

The Hidden Costs of Low Inflation: Savings, Tax and the Dearth of Home Ownership

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Introduction

- This paper is about an arcane topic: the way the inflation component of interest rate payments and receipts should be treated.
- The basic argument is simple and uncontroversial
- If you lend money and there is inflation, your money is worth less when it is returned than when it was lent. If the borrower pays you a sum to compensate you for the loss of value of money, this payment is not income but simply a nominal capital transfer.



SNA Guidelines 7.110.

In inflationary situations it is possible to view an actual payment of nominal interest as consisting of two elements:

(a) A payment equal to the loss of purchasing power on the monetary value of the principal during the accounting period

(b) The balance remaining that represents the real interest accruing to the creditor.

The first element may be calculated by multiplying the value of the principal by the change in some general price index. It may be regarded as a payment made by the debtor to compensate the creditor for the real holding loss on the principal outstanding.

Example 1

The inflation rate is 0% and I lend Harry \$100,000 at zero interest.

- I give \$100000, he gives me an IOU for \$100000

(i) One year later he renews my IOU for \$100 000

OR

(ii) One year later he gives me \$3000 cash and an IOU for \$97000

- I earn zero interest
- The \$3000 is a capital transfer or debt repayment.

Example 2

The inflation rate is 3% and I lend Harry \$100,000 at 3 percent interest.

- He gives me an IOU for \$100,000 + 3% interest.

One year later he pays me \$3,000 and renews my IOU with one for \$100,000 + 3% interest

- The IOU is now worth \$97,000 in real terms
- In real terms I have earned nothing as the \$103,000 buys the same amount as it did a year earlier.
- In nominal terms I have earned \$3,000 interest.

The \$3,000 is a capital transfer that compensates me for inflation, and just as before it is a real debt repayment

Example 3

The inflation rate is 3% and I lend Harriet \$100,000 at 9 percent interest.

- She gives me an IOU for \$100,000 + 9% interest.

One year later she pays me \$9,000 and renews my IOU with one for \$100,000 + 9% interest

- The IOU is now worth \$97,000 in real terms
- In real terms I have earned \$6,000 as I need \$103,000 to buy the same amount as a year earlier.
- In nominal terms I have earned \$9,000 interest.

The \$9,000 can be split into \$6,000 real interest and a \$3,000 capital transfer that compensates me for inflation.

The corollary to this example is usually ignored.

Harriet has paid \$6000 real interest and made a \$3000 capital transfer – she now owes me only \$97000 in real terms.

⇒ \$3000 of the payment has reduced her real debt by \$3000 – it is saving.



This corollary is usually overlooked, but is so important it needs emphasising.

The inflation component of interest payments is saving as it reduces real debt.

The System of National Accounts guidelines (1993) recommends that this adjustment is made and recorded as a memorandum item in high inflation countries. [Section 19.82]

“The element of compensation for inflation should not be considered as a return to capital by the lender and a current cost by the borrower..... the measurement of these components is essential when inflation is high if one wants to interpret correctly figures such as government disposable income or saving (or government deficit) and the corresponding figures for creditor sectors, etc.”

It further adds that ignoring these adjustments “does not does not create great difficulties when inflation is low.”

This is true in *some* circumstances for the purposes of calculating *aggregate statistics*.

- This is because the transfers between borrowers and lenders net out.

It is not true for countries that have a large international net debt position, and it is not true for assessing the saving position of different people within the economy.

This paper argues that the failure to distinguish between real interest and compensation for inflation is distorting our interpretation of

- Saving
- the current account
- Housing affordability

Worse, the failure of the tax system to recognize that the inflation component of interest income is not income may be causing a significant reduction in home ownership rates among young households even when the inflation rate is modest, say 2 – 3 percent.

1. Inflation and the measurement of saving

Suppose Harriet earns \$20 per hour, the real interest rate is 6%, and she borrows \$100000 on an interest only loan.

If the inflation rate is zero, the nominal interest rate is 6% and interest payments are \$6000 per year.

If the inflation rate is 3%, the nominal interest rate is 9% and interest payments are \$9000 per year



inflation = 0, r=6

Period	Price Level	wage	Interest payment	Nominal debt	Real debt	N hours work
0	100	20	6000	100 000	100 000	5000
1	100	20	6000	100 000	100 000	5000
2	100	20	6000	100 000	100 000	5000

inflation = 3, r = 9

Period	Price Level	wage	Interest payment	Nominal debt	Real debt	N hours work
0	100	20	9000	100 000	100 000	5000
1	103	20.60	9000	100 000	97087	4854
2	106	21.22	9000	100 000	94260	4712

Inflation and hidden saving

In New Zealand,

- average fixed mortgage is \$133000

- inflation rate is 3%

=> \$4000 of average annual mortgage payment is saving.

- In 2007, total mortgages were \$145 billion

=> \$4.35 billion not counted as saving!



- The earnings of lenders are also overstated.
- If all lenders were New Zealanders, the understatement of savings by borrowers would exactly offset the overstatement of savings by lenders.
- But New Zealanders are net borrowers, to tune of \$160 billion in 2008(?)
=>Net savings is understated by 2-3 % of GDP



Statistics NZ Household Income and Outlay saving measure

	Real saving	% GDP	Nett debt (nominal)	inflation	Inflation adjustment	% GDP
2003	6,761	6.4%	85,706	2.5	\$2160	1.6%
2004	7,345	6.4%	96,855	1.6	\$1501	1.1%
2005	6,595	5.5%	107,840	2.8	\$2998	2.0%
2006	2,847	2.3%	129,547	3.3	\$4301	2.7%
2007	1,723	1.3%	145,333	2.5	\$3691	2.2%

In the last two years the adjustment has been larger than the estimate of savings

Statistics New Zealand does not make this adjustment in the experimental Household Income and Outlay accounts which they use to measure saving.

(Neither do other countries - but they don't borrow so much)

They don't even acknowledge it could be a problem in their various discussions of saving (eg "Measuring Saving in the National Accounts" 2007)

But there is no excuse for the rest of us.

Inflation and the current account deficit

Exactly the same issue arises with the current account deficit.

A large fraction of the interest payments on foreign debt should be treated as a capital transfer.

The current account deficit is overstated by 2-3 % of GDP

This is precisely the reason why debt to GDP ratios don't increase too quickly.

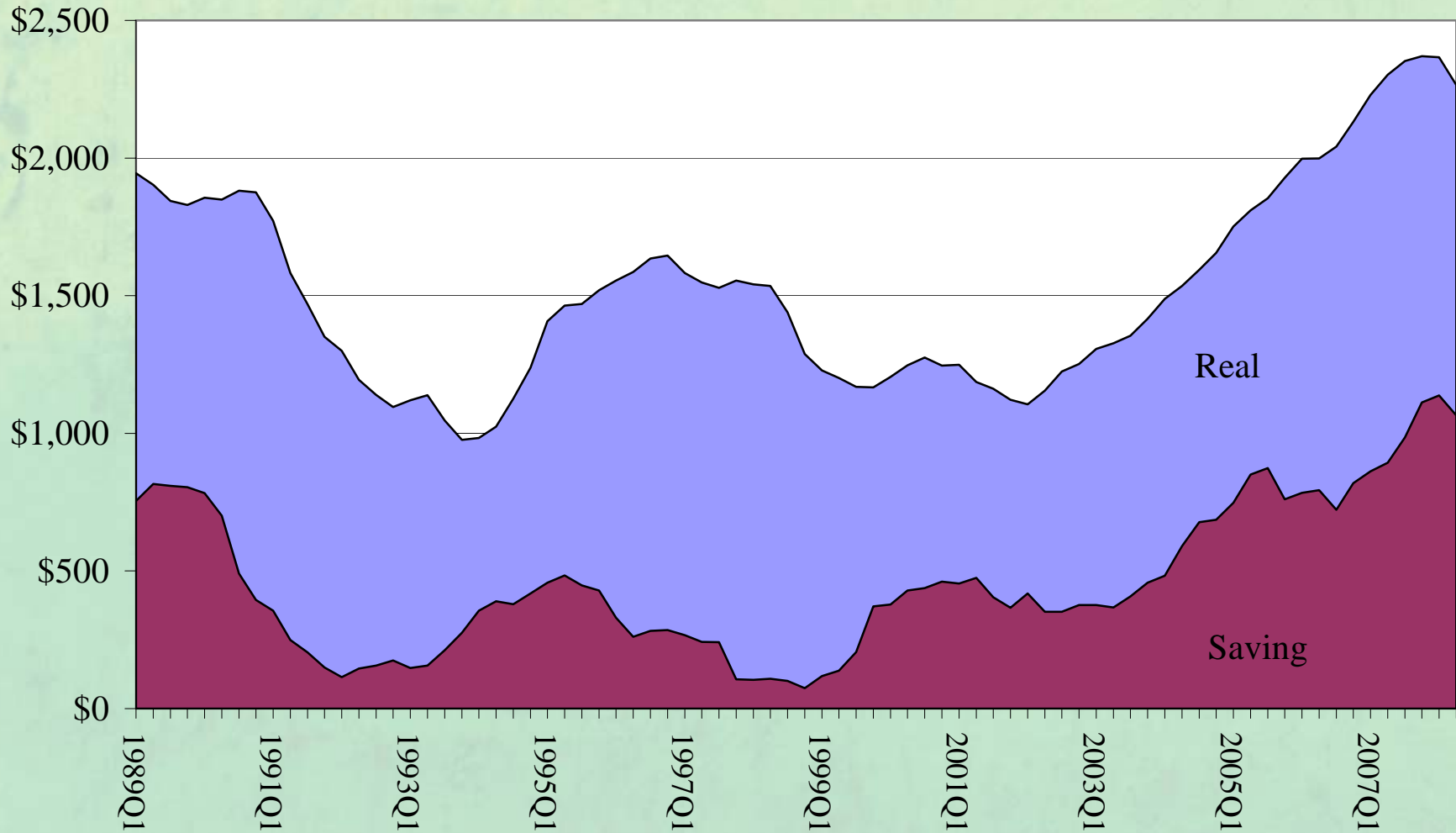
Inflation and housing affordability

- A standard measure of housing affordability is the fraction of income needed to pay the interest on the mortgage required to buy the median priced house. For example

Nominal = $\frac{\text{nominal interest rate} \times \text{QV house price index}}{\text{QES average hourly earnings}}$
affordability
index

- This index treats all of the interest expense as a cost when in fact the inflation component is savings.
- In current high inflation environment, the nominal index overstates the true cost of housing by over 70 %

Monthly interest payments on a median price house (adjusted to 2007 dollar terms)



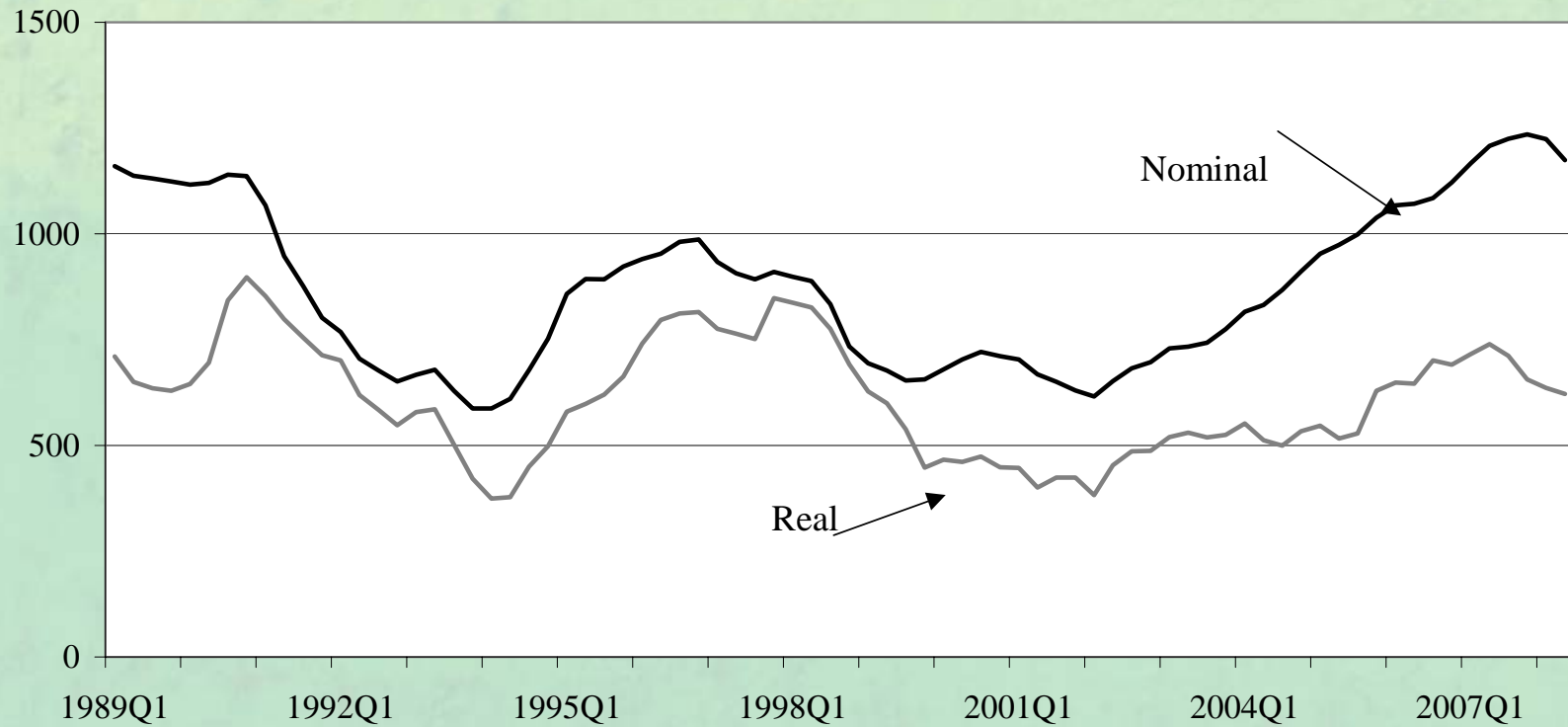
Housing Affordability

- A natural alternative is to calculate the fraction of income needed to pay the real interest on the mortgage required to buy the median priced house. For example

$$\text{Real affordability index} = \frac{\text{real interest rate} \times \text{QV house price index}}{\text{QES average hourly earnings.}}$$

Housing Affordability

Real and nominal affordability indices
Number of hours to pay interest cost on median house.



Housing Affordability

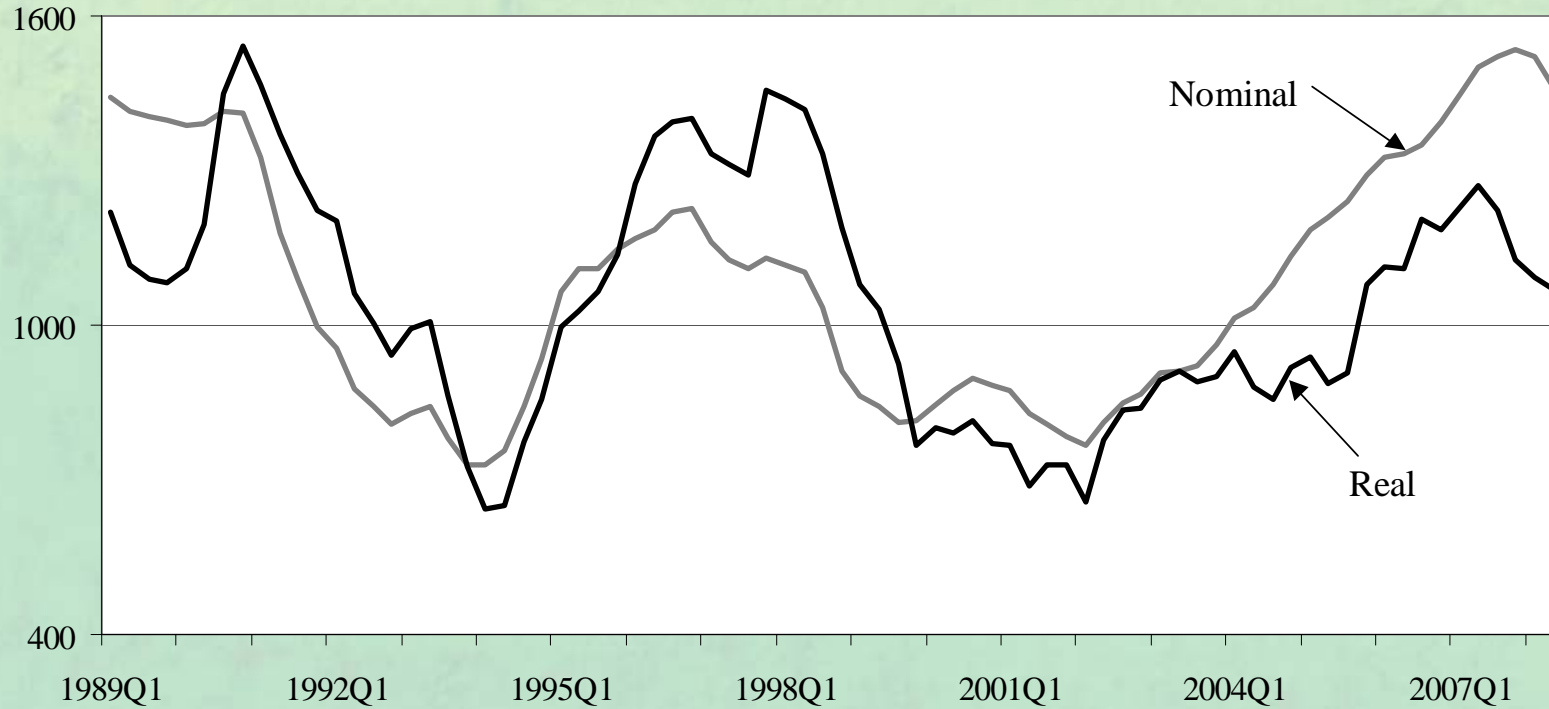
- In June 2008
 - it took 1174 hours to service nominal interest cost
 - It took 622 hours to service real interest cost
 - 88% more (the highest difference in the series)
- In 5 years to September 2007, average overstatement is 69%
- In 5 years to March 2002, average overstatement is 33%
- In 5 years to March 1997, average overstatement is 33%
- Housing affordability index has gotten worse due to rise in average inflation rate since 2002

Housing Affordability

- Both series are very cyclical
- Peaks (housing most expensive) in 1991, 1996/8 and 2007
- Troughs in 1994 and 2002
- In nominal terms, housing affordability worst since series started.
- In real terms, 1991 and 1998 were worse.
- See following graph, rebased so average = 1000

Housing Affordability

Real and nominal house finance cost indices
Average 1992-2007 = 1000



Nominal Affordability Indices

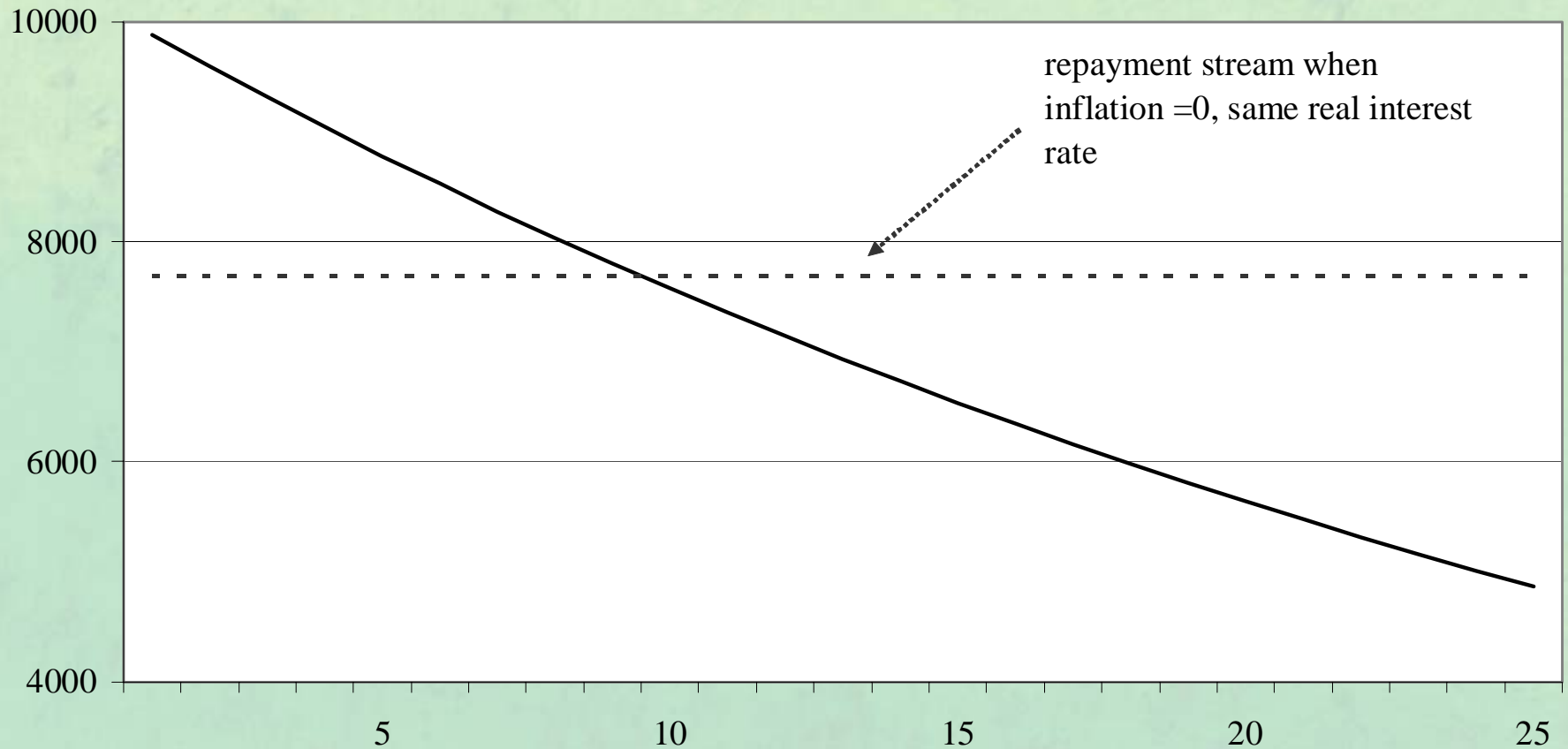
- So what does the nominal index measure?
- It reflects the cash-flow difficulties experienced by mortgaged households that are unable to borrow.
- This is because mortgage contracts are expressed in nominal terms and require a large amount of saving when inflation is high.
- It is not an indication of true cost of housing.
- (Car example)

Mortgage tilt - Modigliani

- An alternative way of considering the issue is to examine the real costs of servicing a mortgage through time.
- If interest rates were 9% and the inflation rate was 3%, the nominal mortgage payment would remain the same through time, but the real payment would get smaller as the inflation rate (and wages) increased.
- Inflation causes “tilt”: much higher payments at the start of a mortgage than the end of the mortgage.
- The nominal affordability index captures the initial payment but this overstates the average payment over the life of the mortgage.

Nominal Affordability Indices

Real repayment stream of a 9% 25 year mortgage
inflation = 3 %



Summary

Inflation distorts the measurement of savings

- The average mortgage owning household saves \$4000 more than they are given credit for
 - Aggregate saving is likely to be understated by 2-3% of GDP
-
- nominal affordability indices overstate cost of housing as a fraction of repayments is saving
 - Housing cost overstated by 70% in last 5 years.

Inflation, credit constraints, and taxes

So far I have concentrated on measurement issues. These are important to ensure appropriate policy is made.

There is a more concern about inflation, however. It imposes real costs on the economy.

Because inflation has its largest effects on interest rates, these are likely to be concentrated on saving and housing market issues.

The rest of the seminar discusses a *model* of the economy that analyses how low rates of inflation affect the housing market.

It is a model. The results are speculative.

The model is designed to capture how inflation has real effects through two mechanisms:

(a) the way higher nominal interest rates “tilt” mortgage payments to the front end of a mortgage.

(b) the way inflation lowers real after tax returns because the Government taxes nominal interest earnings not real interest earnings.

(a) Mortgage tilt (Franco Modigliani)

When inflation increases, nominal interest rates increase and front-end mortgage payments increase (borrowers are forced to save)

In an ideal world, banks would lend the borrower the additional payment. In this case, inflation would have little effect.

They don't, so inflation means credit-constrained (younger, lower income) borrowers have to spend less on other things.

Other (older, richer) borrowers can merely reduce their other saving to meet higher nominal interest payments

(b) Income tax (Jacob Viner, Martin Feldstein)

The New Zealand government taxes nominal interest earnings even though part of these are compensation for inflation (the widow's tax.)

When inflation increases, nominal interest earnings increase but real after tax returns decrease.

This may cause people to save less prior to retirement because after tax real interest rates are low.

It also causes them to substitute towards tax-advantaged investments, which in NZ include capital-gain tax free residential property.

These effects are different on different people. The tax mainly affects higher income, older people, but not younger households (who are borrowers). The borrowing constraints mainly affect younger households, but not older, high income people.

- ⇒ Inflation puts young households into a vicious squeeze.
1. They face more intense competition from higher income middle aged households who wish to buy property to avoid the tax on the inflation component of interest income.
 2. If they buy a house, they will have little free cash to spend on fancy clothes, movies, fast cars or food for the kids.

⇒ They have an incentive to delay home purchase until much later in life.

- The paper builds a model of the economy that integrates the analysis of Modigliani and Feldstein on the ways that
 - inflation affects credit constraints;
 - inflation affects capital income tax rates;
 - these factors affect individual economic choices; and
 - these choices determine house prices.
- The model examines the interaction of a large number of agents who differ by age and income.

- Key aspects of the model
- 4 overlapping generations. This captures
 - Lifecycle income
 - Retirement
 - Credit constraints while young
 - Different housing demand through time
- Multiple agents with different incomes
- Credit constraints on young households
 - Households limited in ability to borrow to smooth consumption

- Different housing options
 - Big and small houses
 - Rental market for small houses
- Agents are restricted to choose from 24 lifecycle housing options eg 0RFF, RFFF, FH HH.
- Housing has to improve in quality except last period
- Renting allowed in first two periods
- Option of living with parents when young

- Detailed tax system
 - No tax on capital appreciation
 - Owner occupiers pay no tax on imputed rent
 - => incentive to own rather than rent.
 - Tax is paid on interest, including inflation component
 - Landlords pay tax on rent not capital appreciation
 - Landlord interest payments deductible
 - => incentive for agents to become landlords when there is inflation.

Tax (continued)

- Different marginal tax rates for low and high income
- There is a GST on consumption
- *The GST rate is solved endogenously so that for all parameter choices the total real tax paid is the same*
- *Option of making inflation component of interest tax exempt*

- Two housing supply options

Model has either

- (i) an inelastic (fixed) supply of big and small houses or
- (ii) an elastic supply of big and small houses

- Agents are forward looking, utility maximising
 - model calculates prices assuming agents behave optimally
 - The prices are functions of exogenous parameters such as interest rates, tax rates, extent of credit constraints, exogenous inflation rate.
- => Calculates how different inflation rates and tax schemes affect housing market when agents are forward looking and rational

Calibration

Broadly calibrated to NZ economy

- year 0 household income is \$20 000 - \$80 000
- 3% discount rate
- main scenarios have 90% loan-to-value ratio and 30% mortgage servicing – income ratio
- examines inflation in 0-3% range
- Main tax rates are 20% < \$50000 and 33% > \$50000
- (also calculates (0,0), (10,10) (20,20) (20,39))
- real mortgage rate is 5%

Results

- The results focus on the way inflation affects the housing market.
- The models suggests the results are large.
- When inflation increases from 0 – 3%,
 - nominal mortgage rates increase from 5% to 8%, or by ~15 - 20% per 1% increase in the inflation rate.
 - the real after tax interest rate falls from 3.33% to 2.33%:
 - Given 3% discount rate, inflation can change the incentive to save for capital accumulation

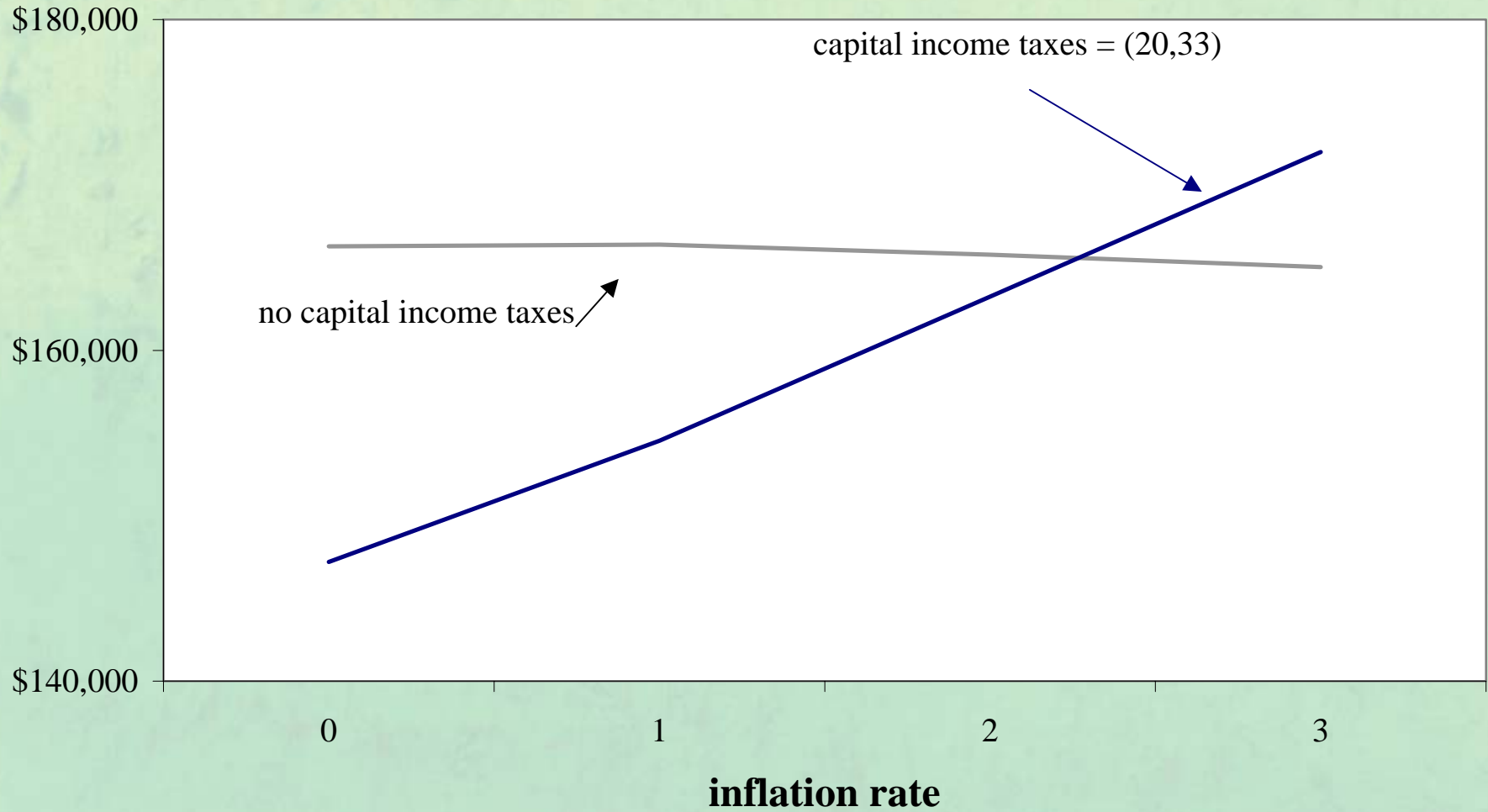
Tax has several effects.

1. Independent of inflation rate it provides an incentive to own rather than rent because imputed rent is not taxed.
2. As inflation rises, it reduces after tax returns from investing in interest earning assets.
3. As inflation rises, it provides incentive to buy bigger houses (and sell in retirement) as capital gain is not taxed.
4. As inflation rises, it provides middle-age high income households an incentive to become landlords to take advantage of tax free capital gains.

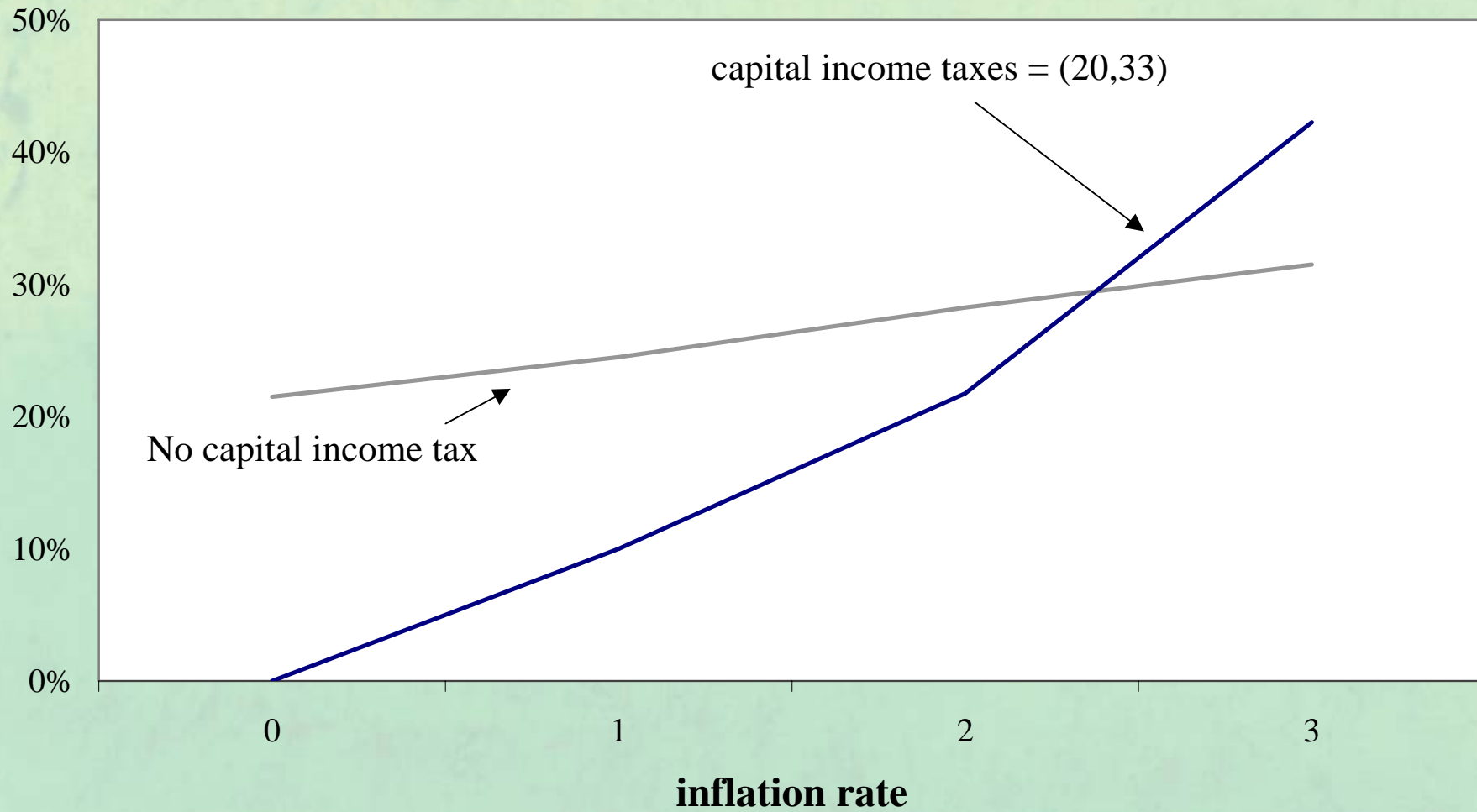
Note that landlords bid up flat prices/ bid down rents until after tax return from leasing = after tax return from interest earning assets

Inelastic Housing Supply

Price of small houses as inflation increases inelastic supply, $r = 5\%$

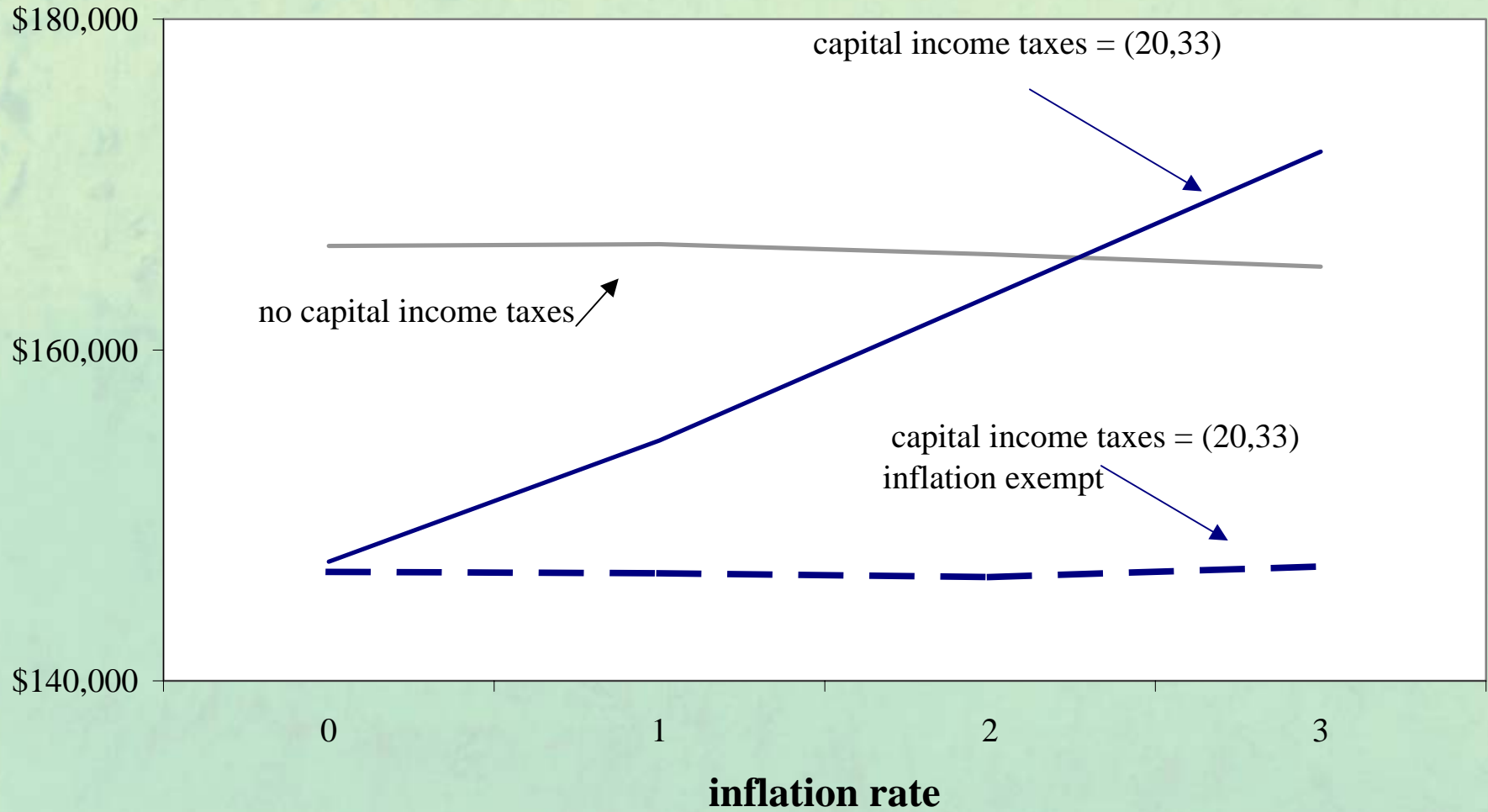


Fraction of young cohort renting as inflation increases inelastic supply, $r = 5\%$

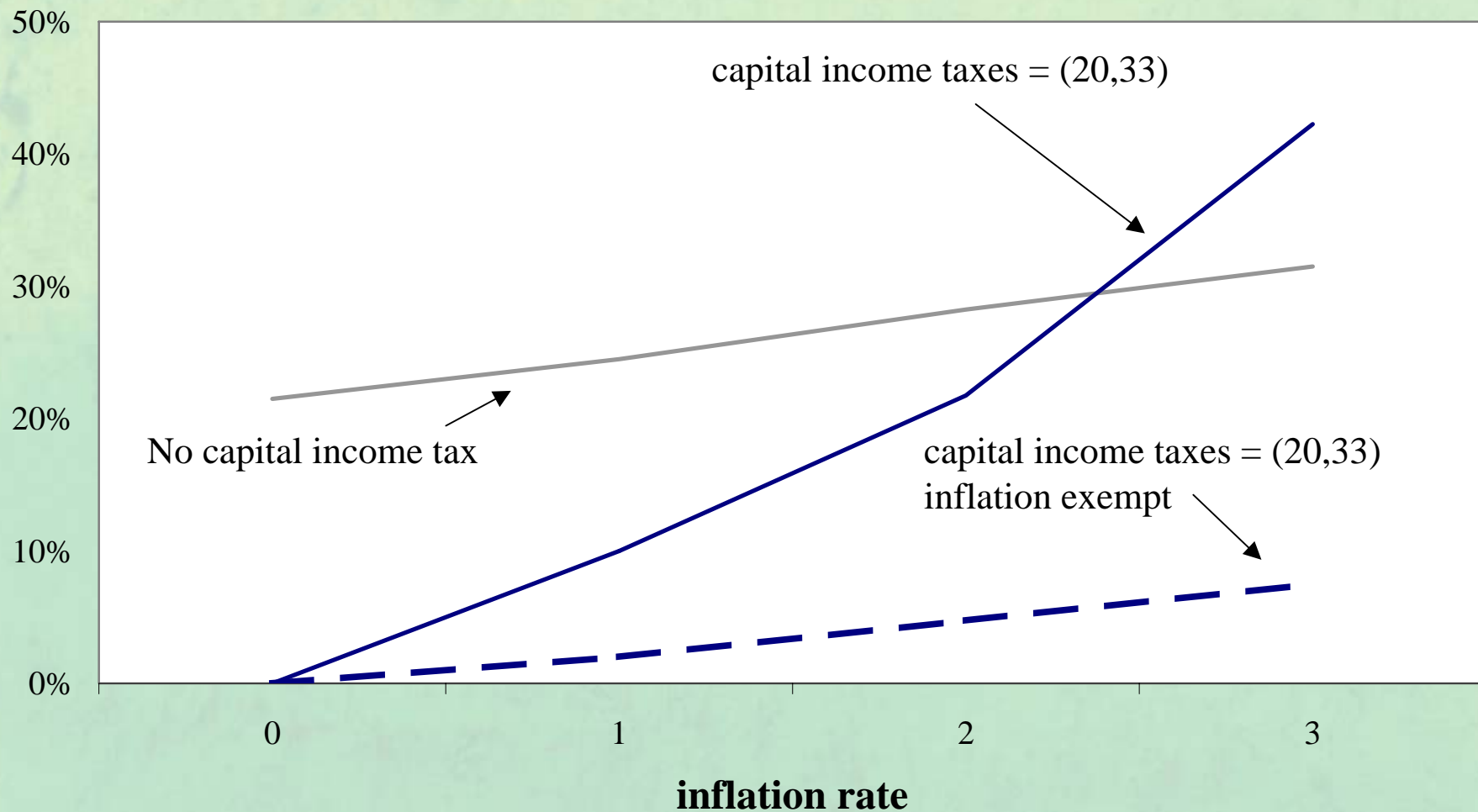


- The interaction of tax and inflation has large effects
- 1% increase in inflation lowers home-ownership rates by 10%!
- Young households are squeezed by higher nominal mortgage payments and competition from capital-gain seeking landlords.
- What happens if the inflation component of interest is tax free?

Price of small houses as inflation increases inelastic supply, $r = 5\%$



Fraction of young cohort renting as inflation increases inelastic supply, $r = 5\%$



- This model suggests the real problem is the “widow’s tax” – the tax on the inflation component of interest income.
 - (It is called the widow’s tax because most domestic lenders are retired people – and therefore disproportionately widows.)
 - Also note that the interest component of mortgage payments is tax-deductible: the corollary distortion
- The rise in inflation, plus tax on inflation component of interest can cause significant changes in home-ownership patterns

- “No acceptable concept of income will include as income the rise in monetary value of a capital asset which represents merely the fall on value of the monetary unit and is not indicative of increased purchasing power in general”

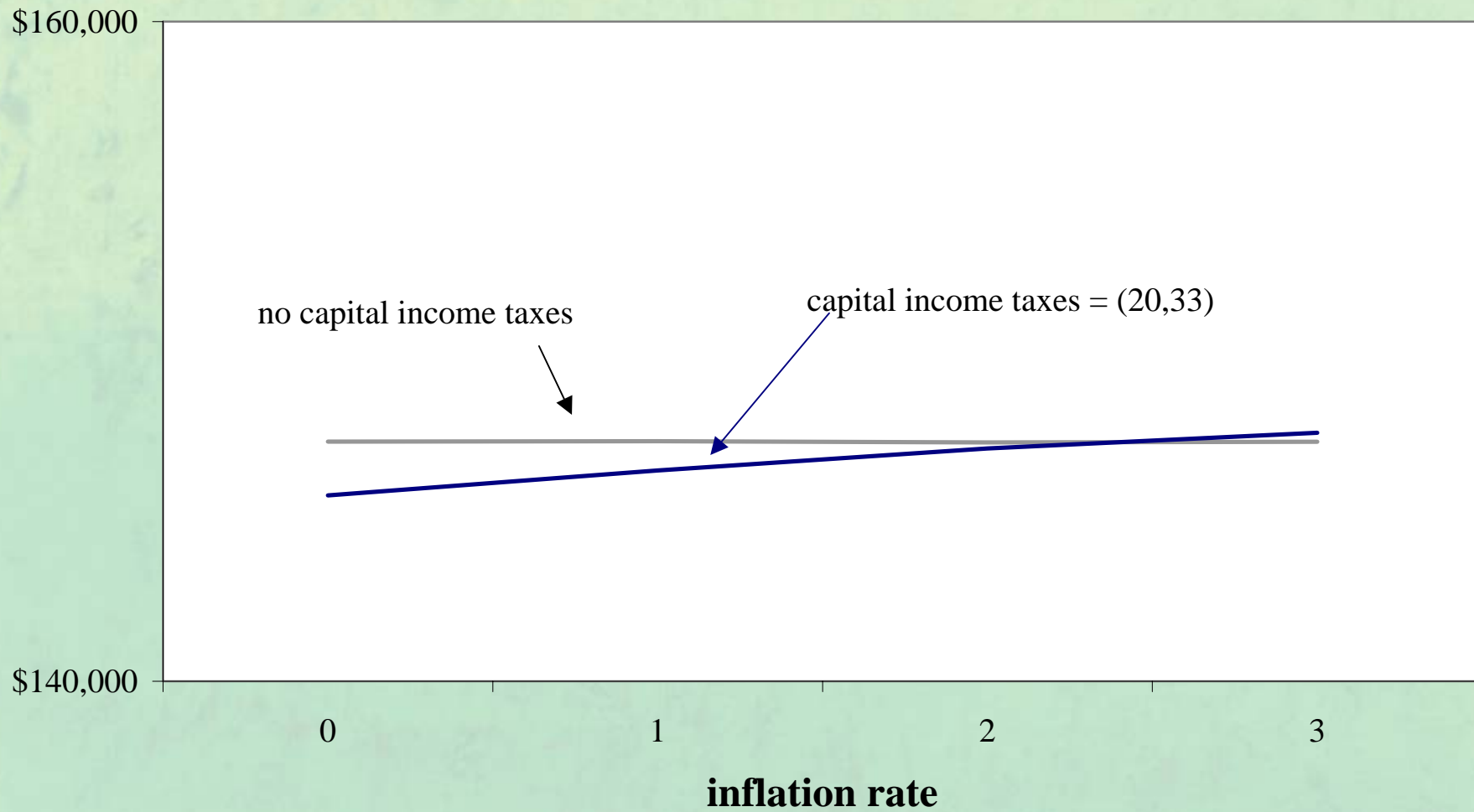
Jacob Viner, “*Taxation and changes in price levels*” *Journal of Political Economy* 1923

Similar to finding of a large number of models including Aaron (1976) and Feldstein, Green and Sheshinski (1978)

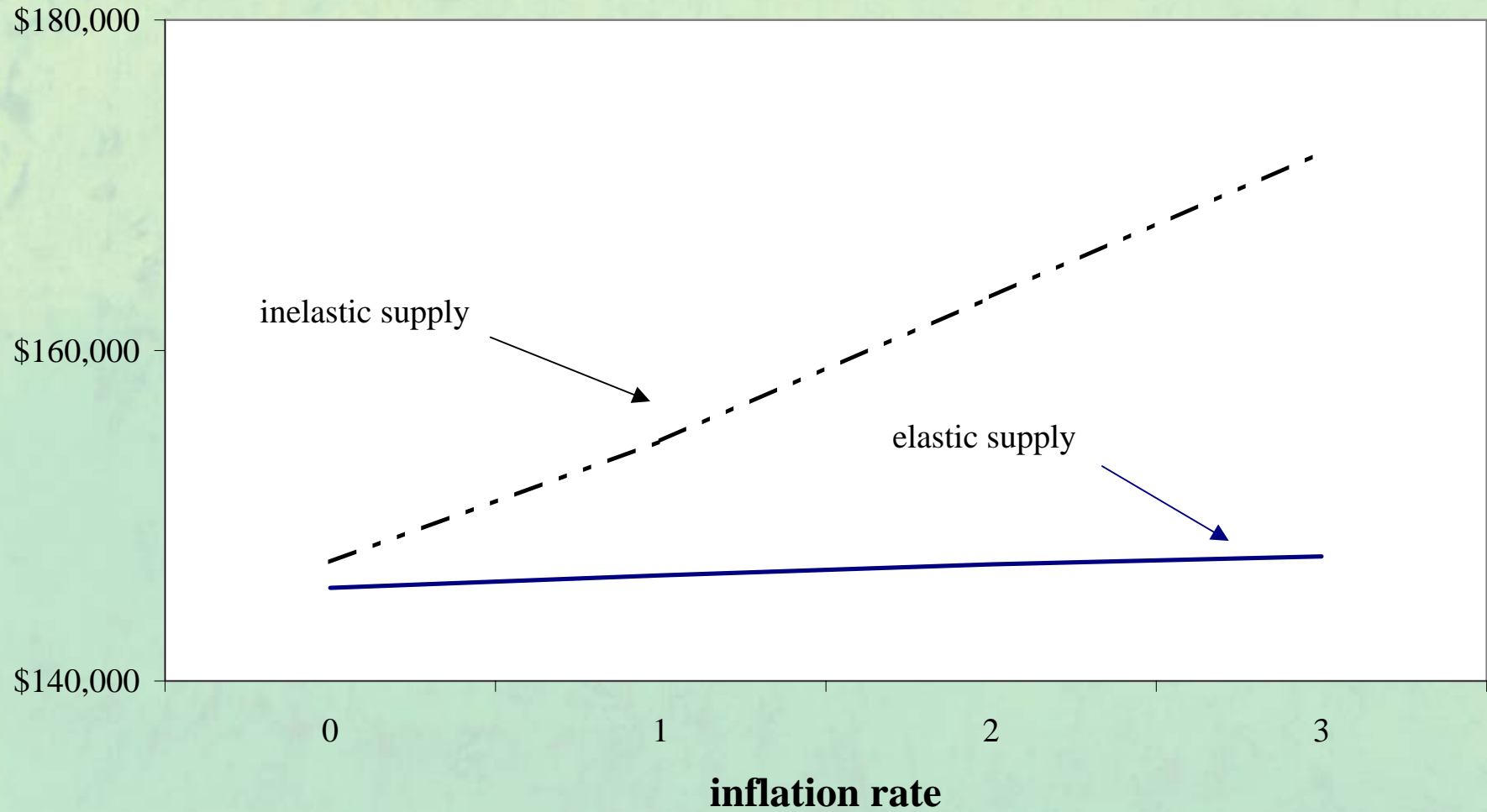
Elastic Housing Supply

- Parameterised to produce similar results to inelastic supply at zero inflation

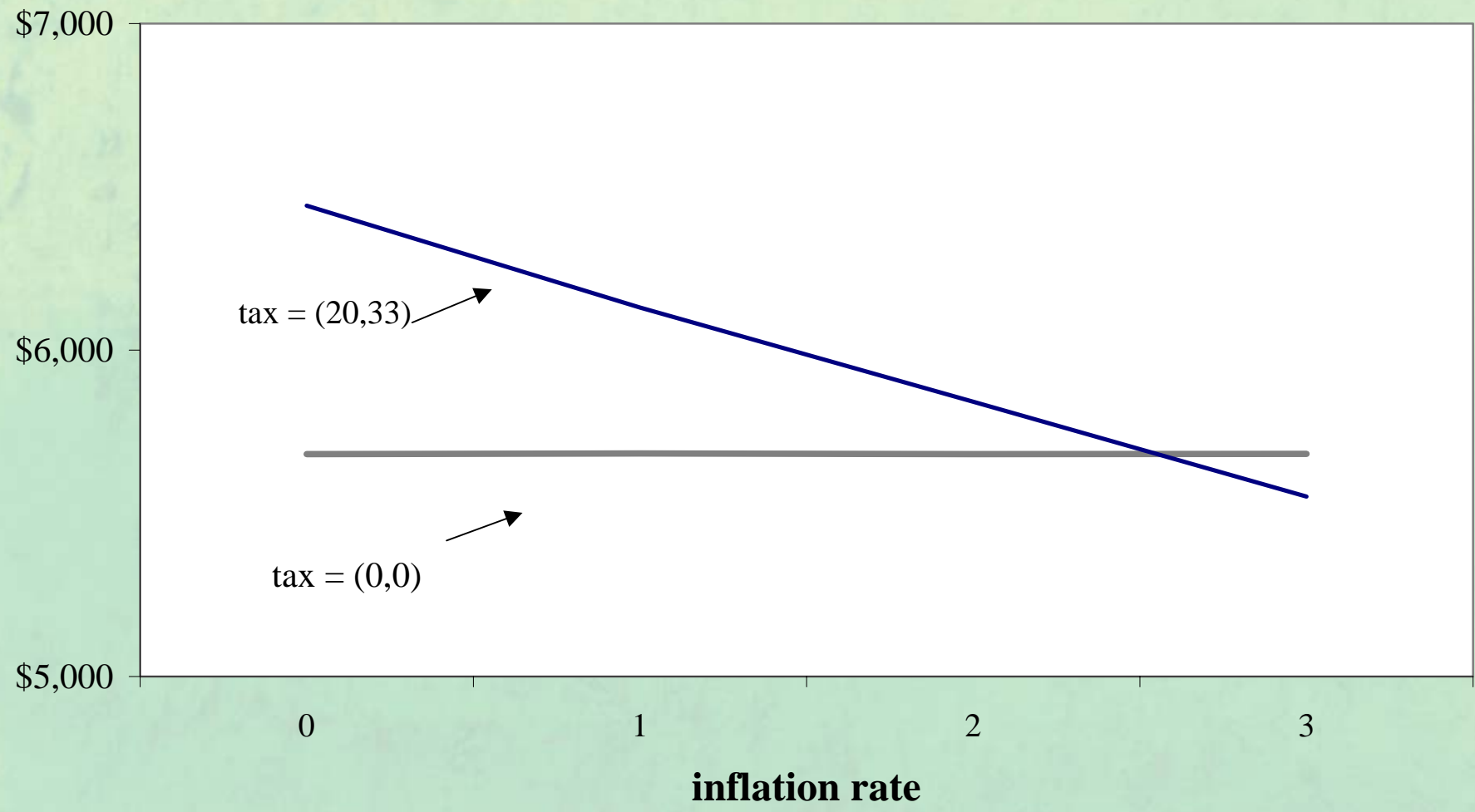
Price of small houses as inflation increases elastic supply, $r = 5\%$



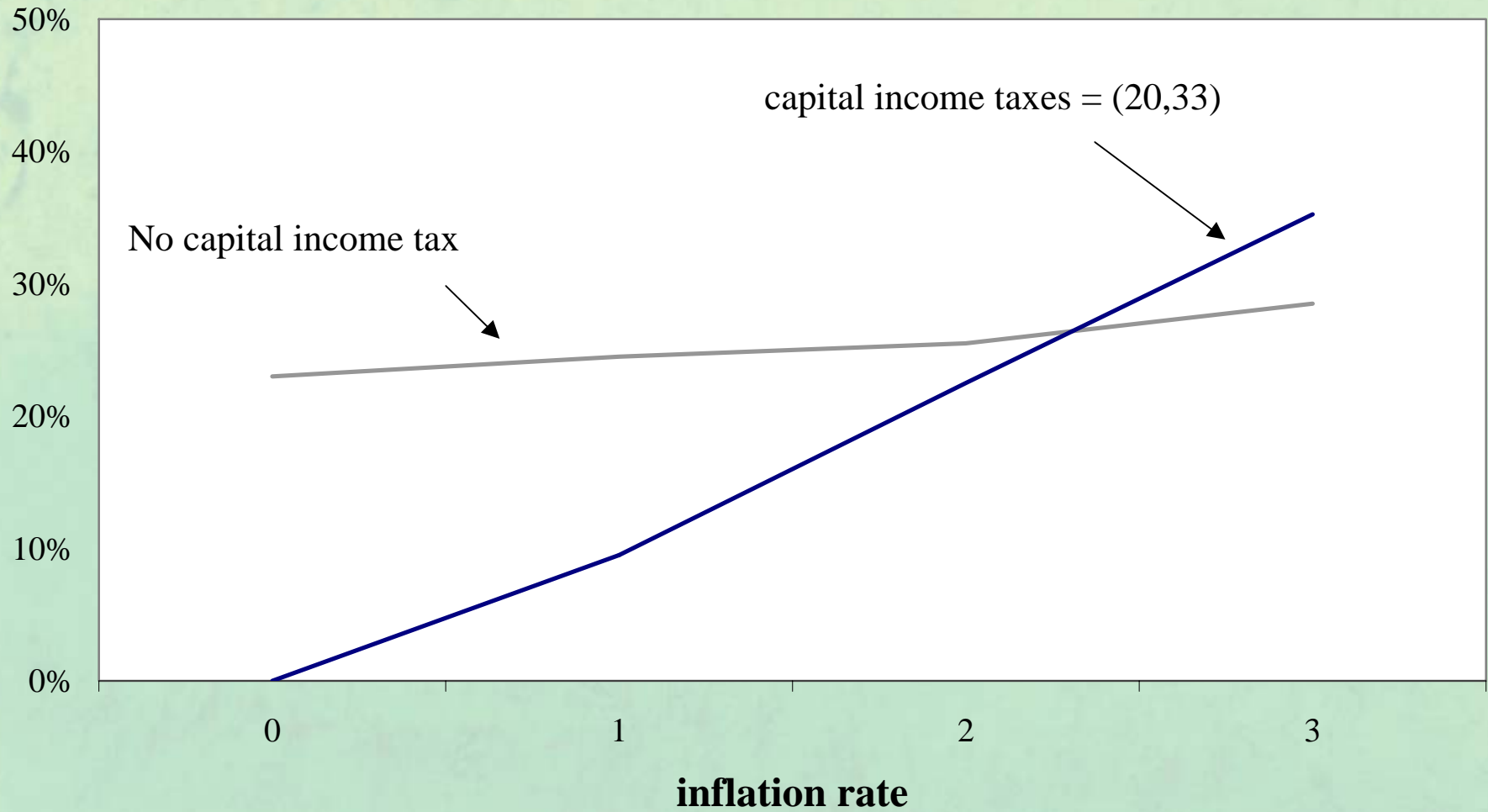
Price of small houses as inflation increases
elastic and inelastic supply, $r = 5\%$, tax = (0.20, 0.33)



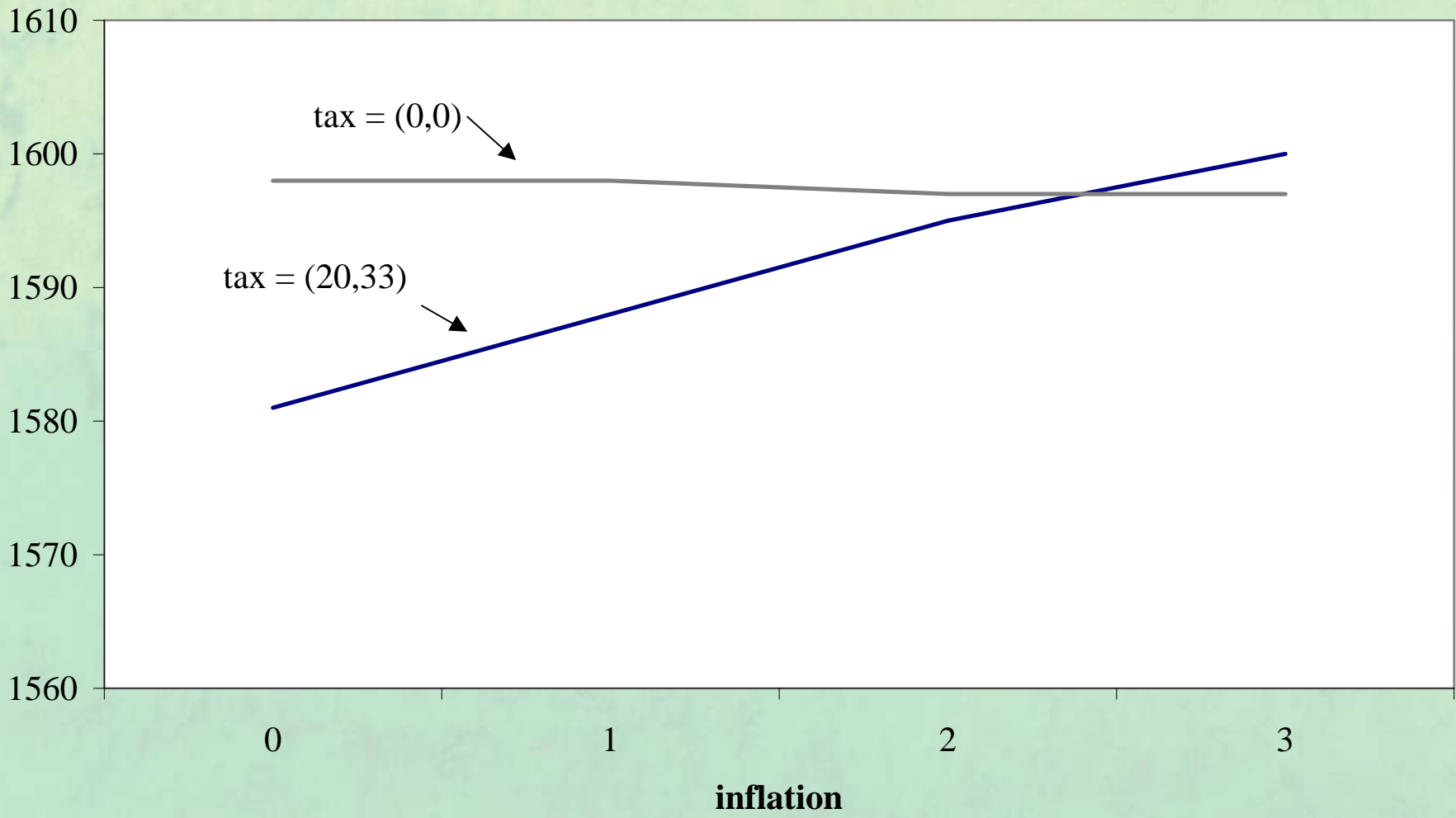
Rent as inflation increases
elastic supply, $r = 5\%$,



Fraction of young cohort renting as inflation increases elastic supply, $r = 5\%$



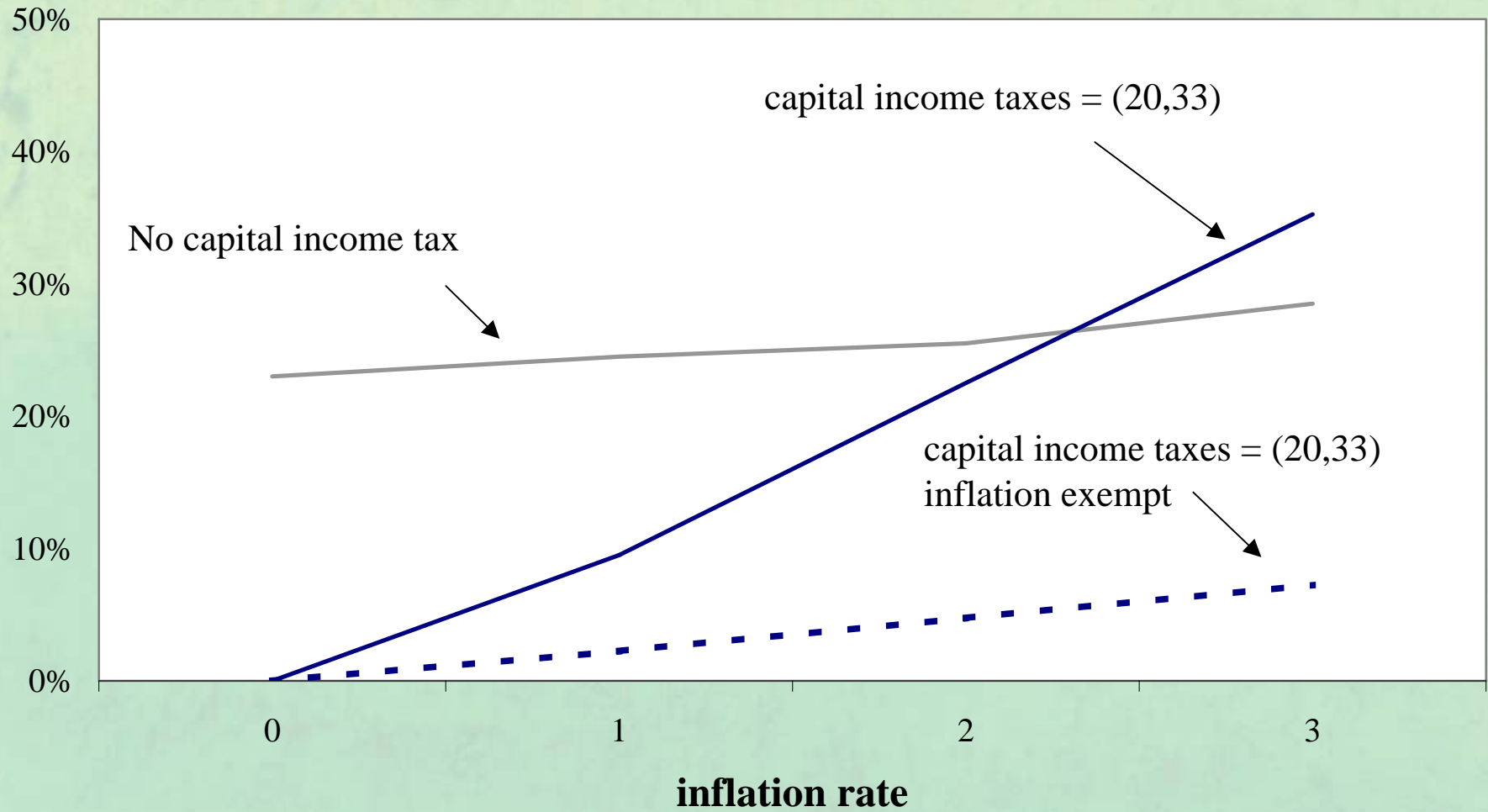
Number of houses as inflation changes elastic supply, $r=0.05$



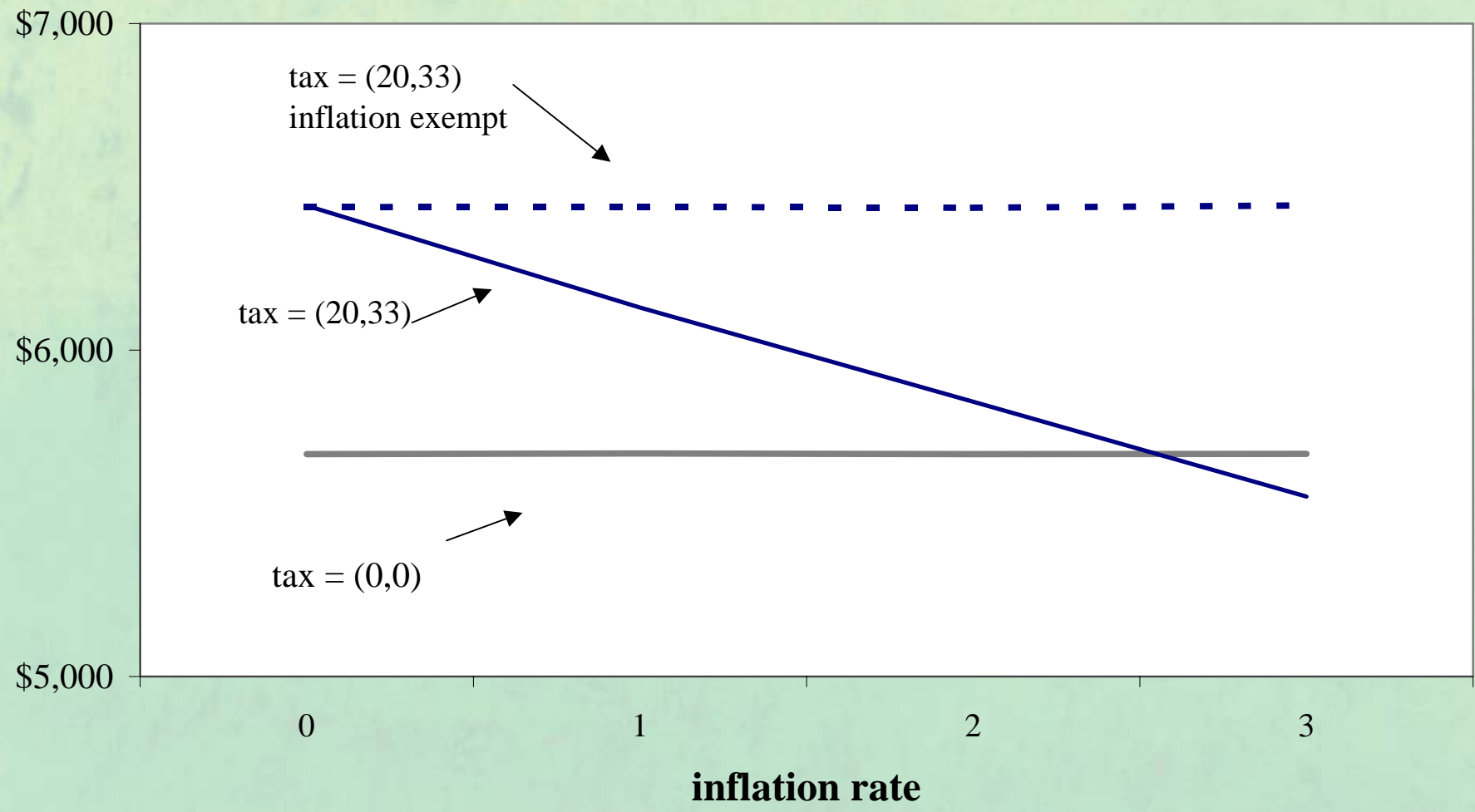
- Similar results on home ownership, but a very different mechanism.
 - flat prices change by little in response to inflation
 - rents are bid down by landlords
 - total number of houses increases
 - number of large houses declines as credit constraints stop young people living in them
 - (this dominates attractiveness of tax free gains)
- What happens if we exempt inflation component of interest earnings from tax?

Fraction of young cohort renting as inflation increases

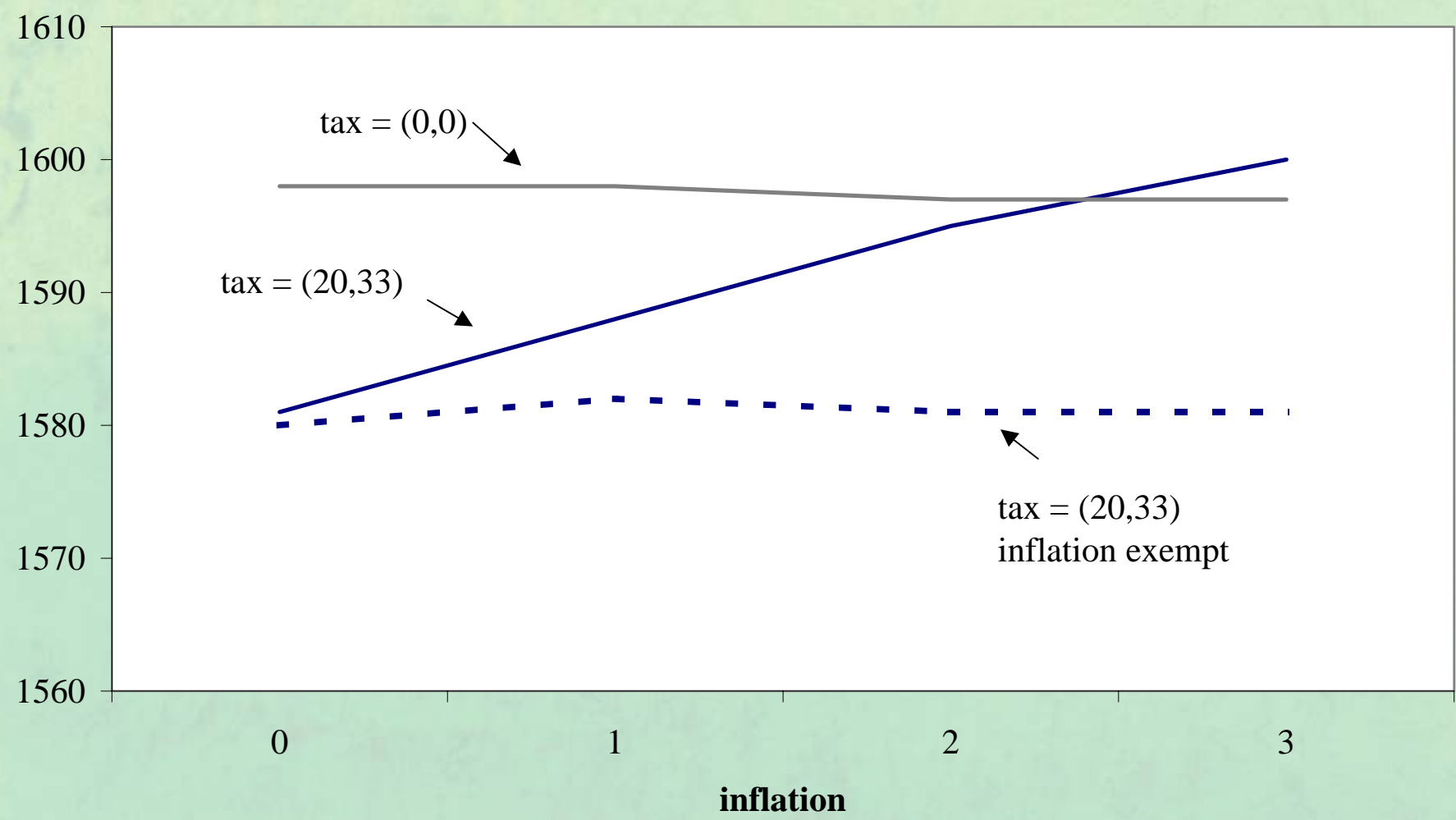
elastic supply, $r = 5\%$



Rent as inflation increases elastic supply, $r = 5\%$,



Number of houses as inflation changes elastic supply, $r=0.05$

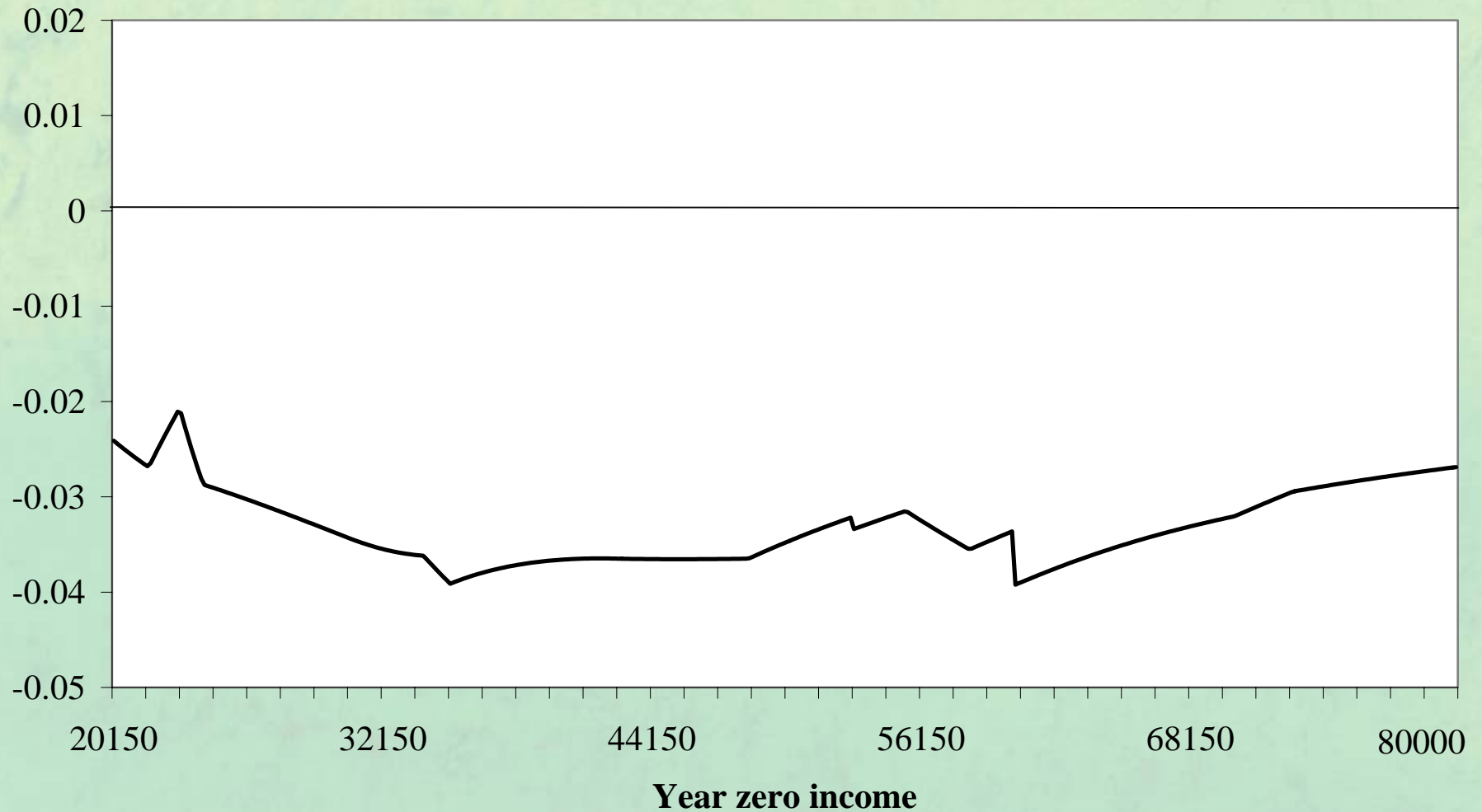


- When the inflation component of interest is exempt from tax, home-ownership rate is little affected by inflation
 - The mechanism is different:
 - rent is higher
 - fewer houses are built
 - more young people staying at home.
 - higher home ownership rates

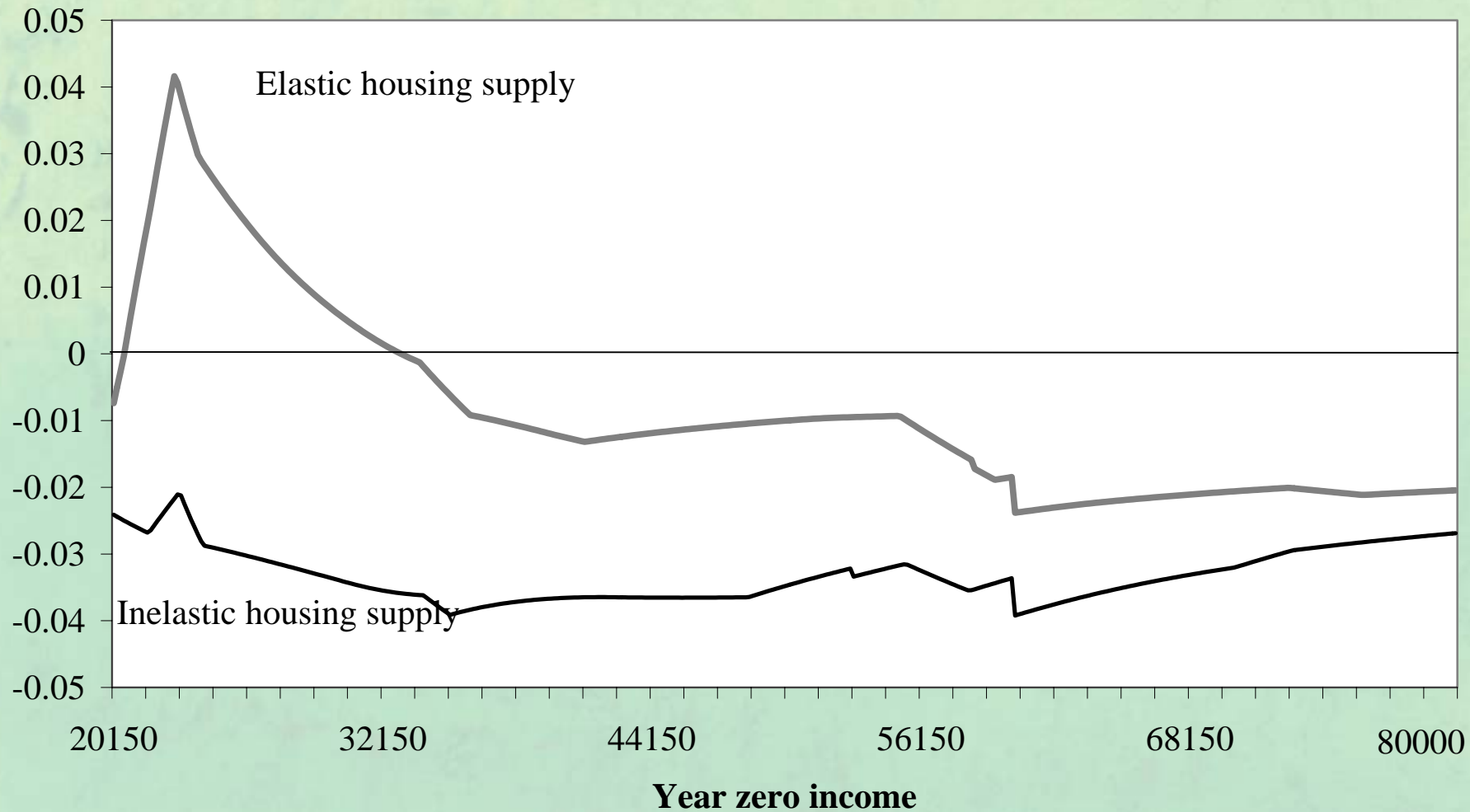
Welfare Analysis

We can calculate the welfare of the households under different inflation rates, and express the change in welfare as the loss (or gain) in consumption necessary to achieve the welfare obtained under zero inflation

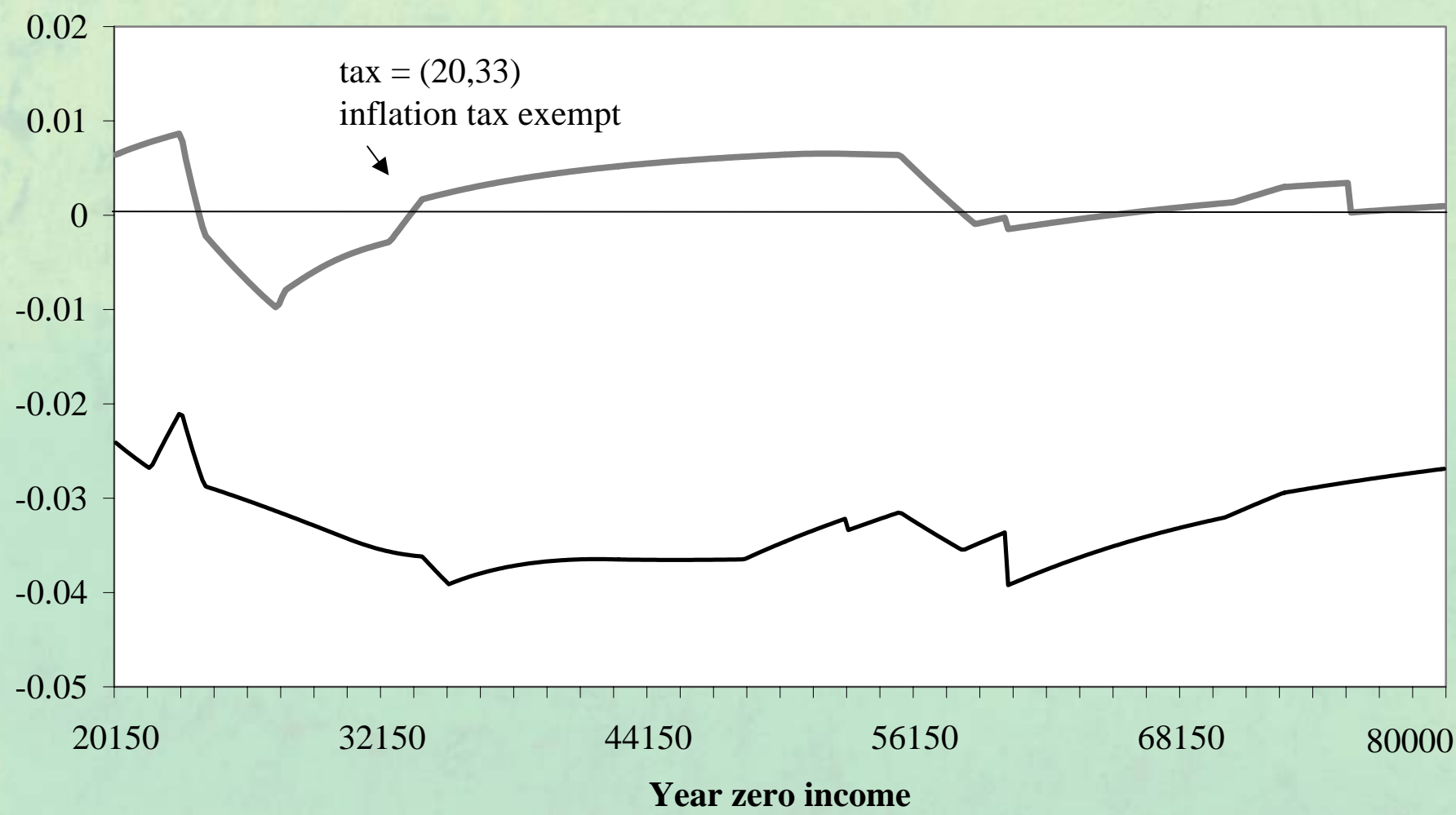
Welfare change when inflation increases from 0% to 3%
Inelastic supply, tax = (20,33) r= 5%



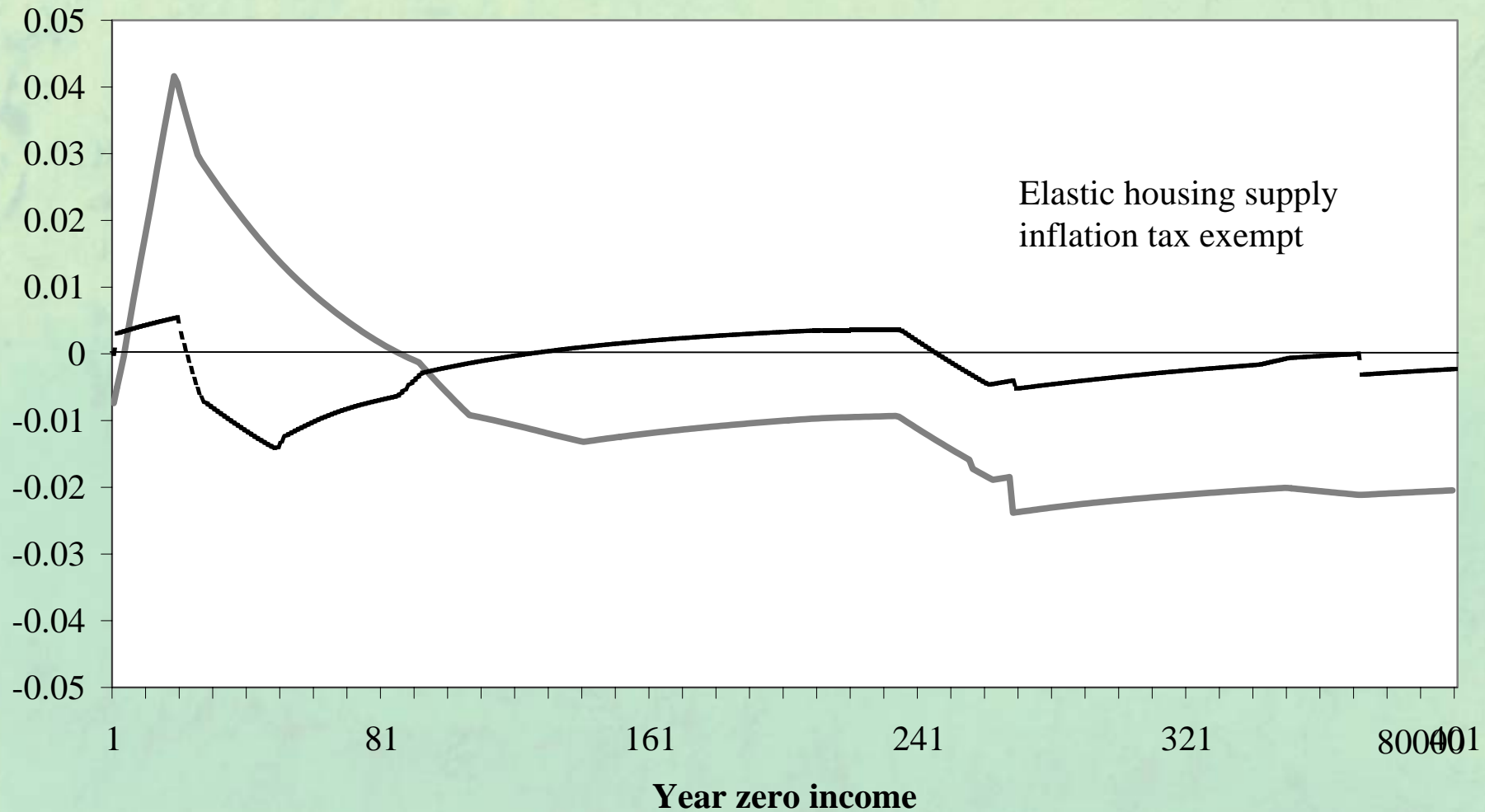
Welfare change when inflation increases from 0% to 3%
Elastic and inelastic supply, tax = (20,33) r= 5%



Welfare change when inflation increases from 0% to 3%
Inelastic supply, tax = (20,33) r= 5%



Welfare change when inflation increases from 0% to 3%
Elastic and inelastic supply, tax = (20,33) r= 5%



- (1) When housing supply is inelastic, 3% inflation reduces welfare by 2-4% for all income levels
- (2) These effects are largely mitigated if inflation component of interest is exempt from income tax
- (3) When housing supply is elastic, inflation improves welfare of low income (increasing number of houses and by lowering rents) but lowers welfare of moderate and high income.
- (4) These effects are also mitigated by if inflation component of interest income is exempt from income tax.

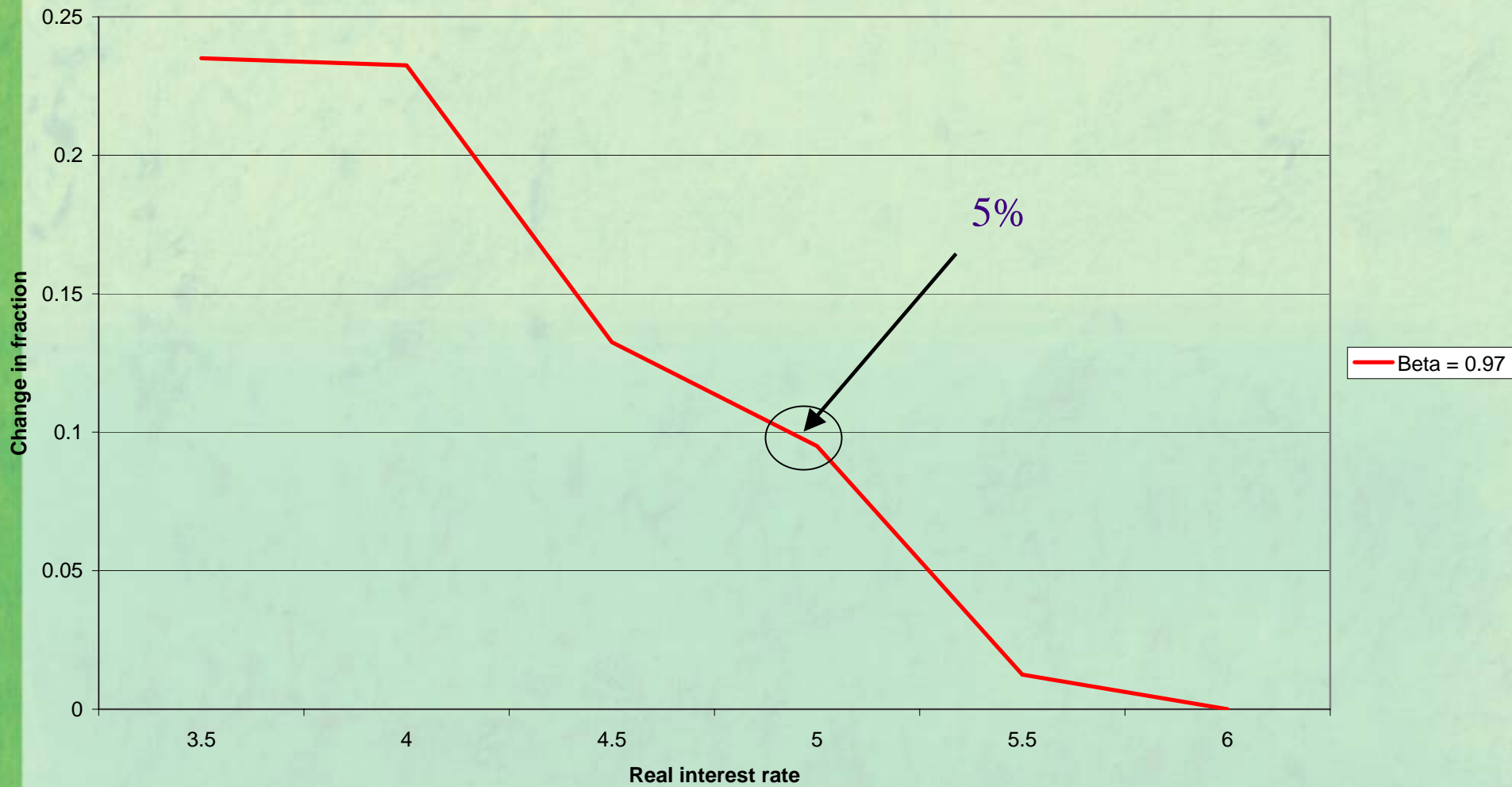
Interest rates, inflation, home-ownership.

The results I have just presented are very large: a 1% increase in inflation leads to a 8-10% reduction in home ownership rates of young households.

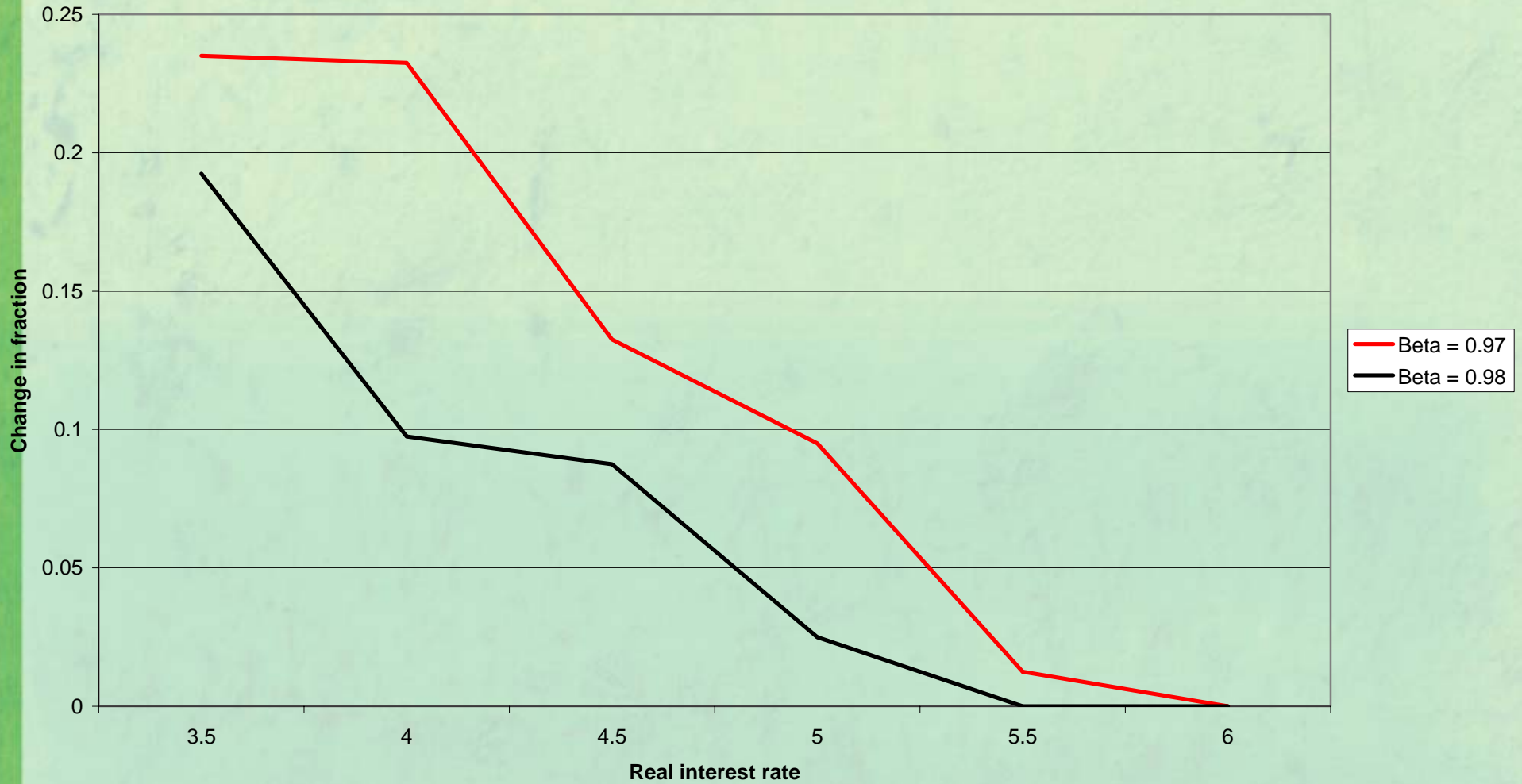
Are these an accident of the parameters I chose?

- (a) The results are robust to variation in a wide range of parameters eg the flat/house mix.
- (b) The important exception is the discount rate and real interest rate.
- Results are very sensitive to the difference between the real interest rate and discount rate.
 - The higher is real interest rate, the smaller the effect on home ownership rates
 - The higher the discount rate, the large the effect on home ownership rates

Change in fraction of young cohort renting (As inflation changes from 0% to 1%; elastic supply)



Change in fraction of young cohort renting (As inflation changes from 0% to 1%; elastic supply)



In the 1990s NZ had real interest rates in excess of 6%

⇒ much smaller effects on home-ownership

Since 2000, NZ has had higher inflation and lower real interest rates (4- 5%)

⇒ much larger effects on home-ownership rates.

Conclusions

In this model:

- Inflation has a very large effect on home ownership rates of young households
- These effects would disappear if the inflation component of interest income is exempt from income tax (for it is not income)
- The effects on house prices and rents depend on the elasticity of the housing supply
 - When supply is inelastic, inflation leads to higher house prices
 - When supply is elastic, inflation leads to lower rents, more houses, and a larger proportion of small houses

Conclusions

- When house supply is inelastic, inflation lowers welfare across all income groups
- When house supply is elastic, inflation increases welfare for low income by lowering rents, but reduces it for medium and high income.
- The welfare effects largely disappear if the inflation component of interest income was not taxed.

Final Words

Inflation distorts the measurement of saving

Inflation front-loads cost of house finance and makes it difficult to afford housing

Taxing the inflation component of interest income imposes unfair burden on lenders – primarily the elderly

Taxing the inflation component of interest income may significantly reduce home ownership rates of young households

Exempting the inflation component of interest from income tax may have large welfare gains, but small revenue losses.

Exodus 22:22-24

"Do not take advantage of a widow or an orphan. If you do and they cry out to me, I will certainly hear their cry. My anger will be aroused, and I will kill you with the sword"