Import Prices

Difference between 1978 and 1989



a price elasticity of −1 is assumed, the volume and price effects would cancel each other out, suggesting that the relative fall in U.S. industrial supplies export price did not have a significant impact on the composition of U.S. manufactured goods exports measured in nominal terms. That the fall in the U.S. steel wage premium differs in its impact on nominal and real exports is consistent with the observation that the difference in the evolution of U.S. import and export composition was greater in real than in nominal terms.

Overall, the fall in the U.S. steel wage premium appears to have had a measurable impact on the composition of U.S. imports over the 1978-89 period, reducing the share held by industrial supplies by about 2 percentage points. However, with no measurable impact on nominal export composition, this 2 percentage point import change alone explains only a small part of the divergence over the last decade in U.S. import and U.S. export composition trends.

Trade restrictions

U.S. and foreign trade restrictions are another factor likely to affect the composition of U.S. manufactured goods imports and exports. The most important U.S. trade restrictions in this regard are the voluntary export restraints on Japanese automobile shipments, the Multi-Fiber Arrangement restricting clothing imports, and the voluntary export restraints on foreign steel shipments to the United States. On the U.S. export side, important foreign trade restrictions have been placed on U.S. automobiles, telecommunications equipment, and wood products (particularly plywood).

The U.S. import restrictions have had surprisingly little measurable impact on U.S. import composition over the 1978-89 period. Restrictions on Japanese automobile shipments to the United States were, in fact, not binding during the April 1989-March 1990 automobile agreement year (although this may to some extent be due to the transplantation of Japanese automobile production to the United States, itself in part a reaction to U.S. import restrictions). Moreover, the fact that Japanese automobile sales to the United States grew significantly faster than overall Japanese manufactured goods sales between 1978 and 1989 suggests that U.S. import restrictions probably did not substantially depress automobiles as a share of total Japanese sales. The rise in price and the quality upgrading of the automobile models that Japan did send to the United States in response to the restrictions may explain the strong nominal performance of Japanese automobile export sales.[19]

U.S. clothing restraints also do not appear to have led to a significant fall in the share of clothing in total U.S. manufactured goods import purchases between 1978 and 1989.[20] Clothing imports doubled (rising from 7 percent to 14 percent) as a share of U.S. clothing

[19]Fred Mannering and Clifford Winston estimate that for these reasons restrictions actually raised the nominal value of Japanese automobile shipments to the United States in 1984 by $3 billion ("Economic Effects of Voluntary Export Restrictions," in Clifford Winston et al., *Blind Intersection? Policy and the Automobile Industry* [Washington, D.C.: Brookings Institution, 1987])

[20]Within the context of the Multi-Fiber Arrangement, the United States has negotiated agreements with the major world clothing producers limiting the growth rate of clothing imports into the United States. U.S. clothing restrictions have varied across trade partners, causing composition shifts in individual regions' trade flows. In particular, restrictions cut clothing sales from the Asian NICs, while the "other Asia" region benefited from the restricted NIC sales by sharply increasing its own clothing shipments to the United States.

Table 6

Change in Foreign Wage Rates Relative to U.S. Wage Rates: 1978-88

(Cumulative Percent Change)

	Western Europe	Canada	Japan	Asian NICs	Average
Finished goods	22	8	40	90	40
Capital equipment	23	6	32	109	43
Industrial supplies	27	14	44	115	49
Primary and fabricated metals	33	21	46	125	56

Notes: Figures are derived from unpublished data provided by the U.S. Bureau of Labor Statistics. The finished goods category is a weighted average of nonelectrical machinery, electric and electronic equipment, precision instruments, apparel and other textile products, and automotive products, based on 1978 U.S. import shares as a proxy for the relative size of each industry. Capital equipment includes the finished goods industries except apparel and other textile products and automotive products. The industrial supplies category is a weighted average of primary metals; fabricated metals; stone, clay, and glass products; chemicals and allied products; and paper products. The Western Europe column shows the simple average of changes in France, Germany, Italy, and the United Kingdom. The Asian NICs column shows the simple average of changes in Taiwan and South Korea. The average column at the right shows the simple average for the eight economies considered.

consumption over these years. Consumer goods imports in general also about doubled (rising from 6 percent to 10 percent) as a share of U.S. consumer goods consumption during the 1978-89 period. This similar change in import penetration ratios suggests that clothing import restrictions, although binding in both 1978 and 1989, did not cause a significant change in clothing's import share. In fact, the restrictions may have prevented clothing's import share from falling because they probably kept out a larger share of potential clothing imports in 1978 than in 1989. That is, if there had been no import restrictions, clothing may well have declined in import share over the course of the 1980s as foreign manufacturers moved increasingly toward more capital-intensive production. (Clothing production is one of the least capital-intensive manufacturing sectors.)

The third major U.S. restriction, limits on steel imports, had only a minor impact on U.S. import composition developments. U.S. restrictions on steel imports were not binding on many foreign suppliers in 1989. Only the European countries came within 5 percent of their maximum allowable market share in the United States. It is plausible that European steel sales to the United States would have been higher last year if there were no U.S. steel restraints. U.S. purchases of European steel grew more slowly than U.S. purchases of other European products. If European steel sales to the United States had grown as fast as overall European manufactured goods sales to the United States, industrial supplies as a share of U.S. manufactured goods imports from all sources would have been about 1 percentage point higher than they actually were in 1989.

Foreign restrictions on U.S. manufactured goods exports do not appear to have had any significant impact on the evolution of U.S. export composition. The automobile, telecommunication, and wood product purchases of the economies with significant trade restrictions against U.S. products would have accounted for too small a share of total U.S. manufactured goods exports to have had a measurable impact on U.S. export composition even if those purchases had substantially increased. In fact, major changes in Japanese telecommunications policy and Taiwanese and South Korean automobile policies increased U.S. sales of these products to these economies about eightfold during the 1978-89 period but did not raise the overall share of telecommunications equipment or automotive products in U.S. exports.

Overall, trade restrictions appear to have had a relatively small impact on shifts in the composition of U.S. trade. Only U.S. restrictions on European steel seem to show any significant effect, pushing U.S. imports slightly in the direction of finished goods.

The four factors together

Demand developments appear to have strongly favored a shift in both U.S. manufactured goods import and export flows toward finished goods and away from industrial supplies, although the impact on the import side was slightly greater. The shift in U.S. imports toward finished goods was also supported by a strong foreign investment performance relative to that of the United States. A declining U.S. steel wage premium and U.S. steel import restrictions restrained imports of this important industrial material and indirectly furthered the increase in finished goods import share. On the export side, the strong foreign investment performance appears to have cut significantly into finished goods as a share of U.S. export sales. In fact, since reductions in the U.S. steel wage premium and foreign trade restrictions seem to have had no discernible impact on nominal U.S. manufactured goods export composition, strong foreign investment appears to be the main reason that finished goods gained no share in U.S. manufactured goods exports during the 1978-89 period.[21]

Impact of shifts in trade composition on the U.S. trade outlook

The shifting composition of U.S. manufactured goods imports toward finished products, unaccompanied by a comparable shift in the composition of U.S. manufactured goods exports, is likely to have significant implications for the outlook for the U.S. trade balance. The apparent durability of the import shift, with finished goods imports maintaining over the last three years the sharp gain in share achieved earlier in the 1980s, suggests that U.S. demand for imports may grow at a faster rate in the future. The lack of a shift in U.S. export composition means that there would be no offsetting increase in foreign demand for U.S. exports, assuming other economic factors remain unchanged. This assymetric situation arises because demand for finished goods generally increases faster than demand for industrial supplies as economies mature. Indeed, world demand for finished goods appears to have grown almost twice as fast as world demand for industrial supplies since 1979.

Put more formally, an economy's income elasticity of demand for imported finished goods is generally greater than its income elasticity of demand for imported indus-

[21]Hickok, "Factors," considers the possible impact on U S trade composition of scale economies in certain trade sectors, trade hysteresis resulting from large exchange rate movements in the 1980s, and shifts in U S trade flows between different trade partners Only the last of these three factors appears to have played a role, and that role modest, in shaping the 1978-89 evolution of U.S. trade composition. Of course, shifting trade flows across trade partners could in part be a reaction to the demand, supply, and trade restriction developments discussed in this section

trial supplies.[22] Consequently, the shift in U.S. import composition in favor of finished goods is likely to have raised the aggregate U.S. income elasticity of demand for imports above what it otherwise would have been, leading to higher U.S. import purchases as the U.S. economy grows. With no apparent significant shift in the composition of U.S. exports, sales of U.S. exports would receive no comparable boost in response to economic growth abroad, again assuming other factors remain unchanged.

The increased sensitivity of U.S. import demand to income growth without a corresponding change on the export side implies that, in coming years, overall U.S. economic growth may have to be slower or U.S. prices lower relative to foreign prices than would otherwise be the case in order for the United States to maintain a given trade balance level. Trade adjustment through lower U.S. prices relative to foreign prices is, however, likely to be harder to achieve than in the past because of the change in U.S. import composition over the 1978-89 period. The demand for differentiated finished goods responds to significant nonprice factors and consequently tends to be less sensitive to relative price changes than does the demand for homogeneous industrial supplies. Therefore, the U.S. price elasticity of demand for imports may have decreased as U.S. import composition shifted toward finished goods and away from industrial supplies.

Several other characteristics of international trade suggest that recent U.S. trade composition developments could lead to market dynamics even more unfavorable to the U.S. trade outlook than these elasticity considerations alone suggest. Finished goods are typically differentiated products; brandname recognition and purchaser loyalty are important. For capital goods, moreover, design specification and compatibility with related equipment are also key considerations. For these reasons, foreign exporters who have moved more into finished goods have altered market dynamics in their favor: they are likely not only to retain their increased market share but also perhaps to make further gains in that share. They have consequently affected the outlook for trade composition as well as the actual trade composition developments of the 1978-89 period.

A more conjectural dynamic impact of the U.S. trade composition shift that has occurred since 1978 is the likely effect it has had on perceptions of the quality of foreign products. As foreign producers, especially those in countries relatively new to the international trade arena, demonstrate that they can produce sophisticated finished goods, they enhance the perceived quality of all their products. An improved foreign quality reputation further increases U.S. demand for imports, particularly in the finished goods category where quality characteristics are important.

Conclusion

Finished goods climbed 11 percentage points as a share of U.S. manufactured goods imports between 1978 and 1989. They showed no increase as a share of U.S. manufactured goods exports during this period. Since finished goods have been growing more rapidly than industrial supplies in both U.S. and world demand, this 11 percentage point difference in U.S. import and U.S. export developments is not an encouraging sign for U.S. competitiveness. Weak U.S. investment relative to investment abroad appears to be the most important factor behind the difference. A reduction in the U.S. steel wage premium, U.S. restrictions on steel imports, and slight differences between foreign demand developments and those in the United States have also contributed, but these three factors together seem to account for at most only half of the 11 percentage point divergence. Changes in relative capital supplies probably account for the other half. In fact, only changes in relative capital supplies appear to explain adequately why the decline in U.S. competitiveness in the finished goods sector has been so widespread across trade partners.

As for developments affecting the future, investment abroad appears to continue to outpace investment in the United States. Western Europe, where investment was less buoyant than that of other regions through the mid 1980s, in particular appears to have increased its investment effort in recent years. Given the dynamics underlying the U.S. trade composition developments of the past decade, unless the pattern of relatively weak U.S. investment is reversed, the United States may well face a more challenging international trade environment in coming years.

[22] Income elasticities of demand for imports are not available separately for the finished goods and industrial supplies categories within the manufactured goods sector However, elasticities have been separately estimated for raw materials and for total manufactured goods. Morris Goldstein and Mohsin S Khan present estimates of these elasticities drawn from eight different studies in "Income and Price Effects in Foreign Trade," *Handbook of International Economics*, vol 2, chap. 20 (New York Elsevier Science Publishers, 1984), p 1086 The manufactured goods elasticity was higher than the raw materials elasticity in every study The average of the estimated manufactured goods elasticities was 1 5; the average of the estimated raw materials elasticities, 0 8 It is reasonable to expect that the elasticity for the industrial supplies component of manufactured goods would be similar to the raw materials elasticity while the elasticity for finished goods would be higher than the overall manufactured goods elasticity