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CENTER FOR REAL ESTATE
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WORKING PAPER 84-88

TAXES, POINTS AND RATIONALITY

IN THE MORTGAGE MARKET

BY

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GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

CENTER FOR REAL ESTATE AND URBAN ECONOMICS
UNIVERSITY OF CALIFORNIA, BERKELEY

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Mortgage Market
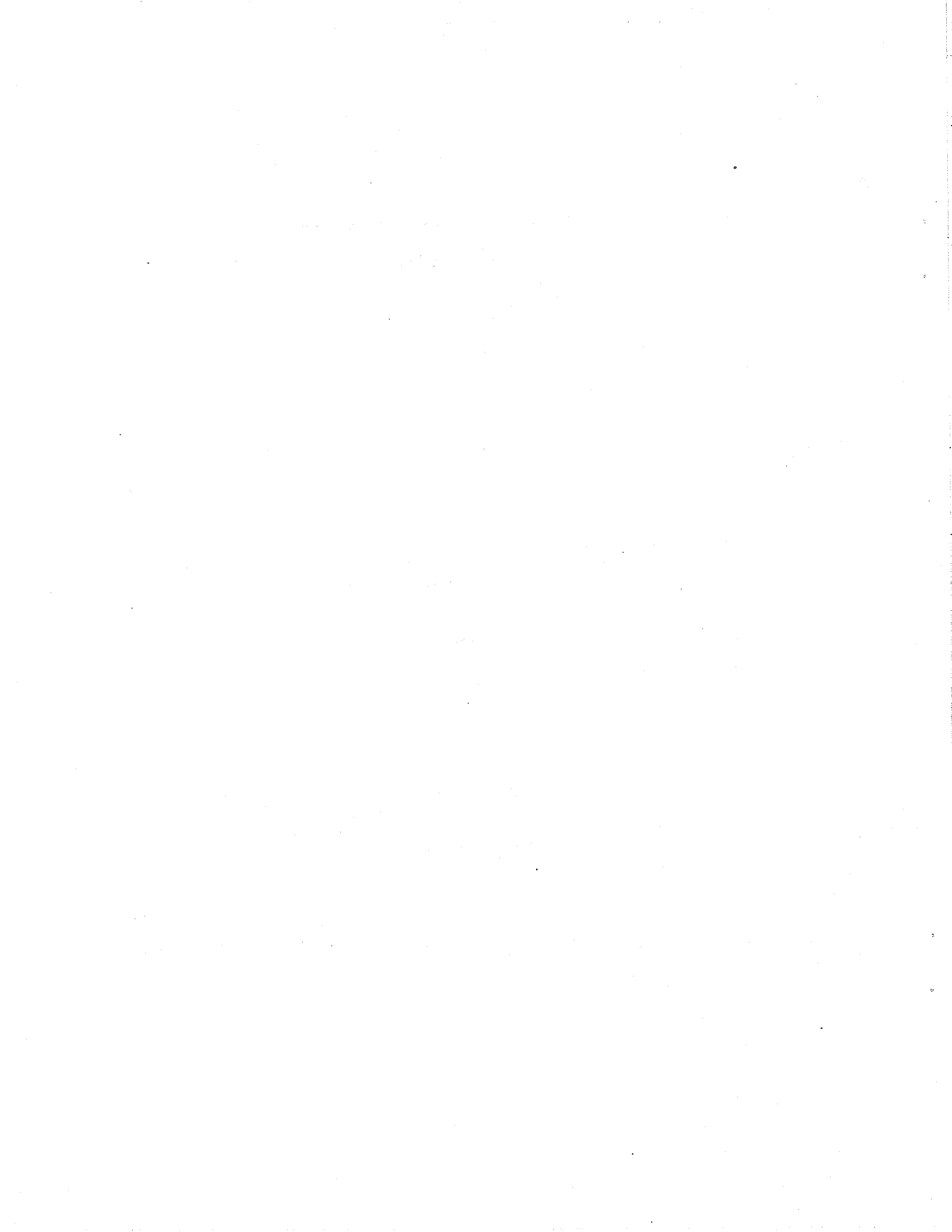

by

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May, 1984

Working Paper 84-88

Taxes, Points and Rationality in the

Mortgage Market

I. Introduction

This paper addresses the issue of why discount points exist in the

mortgage market. In a world of perfect markets and no uncertainty, mortgage

institutions would achieve the same required rate of return regardless of loan

structure. If for some reason the effective interest rate was below the

required rate, points could be used as a mechanism to raise the rate to the

competitive level [See Curley and Guttentag, 1974]. But it is not apparent

why this particular means should be the one used. In the current deregulated

market, the lender could just as easily increase the contract rate to achieve

the same goal. In other words, since lenders in a competitive market can only

earn a normal rate of return, discount points would not seem to have any

special purpose. Thus some other explanation must be used to explain the

particular role of points.

Historically, the most common explanation for points relates to FHA

insured and VA guaranteed loans. Interest rates on these mortgages tended to

lag behind conventional interest rates because of government regulations. As

a result, discount points were charged by the lender to make effective yields

on these loans equivalent to the yield on conventional mortgages [See Colwell,

Guntermann and Sirmans (1979); Guntermann (1979) and Zerbst and Brueggeman

(1977)]. However, such reasoning can hardly serve to explain why discount

points are also observed on conventional loans, especially now that many

former restrictions, such as usury laws, have been relaxed. Furthermore FHA

loans have been deregulated to the extent that the contract rate is allowed to

move in conjunction with the conventional mortgage rate. The traditional explanation for points would then predict that points would disappear from FHA loans.

This paper provides evidence that the particular tax treatment afforded both lenders and borrowers in the mortgage market provides the sought for reason behind points. The tax explanation we offer indicates why points can occur with conventional loans and so why, even with deregulation, they can continue to occur with FHA loans.

Another apparent explanation for points would involve the role of uncertainty. Section II provides critical evaluation of this approach. The formulation of our model is described in Section III. Section IV provides some preliminary analysis, whereas Section V completes the study of the model in the case of a flat rate income tax schedule for the borrower. Section VI then extends the analysis to include a graduated tax schedule. Section VII provides a simulation of the model that indicates the types of borrowers that would actually prefer points. Finally, Section VII presents a summary and conclusion.

II. Alternative Theories for Discount Points

In a world of perfect markets and no uncertainty, there would seem to be no specific reason for discount points to exist. This invites the idea that discount points may be explained by recognizing the existence of uncertainty. Indeed, an informal explanation that has been advanced is that paying discount points is like purchasing an option to prepay with no penalty: lenders trade off discount points for the prepayment penalties they would otherwise require. Lenders, being less risk averse than individuals, will trade at terms

attractive to the consumer, for whom up-front discount points are certain, while possibly occurring prepayment penalties are uncertain.

For this argument to have much merit, one needs to ascertain why prepayment penalties exist at all. They would not appear to be required of true variable rate loans, which act like a sequence of one-year loans at the prevailing interest rate, so that the contract may be halted at any time to neither side's detriment. On the other hand, something like prepayment penalties would be required of fixed interest loans, due to the asymmetry that the individual may prepay, but the lender may not call in the loan. In times when the interest rate turns out to be higher than anticipated, the lender loses money on his loans; so to make a normal rate of return on average, the lender must assure himself compensation in those times when the interest rate turns out to be lower than expected. Borrowers seek to avoid that compensation by prepaying their loans; so to prevent this avoidance, the lender must use prepayment penalties.

The question then becomes whether risk averse individuals would prefer fixed or variable interest loans. In real present value terms, the payment on a variable interest loans involves no risk, as opposed to the real payment on a fixed interest loan. It is for precisely this reason that prepayment penalties would be required only of fixed interest loans, with the subsequent presumption for discount points. But if one wants to eliminate real risk to the greatest extent possible, one would adopt variable rate loans and circumvent the entire problem.

One can of course just take it for granted that fixed interest loans or otherwise less than true variable rate loans prevail, due perhaps to institutional requirements inherited from a stable period when there was little distinction between the two. However, as we examine further in the

body of our paper, whatever tradeoff may be seen between discount points and prepayment penalties, there is certainly also an observed tradeoff between discount points and the contract rate. To the extent that this occurs, discount points act as a deterrent to prepayment and would hardly serve the interests of an individual contemplating prepayment. In return for discount points, individuals can receive lower contract rates on the loan. But when a loan is paid off sooner than expected, the entire face value of the loan must be repaid, not just the amount net of the discount points which was originally received from the bank. If a person prepays sooner than anticipated, he loses some portion of the benefit from the lower contract rate which compensated for the points. Therefore, discount points serve in this manner as an obstacle to prepayment. Clearly, there are other means by which the borrower may pay for the absence of prepayment penalties which the borrower contemplating prepayment would prefer.

Given the doubtful state of arguments explaining discount points as a form of option to reduce uncertainty, we take the opposite tack of treating a world of certainty, but where indirect market imperfections are considered in the form of a tax system. In order to see whether the tax treatment of discount points can by itself sufficiently explain their existence, we maintain the assumption of perfect markets in all other respects. As a result of this position, a simple but important principle is that all equilibrium situations must result in lenders earning a normal rate of return for their category. Much can be made of the fact that discount points raise the effective rate of return, [See Curley and Guttentag, 1974], but this type of thinking can be seriously misleading unless it is also recognized that lenders can assure themselves of only a normal rate of return and that discount points are only one of the means by which this normal rate of return can be attained.

Since lenders ultimately care only about their rate of return and not the means for achieving it, an explanation of why the particular device of discount points is so prominently observed is going to have to rest on something other than its raising the effective rate of return. The particular tax treatment of discount point afforded both lenders and borrowers provides such an explanation.

III. The Formulation of the Model

We are concerned only with how the purchase of a house is financed, and so take the sale price $\bar{P}$ as given. We also take the amount of downpayment D as exogenous; this is presumably dictated by conventions reflecting risk and moral hazard considerations. The remainder of the price is normally financed by a loan L, so that

(1) $\bar{P} = D + L$.

However, in the case of discount points, which are expressed as a fraction α of the loan, the borrower receives only a payment of $(1-\alpha)L$ from the lender and must make up the difference αL toward purchase of the house himself. Nonetheless, the borrower is required to repay the entire amount L to the lending institution.

Current tax laws are such that both discount points and nominal interest payments are tax deductible to the borrower. Since these laws are stated in nominal not real terms, they introduce distortions. Thus otherwise inessential nominal considerations have a real impact. We are interested in the effective present value price of the house P to the purchaser. This is

(2) $\bar{P} = D + \sum_{j=1}^{n} \frac{(1-t_j)(\theta-\beta_j)L}{(1+r')^j} + \sum_{j=1}^{n} \frac{\beta_j L}{(1+r')^j} + (1-t_0)\alpha L$

with $r' = (1-t)r$, where t_j is the marginal tax rate to the borrower in the jth period, t is the average marginal tax rate over the term of the loan, and r is the market rate of return.[1] We let n stand for the exogenously set term of the loan (henceforth suppressed), while Θ is to be the mortgage constant. That is, because we are dealing with fixed interest loans, the nominally fixed payment each period may be expressed as a fraction Θ of the face value of the loan. Finally, β_j is the percent of the face value of the loan being paid in the jth period. It is convenient to work in a per dollar loan basis; so rearranging we have $p = P/L$, the effective house price per dollar of the loan, as

$$(3) \quad p = d + \Sigma \frac{(1-t_j)\Theta}{(1+r')^j} + \Sigma \frac{t_j\beta_j}{(1+r')^j} + (1-t_0)\alpha,$$

where $d = D/L$. The first sum indicates the cost of loan payments, assuming all payments are tax deductible; whereas the second term adjusts for the fact that principal payments are not in fact tax deductible. We have taken r to be constant for simplicity; in our setting of certainty, no conceptual difficulties would arise from allowing the market rate of return to vary through time.

Recall that we are assuming perfect capital markets, so that both the borrower and the lender are concerned only with present value considerations. In return for paying discount points, the borrower receives a lower contract rate on the loan than would otherwise be the case. Since the lender receives neither more nor less than a normal rate of return on the investment, the sum of the repayments discounted at the lender's required rate of return must balance with the actual payment to the borrower. That is

$$(4) \quad L = (1-\mu)\Sigma \frac{\Theta L}{(1+r'')^j} + \mu\Sigma \frac{\beta_j L}{(1+r'')^j} + (1-\mu)\alpha L$$

with $r'' = (1-\mu)r$, where μ is the lender's marginal tax rate. Since the size of the loan is small from the point of view of the bank it will not affect the tax rate μ. We also suppose for convenience that μ is not anticipated to change over time.

The mortgage contract rate $\bar{r}$ is that discount rate which balances the discounted payments with the face value of the loan, regardless of the amount deducted as points. Thus, we have

$$(5) \quad L = \Sigma \frac{\Theta L}{(1+\bar{r})^j}$$

Unlike (4), which reflects strong assumptions of perfect competition, (5) is merely an identity. We develop the mechanical relation between the mortgage constant Θ and the contract rate $\bar{r}$ in the next section.

IV. Structural Equations

It is useful at this point to determine what proportion of the loan payment in each period is the principal. We have

$$(6) \quad \beta_j = \Theta - \bar{r}(1 - \overset{j-1}{\underset{}{\Sigma}} \beta_i);$$

that is, the principal payment β_j in the jth period is the mortgage constant less the contracted interest payment on the remaining principal. From this, it follows that

$$(7) \quad \beta_j = (1+\bar{r})\beta_{j-1}.$$

This is an elementary first order difference equation with initial condition $\beta_j = \Theta - \bar{r}$, whose solution by forward induction is found to be

(8) $\beta_j = (1+\bar{r})^{j-1}(\theta-\bar{r})$.

Thus the proportion of the mortgage payment devoted to amortizing the loan rises exponentially over time.

Defining

(9) $S_{\bar{r}} = \Sigma \dfrac{1}{(1+\bar{r})^j} = \dfrac{1-(1+\bar{r})^{-n}}{\bar{r}}$

by power series summation, we may rewrite (3) as

(10) $1 = \theta S_{\bar{r}}$.

Since by (9), $S_{\bar{r}} < \dfrac{1}{\bar{r}}$, these last two expressions gives us $\theta > \bar{r}$, so that in fact $\beta_j > \beta_{j-1}$.

Differentiating (8), we find

(11) $\beta_j' \equiv \dfrac{d\beta_j}{d\theta} = (j-1)(1+\bar{r})^{j-2}(\theta-\bar{r})\dfrac{d\bar{r}}{d\theta} + (1+\bar{r})^{j-1}(1- \dfrac{d\bar{r}}{d\theta})$

Differentiating (10) in turn, we have

(12) $\dfrac{d\bar{r}}{d\theta} = \dfrac{-S_{\bar{r}}^2}{S_{\bar{r}}'} > 0,$

which is indeed positive since

(13) $S_{\bar{r}}' = \dfrac{-S_{\bar{r}} +n(1+\bar{r})^{-(n+1)}}{\bar{r}} < 0,$

as follows from $\overset{n}{\Sigma}(1+\bar{r})^{-j} > n(1+\bar{r})^{-(n+1)}$. In fact substituting (13) into (12) also gives us

(14) $\dfrac{d\bar{r}}{d\theta} = \dfrac{\bar{r}S_{\bar{r}}^2}{S_{\bar{r}} - n(1+\bar{r})^{-(n+1)}} = \dfrac{1 - (1-r)^{-n}}{\dfrac{1 - n\bar{r}(1+\bar{r})^{-(n+1)}}{1 - (1+\bar{r})^{-n}}} > 1,$

since $1 - (1+\bar{r})^{-n} = \bar{r}S_{\bar{r}} < \bar{r}n(1+\bar{r})^{-1}$.

With this lower bound on $\dfrac{d\bar{r}}{d\theta}$ we can conclude from (11) that

$$(15) \quad \frac{d\beta_j}{d\Theta} - \frac{d\beta_{j-1}}{d\Theta} = (1+\bar{r})^{j-2}(\bar{r}(1-\frac{d\bar{r}}{d\Theta}) + (\Theta-\bar{r})\frac{d\bar{r}}{d\Theta}$$

$$+ \bar{r}(j-2)(1+\bar{r})^{-1}(\Theta-\bar{r})\frac{d\bar{r}}{d\Theta})$$

remains positive after turning positive, which it eventually must since $\frac{d\beta_j}{d\Theta} > 0$ and $\frac{d}{d\Theta} \Sigma \beta_j = 0$. Thus negative $\frac{d\beta_j}{d\Theta}$ all precede positive $\frac{d\beta_j}{d\Theta}$ and since earlier terms are weighted more heavily,

$$(16) \quad \Sigma_r \beta_j' \equiv \frac{d}{d\Theta} \Sigma \frac{\beta_j}{(1+r)^j} < 0,$$

a term that appears below.

V. Flat Income Tax Schedule

To see the basic reasoning, we first treat the simpler case where the marginal tax rate t of the borrower is constant. Rewriting the normal rate of return equation (4) in per dollar form we have

$$(17) \quad 1 = (1-\mu)\Theta S_{r''} + \mu\Sigma \frac{\beta_j}{(1+r'')} + (1-\mu)\alpha.$$

Differentiating with respect to points gives

$$(18) \quad 0 = (1-\mu) \frac{d\Theta}{d\alpha} S_{r''} + \mu \Sigma_{r''}\beta_j' \frac{d\Theta}{d\alpha} + (1-\mu).$$

On the other hand, differentiating the borrower's price equation (2) gives us the similar expression

$$(19) \quad \frac{dp}{d\alpha} = (1-t) \frac{d\Theta}{d\alpha} S_{r'} + t \Sigma_{r'}\beta_j' \frac{d\Theta}{d\alpha} + (1-t).$$

Substituting (18) into (19) yields

$$(20) \quad \frac{dp}{d\alpha} = \frac{(1-t)(1-\mu)(S_{r''}-S_{r'}) + (1+t)\mu \Sigma_{r''}\beta_j'-(1-\mu)t \Sigma_{r'}\beta_j'}{(1-\mu)S_{r''} + \mu \Sigma_{r''} \beta_j'}$$

Notice that when $\mu = t$, so that the lender's and borrower's marginal tax rates coincide, we get $r' = r''$ and p is unaffected by the number of points. There are then no tax arbitrage possibilities between borrower and lender and so the tax treatment of points is of no importance. However when $t>\mu$, so that the

borrower is being taxed more heavily on the margin than the lender, points become desirable.

To see the main workings of this, we employ the approximation that since $r' = (1-t)r$ and $r''=(1-\mu)r$, then because $S_r \sim \frac{1}{r}$ for a long term loan, we have both $(1-t)S_{r'} \sim S_r$ and $(1-\mu)S_{r''} \sim S_r$. Substituting these into (18) and (19) we find

$$(21) \quad \frac{dp}{d\alpha} \sim (\mu-t) + (t\Sigma_{r'}\beta_j^{'} - \mu\Sigma_{r''}\beta_j^{'})\frac{d\theta}{d\alpha}$$

The latter term is quantitatively insignificant, as will be seen in the simulations. It arises only because of the fact that just the interest portion and not all the mortgage payment is tax deductible. Basically, with a lower marginal tax rate for the lender, he receives $1-\mu$ dollars for every $1-t$ dollars spent by the borrower on points. As we have modeled it, there is perfect competition in the credit market, assuring a normal rate of return for the lender. Thus all tax advantages are passed back to the borrower in the form of money favorable terms on the loan. This assumption, though, was made only for convenience, since however the savings in taxes are split, it is clear that the borrower and lender will act to minimize the total tax burden. (This line of reasoning is developed more fully in Miller (1977)).

To see the results geometrically, we consider the implicit tradeoff in (4) between points α and the mortgage constant θ that allows the lender to maintain a normal rate of return. The slope of this line will be

$$(22) \quad \frac{d\theta}{d\alpha}\bigg|_{\pi} = \frac{-(1-\mu)}{(1-\mu)S_{r''} + \mu\Sigma_{r''}\beta_j^{'}} \sim -r(1-\mu)$$

The borrower on the other hand is interested in minimizing the cost of financing his purchase of a house. We may consider the isocost curves between θ and α implicit in the pricing equation (2), finding their slope to be

FIGURE 1A
Optimal Points with $\mu < \tau$, Proportional Tax

θ

$\tilde{\tau}=0$

$\pi(\alpha,\theta)=0$

$P(\alpha,\theta)=\bar{P}$

O

$1-S_r$

$\dfrac{n}{1-\mu}$

1

α
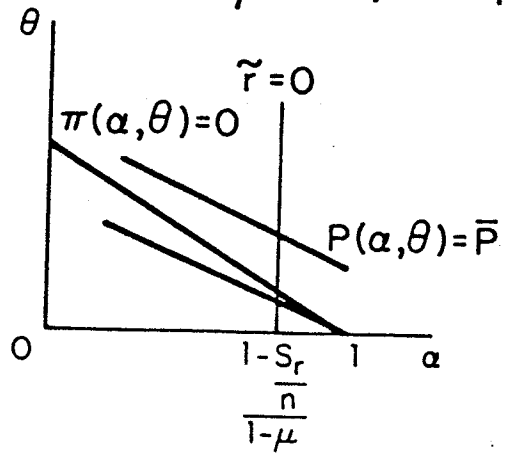
FIGURE 1B
Optimal Points with $\mu = \tau$, Proportional Tax

θ

$\tilde{\tau}=0$

$\pi(\alpha,\theta)=0$

$P(\alpha,\theta)=\bar{P}$

O

$1-S_r$

$\dfrac{n}{1-\mu}$

1

α
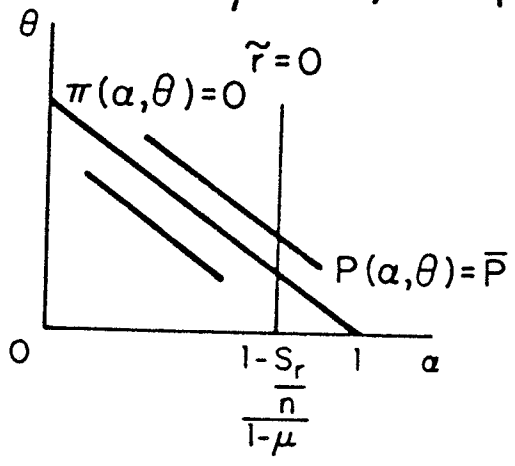
FIGURE 1C
Optimal Points with $\mu > \tau$, Proportional Tax

θ

$P(\alpha,\theta)=\bar{P}$

$\tilde{\tau}=0$

$\pi(\alpha,\theta)=0$

O

$1-S_r$

$\dfrac{n}{1-\mu}$

α
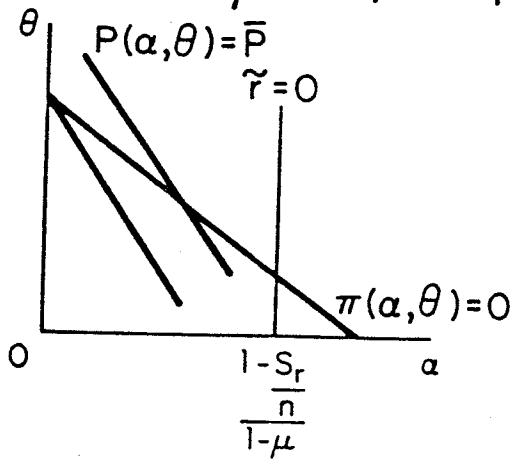
(23) $\dfrac{d\Theta}{d\alpha}\bigg|_p = \dfrac{-(1-t)}{(1-t)S_{r'}+t\Sigma_{r'}\beta_j'} \sim - r(1-t).$

In Figure 1-A through 1-C we show the three cases $t>\mu$, $t=\mu$, and $t<\mu$. Treating only the tax considerations results in extreme behavior, since the tax advantages of a point is essentially the same regardless of the number of points, given constant tax rates for the borrower and lender. In the next section we analyze the more realistic case where the borrower faces a graduated income tax schedule. Qualitatively, however, the results remain much the same.

V. Graduated Income Tax Schedule

In order to prepare for the simulations in the following section where the actual U.S. tax schedule is employed, we now consider the effect of a graduated income schedule. Also in the interests of realism, we allow for a peculiarity of the current tax laws which permits lending institutions to spread the tax liability of income received in points over the life of the loan, though the borrower may take his deduction immediately.

The degree to which points affect the borrower's tax bracket depends on the effect of deductible interest payment on taxable income y_j, represented by

(24) $\dfrac{dy_j}{d\alpha} = -\dfrac{d\Theta}{d\alpha} - \dfrac{d\beta_j}{d\alpha}L$, $\qquad \dfrac{dy_0}{d\alpha} = -L$

Taking this into account, we find

(25) $\dfrac{dp}{d\alpha} = \Sigma \dfrac{(1-t_j)}{(1+r')^j} \dfrac{d\Theta}{d\alpha} - \Sigma \dfrac{(\Theta-\beta_j)t_j'}{(1+r')^j} \dfrac{dy_j}{d\alpha}$

$\qquad + \dfrac{d\Theta}{d\alpha} \Sigma \dfrac{t_j\beta_j'}{(1+r')^j} + (1-t_0) + t_0'\alpha L.$

Now the slope of isocost combinations of α and Θ takes the form

$$(26) \quad \frac{d\theta}{d\alpha}_p = \frac{-(1-t_0) - t_0' \, \alpha L}{(1-t) \, S_{r'} + t\Sigma_{r'}\beta_j' + \Sigma \, \dfrac{(\theta-\beta_j)t_j'(1-\beta_j')L}{(1+r')^j}}$$

where to make its appearance manageable we have assumed that the marginal tax rate turns out to be the same for all periods, other than the date of purchase when the possibly large deduction of points occurs.

The lenders' normal rate of return equation must be modified by the permitted tax deferrals introduced in the previous paragraph, so the slope of the (α,θ) tradeoff is now found to be

$$(27) \quad \frac{d\theta}{d\alpha}_\pi = \frac{\dfrac{(1-\mu S_{r''})}{n}}{(1-\mu)S_{r''} + \mu \, \Sigma_{r''}\beta_j'}$$

It is still the case that quantitatively the major impact of α on θ for either of the above expressions appears only in the first term of the denominator, so that beginning from no points, that is with $\alpha=0$, we find that the tradeoff $\frac{d\theta}{d\alpha}_p$ acts like $\frac{1}{S_{r'}} = (1-t)r$. The lender's tradeoff on the other hand now acts

$$(28) \quad \frac{\dfrac{(1-\mu S_{r''})}{n}}{(1-\mu)S_{r''}} < \frac{1}{S_{r''}} = (1-\mu)S_r$$

Thus in the plausible case that the borrower's tax rate t exceeds the lender's tax rate μ, the borrower will surely take some points. In fact, the direct effect of the nonlinear tax schedule appearing in the numerator reinforces this effect and increases with α, so considering only tax advantages drives one to a corner solution with all points, just as in the earlier analysis with a flat tax rate (See Figure 2). While, therefore, we have provided a tax rationale for the desirability of points, limits as to the number of points

must rest on considerations other than the tax advantage. The most obvious explanation is to admit the existence of capital market imperfections for the borrower. In the period where the borrower is buying the house and hence must come forward with a downpayment, it may be very difficult for the borrower to also pay substantial points, whatever their tax advantage.

This does however raise the interesting question of why points have not replaced downpayment as collateral. Be it as a downpayment or as points, an upfront payment by the borrower creates security for the lender. In fact with points, the borrower is even more hesitant to default, since he has no legal opportunity to recover any of his payment, whereas a downpayment would have given him some equity. From the tax standpoint, however, it is easy to see that the borrower prefers points, since here the choice is not between points and interest payments, both of which are deductible, but between points and downpayment of which only the first is deductible. Except for laws requiring a minimal downpayment, it is not clear why points have not come to dominate downpayments.

VI. Simulation Results

The main thrust of our study is that points exist because of the tax advantage to the borrower who, if in a higher tax bracket than the lending institution, receives greater tax deductions from discount points than the lender incurs tax liabilities.

The first step in the simulation of our theoretical results is to estimate the tradeoff between points and the contract rate. This is done using the following implicit equation:

FIGURE 2

Optimal Points with $\mu < \tau$, Graduated Tax
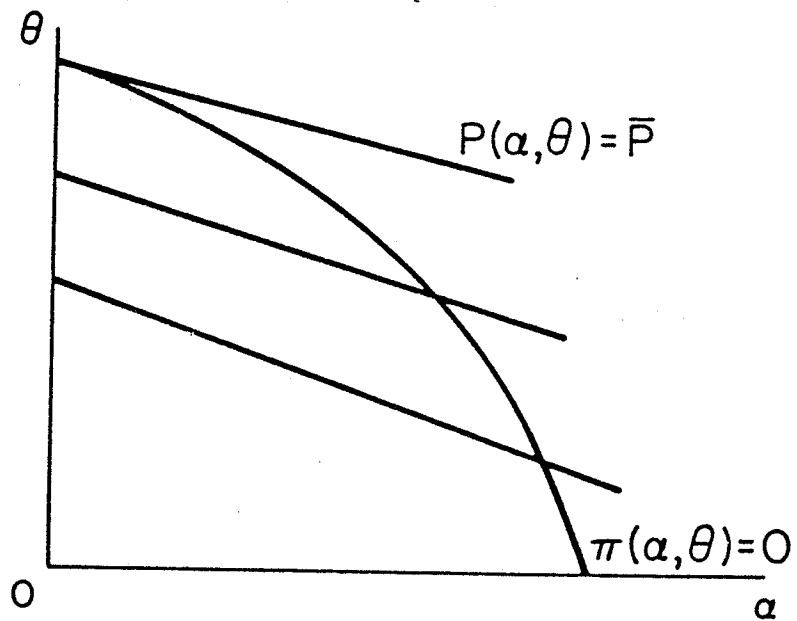
$$(29) \quad 1 = (1-\mu)S_{r''}\frac{\bar{r}}{1-(1+\bar{r})^{-n}} + \frac{\mu}{1+r''}\left(\frac{\bar{r}}{1-(1+\bar{r})^{-n}} - \bar{r}\right)\left(\frac{1 - \frac{1+\bar{r}}{1+r''}^{-n}}{1 - \frac{1+\bar{r}}{1+r''}}\right)$$

$$+ \left(\alpha - \frac{\alpha}{n}\mu S_{r''}\right)$$

which is a simplified form of the normal profit requirement.

Equation (29) allows us to derive the mortgage contract rate for any given amount of points. The second step in the simulation process is to substitute the series of (α,r) combinations into an effective housing-price equation to determine the least cost combination. The expression for housing price (29) to be minimized is equation (3) modified to include the current U.S. nonlinear tax schedule T( ). This takes the form

$$(30) \quad \bar{P} = D + \sum^{n} \frac{\Theta L - T(y_j) - T(y_j - L(\Theta-(1+\bar{r})^{j-1}(\Theta-\bar{r})))}{(1+r')^j}$$

$$+ \alpha L - (T(y_0) - T(y_0 - \alpha L)).$$

Equation (30) determines when borrowers choose points. Figures 3, 4, 5 and 6 provide some indication of where the division between points and no points lies. Each figure presents the division in terms of two separate assumptions concerning the value of the house. The solid line represents a $120,000 house with an $18,000 downpayment and a $102,000 loan. The dotted line indicates the division with a $50,000 house financed by a $6,000 downpayment and a $44,000 loan. This second case characterizes a typical FHA mortgage. The assumed interest and inflation rates are varied between figures. Figure 3 uses a nominal interest rate of 10% with no inflation, in comparison to Figure 4 which assumes an interest rate of 15% with 5% inflation. In Figure 5 the interest rate is 5% with no inflation, while Figure 6 assumes a 10% nominal interest rate with 5% inflation. In the cases

FIGURE 3

Points - No Points Frontier

r =.1   D= 6,000   L= 44,000   GR=0 — —
r =.1   D= 18,000   L= 102,000   GR=0 ——
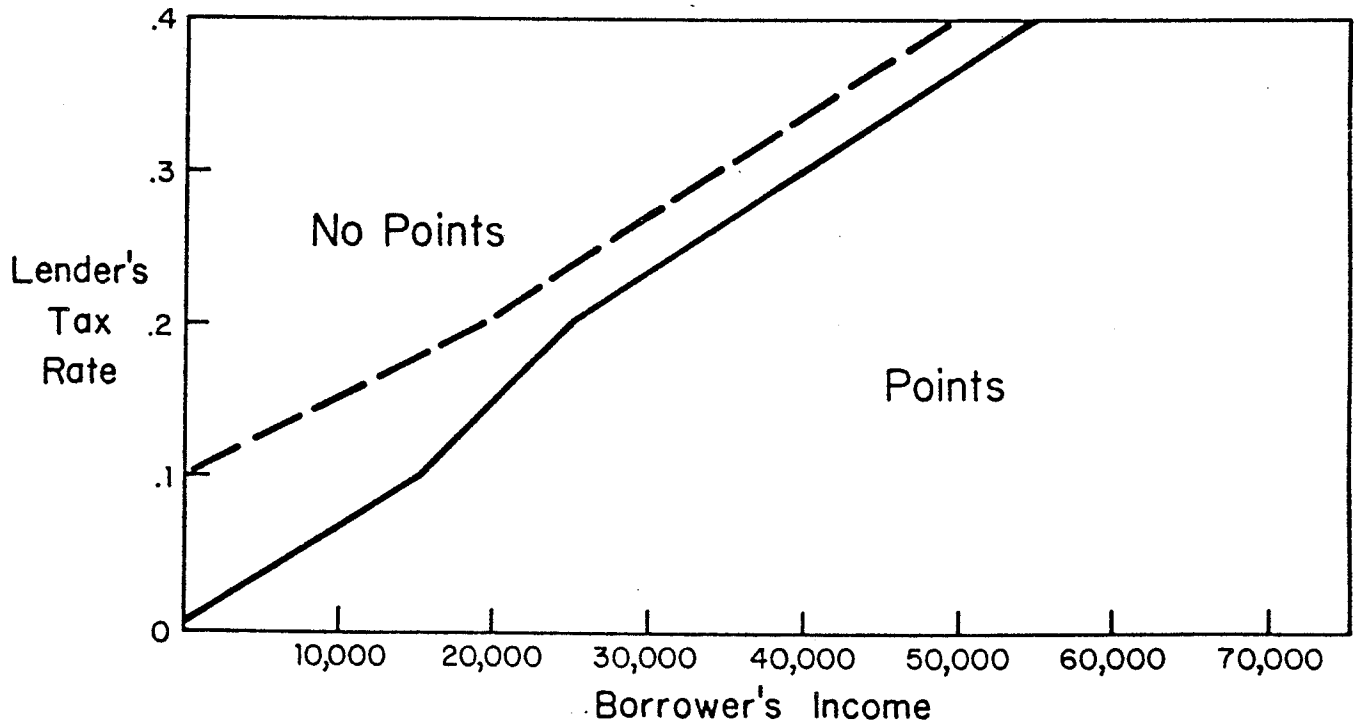
FIGURE 4

Points - No Points Frontier
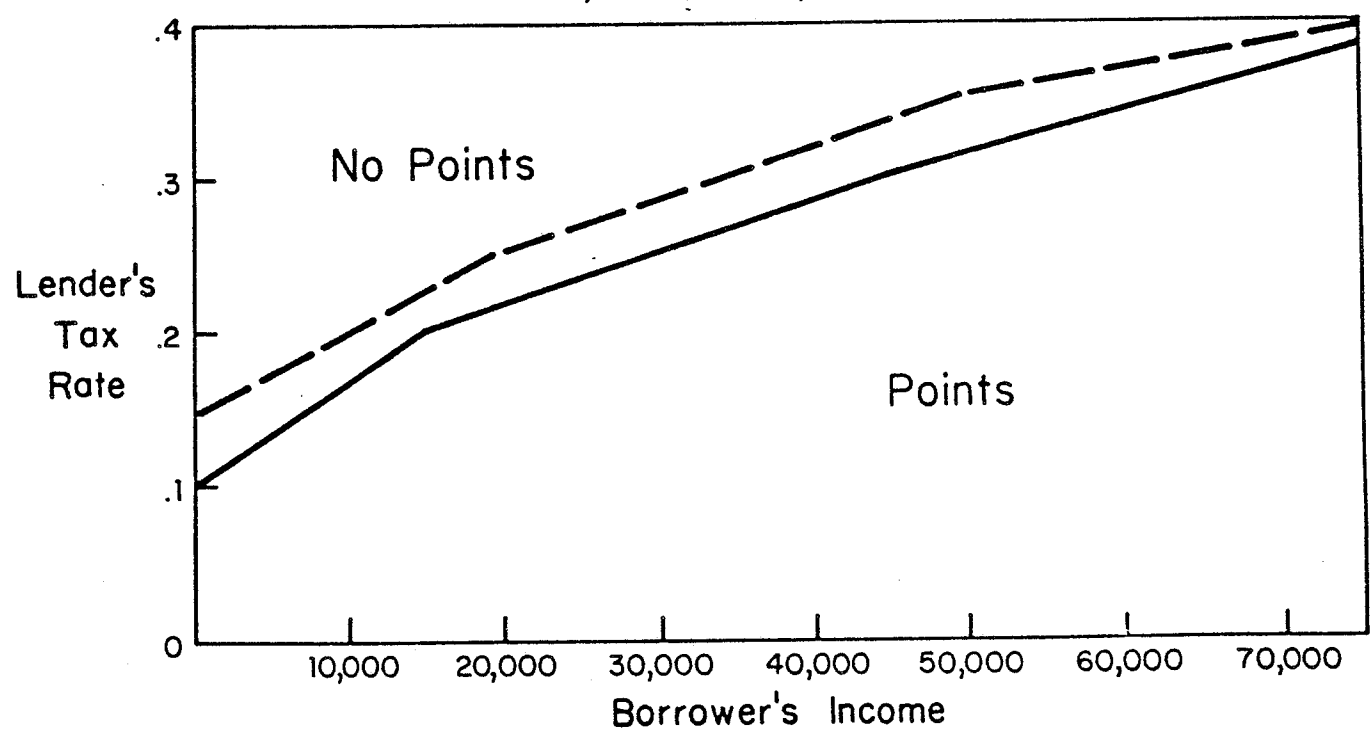
FIGURE 5

Points – No Points Frontier

r=.05   D= 6,000   L= 44,000   GR=0 ——— —

r=.05   D= 18,000   L= 102,000   GR=0 ————
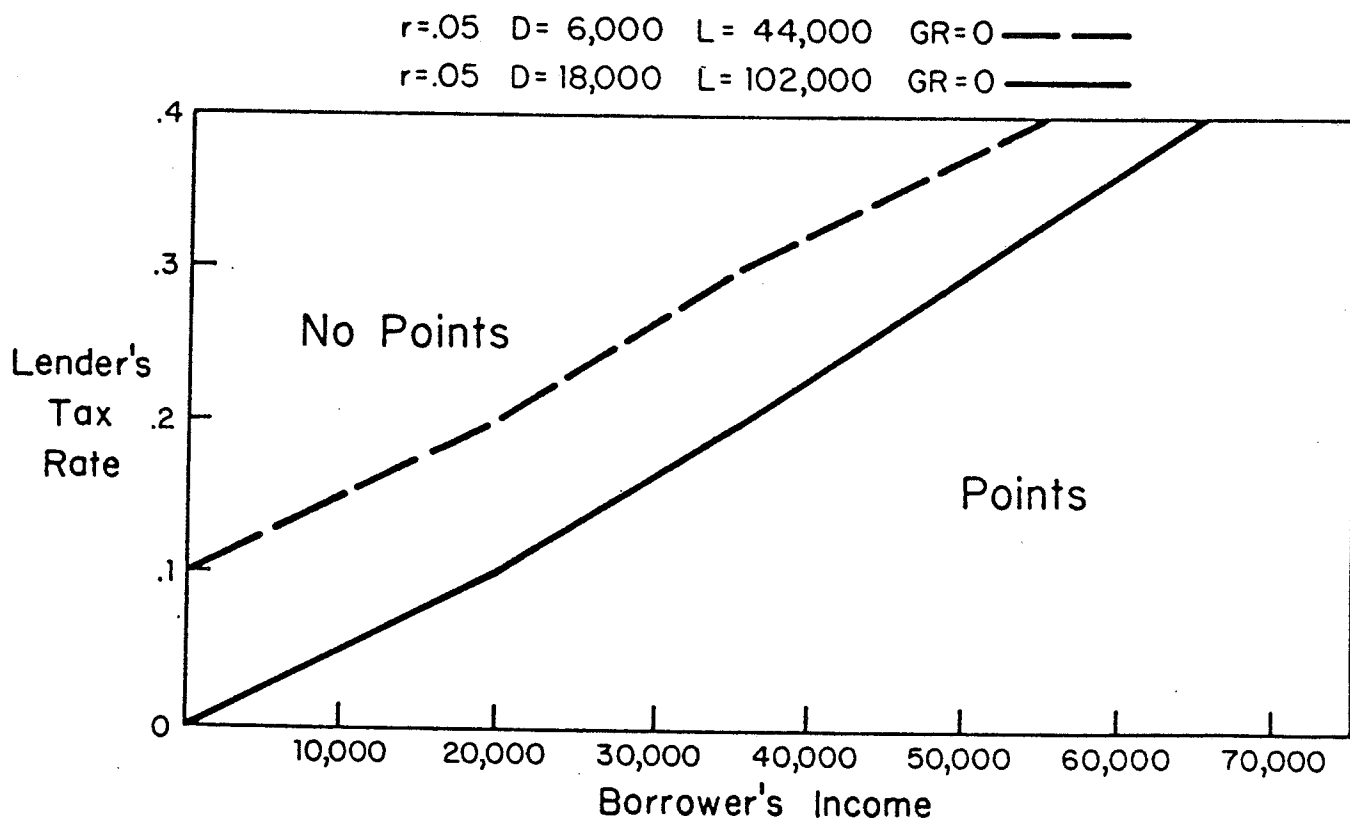
FIGURE 6

Points – No Points Frontier

r=.1   D= 6,000   L= 44,000   GR=.05 ━ ━
r=.1   D=18,000   L=102,000   GR=.05 ━━━

No Points

Lender's
Tax .2
Rate

Points
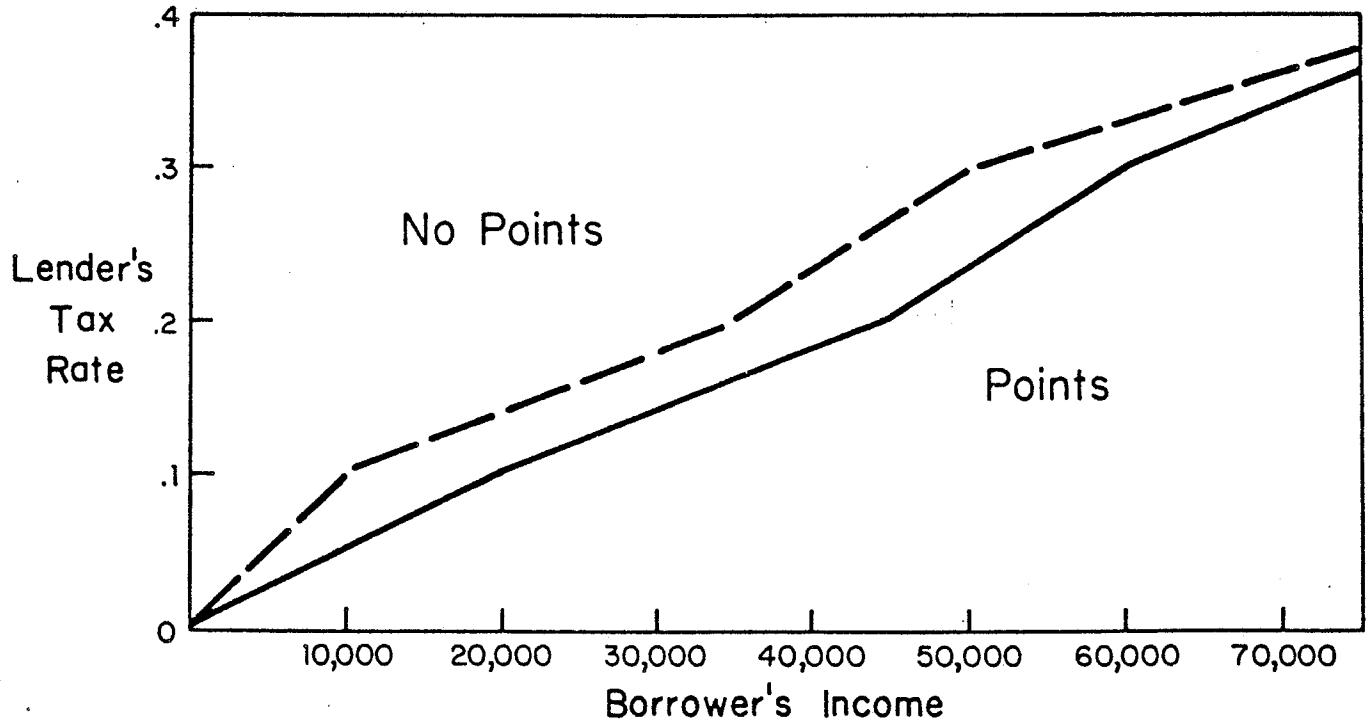
Borrower's Income

where inflation is present, it is assumed that the borrower's income grows at the inflation rate.

As expected from our analysis, the results as demonstrated in Figure 3-6 indicate that high income borrowers want points. Also as expected, the lower the lender's tax rate, the lower is the borrower's income after which points become desirable. These conclusions hold regardless of the interest rate or size of the loan. Lower real rates of interest have very little effect on the number of borrowers who want points; however a higher nominal interest rate due to inflation will cause more lower income borrowers to want points. The dotted lines in figures 3 - 6 represent relatively smaller mortgage amounts, $44,000 versus $102,000. In all cases lower mortgages increase the number of borrowers who would want points. Note that the incomes indicated in Figure 3 - 6 represent income before deduction of interest payments but after other deductions.

VII. Conclusion

This study examined why points exist for mortgages in general and provided evidence that points on FHA loans should occur less frequently than those on conventional loans. In the process of resolving these questions a number of insights into the mortgage market were achieved. An important principle was that changes in loan structure due to points, prepayments or other deviations in the typical mortgage have no impact on the competitive rate of return. Thus, the essential role of points is not to raise the effective rate of return. The reason for points also does not center around their use as the purchase price of an option for prepayment, since risk can be better reduced by other means. Instead it is taxes that play the critical role in explaining points. If as is typically the case, the borrower faces a

larger marginal tax rate on income than does the lending institution, the tax burden of borrower and lender can be reduced by the borrower paying points. This tax savings is passed back to the borrower in the form of more favorable terms on the loan.

FOOTNOTES

[1] In principle, the discount rate each period is different, even with a constant market rate of return, since it also depends on the individual's marginal tax rate that period. In order to avoid such complications we have discounted all payments at the average discount rate over the term of the loan by using an average marginal tax rate t.

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