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The Housing Rebound

*Changing Views of Comparative
Advantage*



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THE HOUSING REBOUND

The construction industry has experienced an upsurge of record proportions since July 1970. Private housing construction spearheaded the upsurge, although there were substantial increases in nonresidential and public building as well. From a cyclical low of \$30 billion in July 1970, the value of new private residential construction put in place reached a seasonally adjusted annual rate of \$52.5 billion in April 1972, 75% higher than July 1970. Total new construction put in place rose from a cyclical low of \$91.1 billion in April 1970 to \$122.6 billion in April 1972. This gain, which represents an increase of 34.6%, dramatically illustrates the position of the construction industry as a leading source of economic expansion in the past year and a half.

The recent surge has been a boon to the construction industry, which was hard hit by the scarcity of mortgage money and the high mortgage interest rates of 1969 and early 1970. The effects of the two latest tight money episodes (1966 and 1969) on private residential housing were especially noticeable,

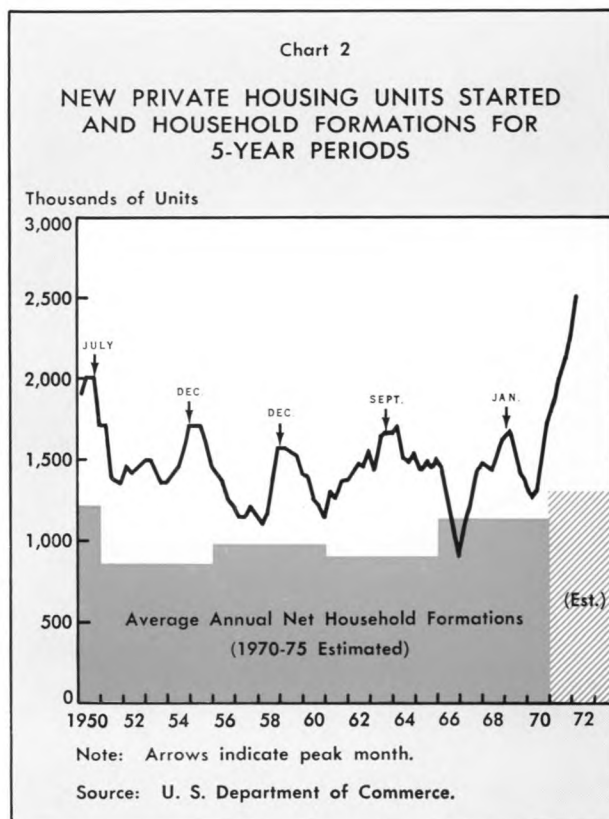
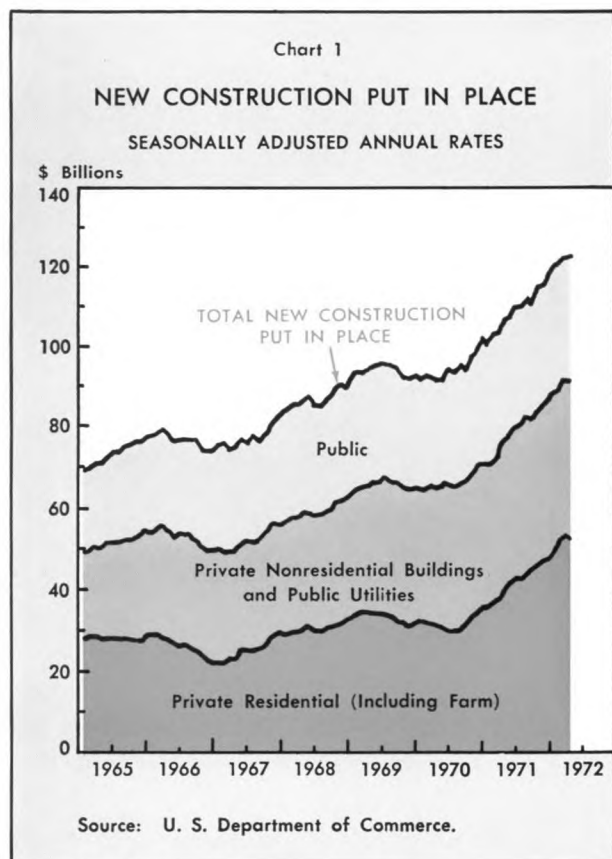
as clearly shown in Chart 1. The recoveries from the ensuing downturns, however, differ considerably. The recent housing recovery has been both sharp and prolonged relative to comparable episodes in the past.

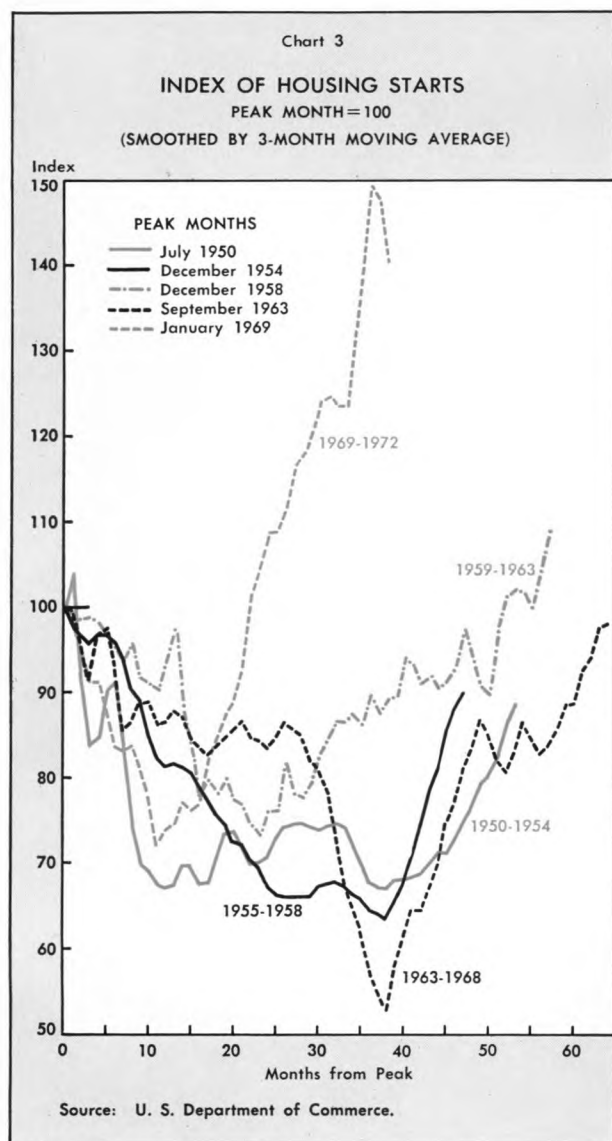
The implications of the data are unmistakable. As spokesmen for the construction industry are wont to point out, the residential building rebound has been the star of the recovery from the 1969-1970 business slowdown. Underlying this rebound is a large backlog in housing demand built up mainly in earlier tight money periods, changes in financial conditions and in other governmental policies affecting housing, and industry ingenuity in expanding supply apace with housing demand.

DEMAND AND SUPPLY FORCES IN THE HOUSING MARKET

Housing Cycles

Home building in this county appears to have followed a wave-like pattern, as can be seen from the data on new private housing starts shown in Chart 2.



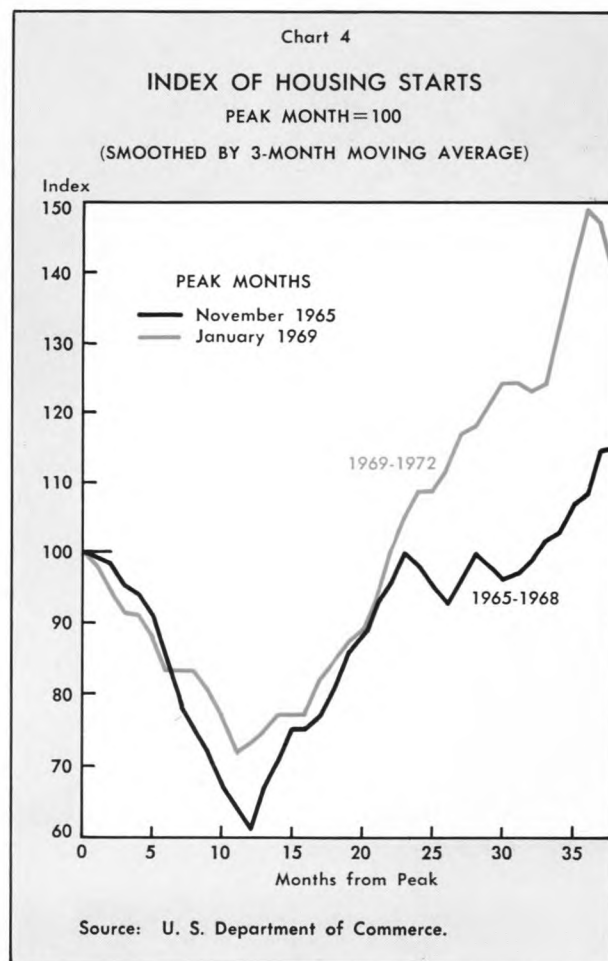


Five distinct cycle-like movements in the series are discernible, and the peak of each is designated in the chart. To facilitate comparison of these movements, or so-called housing cycles, Chart 3 gives, for each cycle separately, the number of housing starts in the months subsequent to the peaks expressed as a percentage of the peak value of the series for that cycle.

Four of the cycles, those prior to 1969, have an average duration of $4\frac{2}{3}$ years from peak to peak. The most recent cycle, which began in January 1969, may not have yet run its course, although starts fell off rather sharply in March and April of this year. In any event, the most striking characteristic of this latest cycle is the unusual strength of the recovery phase as compared with the same phase in earlier cycles. This strength is readily apparent from even the most casual inspection of Chart 3.

As noted earlier, a major factor in the latest housing rebound has been a sharp change in financial conditions since 1969. The two recent tight money episodes had a pronounced effect on the housing market, but there are some interesting differences in the two cycles associated with these episodes. Chart 4 compares the November 1965-November 1968 period to the January 1969-January 1972 period. As can be seen from the chart, the trough of the housing downturn was relatively deeper in the 1965-1968 cycle than in the 1969-1972 period. The recovery from the trough, moreover, was much stronger in 1969-1972.

Interestingly enough, further scrutiny of housing starts since 1950 (Chart 2) reveals that there has been very little long-run trend in the series. Other than cyclical and irregular variations, the distinguishing characteristic of housing starts in the fifties and sixties has been the absence of any positive trend in the series. Thus, the behavior of housing starts since 1970 has been all the more unusual.



Measuring the Supply of Shelter

Total private starts figures include both single and multi-family dwellings. The number of multi-family units started increased from 482 thousand units in January 1970 to 1,342 thousand units in February 1972 at seasonally adjusted annual rates. The percentage of total starts in multi-family dwellings also increased, from 45.5% to 50.5%. Thus, the increase in the total private starts series includes a relatively large increase in multi-family units. Since each dwelling unit in a multi-family unit is counted as a separate start in the series, the increase in the percentage of multi-family units does not result in an understatement of individual dwelling places started.

Mobile homes, however, are not included in the housing starts series, and mobile home shipments totaled 497 thousand units in 1971, up from 401 thousand in 1970. Thus, shelter is becoming available to more families than is indicated by the growth in housing starts.

Demand Factors

The housing industry is influenced, over the long run, by both population growth and changes in the level of affluence. The average rate of net household formation, published for five year intervals by the National Industrial Conference Board, measures fairly accurately the effect of population growth on the demand for houses. This series is superimposed on Chart 2, which shows housing starts since 1950. Through the latter half of the 1960's, the difference between net household formation and the level of housing starts was clearly smaller than in earlier periods. Thus, housing demand was being stored up during the late sixties. This pent-up demand accounts for much of the strength of the recent housing rebound. However, as is also clear from the chart, the relationship between housing starts and family formation has again changed. By January 1972 the difference was much larger than in any other time period since 1950. Current data thus indicate that present levels of starts are higher than can be sustained by net family formation.

The difference between starts and net family formation, however, does not by itself portend dire consequences for the housing industry. Even though starts are much higher than family formations at the present time, the new relationship can be sustained if changes in other factors that contribute to demand are sufficient to account for the difference. For example, if (1) more houses were demolished or abandoned, (2) population shifted more rapidly from

central cities to suburbs (or vice versa), and/or (3) an increase in subsidy programs made homes available to those who previously could not buy homes, the demand for houses would be much stronger than would be indicated by the rate of new family formation. Even existing households who are already housed can contribute to housing demand since people often wish to up-grade their dwelling unit as they become more affluent. From 1950 to 1960, median family income adjusted for inflation increased 37.6%. From 1960 to 1970 it increased 33.9%. As real income rose, so did the consumer's ability to buy a better home and also to buy a second home. Both of these factors contributed to the growth in the demand for housing during the late sixties.

The availability and cost of mortgage credit, both of which are sensitive to general credit policy, have an important bearing on the demand for housing. Monetary policies designed to stem inflation tend to make credit scarce, and such policies were clearly an important factor in the 1969 housing downturn. But specific governmental programs for providing funds to the mortgage market cushioned this effect and helped to keep the downturn from becoming as severe as in 1966. Much of this government help to the mortgage market was channeled through certain institutions whose functions were either newly initiated or re-thought after the 1966 episode with the specific purpose of averting its repetition.

Although the availability of credit is difficult to measure with precision, total funds flowing into savings institutions and household savings accounts at commercial banks provide a rough proxy for fund availability in the mortgage market. Savings flows from 1968 are shown in Chart 5a and mortgage interest rates in Chart 5b. The charts point up the extreme stringency and the high cost of mortgage money in 1966 and 1969. Once monetary policy began to ease in early 1970, however, savings inflows recovered quickly, and this helped account for the housing rebound.

Federal Stimulus to Demand The Federal government has long been involved in programs to stimulate the demand for housing and to promote house ownership. Some of these provisions, as indicated earlier, are designed to increase the availability and lower the cost of mortgage credit. Others involve direct government outlays for public housing, community development, and rent subsidies and supplements. Following the credit crunch of 1966, which bore so heavily on the construction industry, Federal programs in both areas were expanded significantly. This increased government activity in the mortgage

and housing markets has been an important factor in the current housing rebound.

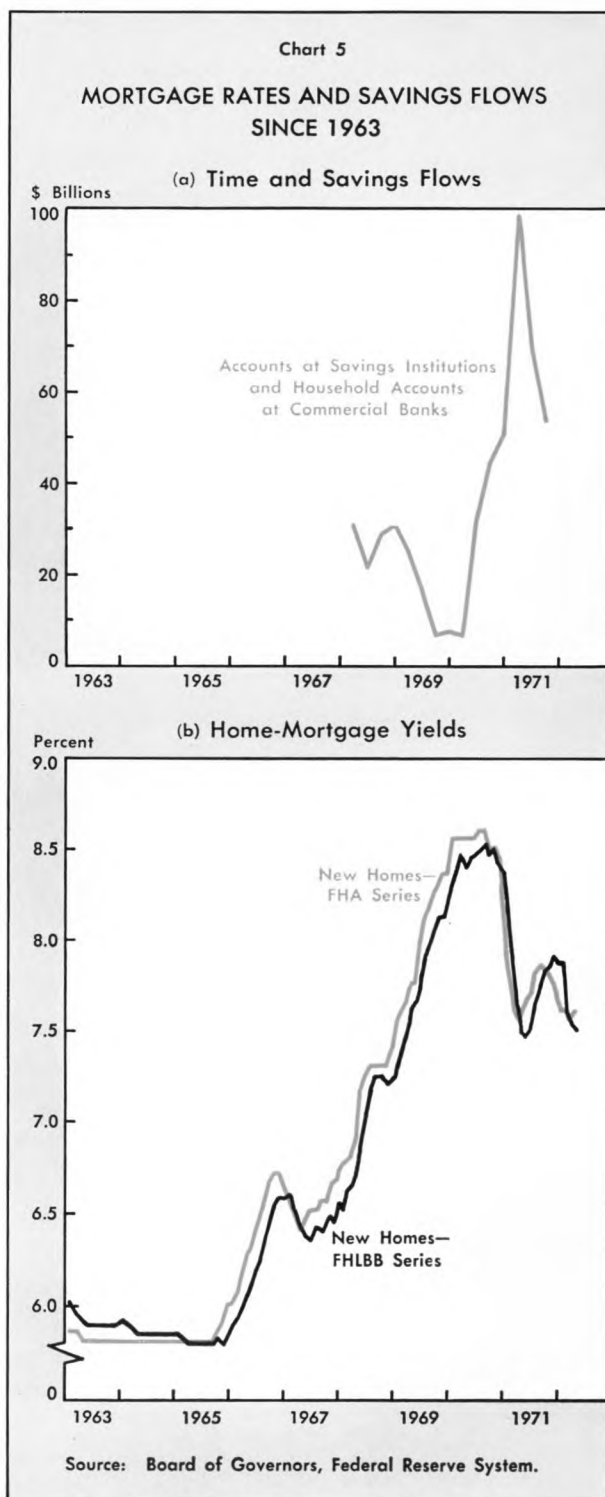
Federal National Mortgage Association One of the functions of the Federal National Mortgage Association, or Fannie Mae, is to stabilize the mortgage market by providing a secondary market for mortgages. Prior to 1968, FNMA also had a special assistance and a management and liquidating function, but these functions were split off from FNMA when she became a privately owned corporation in 1968 and are now functions of the Government National Mortgage Association (GNMA).

With respect to providing a secondary market for mortgages, therefore, FNMA has benefited from several years of experience. The 1966 situation in particular pointed to some problems that FNMA would face when it was confronted with a major reduction in the availability of funds in mortgage markets. Under operating procedures existing at that time, FNMA stood ready to buy all eligible mortgages at announced prices. Because of sharply rising interest rates, the agency was confronted with a flood of mortgage offers, and its credit supplies were soon exhausted, with mortgage holdings rising to near statutory ceilings.

In 1968, with its conversion from a government owned to a private corporation, Fannie Mae's purchasing procedures were altered in a significant way. Its function remained one of making a secondary market for mortgages and gearing its purchases and sales to current and prospective conditions in mortgage markets, as reflected in mortgage rate movements. The new Fannie Mae continues, as before, to finance its operations by selling its own debt obligations in the market for government agency securities. But as a private corporation, FNMA obligations are not included as part of the government debt and are not, therefore, subject to Congressionally-imposed debt ceilings for U. S. public debt. FNMA is not free to issue as much debt as it chooses, for the Secretary of Housing and Urban Development must approve the corporation's total debt and the Secretary of the Treasury must approve the timing, maturity, and amount of all security issues. Nevertheless, its debt ceilings are presently much higher than they were in 1966; and more importantly, they are more flexible.

As a result of the 1966 "credit crunch," FNMA also changed its method of operating. Under the current procedure, Fannie Mae accepts bids each week from the public, mostly mortgage companies, which include the price and quantity of mortgages they would like to sell over a future period (usually four months). When the bidding closes, Fannie Mae de-

cides how many of these offerings to accept. In this fashion, prices (and, hence, rates on Fannie Mae's holdings) are determined by offers received from the market. And most importantly, by varying the dollar amount of commitments, Fannie Mae can determine the exact dollar amount of mortgages



that it is committed to buy and can therefore influence directly the market supplies of mortgage funds. Its operations also add to the liquidity of the portfolios of permanent and temporary mortgage lenders.

Fannie Mae's operations can be keyed to ironing out temporary ups and downs in the mortgage market, in which case purchases in one period may be offset by sales shortly afterward. But the corporation is principally a buyer of mortgages, and it holds them on a permanent basis, which of course provides additional funds for the mortgage market. By varying its purchase activity, it can help to provide funds for the housing industry in periods of mortgage credit stringency. In the recent tight money period, it allowed its mortgage holdings to rise substantially. As shown in Chart 6, its holdings of \$7.3 billion in January 1969 rose to \$15.5 billion by January 1971. They edged off slightly during the first half of 1971 but resumed their upward trend thereafter.

Government National Mortgage Association Another important functionary in the mortgage market is the Government National Mortgage Association, generally referred to as Ginnie Mae. GNMA is an agency of the Federal Government that was organized to take over some of FNMA's functions when the latter became a private enterprise in 1968. GNMA serves two major functions, a special assistance function and a management and liquidation function. Special assistance funds can be used to finance home mortgages qualifying under special programs such as slum clearance and low-income housing. Special assistance money can also be used to purchase mortgages to resist declines in home building activity if they appear to pose a threat to the stability of the economy. In its management and liquidation function, Ginnie Mae manages and liquidates several existing mortgage portfolios as an agent for the Federal Government. Another function given to GNMA by Congress was the "pass-through" security program. This program is designed to enable more of the investing community to purchase mortgages and thus to broaden the mortgage market.

Ginnie Mae's mortgage portfolio is much smaller than Fannie Mae's and, as shown in Chart 6, rose at a much slower rate in 1970. But this is not the only index of the relative importance of the new government agency in the mortgage market. In recent months, Ginnie Mae has had the responsibility of administering a \$2 billion program of Federal subsidies designed to reduce mortgage rates on moderately priced houses. The program allowed Ginnie Mae to buy FHA and VA home and multi-family loans at prices of 96 cents on the dollar for new

homes and 95 cents for existing structures. The existing market rate when the program was instituted was 91 and 92 cents, so GNMA purchased mortgages or mortgage commitments at prices considerably above the market level. Then GNMA either resold the mortgages at the existing market price, taking a loss on the transaction, or held them until prices rose again. Although GNMA could purchase no mortgages higher than \$24,500 (\$22,000 for less than four bedroom homes), which some builders thought was an unreasonably low ceiling, the program was, nevertheless, well received. Basically, GNMA was helping to pay the discount charges (often called "points") for the homebuyer, and in the process bringing more families into the housing market.

By December 1971, GNMA, using special assistance funds authorized by Congress, had issued \$2.3 billion of commitments and purchased \$50 million of mortgages. GNMA still has almost \$2 billion of the funds available for use if support operations again become necessary. These funds have not been used to purchase mortgages or commitments this spring, mainly because mortgage money has been ample and rates have fallen below the support levels. However, if mortgage rates again begin to rise, GNMA is expected to reactivate the plan.

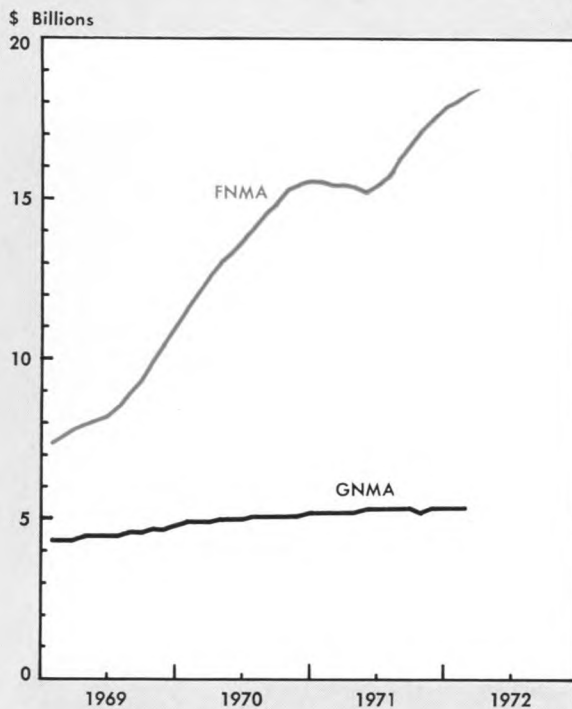
The Housing and Urban Development Act of 1970 Another source of strength in the housing sector was the Housing Act of 1970. The Act increased spending for rent supplements, home ownership, and rental subsidies, although its major purpose was to develop new communities for urban growth. It set up a new Community Development Corporation (CDC) to oversee a \$500 million program of Federal guarantees of obligations issued by developers of new communities. The CDC can also make direct loans on community development programs approved by the Department of Housing and Urban Development and can help pay debt services for state land development agencies on those programs.

Other programs Along with the \$2.1 billion allotted to GNMA to keep mortgage rates for moderately-priced homes from rising, the Federal Home Loan Mortgage Corporation began actions to help purchasers of somewhat larger homes. It announced that it would buy mortgages larger than \$22,000, which helped to subsidize the purchase of homes larger than those covered by the GNMA subsidy. It also raised the price that it would pay for FHA and VA loans by three full points to 94.

In another effort to support the housing market, the Federal Home Loan Bank Board allowed Federal associations to make mortgage loans on up to 95%

Chart 6

FNMA AND GNMA MORTGAGE HOLDINGS



Source: Board of Governors, Federal Reserve System.

of a home's assessed valuation. This change in policy enabled more people to purchase homes by lowering the required down payments. Also, liquidity requirements were lowered from $7\frac{1}{2}\%$ to 7% for savings and loans, which freed around \$800 million for mortgages.

Supply Factors

The Boeckh building cost index for residences, shown in Chart 7, rose 22% from 1969 to 1972. This building cost index takes into account prices for building materials, common and skilled labor, and sales and social security taxes. It is also adjusted to reflect the impact of labor shortages and labor efficiency.

Prices of new houses, while up substantially in recent years, have lagged behind the increase in building costs; partly because of significant technological improvements in the construction industry. The Bureau of the Census' one-family houses index, a price index for houses computed from actual transactions prices, rose 16% between the second quarter of 1968 and the second quarter of 1972. For the

same period, the Boeckh building cost index rose 22%. The Census index takes account of all cost items that enter the selling price, including the value of the undeveloped lot, the cost of construction, land costs, selling expenses, and "points" paid by the seller in connection with mortgage financing. This index is thus broader than the building cost index and more reflective of productivity and financial changes. Part of the difference in the performance of the two indexes is attributable to changes in mortgage rates and other finance charges and land prices. But part is also attributable to cost-cutting innovations in the construction industry.

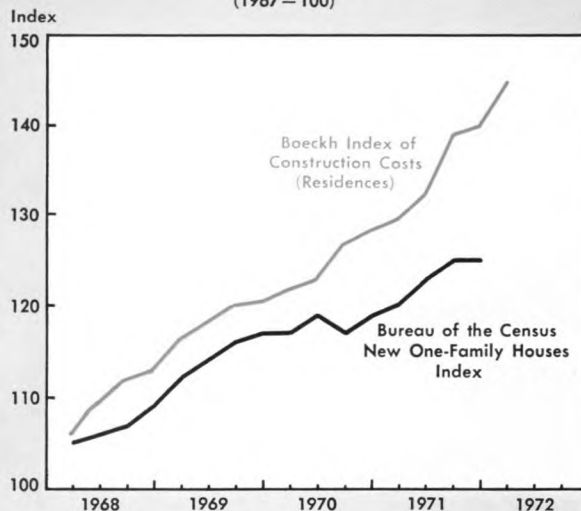
The construction industry, contrary to some commonly held beliefs, has been increasingly productive for the past several years. Builders use prefabricated materials in almost every house constructed. The increased use of pre-hung doors and prefabricated materials has improved productivity by removing a greater percentage of the construction from the site. Off-site production is less subject to the vagaries of weather and, since it can be adapted to factory techniques, frequently requires less skilled labor.

Modular Housing The ultimate step in reducing home building to a factory process is the modular home. The modular home industry is in its infant stages and has accounted for only a small fraction of the new shelter built in recent years. Only 27,000

Chart 7

CONSTRUCTION COST INDEXES

(1967=100)



Source: U. S. Department of Commerce.

modulars were produced in 1970 and 52,160 in 1971. But the process could well prove to be a major innovation in the housing market, especially in the market for second, or vacation, homes.

The advantages of modular construction stem from the ability of modular builders to use fewer skilled workers, to schedule work more efficiently, and in general to speed up the construction process. Essentially, modular construction amounts to on-site operations moved indoors. By doing the bulk of the building indoors, year-round production can be scheduled, and labor can be utilized more efficiently. Not only can workers be hired on a more permanent basis, but their tasks can be more specialized. Thus, modular construction is a relatively new application of the economic principle of specialization and division of labor to the housing industry.

A number of special problems in modular construction have thus far held back the growth of the process. The diversity of building codes in various municipalities has inhibited standardized production, and financial institutions have not yet accommodated themselves to the industry. The financial community often views modular companies as simple construction companies. Construction loans to finance conventional buildings are usually made in various stages as the structure nears completion on the lot. The modular house, however, is virtually completed when it arrives on the site, and work done in the factory

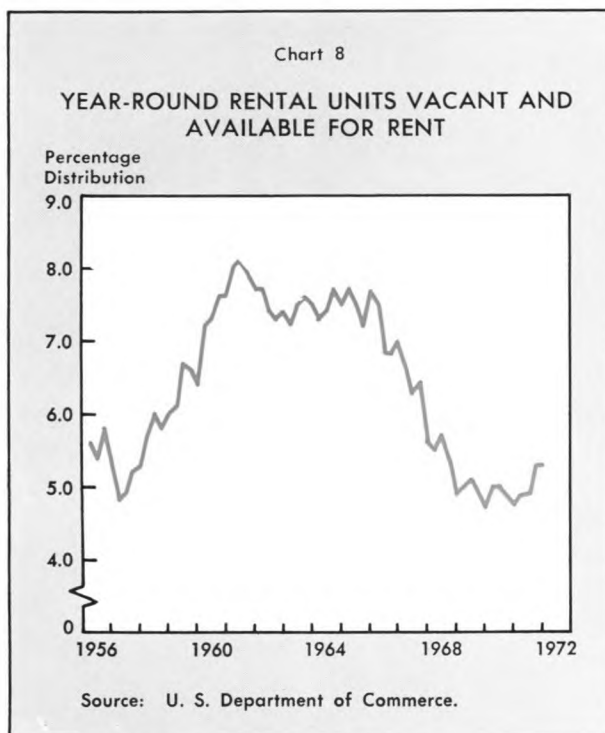
is not eligible for interim construction loans of the traditional type. Also, as compared with other businesses, the modular firm has a unique inventory problem, since bad weather on the prospective home site can cause a piling up of finished modules. On the other hand, the modular building firms should have a working capital advantage over the traditional builder since construction time is shortened. Shorter construction time should also result in less interest expense per house than for traditional building.

A final difficulty that has plagued the modular builder is that of controlling the output of the firm. The builder must know exactly where his factory's output will go when it comes off the assembly line, and he must make sure that the purchaser will be ready to accept the house when it is completed. In many cases modular producers have been forced to become land developers in order to solve this control problem. The capital needs of the modular producer are thus likely to be far greater than those of the ordinary builder.

CONCLUSION

Spurred by a congenial turn in credit conditions, a number of Federal Government initiatives, and technological developments in construction, housing has rebounded sharply in the past two and a half years. Through 1970 and 1971, residential building was a major prop holding up a sagging economy. But the sharpness of the rebound, coupled with its extended duration, has precipitated some forms of over-building. As noted earlier, the rate of housing completions is far in excess of the rate of new family formation. Moreover, the vacancy rate for rental units, shown in Chart 8, is seemingly beginning to rise, although it edged lower in the first quarter of 1972. At the end of 1971, this rate was still considerably below the level maintained in the early sixties, but a large number of houses started in the second half of 1971 and the first months of 1972 were not yet ready for occupancy at that time. Regionally, there are signs of over-building. Apartments in some parts of California and in some major Southern and North Eastern cities appear to be experiencing rental difficulties. In some markets, according to *House and Home Magazine*, vacancy rates are as high as 20%. All in all, it seems unlikely that the recent rapid rate of growth of housing will continue through 1972. Even so, total starts seem likely to remain for a time yet at levels that, by historical standards, are high; and the construction industry appears likely to remember 1972 as an excellent year.

William E. Cullison



CHANGING VIEWS OF COMPARATIVE ADVANTAGE

International trade theory is based on the fundamental concept of comparative advantage. This concept refers to the relative cost or productivity advantage one country enjoys over others in the production of certain commodities. Since the early nineteenth century, economists have employed the concept to explain why nations trade, to demonstrate the gains from trade, and to predict the commodity composition and geographical pattern of trade flows.

Events, empirical research, and policy debates have all combined in recent years to focus attention once again on the subject of comparative advantage. Chief among the events has been the sharp deterioration of the U. S. merchandise trade balance since 1964, culminating in the \$2.9 billion deficit in 1971—the first deficit since 1935. This experience has convinced many observers that there has been an adverse structural shift in the sources of U. S. comparative advantage, an interpretation that is relatively new. Up to 1970, short-run, cyclical influences rather than long-run structural factors were cited as the principal cause of the dwindling trade balance. That is, domestic inflation accompanying a sharp business upswing, associated in part with the Vietnam War, was thought to be the chief factor contributing to a strong surge in U. S. imports and to declining price competitiveness of U. S. exports. Specifically, analysts attributed the trade balance deterioration to such factors as excess aggregate demand, slowing productivity growth, escalating wage rates, and rising unit labor costs—all characteristics of the inflationary boom of the late 1960's. By 1971, however, the inflation interpretation seemed inadequate. For instance, excess demand had been eliminated in the recession of 1970. It is true that cost-push inflation had not disappeared, but its effect on the trade balance should have been partly neutralized by price movements abroad. In 1971, many of this country's trade competitors were experiencing rates of inflation, rises in unit labor costs, and increases in export prices that outstripped those here. Despite this relative improvement on the inflation front, however, the U. S. trade balance deterioration persisted. But if cyclical changes in relative rates of inflation could not explain all of the trade balance decay, what additional explanations might there be?

Some economists began to suspect that long-run forces were altering the basic determinants (technological superiority, factor proportions, resource availability) of the pattern of U. S. comparative advantage.

Suspicious of an adverse structural shift in U. S. comparative advantages were strengthened by other developments, including: (1) the phenomenal rise in the economic capability of such leading U. S. trade partners as Japan and Germany; (2) the trend toward increased economic integration within regional trade blocs, which has resulted in intra-bloc trade creation and extra-bloc trade diversion; and (3) the growth of the multinational corporation, which has provided a major channel for the international transmission of technology, capital, and managerial skills. These developments have forced policymakers and businessmen to reassess longer-run U. S. trade prospects.

The resurgence of discussion on the topic of comparative advantage has not resulted solely from developments on the world trade scene, however. Statistical research, too, has played a role. Recent empirical studies have severely challenged some long-established notions about the nature and sources of U. S. comparative advantage. For example, as recently as the mid-1950's it was widely believed that the superior competitive position of U. S. products in world markets stemmed from the large stock of tangible capital with which American labor worked. Moreover, the structure of U. S. comparative advantage was thought in some quarters to be stable and enduring. Within the past decade, however, researchers have found evidence indicating that U. S. comparative advantage emanates from skills, knowledge, and technology rather than from a high capital/labor ratio, and that the structure of comparative costs is continually being altered by the generation and diffusion of technical knowledge.

The subject of comparative advantage has also surfaced in current debates over trade policy. Modern protectionists claim that the comparative-cost doctrine has little contemporary validity, while free-traders maintain that it is still a valid policy guide.

These recent events, empirical studies, and policy

debates have had a substantial impact on international trade theory. Current explanations of comparative advantage differ markedly from older, traditional explanations. This article indicates how economists' conceptions of the nature and sources of comparative advantage have been altered by recent empirical research and by the changing position of the United States in world trade.

The Classical Doctrine of Comparative Advantage A nation is said to have a comparative advantage in the production of a good when its efficiency in producing that good compared to its efficiency in producing another good is higher than that of other nations. The first clear statement of this concept dates back to the early nineteenth century when David Ricardo formulated his celebrated England-Portugal, cloth-wine example. Suppose that in England it takes 10 labor hours to produce a unit of cloth and 12 labor hours to produce a unit of wine. That is, the productivity of an hour of English labor is $1/10$ unit of cloth or $1/12$ unit of wine. In Portugal, however, the labor requirements per unit of output are nine and eight, respectively, in cloth and wine. That is, the productivity of an hour of Portuguese labor is $1/9$ unit of cloth or $1/8$ unit of wine. Then the ratio of labor productivity (output per labor hour) in cloth production to that in wine production is higher for England than for Portugal ($12/10$ vs. $8/9$). England, in this example, although absolutely less efficient than Portugal in the production of both commodities, nevertheless clearly has a comparative advantage in cloth. Portugal, conversely, has a comparative advantage in wine.

Ricardo's chief objective in using his illustration was to demonstrate the *mutual profitability* of international specialization and free trade, i.e., that the gains from trade would accrue to all nations. Ricardo explained that each nation, by specializing in the production and export of its comparative advantage good, could obtain the other good with a smaller sacrifice of its export good than if it endeavored to produce the import good itself with labor transferred from the export industry. If England, for example, sought to be self-sufficient in wine, the production of each unit of that commodity would require the release from cloth production of labor-hours sufficient to produce $12/10$ units of cloth. The cloth cost, therefore, of each wine unit in England ($12/10$) is much higher than its cost in Portugal ($8/9$). Similarly, the wine sacrifice per unit of cloth in a self-sufficient Portugal ($9/8$) would be higher than in England ($10/12$). Clearly, Englishmen could obtain wine more cheaply by producing cloth and

trading it to Portugal, where a unit of wine costs less than one unit of cloth, than by producing it at home at a cost of more than one unit of cloth. Likewise, Portuguese could get cloth more cheaply by producing wine and trading it to England, where cloth costs less than one unit of wine, than by producing it domestically at a cost of more than one wine unit. In short, by specializing and engaging in free trade, England could obtain wine from Portugal at a smaller sacrifice of English cloth, and Portugal could obtain cloth from England at a smaller sacrifice of Portuguese wine. Each nation, therefore, could obtain via specialization and trade more of both goods from the same amount of labor input or, alternatively, obtain the same amount of goods with less expenditure of labor, than if it endeavored to be self-sufficient. As Ricardo emphasized, these gains from trade in no way depended on absolute levels of productivity. For instance, one country might be *absolutely* more efficient than its trading partners in the production of all commodities; yet that country would still find trade beneficial as long as its *relative* costs, or productivity ratios, differed from those in other countries.

Taking their cue from Ricardo, other nineteenth century classical economists attributed comparative advantages solely to national differences in relative labor productivity, i.e., ratios of output per man hour for pairs of commodities. No explicit recognition was given, in the classical analysis, to the productivity of other factor inputs, such as capital and land, nor was it explained why the labor productivity ratios differed among countries.

The Factor-Proportions Theory Later, in the 1920's and 1930's, economists added a second factor of production, capital, to the model and attempted to link comparative advantages to nations' relative endowments of capital and labor. According to the factor-proportions theory, a country with a relatively high capital/labor ratio would export capital-intensive commodities and import labor-intensive ones. The former commodities tend to be relatively inexpensive in the capital-rich country, because they use intensively the country's relatively abundant (hence relatively cheap) resource, capital. Labor-intensive commodities, however, tend to be comparatively dear since they embody large amounts of the country's relatively scarce and expensive resource, labor. Conversely, a country with a relatively high labor/capital ratio would export labor-intensive goods and import capital-intensive ones. Each country has a comparative advantage in producing goods that use intensively the country's relatively plentiful resource.

In short, each country's product-mix, as well as the commodity composition and geographical pattern of its trade, would be determined by international differences in factor proportions.

Leontief's Test Although relatively simple, the factor proportions theory seemed to exhibit considerable explanatory power, thereby accounting for its almost universal acceptance prior to the early 1950's when its validity was finally challenged by empirical research. The factor-proportions theory predicted that the U. S., certainly the most capital-abundant country in the world, would export capital-intensive goods and import labor-intensive ones. But a 1953 study by Harvard University's Wassily Leontief revealed that, contrary to the theory, U. S. exports were actually *less* capital-intensive than U. S. imports. Evidently, the U. S. had a comparative advantage in relatively labor-intensive goods and a comparative disadvantage in relatively capital-intensive ones, despite the relative scarcity of labor and the relative abundance of capital in this country.

Leontief's paradoxical findings created much consternation among adherents of the factor proportions theory. Leontief himself attempted to reconcile his findings with the theory by suggesting that U. S. labor is three times more efficient than foreign labor, the difference being due to "entrepreneurship and superior organization" rather than to a high capital/labor ratio. In other words, U. S. labor measured in terms of efficiency units (i.e., units of equivalent foreign labor) is three times more plentiful than when conventionally measured (i.e., U. S. man years). Thus, because of the efficiency factor, or labor-quality differential, of three, the U. S. is actually a labor-abundant country. Consequently, the measured factor composition of U. S. trading patterns conforms to the factor proportions explanation. Leontief's conjecture, however, was an unsatisfactory resolution of the paradox, because it did not adequately identify the factors augmenting labor's efficiency. Subsequent research has focused on the precise specification of these factors. In contrast to Leontief, however, recent researchers have tended to treat these efficiency-augmenting factors as types of capital instead of as additional units of labor.

Sources of U. S. Comparative Advantage If U. S. comparative advantage is not based on the large amount of tangible capital per worker in this country, then what is its basis? Several possible sources of comparative advantage have been studied, including, among others: (1) the large amounts of *human capital* embodied in the labor force, i.e., high labor skills stemming from education and training;

(2) technological superiority based on research and development (R and D) expenditures; (3) economies of scale resulting from the large domestic market, which enables goods to be produced at lower costs in the U. S. than abroad; (4) greater availability of entrepreneurial talent and innovativeness in the U. S. than abroad; (5) the domestic availability of certain raw materials combined with their nonexistence abroad; and (6) tariff structures that bias U. S. production and export toward labor-intensive commodities.

Empirical Findings Of the possible determinants of U. S. comparative advantage, the most important, according to recent empirical studies, appear to be human capital (skills) and R and D activity. Recent studies indicate that inputs of human capital—measured either by the capitalized value of the differential between the annual wages of skilled and unskilled labor, or by the ratio of highly skilled workers to total workers—tend to be significantly higher in U. S. industries with strong net export positions than in those industries having weak export positions. Moreover, comparisons of representative bundles of U. S. export and import-competing goods (the latter being a proxy for foreign-produced imports) show the former to have a higher skill content than the latter. In fact, when estimates of human capital are combined with estimates of tangible capital in a measure of total capital input, U. S. exports become more total-capital-intensive than the products of U. S. import-competing industries. Researchers have also found fairly strong positive correlations between various measures of industry R and D activity (e.g., R and D spending as a percentage of total sales, or the ratio of scientists and engineers to total employment) and alternative indices of export performance (e.g., gross and net exports as a percent of total sales, or U. S. share of total exports of major industrial countries).

These studies, of course, are not without shortcomings, and should be interpreted with some skepticism. For example, the assumption that wage differentials (a measure of skill differences) stem solely from disparities in education, training, and other types of human investment, seems unwarranted. Also, in view of the probable close correlation between skill intensity and R and D activity in given industries, one could question whether skills and R and D activity are mutually exclusive determinants of comparative advantage. Despite these shortcomings, however, recent evidence is sufficient to suggest that the chief determinants of our comparative advantage are (1) human capital and

(2) technological superiority, as represented by R and D activity.

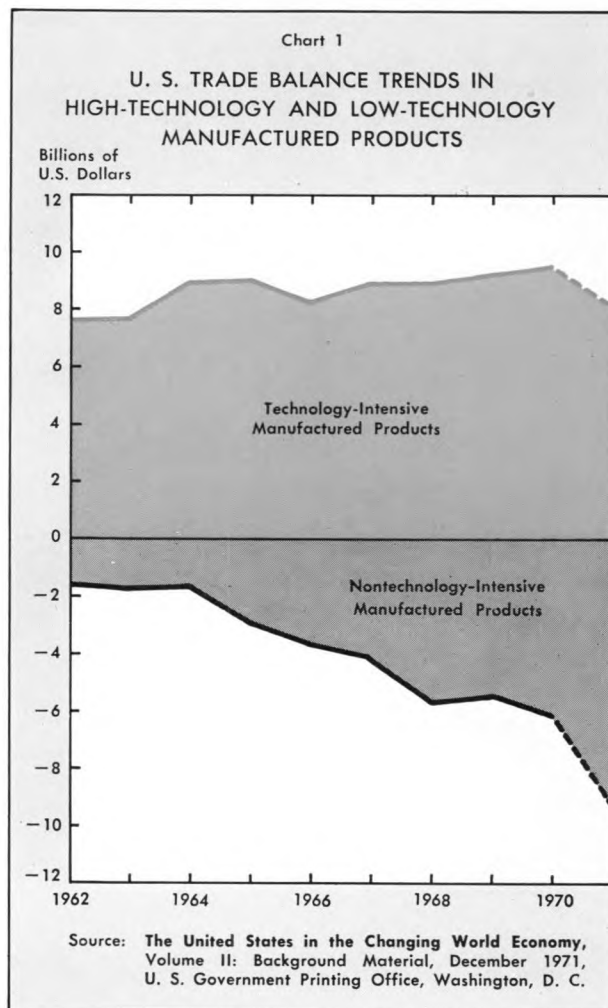
The importance of the technology factor is illustrated in Chart 1, which contrasts the strong trade surplus in technology-intensive manufactured products with the increasing trade deficit in non-technology-intensive products. High-technology products account for more than one-half of U. S. total exports and about one-third of total imports. Low-technology products, too, compose roughly one-third of U. S. total imports but constitute only one-eighth of U. S. exports.

Factor-Proportions or Technology Gap? The finding that U. S. exports are skill-intensive and technology oriented is consistent with both the old factor-proportions interpretation of comparative advantage and a newer interpretation based on the concept of a "technology gap." As mentioned previously, the older interpretation is still valid provided one extends the concept of capital to include labor skills (human capital) and capital-embodied technology as well as tangible capital (plant and equipment). That is, with capital broadly defined, advocates of the factor-proportions theory can still maintain that U. S. exports are indeed capital intensive, as the theory predicts.

Many economists, however, prefer a newer interpretation, which states that labor skills and technology indirectly promote the development of temporary trade advantages by fostering the new product or process innovations that generate those advantages. This interpretation of the role of skills and technology in the creation of comparative advantages is a component of a new theory of international trade.

The New View The new view integrates a number of previously mentioned determinants of comparative advantage into a dynamic, "technology gap" explanation of international trade. According to this theory, the availability of entrepreneurial, scientific, and engineering talent enables domestic firms to generate continually the sophisticated new products increasingly demanded by consumers in the affluent U. S. After its introduction in the domestic market, a new good is usually exported to profitable foreign markets. The knowledge, technical capabilities, and special managerial skills required for the successful introduction of the innovation provides the U. S. producer with an initial advantage in world markets. In other words, U. S. competitiveness is based on a "technology gap."

The technological advantage enjoyed by the U. S.



producer is transitory, however. The technology gap is continually narrowing for particular products as knowledge of the innovation spreads abroad and foreign producers adopt it. Eventually the transfer of technology is completed, and the technological lead of the U. S. in this product vanishes. Production of the good may eventually pass almost entirely from the U. S. to foreign countries, which then export it to the U. S.

Note, however, that while this country's technological advantages in some products are disappearing, others are constantly being created. The entire structure of trade advantages, in fact, is continually being modified by the simultaneous destruction and generation of technology gaps. It is this dynamic conception of comparative advantage, which views individual advantages as transient components of an evolving structure, that distinguishes the new view from the older interpretations.

Faster Diffusion of Technology An important implication of the new view is that U. S. producers systematically must generate innovations as rapidly as knowledge of the old technology is disseminated abroad, if the U. S. is to maintain its traditionally strong foreign trade position in manufactured goods. Pessimists fear that it is becoming more difficult for U. S. producers to maintain the required pace of innovation.

For one thing, the required pace may be increasing. Foreign producers seem to adopt new methods more quickly now than they formerly did. The international diffusion of technical knowledge is much faster than it used to be. Trade in research-intensive new products, international licensing and sale of patents, foreign travel by scientists and professionals, private direct investment, and, of course, faster means of transportation and communication all serve as vehicles for the rapid transmission of technical knowledge. The more rapid spread of technology, of course, shrinks the average lead-time that U. S. producers have to profitably exploit foreign markets. In short, acceleration in the rate of transfer of technology may have increased the required rate of innovative activity while simultaneously reducing the potential profitability of any given innovation and thus the incentive of U. S. producers to undertake it.

The Multinational Firm A major factor contributing to the more rapid propagation of U. S. technology has been the phenomenal growth in direct investment by U. S. firms in manufacturing facilities abroad. Such investment, the outstanding value of which increased from \$32 billion in 1960 to \$71 billion in 1970, promotes the transfer of technology in two ways. First, investment is often accompanied by direct transfer of a "package" of capital, production techniques, skills, and managerial methods to foreign subsidiaries. Skilled personnel are often considered as indispensable complementary inputs to be used in combination with physical capital facilities. Therefore, managerial and technical people are frequently dispatched abroad by the parent firm to tend the equipment as well as to advise and train the employees of its subsidiaries. Second, the increased competition provided by U. S. subsidiaries stimulates local producers to adopt the latest technology and spurs them to undertake innovative activity of their own.

Pessimists also fear that our research lead is being eroded by the willingness of other industrial powers to devote a greater proportion of their resources to productive research than we do. Although R and

D spending in the United States is almost triple that of Western Europe and eight times that of Japan, too much of this spending, it is claimed, is for sterile defense purposes. Our civilian research effort—measured by civilian R and D expenditures as a percent of GNP or by the proportion of the population engaged in civilian R and D work—was surpassed by that of Japan and Western Europe in the 1960's.

The pessimists' case is by no means proved, however. It is too early to determine whether the U. S. has suffered a permanent reduction in its technological lead. A longer run perspective is useful here. One need only remember that as recently as five years ago spokesmen for the nations of Western Europe were raising the specter of inevitable domination of European markets by U. S. owned firms (the so-called "American Challenge" thesis of French journalist J. J. Servan-Schreiber). These same people were also predicting a growing technology gap, with Europe receding progressively behind the U. S. position of technological superiority. Moreover, these people were lamenting the loss of scientists and other skilled professionals to the U. S. via emigration (the so-called "brain drain"). Just as the tide has turned for Western Europe, so it may also turn for the U. S. In contrast to the pessimists, some observers are confident that U. S. producers can continue to generate innovations at an expanded rate. Moreover, the optimists point out that the transfer of technology is two-way, i.e., U. S. producers have benefitted from the reverse transfer of foreign innovations, capital, and skilled personnel. Finally, contrary to the "sterility" contention of the pessimists, defense related research expenditure may ultimately have a high commercial pay-off, although admittedly the rate of technological advance may be less than it would be if the same research effort were allocated by the private sector according to economic instead of military criteria.

Is the Comparative Advantage Principle Obsolete? Does the doctrine of comparative advantage provide a useful and valid guide for trade policy in the modern world? Should the U. S. continue to press for freer trade according to the dictates of this doctrine, even though foreign goods are becoming increasingly competitive with ours? Should the U. S. adhere to the doctrine and discontinue producing goods that can be obtained at lower opportunity cost via importation than via domestic production? These questions form the heart of much of the current controversy surrounding U. S. foreign economic policy.

Protectionists, convinced that freer external trade

and investment would result in the export of U. S. jobs and the loss of U. S. technological supremacy, argue that the comparative advantage doctrine has little contemporary validity, although admittedly the doctrine might apply in a static world. In a stationary world, capital and labor would be fixed in quantity and immobile internationally. Moreover, technological change would be absent, thereby freezing international differences in technology at their initial levels. In such a world each nation would have a well-defined, enduring set of comparative advantages based either on factor proportions or on technological superiority. There would be no problem of sudden shifts in the ranking of comparative cost differences with consequent disruption in the industrial composition of the world's major economies. The stability and durability of the pattern of comparative advantages would insure the virtual absence of risks of specialization.

In the real world, however, these conditions are violated. The real world is dynamic, not stationary. Change is the rule; static conditions the exception. Factors of production are mobile internationally; and technological leadership waxes and wanes, contrary to the assumptions underlying the classical free trade model. Protectionists contend that the international mobility of capital and managerial resources can quickly alter factor proportions. For example, a domestic U. S. industry could exhibit a high ratio of capital and entrepreneurial skill relative to labor and natural resources in one decade, but a low one in the next, as U. S. capital and management go abroad to combine with foreign labor and natural resources. Similarly, the rapid dissemination of knowledge may eliminate and even reverse a nation's technological lead. In short, in the modern world, there is no stable, lasting basis for comparative advantages. The list of rankings is constantly shifting. Protectionists maintain that the rapidly shifting list of comparative advantages requires an unattainable degree of adaptability in the economy. Lacking infinite flexibility, the economy cannot alter its product-mix or reallocate its resources swiftly enough to keep up with changing comparative cost conditions. Consequently, free trade must lead to structural maladjustment, resource unemployment, and periodic deficits in the merchandise trade balance.

Thus, according to the protectionist argument, a free-trade policy is harmful to a country confronted with shifting comparative advantages and constrained by an imperfectly flexible industrial structure. This very line of reasoning has been employed by labor leaders and businessmen who advocate controls on U. S. trade and direct foreign investment.

The free trade school disagrees with the protectionists. While not denying that comparative advantages change more rapidly today than in Ricardo's time, free traders think that the economy has sufficient flexibility to adjust to such changes. Free traders do not necessarily believe that the declining merchandise trade balance is indicative of a fundamental incapacity of the economy to adjust. Instead, they see it as a perfectly normal adaptation to changing comparative advantages, in which our net exports of merchandise have been supplanted by net exports of capital, technology, and skills. In fact, some free traders are predicting persistent deficits in the U. S. merchandise trade accounts over the next several decades. This prospect does not alarm them, however. They think the merchandise trade deficits can be offset by earnings from net exports of services together with the dividend earnings of U. S. capital located abroad, thereby maintaining overall equilibrium of our total balance of payments. That is, the earnings of new U. S. comparative advantage activities—supplying the rest of the world with advanced services, skills, and technology either embodied in capital or complementary to it—would compensate for the deficit incurred in this country's former comparative advantage activity, merchandise trade. If the U. S. reaches a position characterized by a persistent trade deficit offset by net exports of services and return on foreign investment, it will have attained the same "mature creditor" stage in the development of its balance of payments that Great Britain reached in the nineteenth century. Great Britain, although confronted with a chronic excess of imports over exports, experienced little difficulty up to World War I in balancing its international accounts. That country simply covered its import surplus with the interest and dividend yield from its accumulated foreign investments.

In answer to protectionist claims that trade restrictions are needed because the economy is not sufficiently adaptable to changing comparative advantages, free traders point out that trade restrictions would actually reduce adaptability. By shielding domestic producers from foreign competition, protection would permit them to be more sluggish in adapting to technological change initiated abroad. Finally, free traders point out that comparative advantages *within* the U. S. are continually being altered by changes in tastes, technology, and the geographical location of resources. Yet, protectionists do not advocate restrictions on domestic trade or on the domestic migration of labor and capital.

Free traders, of course, are not unaware of the dislocations incidental to rapid change. But they

emphasize that such dislocations are better alleviated by tax-financed adjustment assistance (job retraining, employment counseling, relocation subsidies, etc.) than by departure from the principle of comparative advantage. Financed by the beneficiaries of change, adjustment assistance would permit a more equitable sharing of the costs of change while simultaneously redirecting dislocated resources into the new lines of comparative advantage.

In short, free traders point out that the doctrine of comparative advantage is still the blueprint for the most efficient allocation of resources. They argue convincingly that policies that combine the precepts of this doctrine with adjustment assistance to groups dislocated by change will do more to promote overall welfare than will protectionist policies.

Summary Economists' views of the sources and nature of comparative advantage have undergone significant change since Ricardo's time. Originally thought to be based on international differences in labor productivity and later on relative endowments of factor proportions, the comparative advantages enjoyed by developed countries such as the U. S. are now seen as emanating largely from human skills, knowledge, and technology.

Recent developments in the world economy—including the increasing international mobility of capital, the faster dissemination of technology, and the narrowing differential between the economic capability of the U. S. and her trading partners—have also altered economists' conceptions of the pattern of this country's comparative advantage. The structure of comparative advantage, once thought to be stable and enduring, is now seen as shifting rapidly and frequently, thereby raising the risks of specialization and the costs of adjustment. Protectionists, claiming that these adjustment costs are unduly high, hold that the doctrine of comparative advantage is no longer valid. But free traders still contend, as did Ricardo, that the principle of comparative advantage provides the best guide for the optimal allocation of any nation's resources and the maximization of world welfare. In short, free traders argue convincingly that the benefits of unrestricted commerce outweigh the costs. In concordance with this latter view, most economists would probably agree that the basic conclusion of the comparative advantage doctrine—that free trade is mutually beneficial—remains as cogent today as it was in Ricardo's time.

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