

REGIONAL CYCLES IN PRIVATE RESIDENTIAL
CONSTRUCTION AND THE IMPACT
OF MONETARY POLICY

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PREFACE

Studies of postwar housing cycles are almost exclusively concerned with the impact of monetary policy on private residential construction at the national level. There are few systematic studies concerned with regional differences in postwar housing cycles. The conventional argument is to attribute differences in regional housing cycles to regional differences in the availability of residential mortgage credit. This is of interest to this researcher because it seems to contradict the prevalent view of the country as an area of unrestricted movement of resources.

This study hypothesizes that the differences in regional housing cycles are due to regional differences in the demand for residential mortgage credit. In order to test the hypothesis, the elasticity of the demand for residential mortgage credit is estimated for the Western and the Northeastern sections of the country.

I would like to take this opportunity to express my appreciation to my thesis advisor, Dr. Frank G. Steindl, for his assistance and guidance.

Finally, I would like to express appreciation to my wife, Patty, for her understanding, encouragement, and sacrifice during the preparation of this study.

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CHAPTER I

INTRODUCTION

The purpose of this study is to investigate the regional impact of a restrictive monetary policy upon private residential construction. The conventional argument states that the housing cycle is more severe in the Western region of the United States than the Northeastern region because a restrictive monetary policy causes a greater contraction in the availability of residential mortgage credit in the West. This is of particular interest because of the commonly held view of the country as being a large area of unrestricted trade and movement of resources. To say that housing cycles are more severe in the West because of a greater contraction in the availability of mortgage credit suggests that there may be some restrictions to the inter-regional movement of mortgage funds. This study attempts to explain the difference in regional housing cycles from the standpoint of the demand for residential mortgage credit.

The Scope of the Study

The scope of this study is to examine the housing

cycles of the Western and Northeastern regions¹ of the United States as representative of capital deficit and capital surplus regions respectively.² The period of time with which this study is concerned is 1954-1967. This period is chosen because it encompasses three major residential housing cycles.

The first objective of this study is to determine whether or not the two regions have housing cycles of different amplitudes. This is accomplished by eliminating the trend for the value of private residential construction and then converting the residual to relative values so that inter-regional comparisons of cycle amplitudes can be made.

The second objective of the study is to investigate conditions in the regional residential mortgage credit market which would account for cyclical fluctuations in pri-

¹The Western region refers to the standard census definition of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Whenever possible Hawaii and Alaska were excluded in order to make the data as consistent as possible for the span of years covered. The Northeastern region refers to the states of Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

²There are various ways to distinguish between a capital deficit and a capital surplus region. One of the simplest is that a capital surplus region does not generate sufficient funds for all of its residential mortgage credit needs, and the volume of funds provided by out of state lenders over time is a substantial proportion of mortgage credit holdings. See Fred Case, "California Continuing Needs for Mortgage Capital," California Management Review, Winter 1967, pp. 80-84.

vate residential construction. There are two hypotheses:

1. Different amplitudes may be explained by regional disparities in the availability of residential mortgage credit.
2. Regional differences in amplitudes may result from regional differences in the demand for residential mortgage credit.

The first is essentially the conventional theory. It was investigated by Eugene A. Brady, who found a general tendency for the mortgage market to become homogeneous.³ Brady in a study of the housing cycles in the Northeast and the West for the period of 1954-1959 found no significant difference in the amplitudes of the cycles or in the availability of mortgage credit. A significant difference between the two regions in the housing cycle of 1966 would suggest the residential mortgage market has become more regional in nature. The second hypothesis offers an explanation for differences in the amplitudes of regional cycles, even if the availability of residential mortgage credit is the same in both regions. If the elasticities of demand for residential mortgage credit are different between the two regions, this would result in housing cycles of different amplitudes.

This study concentrates on the second alternative. It differs from previous studies because the objective is to

³Eugene A. Brady, "Regional Cycles of Residential Construction and the Interregional Mortgage Market: 1954-1959," *Land Economics*, February 1963, pp. 15-30.

explain regional differences in cyclical fluctuations by the investigation of demand rather than supply conditions.

The hypothesis of this study is:

Some regional differences in the availability of residential mortgage credit do exist, but whether the impact of restrictive monetary policy is greater on the volume of residential construction in the West than in the Northeast is dependent in the regional demand for mortgage credit.

CHAPTER II

THE NATIONAL HOUSING SECTOR

The postwar regional fluctuations in the construction of private residential housing are closely related to the national housing cycles.¹ Both the existence of regional housing cycles and their relationship to national housing cycles are evident from yearly data shown in Figure 1. The same conditions which are responsible for national cycles are applicable to regional cycles; only the severity of the impact among regions differs. Consequently, before any meaningful analysis of regional housing cycles can be made, there are certain aspects of national housing cycles which need to be discussed.

The Origin of National Fluctuations in Residential Construction

Postwar fluctuations in private residential construction are considered the result of monetary policy coupled

¹Private residential construction and private residential housing are considered identical of this study. Private residential construction is composed of two parts: (1) one to four family homes, and (2) privately owned multi-family units. The one to four family homes are the most important, consisting of approximately 65% of the housing starts and 70% of the value of private residential construction.

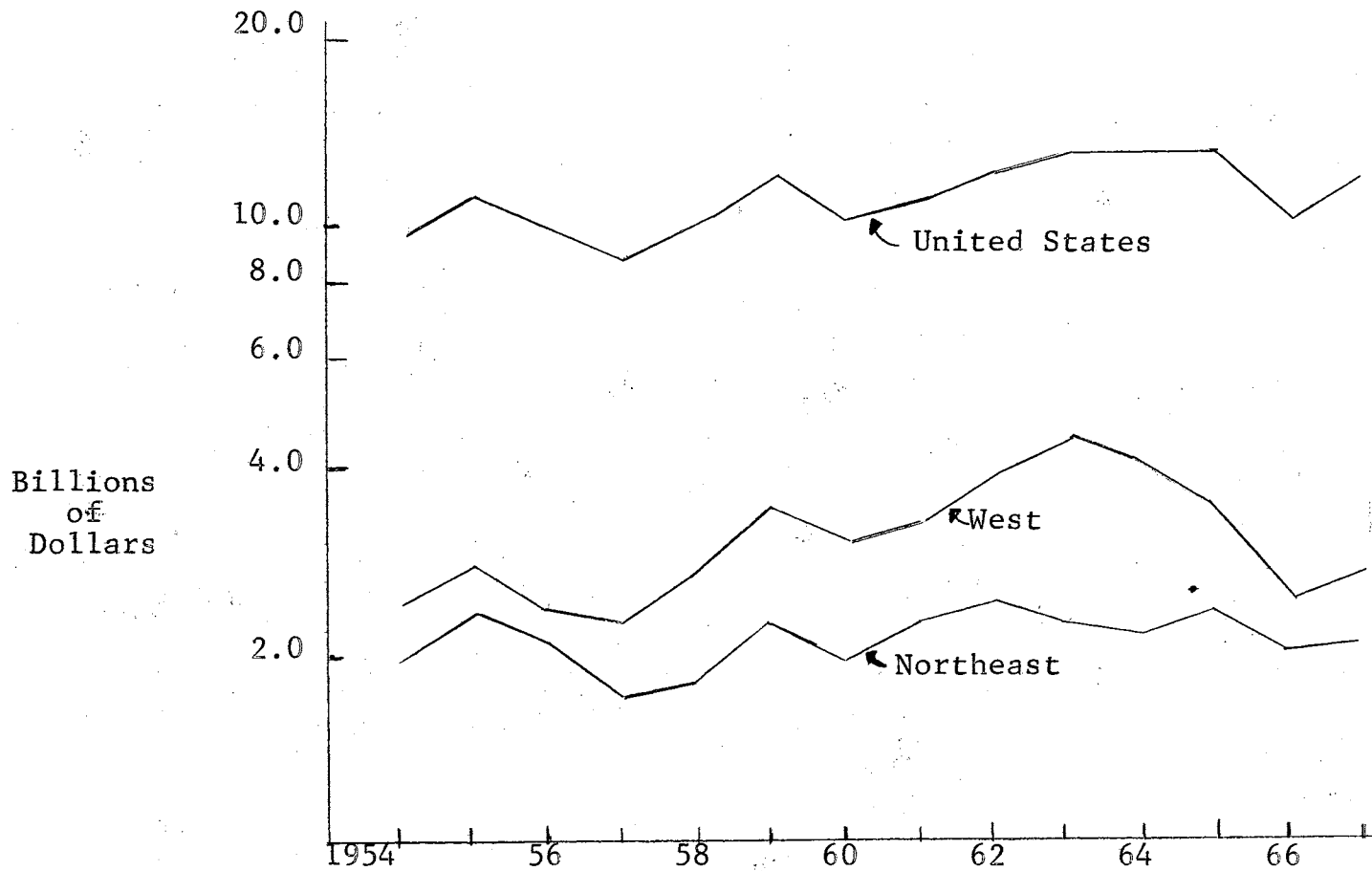


Figure 1. Value of Building Permits For New Privately Owned Residential Housing Units. Source: United States Department of Commerce, Construction Review (Washington: United States Printing Office, Various issues).

with the rigidity of governmental policies associated with federal-underwritten mortgages.² Monetary policy is responsible for fluctuations in residential construction through the general reduction in the availability of mortgage credit.

The relationship between the volume of credit available to housing, the volume of private residential construction, and the impact of monetary policy on residential construction is shown in Figure 2. In periods of relative monetary ease, the net changes in mortgage loans outstanding tend to be greater than the value of new construction, and the opposite holds during periods of monetary restraint.³ The reason is quite simple. During periods of ample credit, there tends to be a large volume of existing homes purchased with mortgage credit which causes the net

²Jack M. Guttentag, "The Short Cycle in Residential Construction, 1946-1959," American Economic Review, June 1961, pp. 186-187.

-----, "Recovery in Housing Activities," Survey of Current Business, August 1967, p. 5.

³Board of Governors Federal Reserve System, "Monetary Policy and the Residential Mortgage Market," A Study of Mortgage Credit, Committee on Banking and Currency, Subcommittee on Housing, U.S. Senate, 90th Congress, 1st session, May 22, 1967, p. 20. The periods of monetary restraint are the same as those periods used by the Board of Governors. Periods when the commercial banking system had net borrowed reserves provides a sufficiently accurate demarcation of this study.

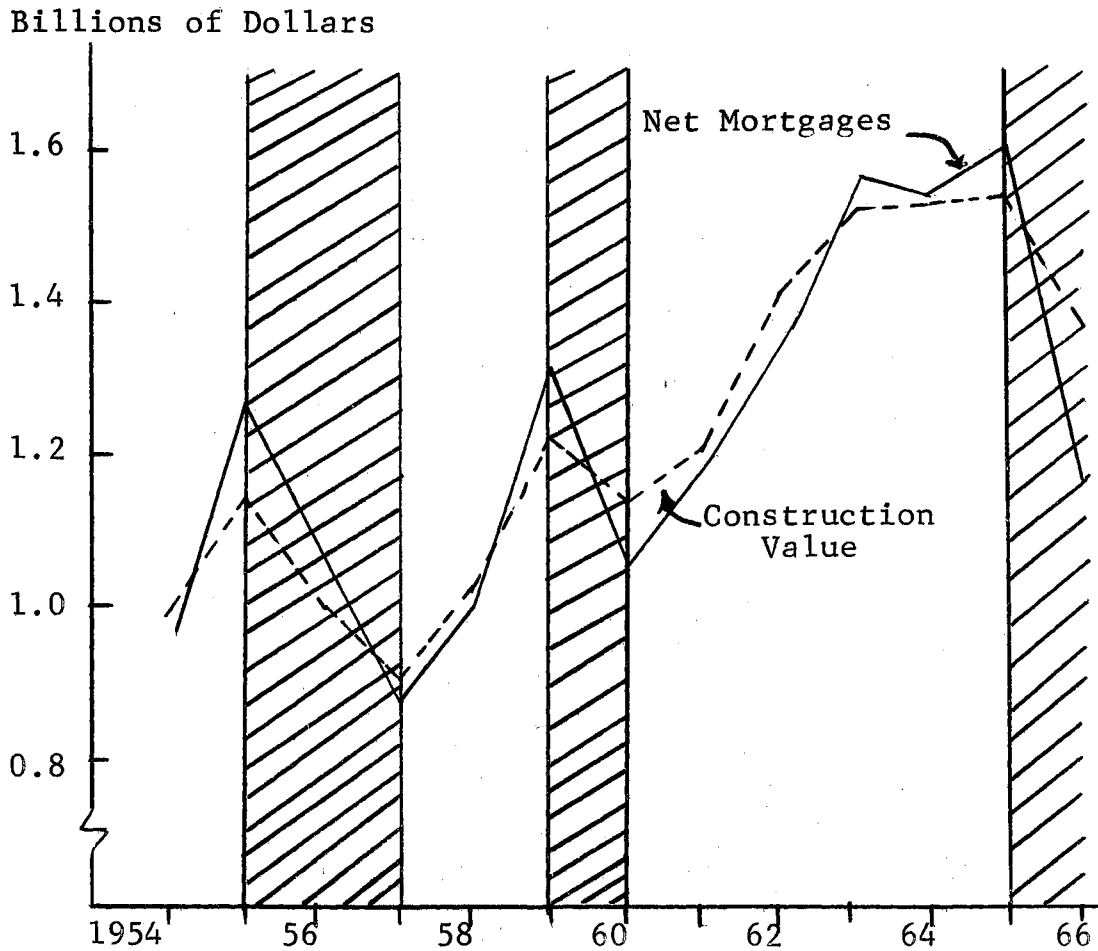


Figure 2. Building Permit Valuation of Privately Owned Housing and Annual Change in Mortgage Loans Outstanding on 1-4 Family Homes. Note: Shaded areas are points of restrictive monetary policy. Source: Savings and Loan Fact Book, 1967; U.S. Department of Commerce, Construction Review. 1-4 family units were used because mortgages on multifamily units are grouped with commercial mortgages which can include motels, stores, shopping centers, and even manufacturing firms.

change in mortgage loans outstanding to exceed the value of new construction. During periods of monetary restraint, the value of new construction exceeds the net change in mortgage loans outstanding because net change is less than the flow of residential mortgage credit going to construction. The important thing is that the turning points tend to be the same, and the upper turning tend to be during periods of restrictive monetary policy, thus demonstrating the rapid effect of monetary policy on residential construction.

Restrictive monetary policy not only affects private residential construction through the general reduction of available funds, but it also has an additional selective impact. During periods of monetary restraint, market rates of interest rise. Thrift institutions such as savings and loan associations and mutual savings banks, which provide better than half of all mortgage credit for private residential construction, find it difficult to attract funds at the going rate on savings. The rate of interest on dividends these institutions can pay depositors is dependent on long-term mortgage investments which during periods of restrictive monetary policy yield less than the present rate of interest. Consequently, the interest rate which is paid on deposits is less than yields on alternative types of securities; therefore, in periods of increasing interest rates, funds are pulled away from these thrift institutions and an increasing share of what would have been savings

flow is used directly in the securities market or goes to commercial bank time deposits and certificates of deposit.⁴

Governmental policies concerning the Federal Housing Administration insured home loans and Veterans Administration guaranteed home loans have a tendency also to cause investment funds to be channeled away from the housing sector as yields on other types of securities increase. The F.H.A. and V.A. not only protect the investor against loss, but they stipulate maximum interest rates, discount policy, and other factors which influence the profitability of such mortgages. These policies are determined administratively. There is a tendency for policy changes to be rather sluggish vis-a-vis market conditions. Due to the sluggishness of adjustment of the maximum interest rate ceiling, as yields on other types of securities increase, there is a tendency for such institutions as life insurance companies and commercial banks to withdraw funds from the housing sector and especially from the federal-underwritten mortgage market.

The sluggishness in adjustment of the interest rate on insured mortgages is of particular importance in the conventional argument concerning regional housing cycles. Leo Grebler indicates the "inflexible interest rate ceiling" as the reason for capital deficit regions having "especially wide fluctuations in the supply of funds for government

⁴Ibid, p. 29.

underwritten loans."⁵ He concludes: "Thus, the inflexible interest rate ceilings have resulted in geographical discrimination."⁶

Residential Mortgage Instruments

Long-term mortgage and short-term financing are the two major types of financing used for the construction and purchase of private residential housing. Short-term financing is only important to the homebuilder or the contractor in the actual construction phase. It is of minor importance in the housing sector because short-term financing is normally available only if long-term mortgage financing for the purchase of the home can also be obtained. It is the availability of long-term credit which produces the cyclical fluctuations in private residential construction. The three important types of long-term financing are conventional loans, F.H.A. insured loans, and V.A. guaranteed loans.

Of the three types of long-term financing, conventional mortgage credit is the most important. It represents between 65% of the total net flow of mortgage credit

⁵Leo Grebler, Housing Issues in Economic Stabilization Policy, National Bureau of Economic Research, Occasional Paper #72, 1960, p. 95.

⁶Ibid.

into housing during periods of monetary ease and 75% of the total flow during periods of restrictive monetary policy. Conventional loans are the same as any other type of investment. Rates of interest, down payments, and pay-out periods are all determined by market conditions; therefore, the supply of conventional mortgage credit could remain the same or even increase during periods of restrictive monetary policy by increasing its share of available investment funds.

The primary purpose of the federal underwriting activities of the F.H.A. and V.A. is to increase the general standard of housing by making credit available at more liberal terms than conventional financing. This is accomplished by minimizing the risk of loss to the lender because of default, and by attracting funds from institutional lenders by offering greater liquidity and uniformity than conventional mortgages. The principle drawback of federal underwriting is the sluggishness with which the maximum allowable interest rate adjusts to market conditions. This causes the market to allocate funds away from the federal-underwritten mortgages during periods of restrictive monetary policy and create a "feast or famine" situation in the availability of F.H.A. and V.A. insured mortgage credit.⁷

⁷Saul B. Klamman, The Postwar Residential Mortgage Market (Princeton, 1961), p. 83.

The administrative setting of maximum allowable interest rates creates a situation represented by Figure 3. During periods of monetary ease the interest ceiling (i_m) does not affect the market equilibrium of i_1, g_1 . When the supply of mortgage credit contracts to S_2, S_2 , a shortage exists and the market does not reach equilibrium. The contraction in the volume of credit going to housing (g_3, g_1) is greater than it would have been without the interest ceiling.

Sources of Residential Mortgage Credit

There are four major sources of mortgage credit. Savings and loan associations are the most important source, supplying between 40% and 45% of the total mortgage credit going to private residential construction. The three other major sources are life insurance companies, mutual savings banks, and commercial banks. They account for about 33% of the total mortgage credit, as shown in Table I.

The savings and loan associations are highly specialized lenders with private residential mortgage loans for 1-4 family houses accounting for over 86% of their total mortgage lendings. Since 1960, over 90% of these loans have been of the conventional type. The savings and loan associations have favored conventional loans because: (1) their mortgage acquisitions are limited by law to their surrounding areas; (2) in the past, relatively easy access to advances from the Federal Home Loan Bank make the

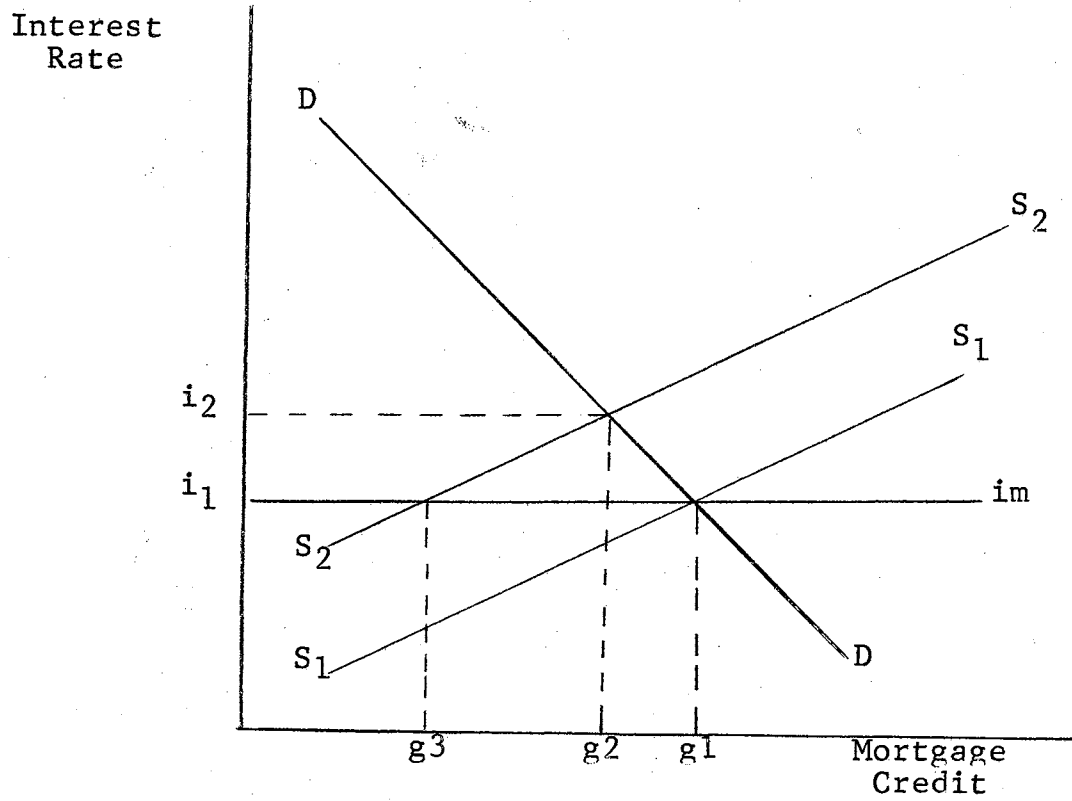


Figure 3. Demand and Supply Curves For Insured Mortgage Credit Markets

TABLE I
MORTGAGE LOANS OUTSTANDING ON ONE
TO FOUR FAMILY NONFARM HOMES
BY TYPE OF LENDERS

Year	Savings & Loan Assoc.	Mutual Savings Banks	Com- mercial Banks	Life Ins. Co.	Fed- eral Agencies	Others
1954	33.0%	11.9%	17.6%	20.0%	3.7%	13.8%
1955	34.0	12.6	17.1	20.0	3.4	12.9
1956	34.3	13.1	16.1	20.3	3.6	12.3
1957	35.3	13.1	15.2	19.9	4.4	12.1
1958	36.4	13.3	15.0	19.0	4.0	12.3
1959	37.9	12.9	14.7	18.0	4.8	11.8
1960	39.2	13.0	13.6	17.6	5.1	11.5
1961	40.8	13.1	13.1	16.8	4.8	11.5
1962	41.9	13.3	13.3	15.9	4.4	11.2
1963	43.4	13.6	13.7	15.0	3.4	11.0
1964	44.1	13.9	13.8	14.5	3.0	10.7
1965	44.3	14.1	14.2	14.0	3.0	10.4
1966	44.6	14.1	14.6	13.8	3.9	10.0

Source: Savings and Loan Fact Book, 1967.

greater liquidity of the governmental underwritten mortgages unnecessary; and (3) having always been authorized to make loans at a high ratio of property value, they feel less need for protection.⁸

The reason the 1966 decline in the net flow of mortgage credit from the savings and loan associations was so severe is apparent from Figure 4. In 1957 and 1960, they were able to increase their dividend rates to prevent any appreciable decrease in the net inflow of savings because of a decrease in the spread between dividends and alternative uses for savings. In 1966, the savings and loan associations were unable to prevent the drastic decrease in spread; the effect on the net inflow of savings is apparent.

Mutual savings banks are also specialized lenders with roughly 67% of their total mortgages in private residential construction. The experience of the mutual savings banks in 1966 was approximately the same as that of the savings and loan associations. The net flow of mortgage credit decreased due to a reduction in the net inflow of savings. There, however, are two characteristics of the mutual savings banks which make them more important to a regional analysis than a mirror image of savings and loan associations. First, nearly 99% of total assets of all mutual savings banks are held by banks in the major Northeastern

⁸Leo Grebler, "California Dependence on Capital Imports for Mortgage Investments," California Management Review, Spring 1963, p. 54.

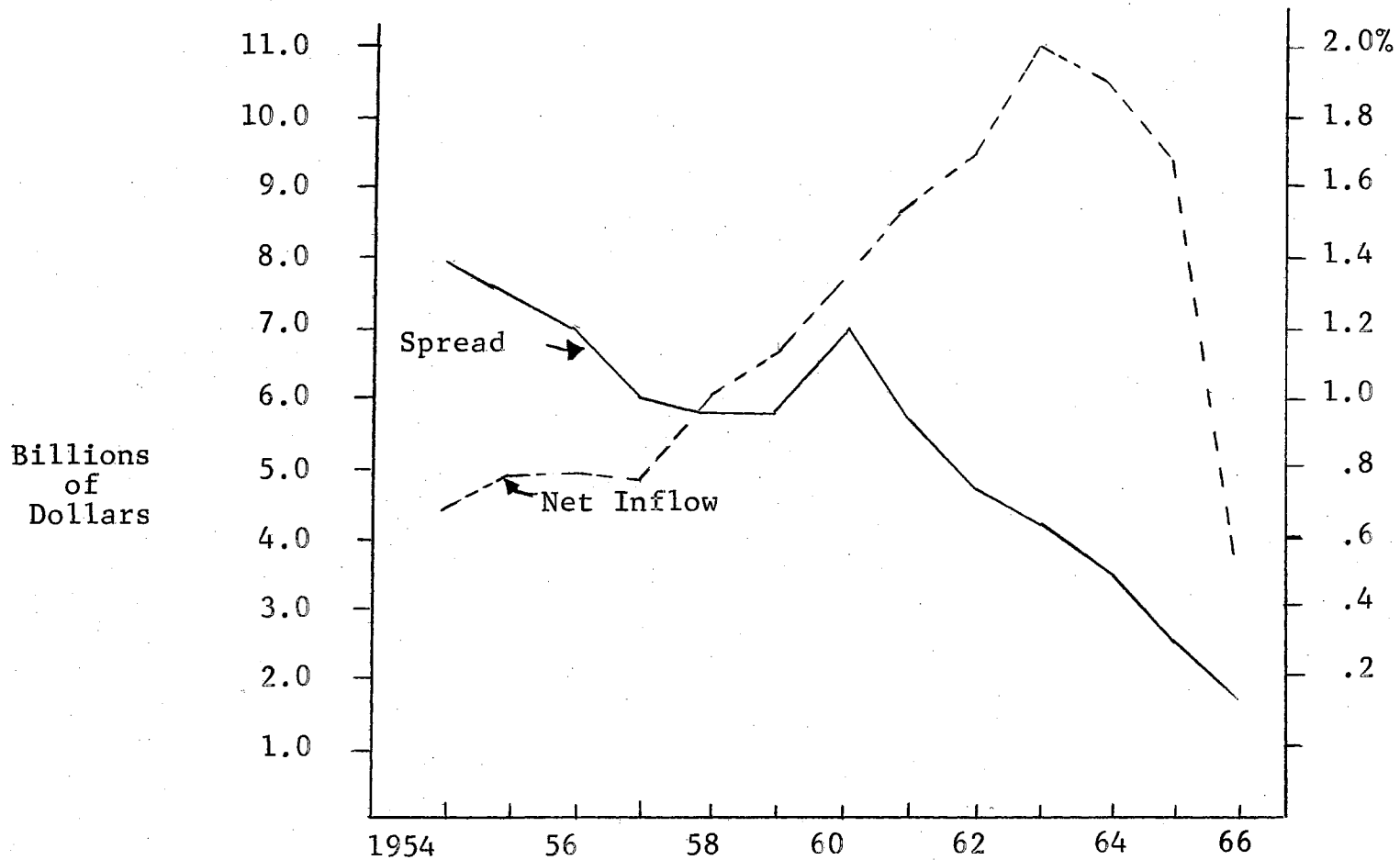


Figure 4. Net Inflow of Savings to Savings and Loan Associations and Spread Between Yields on S. & L. Savings Accounts and Commercial Bank Deposits.
 Source: Savings and Loan Fact Book, 1967.

states. Second, unlike savings and loan associations mutual savings banks are authorized to make out of state loans, but they are limited by legislation to federally-underwritten mortgages.

Commercial banks provide about 14% of the mortgage credit used for residential construction; this represents about 10% of their total loans and investments. The primary influence which commercial banks have on private residential construction is through the interest rates paid on time deposits and certificates of deposit. The commercial banks are in competition with the savings and loan associations and mutual savings banks for savings. Since these institutions specialize in mortgages, any flow of saving away from them would affect the flow of mortgage credit into housing. Although the data are not available, it is doubtful that commercial banks do any significant volume of interregional lending. This would seem logical because long-term residential mortgage loans they make could be expected to be local in nature, simply as a matter of conventional business practice.

Life insurance companies are the largest inter-regional lenders in the residential mortgage market; this makes them an important factor in any study of regional housing cycles. The reduction in the flow of residential mortgage credit from life insurance companies during periods of restrictive monetary policy is due to the upward pressure of monetary policy on market rates of interest in the economy.

As market rates of interest increase life insurance companies shift investment funds out of the low yield federally underwritten residential mortgages into higher yield investments. The residential mortgage activities of life insurance companies, however, are limited to some extent by the greater demand for advances on policies during periods of monetary restraint.

Although mortgage companies originate a large volume of private residential mortgage loans, they are not an important source of funds. The main function of mortgage companies is to act as a financial intermediary. Basically they act as "correspondents" for life insurance companies and mutual savings banks, originating and servicing loans for these investors.

The characteristics of the major sources of private residential mortgage credit are important in any discussion of regional housing cycles. It is the lending characteristics of many of the major sources of mortgage credit upon which much of the conventional theory is based.

Secondary Mortgage Market

Although there is not an organized secondary market for residential mortgages, the Federal National Mortgage Association (F.N.M.A.) does partially fulfill the function of a secondary market by providing some degree of liquidity for mortgage investments in F.H.A. insured and V.A. guaranteed mortgages. The secondary market operations of the

F.N.M.A. tend to be counter-cyclical to the residential housing cycle. It purchases federally underwritten mortgages during period of monetary stringency and resells them when monetary conditions ease. The purpose of the F.N.M.A. operations is to encourage the investment of funds in insured mortgages by assuring investors from all parts of the country a central market for mortgages. The policies of the F.N.M.A. have prevented it from being used as a portfolio adjustment mechanism.⁹ During periods of monetary restraint the F.N.M.A. has refused to purchase "seasoned mortgages," which are usually mortgages over 4 months old. This means investors are not able to sell the older low yield securities in order to purchase newer higher yield securities during periods of monetary restraint. This is done to lessen the impact of monetary policy on residential construction by insuring that available funds are used to purchase mortgages on new homes and not seasoned mortgages. In this way mortgages can still be made by originators without the risk of not being able to find permanent investors.

Summary

The postwar cyclical fluctuations in residential con-

⁹J. A. Cacy, "Specialized Mortgage Marketing Facilities", Federal Reserve Bank of Kansas City Monthly Review, July-August 1967, p. 9.

struction are considered the result of a reduction in the availability of residential mortgage credit due to the implementation of restrictive monetary policy by the Federal Reserve System. The result of restrictive monetary policy is not only to reduce the total volume of investment funds available, but also the share of investment funds allocated by the market to residential construction. The share of investment funds is diminished because of the selective impact of restrictive monetary policy on thrift institutions and the inflexibility of terms on governmental underwritten mortgages. The consequences are housing cycles caused by governmental actions and reinforced by governmental policies.

The residential mortgage market is divided into two sectors: (1) the insured mortgage sector which includes both F.H.A. and V.A. insured loans, and (2) conventional loans. The conventional loan sector is the most important accounting for well over 50% of all residential mortgage investment. The chief characteristic of the conventional mortgage market is its local nature with interest rates and terms varying between different parts of the country. The insured mortgage sector tends to be more uniformed throughout the country. The principal characteristic is the "feast or famine" situation in the availability of insured mortgage credit due to the administrative setting of interest rates and terms.

There are four major sources of residential mortgage

credit: (1) Savings and Loan Associations, (2) Mutual Savings Banks, (3) Commercial Banks, and (4) Life Insurance Companies. Savings and Loan Associations are the most important source of mortgage funds, but their lending activities are restricted to their surrounding areas. Life Insurance Companies and Mutual Savings Banks are the major interregional lenders.

CHAPTER III

CYCLICAL FLUCTUATIONS IN REGIONAL PRIVATE RESIDENTIAL CONSTRUCTION

Although extensive studies have been done on national housing cycles, little has been done on comparisons of regional cycles. Most of the theoretical framework concerning regional housing cycles have been derived from studies of national housing cycles based on aggregate data. This framework is noted as the conventional theory or hypothesis.

Conventional Theory

The bases of the conventional theory concerning regional housing cycles consists of conclusions drawn from aggregate data and from the theoretical framework concerning national housing cycles. From the conclusion that national housing cycles were the result of supply factors it is reasoned that the impact of the housing cycle should differ among geographical regions also because of supply conditions.¹ The regional difference would be due to dif-

¹Albert H. Schaaf, "Federal Mortgage Interest and Rate Policy and the Supply F.H.A. - V.A. Credit," Review of Economics and Statistics, November 1958, pp. 384-385.

ferences in the supply of residential mortgage credit available because of regional disparities in financial resources and the inflexibility of governmental determined interest rates.² Therefore, the fluctuations in private residential construction in the capital deficit West should be of a greater amplitude than the fluctuations in the capital surplus Northeast because of a relatively greater contraction in the availability of residential mortgage credit in the West. The conventional hypothesis more precisely stated is that capital deficit areas should suffer greater fluctuations in private residential construction because relative to capital surplus areas the contraction of mortgage credit available will be greater.

The conventional hypothesis is based on two premises. First, the conventional residential mortgage market is basically local in nature. This affects the total regional market, which in turn reflects the geographical imbalances in financial resources. The local nature of the conventional residential mortgage market is due in part to the fact that savings and loan associations and mutual savings banks are restricted by law to their local lending regions. The conventional mortgage market is further segmented by a lack of uniformity in state laws governing foreclosure,

²Leo Grebler; Housing Issues in Economic Stabilization Policy, National Bureau of Economic Research, Occasional Paper, #72, 1960, p. 95.

usury, borrower's redemption rights and other conditions. Second, because of the localness of the conventional mortgage market, the activities of interregional lenders are carried out almost exclusively in federal underwritten mortgages. For the same reasons that financial institutions diversify the type and the liquidity of their investments, interregional lenders geographically diversify their holdings of private residential mortgages.³ The conventional theory implies that during periods of restrictive monetary policy interregional lenders withdraw more funds from the insured residential mortgage market in the capital deficit area than in the capital surplus area because of the greater spread between the yields on alternative investments and federal insured mortgages. The funds are more likely to leave the housing sector in a capital deficit area because of the preference of interregional lenders for the insured mortgage market.

The first premise needs to be modified because the source of funds for the conventional mortgage market need not be completely local in nature, even if the market for conventional mortgage instruments is local. Although the data are not available, it is possible that a significant portion of funds used in the conventional mortgage market

³Eugene Brady, "Regional Cycles of Residential Construction and the Interregional Mortgage Market;" 1954-1959, Land Economics, February 1963, p. 16.

in the West are out-of-state funds attracted by the western savings and loan associations. In this manner the supply of conventional mortgage credit does not necessarily reflect the financial resources of a region. If California can be considered representative of the western region, in 1965, the amount of funds imported by savings and loan associations and used in the California mortgage market was nearly equal to the amount of funds invested by life insurance companies.⁴ Since savings and loan associations are specialized lenders who invest almost exclusively in conventional mortgages on private residential homes, it can be assumed these funds were used for that purpose.

The second premise similarly needs to be modified because there is no clear evidence that all interregional investors are completely adverse to converting insured mortgage loans to conventional loans during periods of monetary restraint. Although this may be true for mutual savings banks because of legal restrictions limiting them only to F.H.A. and V.A. insured out-of-state mortgage holdings, it does not necessarily apply to life insurance companies. The holding of mortgages by life insurance companies in the West compared to the Northeast does imply that they prefer to perform interregional lending activities in the insured

⁴Fred Case, "California's Continuing Need for Mortgage Capital," California Management Review, Winter 1967, p. 85.

instruments. It does not imply they are completely adverse to making conventional mortgage loans. In Table II, the net flow of life insurance mortgage funds into conventional mortgage loans can be seen to be somewhat counter-cyclical in the West, suggesting that the higher conventional interest rates prevailing during periods of monetary restraint may be sufficient to cause some of the funds withdrawn from the insured market to be used in the conventional mortgage market.

The indication that some of the premises on which the conventional theory is based are erroneous does not necessarily discredit the theory. It may mean that the premises on which the conventional theory is based need to be modified.

Empirical Analysis of the Conventional Theory

A study by Eugene Brady represents the only published empirical analysis of regional residential housing cycles.⁵ Using the "Burns-Mitchell" method of measuring cyclical fluctuations for the period of 1954-1957, it was found that the Northeast actually had a greater cyclical fluctuation than the West. The Northeast had an annual average amplitude over the time period of 27%, while the annual average

⁵Eugene Brady, pp. 15-30.

amplitude for the West was 19.4%.⁶ Brady concluded that:

"Although monetary stringency and a tightening of financial markets had a strong impact upon the residential housing industry, it does not appear that this impact differed to a significant degree between the capital deficit West and the capital surplus Northeast...there does not appear to be a geographic discrimination as to the cyclical availability of loanable funds to the housing industry...when the housing cycle turned down in 1956 and 1957."⁷

Brady concluded that certain institutional changes prevented housing from declining relatively more in the West than in the Northeast. Among these institutional factors were: first, the increased volume of inter-regional lending by mutual savings banks due to the removing of legal restrictions; second, the volume of forward commitments from insurance companies, coupled with a regionally divergent pattern of substitution of conventional for federally underwritten mortgages; and third, the F.N.M.A. did not appropriately adjust regional purchase prices to reflect what would be market determined regional price spreads.

There are at least two criticisms of Brady's study. First, it was concluded that the F.H.A. and V.A. mortgage market in the West did not suffer a greater contraction in

⁶The annual average amplitudes were later revised by Alfred Page. The corrected regional average annual amplitudes were 18% for the West and 38% for the Northeast. See Alfred N. Page, "Regional Residential Construction Cycles," *Land Economics*, February 1965, p. 67.

⁷Brady, p. 29.

TABLE II
MORTGAGE ACTIVITIES OF UNITED STATES LIFE INSURANCE
BY REGIONAL LOCATION OF PROPERTY

Year	% of convention- al Mortgages Held		Net flow of F.H.A. and Conven- tional Mortgage Credit (000)			
	North- east	West	Northeast F.H.A.	Con.	West F.H.A.	Con.
1954	83.3%	49.7%				
1955	81.0	48.3	\$31,099	\$234,362	\$ 16,124	\$304,159
1956	80.4	49.2	16,050	267,203	2,446	382,204
1957	80.7	50.1	12,986	245,854	18,054	356,457
1958	81.4	53.3	35,459	220,220	129,761	341,199
1959	82.2	55.2	31,067	142,356	156,370	385,711
1960	81.8	57.0	64,637	223,021	228,705	552,632
1961	84.7	59.2	3,140	276,589	206,439	470,979
1962	84.2	60.6	54,661	337,809	178,226	643,335
1963	84.9	62.2	78,660	362,652	236,240	945,277
1964	84.4	64.2	88,178	347,489	196,421	871,335
1965	84.7	66.8	86,331	462,122	192,701	907,204
1966	85.1	67.6	34,821	357,675	128,744	906,183

Source: Calculated from Life Insurance Fact Book: Various issues.

the availability of funds. This conclusion was based on the percent of F.H.A. and V.A. loans to total mortgage loans of a region over the time period. Because the percentage of F.H.A. and V.A. loans of the total flow of residential mortgage credit declined relatively the same in both regions, it was concluded that there were no significant differences in the availability of insured mortgage credit. The problem is one of composition. Since neither F.H.A. insured loans or V.A. insured loans consist of over a third of the total mortgage credit, it is doubtful whether a relatively greater decline in the volume of F.H.A. insured mortgage loans in one region than in another would show up as a significant change in the composition of total mortgage loans. In Figure 5, it can be seen that the West did have a slightly greater relative decline in the availability of F.H.A. insured mortgage credit for the purchase of new and used homes in 1954 to 1958.⁸

The second criticism is the failure to explain why the regions had similar cycles in residential construction. If in fact the regions did have relatively the same cyclical fluctuations in the volume of insured residential construction, it still leaves unanswered the question of why the two regions should have the same relative decline in

⁸The availability of credit for new and used homes was used because it best represents the volume of credit available, eliminating any buyer preferences at this stage of the study.

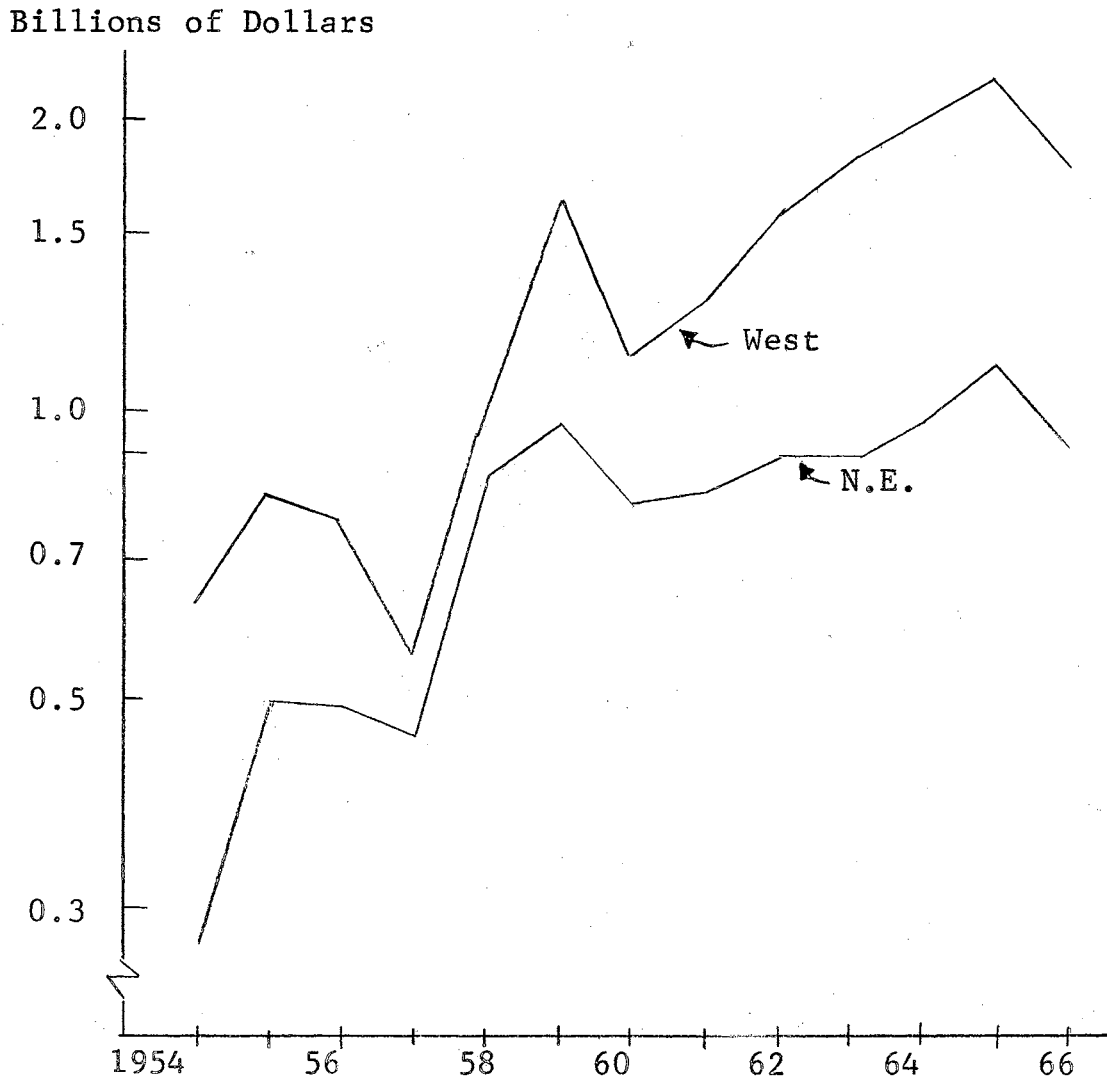


Figure 5. Volume of F.H.A. Insured New and Existing Home Mortgages by Regions. Source: Department of Housing and Urban Development.

the conventional construction. Examination of conventional interest rates (Figure 6) shows that the spread between the rate in the West and the Northeast increases during periods of restrictive monetary policy. This might explain why the interregional lenders such life insurance companies are not particularly adverse to acquiring conventional mortgages in capital deficit regions during periods of monetary restraint, but it is not sufficient to explain why cyclical fluctuations in the flow of conventional residential mortgage credit should be the same in both regions. This is essentially the thesis of this study, that regional cycles are the result of monetary policy reducing the supply of mortgage credit available, but differences in the flow of residential mortgage credit are dependent on the demand characteristics of the regions.

Theoretical Framework

The hypothesis of this study is essentially different from the conventional theory and previous studies because it is concerned with explaining differences in the amplitude of regional residential housing cycles as a result of demand conditions. The basic contention of the conventional theory is that the conventional mortgage market is local in nature; and therefore, the supply of mortgage credit available reflects the financial resources of that region. The greater contractions are due to interregional lenders withdrawing funds faster from the residential mortgage mar-

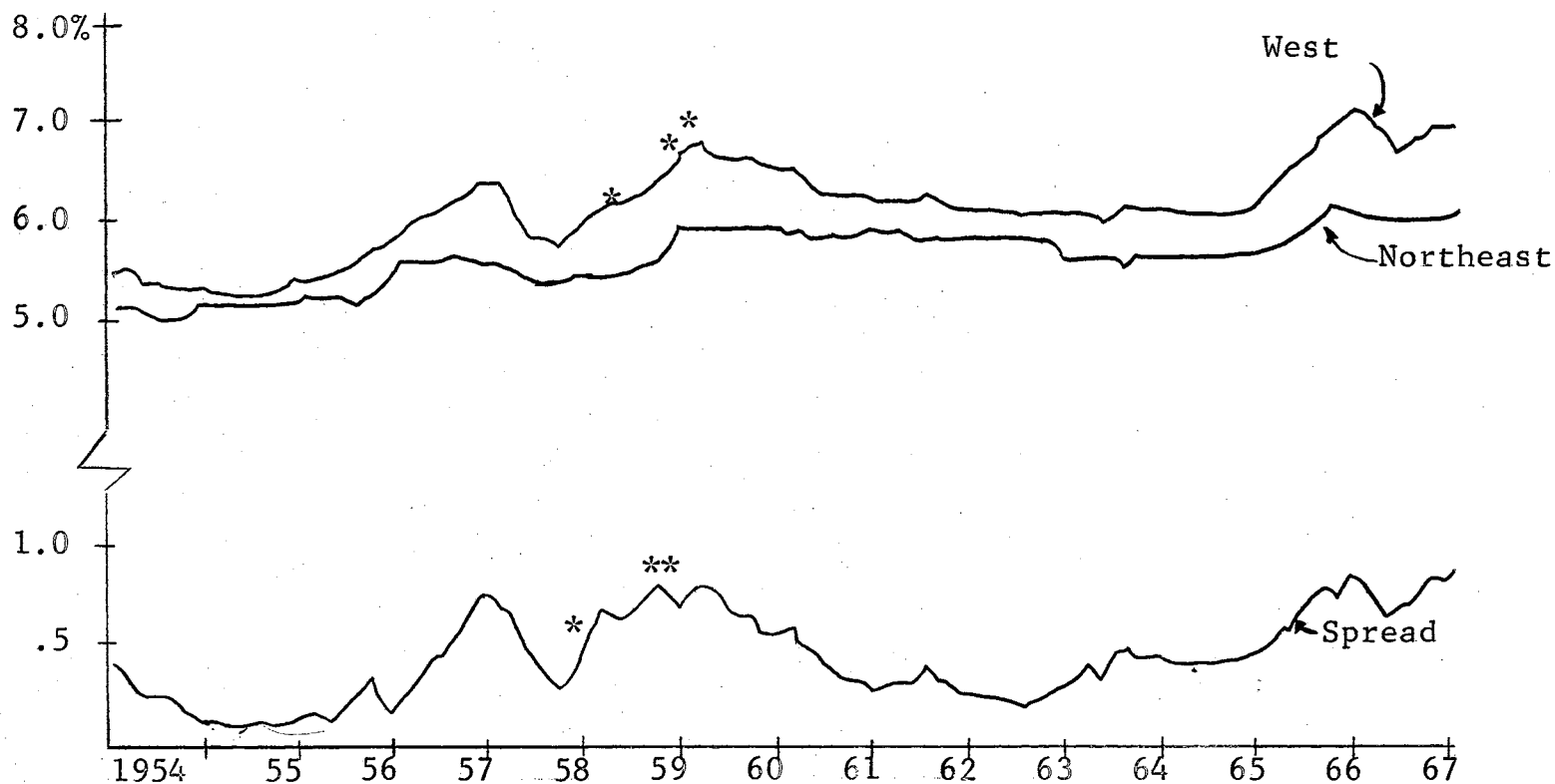


Figure 6. Average Interest Rates For Conventional First Mortgages on New Homes by Regions and Interest Rate Spread Between Regions From 1954 to 1967. *Alaska added. **Hawaii added. Source: Courtesy of the Department of Housing and Urban Development.

ket in a capital deficit region during periods of restrictive monetary policy. The conventional argument gives little consideration to the demand for residential mortgage credit as a factor for explaining differences in regional housing cycles. For instance, if the demand for mortgage credit is inelastic in both regions, the cycles would not be appreciably different. The basic premise upon which the hypothesis of this study is based is that the elasticity of demand is an important determinant of the differences in regional housing cycles.

If the demand for residential mortgage credit is relatively elastic in one or both regions, then the severity of the housing cycles should differ between capital deficit and capital surplus regions. Consider Figure 7. Equal shifts in the supply of mortgage credit (S_1S_1 to S_2S_2) result in housing cycles of different amplitudes in regions A and B. In this case the thesis of the study would be accepted since differences in the housing cycles would be due to the differences in the elasticity of demand. The hypothesis of the study would also be accepted if the demand for residential mortgage credit is inelastic in both regions and the cyclical fluctuations are similar. Even drastic differences in the regional shifts of the supply of mortgage credit, as seen as in Figure 8, would not result in greatly different housing cycles. In this example the similarity in the housing cycles is due to the inelastic demand for residential mortgage credit. If the demand for

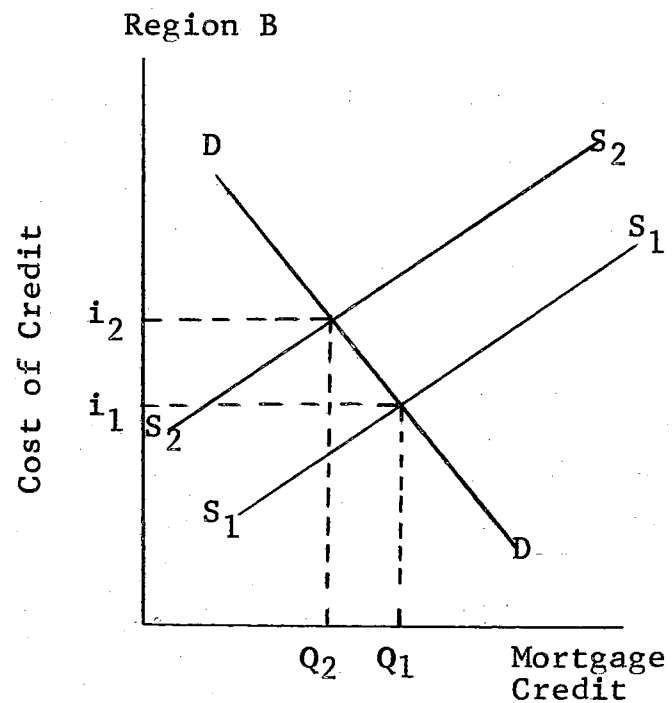
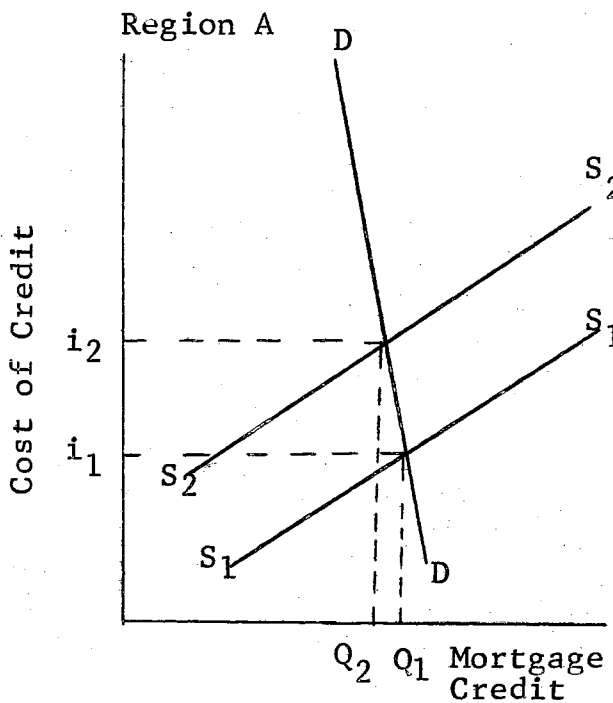


Figure 7. The Decline in Volume of Mortgage Credit Demanded During Periods of Monetary Restraint When The Demand in One Region is Elastic. The charts are double-log therefore the elasticity of demand can be read directly.

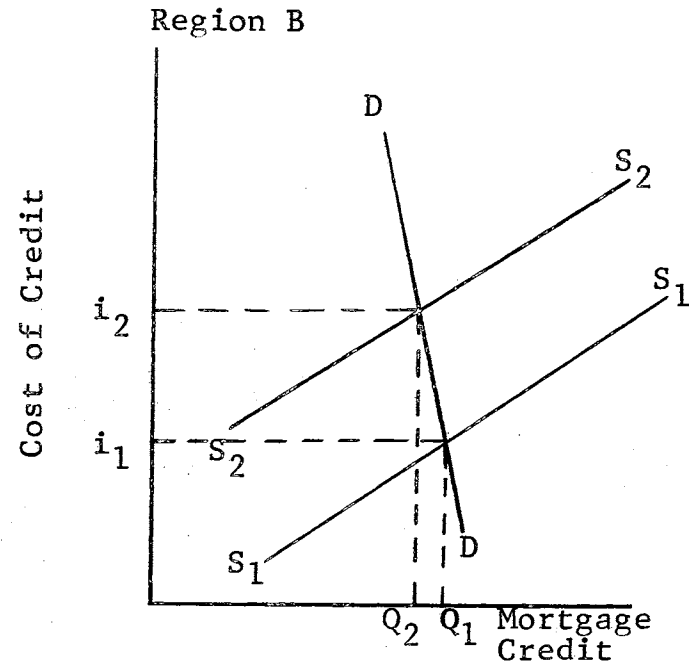
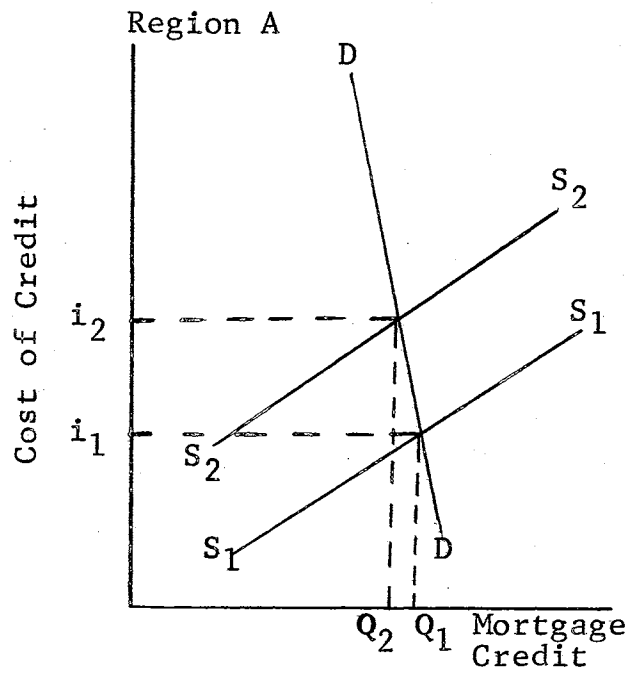


Figure 8. The Decline in Volume of Mortgage Credit Demanded During Periods of Monetary Restraint When Demand is Inelastic in Both Regions. The charts are double-log, therefore the elasticity of demand can be read directly.

mortgage credit is inelastic in both regions and the housing cycles are significantly different, this would discredit the hypothesis. In this case, Figure 9, the absolute availability of credit would determine which region had the greatest cyclical fluctuations. In region A, which represents a capital deficit region, a shortage of mortgage credit would exist after the shift in the supply curve (S_1S_1 to S_2S_2). The supply and demand curves would hypothetically intersect at some very high interest rate, but what would probably result is the interest rate would become sticky at the rate (i_2) where the supply curve becomes completely inelastic.

When more than one housing cycle is considered, the problem of interregional comparisons becomes considerably more complex. When regional comparisons are made of the severity of the impact on monetary policy over several housing cycles both supply and demand factors must be considered. Possibly over time certain determinants of demand could change. Also, it is possible that certain factors which influence the supply of mortgage credit available could change. Although both supply and demand conditions are important as an explanation for regional housing cycles, this study hypothesizes the demand for residential mortgage credit is the most important explanation for regional disparities in cyclical fluctuations.

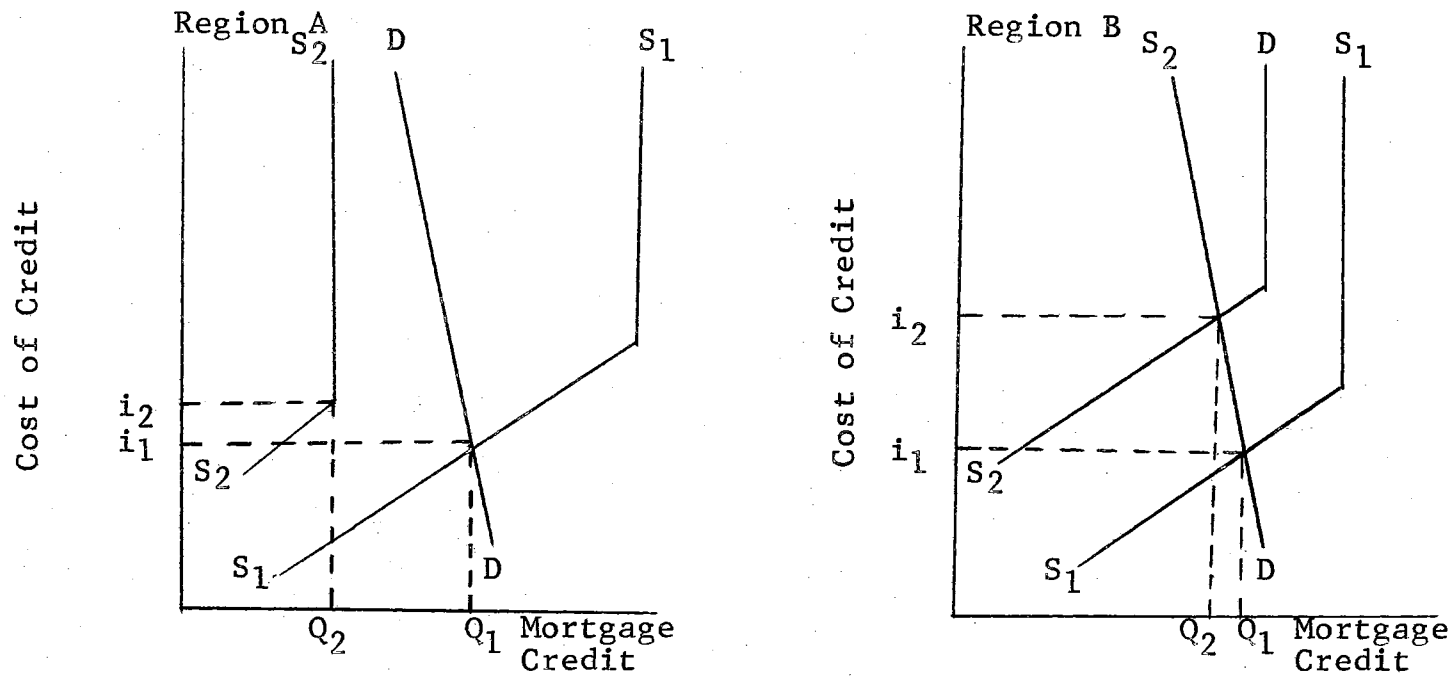


Figure 9. The Decline in Volume of Mortgage Credit Demanded During Periods of Monetary Restraint When an Absolute Shortage Exists. The charts are double-log, therefore the elasticity of demand can be read directly.

Conclusion

Conventional theory hypothesizes that the impact of the housing cycle should differ among geographical regions because of differences in the supply of mortgage credit available due to regional imbalances in financial resources. Capital deficit areas such as the West should experience greater cyclical fluctuations than capital surplus areas such as the Northeast because of a greater relative contraction in the availability of mortgage credit. Empirical testing of the conventional theory actually found the reverse to be true. For the housing cycle of 1954-1959 the West actually had a smaller cycle than the Northeast.

This study postulates that for any particular housing cycle the characteristics of regional demand for residential mortgage credit determines whether capital deficit areas have greater cyclical fluctuation in residential construction than capital surplus regions. The acceptance or rejection of the thesis depends upon the following conditions:

- (1) If the demand for mortgage credit is inelastic in both regions and the cyclical fluctuations are unequal, the thesis is rejected.
- (2) If the demand for mortgage credit is elastic in one or both regions, and the housing cycles are unequal, the thesis is accepted.

The first condition is essentially the conventional argument. The mortgage market does not reach equilibrium and an absolute shortage of mortgage credit exists.

CHAPTER IV

ANALYSIS OF REGIONAL HOUSING CYCLES

The purpose of this chapter is to compare the impact of regional housing cycles and estimate the elasticities of demand for mortgage credit. These are the two factors which must be known in order to test the thesis of this study.

Comparing the Impact of Monetary Policy on Regional Residential Construction

There are many possible ways of measuring the impact of housing cycles in the West relative to those in the Northeast. The methods used in this study are: (1) visual comparisons on semi-logarithmic charts, and (2) a regression residual method.

The simplest method of comparing regional housing is to plot the two series on a semi-logarithmic chart. When the value of permits issued for private residential construction in the Northeast and the West are plotted on a semi-logarithmic chart (Figure 10), it appears that the Northeast had a greater relative decline in the volume of private residential construction during the 1957 and 1961 housing cycles. From Figure 10, it is quite evident in

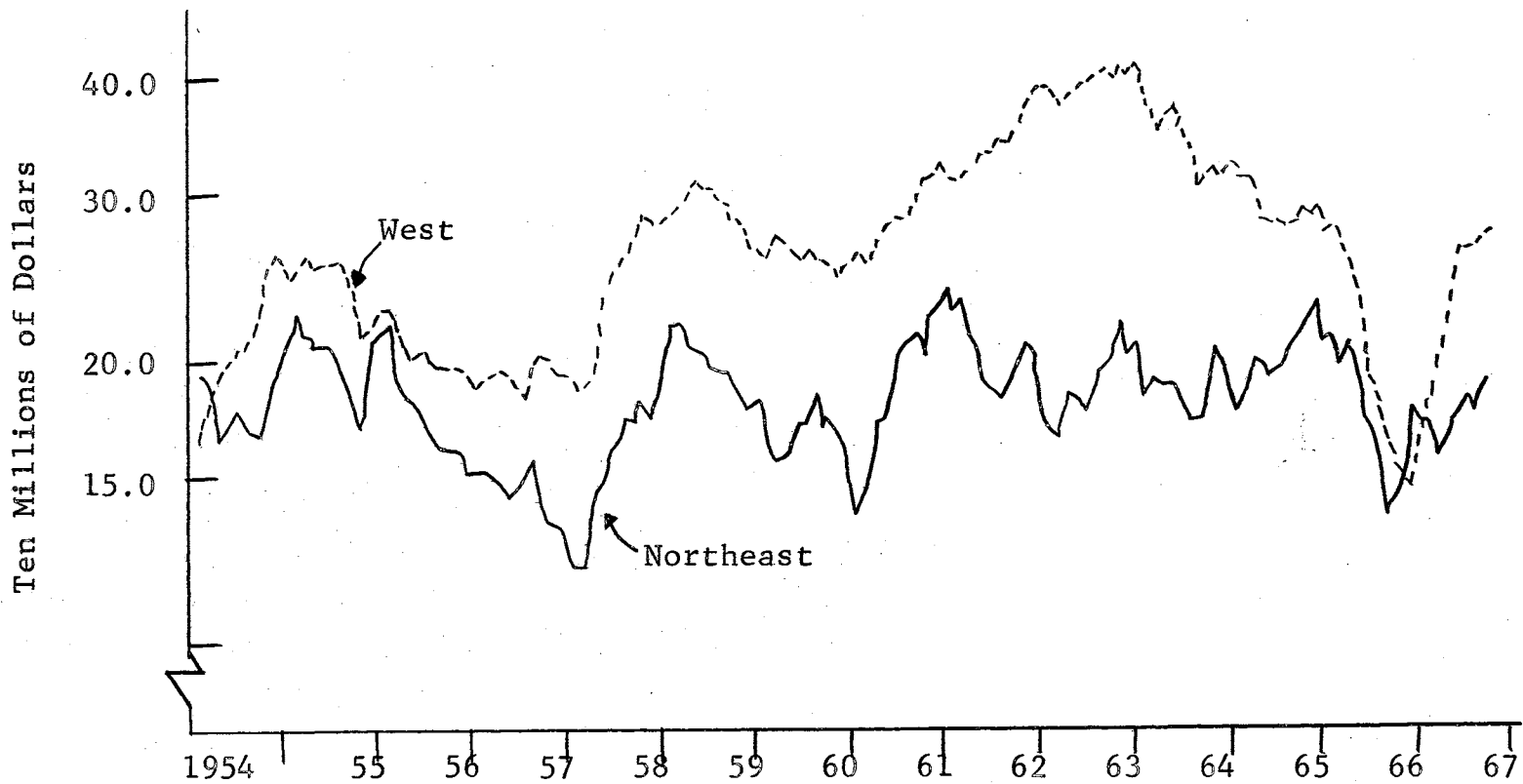


Figure 10. Value of Building Permits for New Privately - Own Residential Housing Units by Regions: Northeast and West. Original data converted to seasonally adjusted three month moving averages. Source: United States Department of Commerce, Construction Review (Washington: United States printing office, monthly).

1966 the relative decline in the West was much greater than in the Northeast. Although it is evident that the declines were greater in one region than in another, it does not necessarily follow that the impact of monetary policy on housing was more severe in one region than in another. The severity of the impact of monetary policy can only be judged after the trend has been removed.

The regression residual method is a fairly accurate method of measuring cyclical fluctuations because it depends on the trend in residential construction and the real determinants of construction having a linear relationship. Ideally the independent variables should be net household formation and disposable personal income since there is considerable agreement that these factors determine the long-run demand for housing units.¹ Unfortunately data are not available on a regional basis for estimating the coefficients of these variables. For purpose of this study net changes in population and total personal income divided by total population should be sufficient for determining the trend.

The trend is determined by a stepwise multiple regres-

¹Leo Grebler and Sherman J. Maisel, "Determinants of Residential Construction: A Review of Present Knowledge," Commission on Money and Credit, Impacts of Monetary Policy (Englewood Cliffs, N.J. 1963), pp. 604-605.

sion analysis for the following equation:

$$V_H = a_1 + b_1X_1 + b_2X_2$$

where:

V_H - Value of Private Residential Construction per year.

X_1 - Population change per year.

X_2 - Per capita Personal Income per year.

The deviation of the predicted trend value from the observed value of residential construction divided by the predicted trend value gives the deviation as a percentage of the trend, or as cycle relatives. When cycle relatives for both regions are plotted, it is possible to make comparisons of the severity of the housing cycle.

The following estimates were found for the West:

$$V_H = -2704.09 + 2.20X_1 + 1709.66X_2 \quad R^2 = .257 \quad df = 10$$

(3.02) (190.95)

The following estimates were found for the Northeast:

$$V_H = 2246.76 - 0.50X_1 + 71.97X_2 \quad R^2 = .088 \quad df = 10$$

(0.74) (190.93)

The nonsignificant coefficients suggest there is no trend in the value of residential construction for the Northeast. The single significant coefficient for the West indicates a positive trend. For data used and source see Appendix A.

The predicted trend values and the actual values of private residential construction are shown in Figures 11 and 12. Plotted also are cycle relatives for each region (Figure 13) which are given in Table III.

For the decline in housing construction ending in

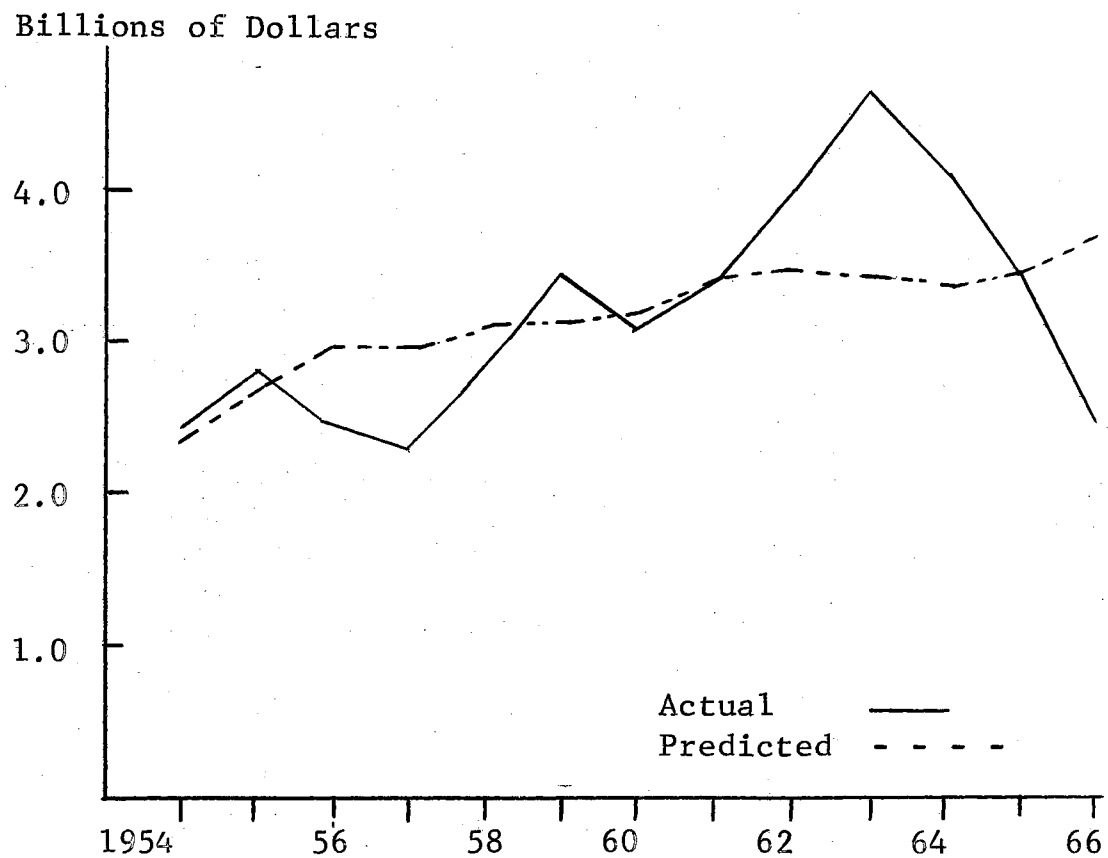


Figure 11. Predicted Values and Actual Values of Private Residential Construction in the West.

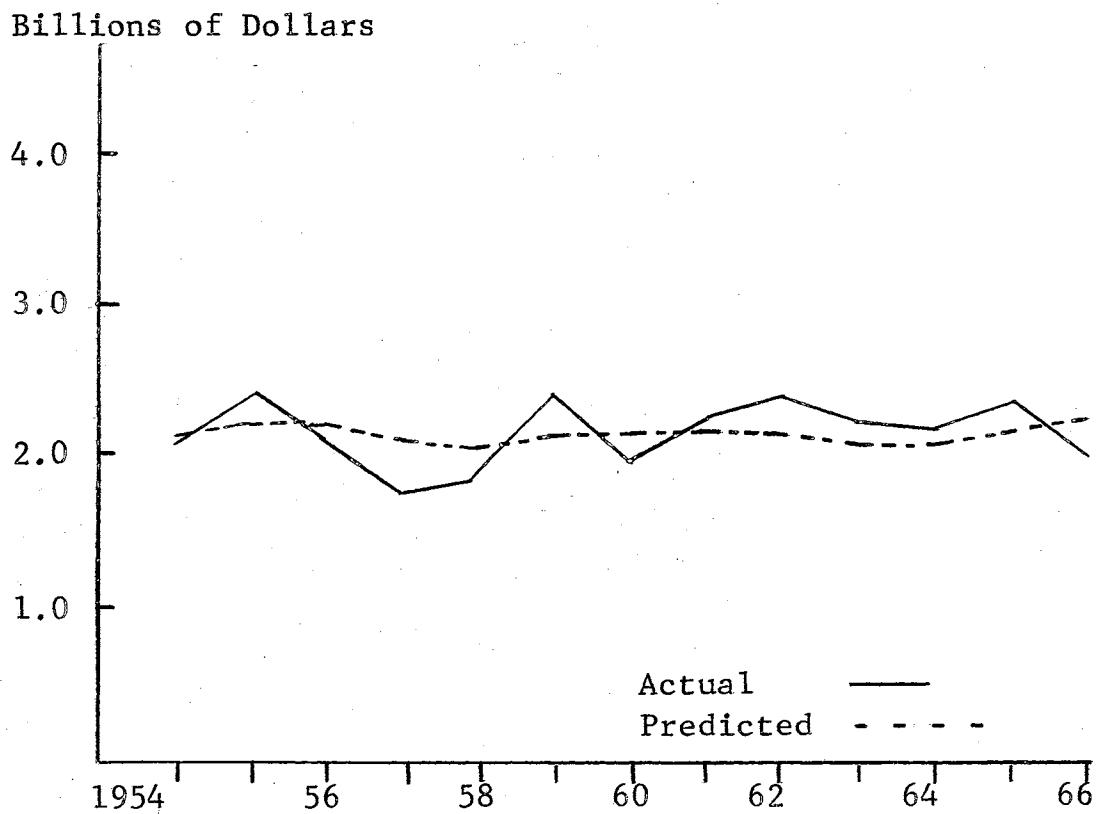


Figure 12. Predicted Values and Actual Values of Private Residential Construction in the Northeast

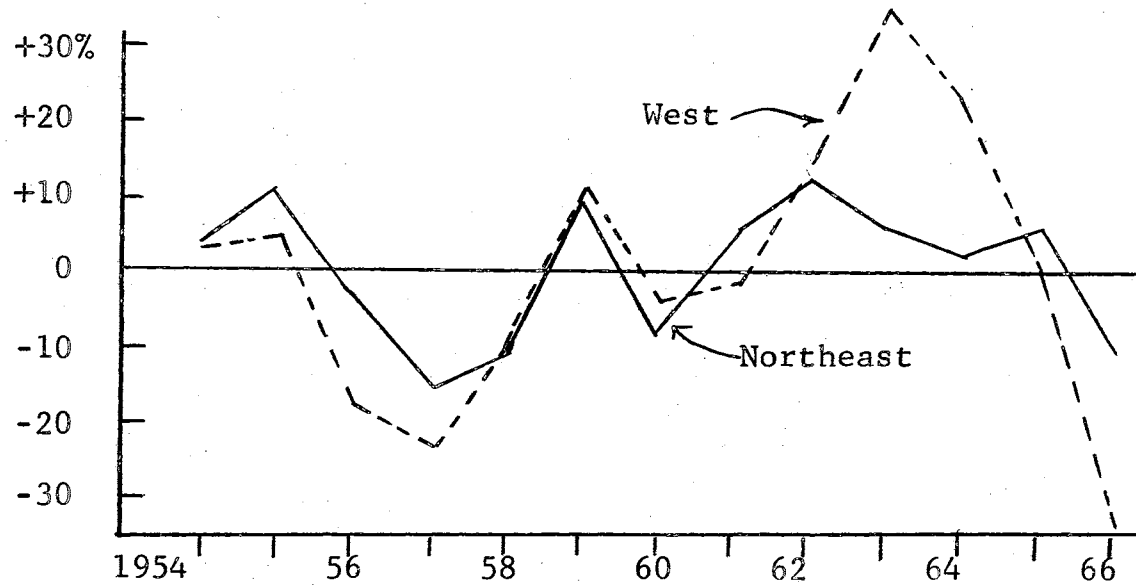


Figure 13. Cycle Relatives for West and Northeast

TABLE III
 ACTUAL AND TREND VALUES OF PRIVATE RESIDENTIAL
 CONSTRUCTION BY REGIONS (\$000)

Year	Northeast			West		
	Actual Values	Trend Values	Cycle Relatives	Actual Values	Trend Values	Cycles Relatives
1954	\$2077.5	\$2071.8	.27%	\$2435.0	\$2371.2	2.69%
1955	2417.5	2188.5	10.46	2829.0	2702.7	4.67
1956	2111.8	2200.9	- 4.05	2443.3	2971.2	-17.76
1957	1778.1	2129.7	-16.51	2298.4	2996.6	-23.29
1958	1857.6	2091.8	-11.20	2813.5	3098.0	- 9.18
1959	2374.7	2157.9	10.05	3493.9	3142.5	11.18
1960	1966.4	2161.9	- 9.04	3089.2	3222.8	- 4.14
1961	3280.8	2164.8	5.36	3370.7	3436.7	- 1.91
1962	2427.5	2168.4	11.95	4028.0	3500.8	15.05
1963	2254.5	2142.3	5.24	4673.5	3467.8	34.77
1964	2220.7	2169.3	2.37	4169.7	3412.9	22.18
1965	2389.0	2248.8	6.23	3481.2	3493.2	- 0.34
1966	2061.1	2321.0	-11.20	2484.1	3793.1	-34.51

1957, the West was found to have the more severe cycle, although only moderately so. The decline in the West exceeded that of the Northeast by approximately 7%. The results of the analysis for the 1960 decline are similar for those found in 1957. In the 1960 cyclical decline, the Northeast has a relative decline of 5% more than the Western region. Due to the difficulties of estimating trend values, it would be rather precarious to draw any firm conclusions as to which area had the greatest cyclical amplitude when the cycle relatives have a relatively narrow spread. The elimination of the trend from the 1966 housing cycle presents a much clearer indication of which region had the most severe cyclical decline than any of the previous periods. For 1966, the cycle relative for the West was -34.5% compared to -11.2% for the Northeast. A relative difference in decline of 23.3 percentage points.

The results of the analysis of the three periods of restrictive monetary policy are not entirely clear. The analysis of the first two housing cycles does not show a clear pattern as to which region has the most severe cycles due to the impact of monetary policy. For the 1966 housing cycle, it is clear that the West suffered a greater relative decline than the Northeast.

Computation of the Elasticity of Demand for Residential Mortgage Credit

In order to test the thesis of this study, the elas-

ticities of demand of factors which determine the cost of residential mortgage credit need to be estimated. Unfortunately complete data for the time period 1954-1967 are not available. The analysis covers the years of 1963 through 1967. This should be a sufficient number of monthly observations, and it does cover a period in which the relative decline was greater in one region than in the other. The model used for estimating the elasticities of demand is log-linear.

The dependent variable which represents the amount of residential mortgage credit demanded should be the gross flow of mortgage credit into private residential construction. Unfortunately, there are no national or regional data available on the gross flow of mortgage credit into housing. Nationally there are data available on the annual net change in mortgage debt outstanding on residential housing, but these data are not available on the regional level. Data for comparison of the two regional cycles thus will have to be generated from building permit data. From the standpoint of estimating the elasticities of demand, the use of the value of permits issued does not present a major problem because of the high correlation which is considered to exist between the value of residential construction and the value of residential mortgage credit.

The independent variables used are those related to the cost of residential mortgage credit. The first independent variable (X_1) is the interest rate for conventional

home mortgages. Since interest represents a direct cost to the borrower, the sign of the coefficient is expected to be negative. The second variable, interest rates on F.H.A. insured loans is a cost to the borrower, but the expected sign of the coefficient is positive. The positive coefficient would result from a substitution effect caused by the administrative setting of maximum interest rates. The fees and charges on conventional mortgages (X_3) is also a direct cost of the mortgage credit and the expected sign would be negative.

As to the expected sign of the number of years to maturity variable (X_4) the general agreement in the technical literature on housing is that a positive relationship exists between the number of years to maturity of a loan and the aggregate volume of mortgage credit demanded.² The argument is that the size of monthly payments are an important determinant of the volume of mortgage credit demanded. The longer the pay out period, the smaller the monthly payments. The smaller the monthly payments the greater amount of credit an individual can afford.

The fifth variable, the loan-to-value ratio, is not an actual cost to the borrower, but is an important determinant of the volume of mortgage credit demanded. The

²David Huang, "The Short Cycle in Residential Construction," Econometrica, April, 1966, p. 445. In an empirical analysis he found a positive relationship between the volume of residential mortgage credit demanded and the number of years to maturity on F.H.A. insured mortgages.

higher the loan to value ratio the smaller will be the downpayment; therefore, more people will be in a financial position to make the downpayment and willing to borrow the balance. Consequently, the expected relation between the volume of mortgage credit demanded and the loan to value ratio should be positive.

$$V = A \cdot X_1^{B_1} \cdot X_2^{B_2} \cdot X_3^{B_3} \cdot X_4^{B_4} \cdot X_5^{B_5}$$

$$\ln V = \ln A + B_1 \ln X_1 + B_2 \ln X_2 + B_3 \ln X_3 + B_4 \ln X_4 + B_5 \ln X_5$$

V - Value of permits issued for private residential construction as an estimate of the value of residential mortgage credit demanded.

X₁- Conventional interest rate on mortgages for private construction.

X₂- F.H.A. insured mortgage maximum interest rates.

X₃- Fees and charges on conventional mortgages as a percentage of purchase price.

X₄- Number of years to maturity of conventional mortgages.

X₅- Loan to value ratio of conventional mortgages.

The double-log transformation was used because it corresponds to the assumption of a constant elasticity between the independent and dependent variables, and the simple application of ordinary least squares to the logarithms of the variables produces an estimate of elasticity.³ For the

³J. Johnston, Econometric Methods, (New York, 1963), p. 48.

sources of the data, see Appendix B.

The following coefficients are estimated for the elasticities of the Northeast:

Northeast

Variable	Coefficient	Standard Error of Coefficient	t value
X ₁	-2.266	1.474	-1.537
X ₂	-0.181	0.767	-0.236
X ₃	-0.204	0.126	-1.614
X ₄	-0.023	0.061	-0.371
X ₅	-1.142	0.919	-1.242

$$R^2 = .100$$

$$df = 51$$

Durbin - Watson Statistic - 1.721

Because the coefficients of the variables (X₁X₂X₃X₄X₅) are not statistically different for zero, it can be concluded that the demand for residential mortgage credit in the Northeast is inelastic with respect to the factors which determine the cost of that credit.

The results for the West are slightly different with two of the coefficients associated with the conventional mortgages being significant.

West

Variable	Coefficient	Standard Error of Coefficient	t value
X ₁	-8.334	1.472	-5.662
X ₂	5.297	1.352	3.919
X ₃	-0.225	0.139	-1.624
X ₄	-2.550	0.549	-4.648
X ₅	2.139	1.113	1.422

$$R^2 = .781$$

$$df = 51$$

Durbin - Watson Statistic - .918

The results of the analysis seem to indicate that elasticity of demand for conventional mortgage credit is more elastic in the West than in the Northeast. Since residential conventional mortgage credit is the largest portion of all residential mortgage credit, the difference in interest elasticity between the Western and the Northeastern region is sufficient to explain the greater impact of the housing cycle in the West during 1966. With the demand for residential conventional mortgage credit being relatively interest elastic in the West and relatively interest

inelastic in the Northeast, equal shifts or contractions the supply of residential mortgage credit result in a greater relative decline in the West than in the Northeast.

There is one variable which cannot be easily added to the equations which might explain why the interest-elasticity of the demand for residential mortgage credit is inelastic in the Northeast and elastic in the West. Vacancy rates may be important in determining the interest-elasticity of the demand for residential mortgage credit through a possible influence on rent. During the period of 1963-1967, vacancy rates in the West were nearly double the rates in the Northeast. Because of data limitations, the effects of the vacancy rates on the demand for mortgage credit for private residential construction cannot be determined.

The sign for the fourth variable in the Western data presents somewhat of a surprise because of the unexpected negative coefficient. It suggests a sophistication on the part of the borrower not previously suspected. It would suggest that the mortgager looks beyond the size of the monthly payments and considers the total cost of the mortgage. The longer the number of years to maturity, the greater the cost of the mortgage in interest paid. The difference between the results of the Huang study and this analysis may be due to the two variables not being the same. In the Huang study the number of years to maturity

on F.H.A. insured loans is used, whereas, in this study the maturity on conventional mortgages is used. The number of years to maturity on conventional loans is determined by market conditions, whereas, on F.H.A. loans the number of years to maturity is administratively determined.

Summary

The analysis of the housing cycles in the Northeast and in the West does not present a clear pattern as to which region had the most severe cyclical fluctuations. For the first two housing cycles the relative fluctuations were only slightly different. During the first housing cycle studied the West had the greatest relative decline in private residential construction, while for the second cycle studied the Northeast had the greatest relative decline. Only for the 1966 housing cycle did the West have a significantly greater decline than the Northeast.

Although data for the complete period of 1954 to 1967 were not available, an analysis to determine the elasticity of demand for residential mortgage credit for the years 1963 to 1967 was attempted. For the Northeast the demand for residential mortgage credit was found to be interest elastic for conventional mortgage credit. This difference in elasticity should be sufficient to explain differences in regional housing cycles.

CHAPTER V

SUMMARY AND CONCLUSIONS

The general agreement in the technical literature concerning housing is that national cycles in private residential construction are the result of contractions in the availability of residential mortgage credit. From this conclusion, it was reasoned that capital deficit regions should have housing cycles of greater amplitudes than capital surplus regions because of a greater contraction in the availability of mortgage credit.

The thesis of this study is that differences in the severity of regional housing cycles are due to the regional demand for residential mortgage credit; although, the housing cycles are caused by supply conditions. If the elasticity of the demand for mortgage credit is elastic in one or both regions, then the regional housing cycles should be different. If the elasticity of demand is inelastic in both regions, then the housing cycles should be similar.

The Northeastern region was used as representative of a capital surplus region, while the West was used as a capital deficit region. An analysis of the cyclical fluctua-

tions in the value of private residential construction found no clear pattern as to which region has the most severe housing cycles. Only in 1966 was it distinctively clear that the Western or capital deficit suffered a greater relative decline than the Northeast. To a certain extent this discredited the conventional argument. The conventional argument was that a capital deficit would have greater cyclical fluctuations due to geographical differences in financial resources. The analysis found for two of the housing cycles the relative declines were not appreciably different, in fact, during one cycle the Northeast had a slightly greater decline than the West. This would suggest that factors other than differences in financial institutions may be important in determining which region has the most severe cyclical fluctuations.

Computation of the elasticity of the demand for mortgage credit for both regions suggested an explanation for the differences in regional housing cycles. The elasticities of the factors associated with the demand for conventional mortgage credit were found to be inelastic in the Northeast. For the West, the demand for residential mortgage credit was found to be elastic in relationship to the rate of interest on conventional home mortgages. Since conventional mortgages are the most important sector of the residential mortgage market, the difference in the elasticity of the conventional interest rate should be suf-

ficient to explain the difference in regional housing cycles. It tends to support the hypothesis that demand conditions are an important determinant of the difference in the severity of regional housing cycles.

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APPENDIX A

DATA FOR VARIABLES OF THE TREND
IN PRIVATE RESIDENTIAL CONSTRUCTION

Northeast				West		
Year	V(Mil- lions)	X ₁ (000)	X ₂ (000)	V(Mil- lions)	X ₁ (000)	X ₂ (000)
1954	\$2077.5	638	\$2.022	\$2435.0	786.0	\$1.956
1955	2417.5	421	2.129	2829.0	859.0	2.055
1956	2111.8	414	2.252	2443.3	908.0	2.149
1957	1778.1	569	2.344	2298.4	868.0	2.216
1958	1857.6	646	2.356	2813.5	882.0	2.257
1959	2374.7	530	2.464	3493.9	807.0	2.380
1960	1966.4	532	2.533	3089.2	813.0	2.419
1961	2280.8	543	2.587	3370.7	857.0	2.487
1962	2427.5	534	2.701	4028.0	794.0	2.606
1963	2254.5	606	2.778	4673.5	708.0	2.698
1964	2220.7	572	2.916	4169.8	597.0	2.809
1965	2389.0	437	2.078	3481.2	528.0	2.944
1966	2061.1	323	3.286	2484.1	503.0	3.152

Source: Total population and X: Current Population Reports, Series P-25, No. 3041 (April 8, 1965).
Current Population Reports, Series P-25, No. 380 (November 24, 1967).

Total Personal Income: Survey of Current Business, Vol. 47. No. 4 (April, 1967).

V: "Construction Statistics 1915-1964," A Supplement to Construction Review, U.S. Dept. of Commerce, January 1966.
Construction Review, February, 1968.

APPENDIX B

The sources of the data for the double log transformation regression analysis used to determine the elasticities of demand were:

V_H	<u>Construction Review</u> , U.S. Department of Commerce. Various issues.
X_1	Courtesy of the Department of Housing and Urban Development.
X_2, X_3	<u>Savings and Loan Fact Book</u> , 1966. U.S. Savings and Loan League.
X_4, X_5, X_6	<u>Digest</u> , Federal Home Loan Bank Board. Various issues.

The values of X_4 , X_5 , and X_6 are estimates, they are the average of the values found in the major metropolitan areas within a region. The values for the Northeast are an average of the values for Boston, New York, and Philadelphia. The values for the West are an average of the values in Denver, Los Angeles, San Francisco, and Seattle.

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