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Taxing Phantom Income and the Simple Economics of Paying In Kind

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Abstract

Modern tax instruments impose cash taxes on non-cash bases. Property taxes, income taxes, gift taxes and estate taxes all must be paid in cash, even though income, gifts and estates only sometimes take the form of cash, and property never does. If it is costly to convert the tax base into cash, taxpayers may suffer from liquidity problems that require them to make painful adjustments to their savings or consumption. Although concern about taxpayer liquidity has shaped tax law and looms large in current debates about wealth taxation, tax accounting, and mark-to-market reforms, the economic factors that influence the welfare costs of cash tax collection have not been explored in a rigorous way. In this paper I present an economic analysis of the liquidity problem, identifying the factors that determine the welfare costs of cash tax collection. I apply this analysis to the property tax and to the taxation of income that accrues before it is received, sometimes called "phantom income."

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Contents

INTRODUCTION

At various times and places in history it has been possible to pay taxes in kind, that is, to remit tax payments in the same form as the thing being taxed. For example, during the Civil War, the Confederate Congress imposed an in-kind tax on agriculture. Mexico currently allows painters, sculptors, and artists to pay taxes in the form of artwork.[1] Nevertheless, today, income taxes, property taxes, estate and gift taxes can generally be paid only in cash.[2] Although cash tax collection is administratively necessary, it has the potential to create problems of taxpayer liquidity. Income, property, estates and gifts need not take the form of cash, so taxpayers may have tax liability but not have cash to pay it. That is, there is a difference in kind between the tax base and the tax itself. Cash income that accrues before it is received even has a name—"phantom income"—that for some taxpayers is as scary as it sounds, because it might compel them to liquidate their assets, at some cost, to pay their taxes. The imputed income from homeownership, which is not taxed under the federal income tax but is reached by the property tax, creates similar problems. The liquidity problem's existence, if not its severity, is well known and motivates numerous rules of substantive tax law and tax administration that are designed to mitigate its worst effects. However, many of these rules have responded to what is essentially an administrative problem by changing the present value of taxpayer liabilities, thereby redistributing the tax burden, encouraging wasteful tax planning, and generating inefficiencies in the allocation of assets that yield phantom or imputed income.

In this paper I describe a simple model that shows how the liquidity problem can arise from the imposition of cash taxes on phantom or imputed income, if that income is allocated to "consumption commitments"—goods for which consumption can only be adjusted at a cost. In the discussion that follows, I call this "cash tax collection" and use the term "phantom income"

[1] See Tim Johnson, *Paying taxes in paintings? Mexican artists say 'yes please,' The Christian Science Monitor*, (July 21, 2014) http://www.csmonitor.com/World/Americas/2014/0721/Paying-taxes-in-paintings-Mexican-artists-say-yes-please. Although taxes are rarely collected in kind, many government transfers are made in kind. For a review of the economic considerations motivating in-kind transfers, see Currie, Janet, and Firouz Gahvari. "Transfers in Cash and In-Kind: Theory Meets the Data." *Journal of Economic Literature* 46.2 (2008): 333-83.

[2] In the case of the federal income tax, payment is not technically restricted to cash. IRC. § 6311(a) ("It shall be lawful for the Secretary to receive for internal revenue taxes (or in payment for internal revenue stamps) any commercially acceptable means that the Secretary deems appropriate to the extent and under the conditions provided in regulations prescribed by the Secretary.") There is a fee, ranging from 1.87% to 2.35% of the payment for the convenience of using a credit card.

to refer to both cash income that accrues before it is received and imputed income. The model shows how the welfare losses associated with cash tax collection depend on five factors: the size of the fluctuations in the taxpayer's phantom income, the costs of converting phantom income to cash, the tax rate, the share of the taxpayer's wealth that is not in cash, and the taxpayer's preferences for committed consumption goods vis-à-vis consumption goods that can be costlessly adjusted. By focusing attention on these variables the model can help identify the taxpayers for whom, and circumstances under which, taxing phantom income imposes meaningful welfare costs.

The model extends the literature on consumption commitments to the tax context and provides the first formal treatment of the liquidity problem created by taxing phantom income. By describing the factors that exacerbate the liquidity problem, the analysis helps identify contexts in which cash tax collection may be relatively more efficient and suggests ways that tax rules should be designed to address liquidity-constrained taxpayers. A framework for evaluating the consequences of imposing cash taxes on phantom income is especially important at the present moment as concrete proposals to expand mark-to-market and accrual accounting[3] and more aspirational reforms to impose a wealth tax garner attention.[4] The model may also provide a partial, welfare-based, explanation for vehement opposition to estate, gift, and real property taxes in the United States.

Part I describes the liquidity problem created by cash tax collection and summarizes how property tax rules and income tax rules have attempted to address it. In Part II, I describe how the existence of consumption commitments can translate positive phantom income shocks to reduced consumption. I illustrate this effect by reporting new evidence from the Household Retirement Study on those factors, including the property tax, that influence whether homeowners adjust

[3] House Ways and Means Committee, Tax Reform Act of 2014 discussion draft, Sections 3301, 3401. The ABA has voiced opposition to Chairman Camp's proposal to place personal services businesses with more than $10 million in annual gross receipts on the accrual method of tax accounting, arguing, *inter alia*, that it will cause them to pay tax on income they have not yet received and might never receive. http://www.americanbar.org/news/abanews/aba-news-archives/2014/07/aba_supports_lawfir.html. One prominent practitioner has noted that "The most serious challenge to a progressive system of mark-to-market taxation is the psychological concern about taxing "paper gains." Miller. http://www.forbes.com/sites/berniekent/2012/01/10/practical-problems-with-a-wealth-tax/

[4] See, e.g., Thomas Piketty, *Capital in the Twenty-first Century*. Harvard University Press, 2014. As one prominent economist has suggested, "[t]he next major [American political] struggle — in economic terms at least — will be over whether taxes on personal wealth should rise — and by how much." Tyler Cowen, *Wealth Taxes: A Future Battleground*, N.Y. TIMES (May. 7, 2008), http://www.nytimes.com/2013/07/21/business/wealth-taxes-a-future-battleground.html?_r=0.

their consumption in response to shocks to home values. In Part III, I specify a model that can be used to analyze the welfare consequences of taxing phantom income and show how it applies in both the property tax and income tax contexts. In the Conclusion I summarize the model's results about which variables are most likely to generate liquidity-based inefficiencies from cash tax collection, and what those results suggest about how relief for illiquidity should be targeted.

I. THE LIQUIDITY PROBLEM

A. Describing the Problem

The tax liquidity problem arises if the government imposes a cash tax on a non-cash tax base and it is costly to convert the tax base into cash. Two of the taxes for which the liquidity problem looms (or is alleged to loom) large are real property taxes and income taxes.

A real property tax generally taxes a property owner on the value of her property. The more valuable is the property, the greater is the tax. The value of the property roughly represents the present discounted value of the per-period rental value of the property, net of costs. If the owner of that property does, in fact, rent the property then the increase in taxes can be paid out of the increase in cash rental income. If the homeowner lives on her property, on the other hand, then the increase in value is associated with an increase in imputed rental income, phantom income, that is unaccompanied by cash. In order to discharge her property tax liability the homeowner must save less, consume less, or somehow convert the increase in property value into cash. This conversion could happen by selling all or a portion of the property and moving, or by borrowing against the property.

The federal income tax imposes a tax on phantom income in a variety of circumstances. Some taxpayers are simply required to account for income and expense on an accrual basis. Such taxpayers must pay tax on income generally before that income is received. Although individual taxpayers generally are permitted to use the cash method of accounting, there are many exceptions in which they are required to include income as it accrues. For example, individuals who are partners in a partnership are required to include their distributive shares of the partnership's income regardless of whether they receive any cash distributions from the partnership. Investments potentially giving rise to income without cash include mutual funds,

debt issued with original issue discount, "payment in kind" notes that make interest payments in the form of additional debt instruments, and interests in a private equity or hedge fund. The returns earned by an investment fund are generally taxed to the investors. In order to pay the tax, those investors can liquidate some of their position in the investment, borrow, or reduce their savings or current cash consumption of other things.

The existing literature on the tax liquidity problem has focused on the costs associated with converting the tax base into cash: the costs of changing residences for example, or the costs of liquidating an asset position. These costs are real, and they are a cause of the liquidity problem, but they are not a measure of the welfare loss associated with cash tax collection. Such costs create an upper bound on the costs borne by taxpayers who pay cash tax on a non-cash base, but taxpayers can be made worse off by taxing phantom income even if they are never observed incurring these costs. Taxpayers who do not convert the base into cash must raise the cash to pay the tax another way, such as by reducing consumption, drawing down savings, or working more. If the taxpayer's utility after paying the tax is greater than the utility that she would obtain after incurring the adjustment costs to convert some of the tax base into cash then she will not move out of her property or liquidate her investment position. Thus, when adjustment costs are high, taxpayers may be willing to reduce their consumption significantly in order to pay their cash tax liability.

Note that the liquidity problem is an administrative problem. If income and wealth are good proxies for a taxpayer's ability to pay, then investors whose assets generate higher returns, and homeowners whose properties increase in value, should pay more in taxes. The administrative problem is that the form of a taxpayer's wealth does not match with the form in which tax must be paid. One problem that has arisen in the property tax context is that liquidity problems are conflated with the lack of ability to pay. Lack of ready cash to pay a tax does not indicate a lack of income or a lack of wealth. The liquidity problem is simply that the income or increase in wealth that provides the normative justification for higher tax liabilities can only be turned into cash at a cost. Rather than address what is primarily an administrative problem with an administrative solution, many property tax policy responses have made substantive changes that reduce the present value of homeowners' tax liabilities, leading to an inefficient allocation of the housing stock and redistribution of the property tax burden.

B. Where the Problem Arises

Differences in kind between taxes and the tax base create costs for taxpayers and engender opposition to the tax. In some cases these costs are meaningful and in others they are trivial. Moreover, although the consequences of being unable to convert the tax base into cash to timely pay tax liabilities are sometimes tragic and obvious,[5] in many cases the costs go largely unobserved because they are quietly borne through reduced consumption of cash goods. In this section I discuss how the liquidity problem arises in the contexts of real property taxes and the federal income tax and the measures that have been taken to address it.

1. Property Taxes

A disconnect between the form of the tax base and the form of tax payment is a feature of all property taxes and may partially explain why they are so hated. Personal property taxes are generally calculated on the value of property such as automobiles, watercraft, farm equipment, machinery, fixtures and furniture.[6] Although these taxes are not comparatively large in magnitude, they are extremely unpopular, in some cases exerting a disproportionately large influence on tax policy discussions and political outcomes.[7] Real property taxes, on the other hand, are large in magnitude, making up 40% of state and local tax revenues.[8] Although they represent the single largest source of own-tax revenue for local governments, property taxes are

[5] See, e.g., Michael Sallah, Debbie Cenziper, Steven Rich, *Left With Nothing*, WASHINGTON POST (Sept. 18, 2013), http://www.washingtonpost.com/sf/investigative/2013/09/08/left-with-nothing/ (homeowner with $134 in unpaid property taxes foreclosed upon), Rich Phillips, *Property tax avalanche threatens homeowners on historic coastal island*, CNN (Oct. 30, 2013), http://www.cnn.com/2013/10/26/living/georgia-island-tax-avalanche/index.html?hpt=hp_t1 (Gullah-Geechee people of Sapelo Island at risk of losing homes because of inability to pay taxes on valuable properties).

[6] For example, Virginia imposes a property tax on vehicle ownership. VA Code Ann. §58.1-3500. Arizona imposes a tax on computers that are used in trade or business. A.R.S. §42-19003.01.

[7] Michael Janofsky, *The 1997 Elections: Virginia; Gilmore Is Elected Governor on Car Tax Vow*, N.Y. TIMES (Nov. 5, 1997), http://www.nytimes.com/1997/11/05/us/the-1997-elections-virginia-gilmore-is-elected-governor-on-car-tax-vow.html ("Invariably, though, any discussion of education, or anything else, over the next four years devolved to a dialogue over the car tax, which Virginians pay each year to their local governments for as long as they own a vehicle. As the months wore on, the candidates focused on little else.")

[8] https://www.census.gov/govs/qtax/. Table 1 - Latest National Totals of State & Local Taxes for 12 months ending March 2014.

also extremely unpopular. They are, in fact, the second most unpopular form of taxation, after the estate tax.[9]

It is difficult to discern what underlies opposition to the property tax. One explanation is that the property tax is more salient than other taxes because it is not collected by withholding, as the income tax on wages is, but requires that a property owner pay the tax authority directly.[10] Another possibility is that the wealth is viewed as an inadequate proxy for ability to pay, or is otherwise viewed as an unfair basis for taxation. Yet another explanation is that there is general dissatisfaction with the use of property tax revenue by local jurisdictions. As demonstrated in the rest of this paper, the unpopularity of real property taxes can be explained in part by the welfare costs associated with the liquidity issues created by cash tax collection. If the liquidity problem is in fact a cause of property tax opposition, little has been done to address it.

Beginning with the enactment of Proposition 13 in California in 1978, there was a wave of property tax protests across the country throughout the 1980s as states and municipalities responded to local political pressure by adopting tax limitations of various kinds, including restrictions on property tax revenues, rates of annual tax increases, and increases in assessed value, among others. Many property tax regimes provide special rules for seniors, including exemptions and, in some jurisdictions, the option to defer property tax collection until the property is sold or the owner dies. Seniors on fixed incomes are viewed as especially vulnerable to the worst aspects of the property tax, and although twenty-seven states have property tax deferral programs,[11] they are generally only available to persons with disabilities or senior citizens.[12] There appears to be widespread agreement that these programs are underused, a characteristic of many property tax programs designed to provide relief to these populations.[13]

Nearly all of these policy responses to property tax revolt have done much more than relieve homeowner liquidity constraints, and sometimes have not done that. Instead, by changing

[9] *2009 Tax Attitudes Study*, Tax Foundation, Feb. 27, 2009, at. 4.
[10] Andrew Hayashi, *The Legal Salience of Taxation*, U. CHI. L. REV. (forthcoming 2014), Cabral, Marika, and Caroline Hoxby. *The hated property tax: salience, tax rates, and tax revolts*. No. w18514. National Bureau of Economic Research, 2012.
[11] Katie Babe, *Property Tax Relief for the Elderly: A Survey of the Nation. Marq. Elder's Advisor* 6 (2004): 325.
[12] Only four such programs are available to homeowners regardless of age and five are not means-tested. Katie Babe, *Property Tax Relief for the Elderly: A Survey of the Nation. Marq. Elder's Advisor* 6 (2004): 325.
[13] Erika Slife, *Nearly 20% of Cook County seniors may miss property tax breaks*, CHI. TRIB. (Sept. 28, 2011) http://articles.chicagotribune.com/2011-09-28/news/ct-met-senior-tax-exemptions-20110928_1_cook-county-seniors-senior-citizen-homestead-automatic-renewal. (reporting that as many as 20% of eligible seniors may not be taking advantages of property tax breaks to which they're entitled).

the actual effective tax rates for seniors and other homeowners, the various limitations on real property taxes that proliferated in the 1970s and 1980s had numerous adverse consequences, including regressive effects,[14] lock-in,[15] and hampered school funding and student performance.[16]

Although it was often asserted that property taxes drove the liquidity-constrained elderly from their homes, there was little evidence of this effect until 1989, when an important early wave of empirical research explored the relationship between liquidity and household mobility among the elderly. Venti and Wise (1989)[17] find that the elderly do not use home equity to finance consumption as they age, and that they are as likely to increase as decrease home equity when they move. This result suggests that the typical mover is not liquidity constrained, although households with low incomes relative to housing wealth are more likely to move and reduce housing wealth when they do, which suggests that transaction costs may constrain those who would like to transfer wealth out of housing. Venti and Wise (1990)[18] find that the potential utility gain from moving is small for most elderly households, but that transaction costs are relatively large, so some households may be prevented from moving even if they would like to do so. They find that although most elderly are not liquidity constrained and the typical elderly family does not want to reduce home equity; the desired reduction in housing wealth is greatest for those with low incomes and high housing wealth. Feinstein and McFadden (1989)[19] and Venti and Wise (2001)[20] find that the main drivers of reductions in housing consumption are family composition changes and retirement, and they find little evidence of widespread liquidity

[14] Andrew Hayashi, *Property Taxes and Their Limits: Evidence from New York City*, STAN. L. & POL'Y REV. (forthcoming 2014). (showing that property tax assessment caps in New York City are regressive).
[15] Fernando Ferreira, *You can take it with you: Proposition 13 tax benefits, residential mobility, and willingness to pay for housing amenities*, J. PUB. ECON. 94.9 (2010): 661-673.
[16] David N. Figlio, *Did the "tax revolt" reduce school performance?*, J. PUB. ECON. 65.3 (1997): 245-269; Downes, Thomas A., Richard F. Dye, and Therese J. McGuire. *Do limits matter? Evidence on the effects of tax limitations on student performance*. J. URB. ECON. 43.3 (1998): 401-417.
[17] Venti, Steven F., and David A. Wise. "Aging, moving, and housing wealth." *The economics of aging*. University of Chicago Press, 1989. 9-54.
[18] Venti, Steven F., and David A. Wise. "But they don't want to reduce housing equity." *Issues in the Economics of Aging*. University of Chicago Press, 1990, 1990. 13-32.
[19] Feinstein, J., McFadden, D., 1989. The dynamics of housing demand by the elderly. In: Wise, D. (Ed.), Economics of Aging. University of Chicago Press, Chicago, IL.
[20] Venti, S., Wise, D., 2001. Aging and housing equity: another look. NBER Working Paper 8608. Seslen (2005) also finds that property taxes have little effect on the moving decision, but use the retirement history survey from 1969-1979. Seslen, T., 2005. Property tax abatement programs: does relief really keep grandma in her home? MIT (dissertation).

constraints. Reschovsky (1990)[21] finds that elderly homeowners are more likely to be out of equilibrium in their housing consumption than elderly renters, and that when elderly homeowners are out of equilibrium it is because they are over-consuming housing.

Much has changed since this first wave of research into the effects of liquidity and transaction costs on elderly mobility. At the time, the reverse mortgage market was almost entirely non-existent, a fact that Venti and Wise (1989) attributed to a lack of demand. Indeed, in federal FY 1990, when the federal Home Equity Conversion Mortgage (HECM) program began, only 157 loans were originated. In FY 2009, however, the number of originations peaked at 114,692 and in FY 2013 there were 60,091 HECMs originated.[22] A nontrivial number of seniors now appear to face prohibitive costs of adjusting their housing consumption. Salkin (2009)[23] has noted that many seniors do not have the financial resources to move, and Boldt et al. (2010) report that in 2008 only 6.7 of senior households changes residences.[24] Data from the 2006 CPS suggest that 9.4% of seniors live at or below the poverty level and 15.6% live at or below 125% of the poverty level.[25]

More recent research suggests that many homeowners are liquidity constrained. Anderson and Dokko (2011)[26] find that subprime borrowers are liquidity constrained, and that a nine month delay in the timing of a lump sum property tax payment results in a 4 percent reduction in the probability of mortgage default in the first year. Sabia (2008)[27] finds that increases in property taxes and utilities are associated with increased mobility. Shan (2010)[28] uses an instrumental variables strategy and finds that higher property taxes are associated with increased mobility for elderly homeowners; in particular, a $100 annual increase in property taxes is associated with a 0.73 percentage point average increase in two-year mobility rates. In

[21] Reschovsky, James D. "Residential immobility of the elderly: An empirical investigation." *Real Estate Economics* 18.2 (1990): 160-183.
[22] http://nrmlaonline.org/rms/statistics/default.aspx?article_id=601
[23] Salkin, Patricia E. *Quiet Crisis in America: Meeting the Affordable Housing Needs of the Invisible Low-Income Healthy Seniors, A.* GEO. J. ON POVERTY L. & POL'Y 16 (2009): 285.
[24] Boldt, Caruth, Reschovsky, supra note 6
[25] Salkin at 294.
[26] Anderson, Nathan B., and Jane K. Dokko. *Liquidity problems and early payment default among subprime mortgages.* No. 2011-09. Board of Governors of the Federal Reserve System (US), 2011. See also Gross, Tal, Matthew J. Notowidigdo, and Jialan Wang. "Liquidity constraints and consumer bankruptcy: Evidence from tax rebates."
[27] Sabia, Joseph J. "There's No Place Like Home A Hazard Model Analysis of Aging in Place Among Older Homeowners in the PSID." *Research on Aging* 30.1 (2008): 3-35.
[28] Shan, Hui. "Property taxes and elderly mobility." *Journal of urban economics* 67.2 (2010): 194-205.

contrast, Boldt et al. (2010) find that property tax increases in Wisconsin have very little effect on whether the elderly are forced to move.[29]

Increases in property taxes and other costs of homeownership are expected to lead to increase household mobility, so long as the costs of moving or otherwise converting housing wealth into cash are not prohibitive. There is little direct evidence of the costs associated with accessing home equity for the purpose of paying property taxes; however, Texas provides a helpful counterpoint because it has a flourishing property tax lending industry. In 2011, nearly 100 property tax lenders in Texas made 12,772 loans totaling $224 million, of which 85% were made to residential borrowers.[30] Property tax lenders make direct loans, typically with terms of 3-5 years, to homeowners to pay off their delinquent property taxes and, in return, obtain the taxing authority's lien on the property. This tax lien has priority over any mortgage liens that may exist on the property, providing the property tax lender with a secure position. Property tax loans are costly. The interest rate on these loans in 2011 averaged 14.37% with a maximum statutory rate of 18%. In addition to high interest rates, these loans often have high origination fees for application, underwriting, and inspection of the property. In a survey of three lenders from 2007, interest rates on a $5,000 5-year loan varied from 12% to 18% and closing costs varied from $225 to $1,500 (for loans with an 18% rate).[31] The average loan amount in 2011 was $8,809.77 with average closing costs of $865.52, or 10% of the loan amount.[32] Thus, for homeowners who must take out property tax loans, at least, the costs of paying the costs of homeownership and remaining in one's home can be significant.

2. The Federal Income Tax

Although most individual taxpayers report income primarily from the receipt of cash wages, income can come in many other forms and at different times. For example, income can come in the form of services or property. Income can also arise at a time when the taxpayer

[29] Boldt, Rebecca, Bradley Caruth, and Andrew Reschovsky. "Are Property Taxes Forcing the Elderly Out of their Homes." *Lincoln Institute of Land Policy Working Paper, Cambridge, MA* (2010).
[30] *Property Tax Loans Another Frontier for Predatory Lenders*, Citizens for Tax Justice. http://www.ctj.org/taxjusticedigest/archive/2014/04/property_tax_loans_another_fro.php#.U3IfIsa47wI
[31] The discussion in this paragraph is based on information from What We Know About Property Tax Lending So Far. Center for Public Policy Priorities. Oct. 18, 2007.
[32] LEGISLATIVE REPORT PROPERTY TAX LENDING STUDY., Office of Consumer Credit Commissioner, (2012)

doesn't appear to receive anything at all, such as when indebtedness of the taxpayer is cancelled by a creditor. Although the definition of gross income for federal income tax purposes differs in many ways from economic income, and the timing of that income's inclusion varies based on a number of factors, an increase in a taxpayer's consumption or wealth often results in taxable income even if that income is not accompanied by cash. That is, taxpayers often owe tax in respect of phantom income. However, the taxation of true phantom income under the federal income tax differs from the taxation of imputed income under the real property tax in this respect: the property tax imposes cash tax collection on the contemporaneous receipt of imputed income, whereas cash tax collection under the federal income tax need not be contemporaneous with the receipt of income that itself need not take the form of cash. Thus, there is both a timing difference and a kind difference in the case of the income tax. The timing difference is a variation on the kind difference; a taxpayer who pays tax today on income that is received tomorrow pays out of current, rather than future consumption, so that the "kind" is the period in which the income is received.

The kind difference is a problem for all taxpayers. Individuals who receive property as compensation, for example, must pay cash tax in respect of that property. The timing difference arises for accrual method taxpayers at all times, and for cash method taxpayers under certain circumstances. Accrual method taxpayers must generally include income when the right to that income becomes fixed and the amount of the income is reasonably determinable.[33] Cash method taxpayers, on the other hand, include income when that income is actually or constructively received.[34] Thus, even a cash method taxpayer is required to pay tax on income that has not been actually received, if that income has been "constructively received," *i.e.*, if it has been "credited to his account, set apart for him, or otherwise made available so that he may draw upon it at any time, or so that he could have drawn upon it during the taxable year if notice of intention to withdraw had been given."[35] Moreover, cash method taxpayers may be required to include income currently if they have the economic benefit of that income, if that income has been set aside for them and is not subject to the claims of the payer's creditors even if it is not reducible to cash at the discretion of the taxpayer. In addition to the accounting rules for cash method

[33] Treas. Regs. Section 1.451-1(a).
[34] Id.
[35] Treas. Regs. Section 1.451-2(a).

taxpayers, there are a number of statutory rules that compel the current inclusion of income that will not be paid in cash until some later date. These include the current accrual of interest income on a debt instrument with original issue discount, the allocation of a partner's distributive share of a partnership's income, or appreciation in the value of securities for dealers under mark-to-market accounting.[36] Taxpayers so compelled are generally described as being taxed on phantom income.

The fact that the income tax base differs in kind and in time from income tax payment raises potential liquidity problems, which the Code has numerous provisions designed to mitigate.[37] For example, in the case of sales of property where at least one payment is received after the year of sale, tax is only payable in respect of the gain as payments are received.[38] Perhaps the most important feature of the income tax that mitigates the liquidity problem is the realization requirement.[39] Gains and losses from property are not generally taxable until that property is sold or disposed of.[40] Waiting to tax gains from property transactions until a realization event addresses the liquidity problem (and also the problem of how to accurately measure gain and loss). At the same time, there are well-known problems with the realization requirement[41] that provide the opportunity for significant tax avoidance. Because realization is within the control of the taxpayer, well-advised taxpayers can defer paying tax on their gains or avoid them entirely.[42] The deferral and sometimes complete non-taxation of unrealized appreciation shifts the distribution of the tax burden and creates massive tax planning waste.

[36] IRC Sections 1272, 702(a), 475.
[37] Nevertheless, Listokin (2010) provides an analysis showing that the income tax creates a preference for liquidity that encourages the oversupply of liquidity. The benefits of liquidity go untaxed while the costs of converting illiquid assets to consumption are only partially deductible.
[38] IRC Section 453.
[39] The argument has been made that taxing income before it is "realized," i.e. while it is still phantom income, is unconstitutional. Courts have rejected this argument. See Murphy v. United States, 992 F.2d 929, 931 (9th Cir. 1993) (upholding Section 1256); Eder v. Commissioner, 138 F.2d 27, 29 (2d Cir. 1943) (foreign personal holding companies); Garlock, Inc. v. Commissioner, 489 F.2d 197, 202 (2d Cir. 1973) (subpart F income), cert. denied, 417 U.S. 911 (1974); Estate of Leonard E. Whitlock v. Commissioner, 547 F.2d 506 (10th Cir. 1974), cert. denied 419 U.S. 839; Dougherty v. Commissioner, 60 T.C. 917 (1974) (same). Thanks to Bret Wells for these references.
[40] But see, e.g., IRC Section 1259 (constructive sale rules for appreciated financial positions), IRC Section 1031 (non-recognition treatment for like-kind exchanges).
[41] See, e.g., Schizer, David M. *Realization as Subsidy*. NYUL Rev. 73 (1998): 1549 (noting that "Perhaps no concept in tax law is so well established, and yet so widely criticized, as realization" but arguing that the realization requirement can be justified as a subsidy for savings).
[42] The taxation of these gains may be avoided upon the death of the property owner through application of IRC Section 1014.

What was meant to be a doctrine of administrative convenience has become a small tail wagging a very large dog.[43]

There is little evidence about how liquidity-constrained taxpayers would be affected by greater use of accrual taxation. One notable exception is Shakow (1986)[44] who proposes an accrual-based tax but makes numerous practical concessions, such as excluding hard to value securities and most collectibles. Using data from the 1986 Survey of Consumer Finances, Shakow finds that at most only a few percent of the population would have liquidity issues if his proposal for accrual taxation were adopted.

II. CASH TAXES AND CONSUMPTION COMMITMENTS: SOME EVIDENCE

The potential for liquidity problems to arise depends not just on the amount of liquid and illiquid assets owned by a household, but also how much of their liquid assets are committed to consumption that is costly to adjust. For example, it may be costly to reallocate to other uses income that is committed to mortgage payments, insurance, or utilities. Consider an individual who consumes only two goods: food and housing. The amount of food that the taxpayer consumes can be costlessly adjusted, whereas the amount of housing that is consumed can only be adjusted at a cost. An individual who owns her own home can reduce her housing consumption by moving or by taking in a tenant to occupy some part of the home, but both entail non-trivial costs. In the case of moving, these include moving costs, possibly mortgage origination fees, the psychological costs of changing residences, and the time and effort of finding a new home. In the case of taking in a tenant, there are the costs of finding a suitable renter, ensuring that the arrangement is legally compliant, preparing rental agreements, and the psychological costs of shared living space. Alternatively, the same homeowner can increase her housing consumption by purchasing a second home that is more desirable during certain seasons of the year, or make improvements to her primary residence. Both of these adjustments are costly.

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[43] Helvering v. Horst, 311 U.S. 112 (1940) (stating that the realization requirement was one based "on administrative convenience").

[44] David J. Shakow, *Taxation without realization: a proposal for accrual taxation*. U. PA. L. REV. (1986): 1111-1205, 1117. For efficiency analysis of realization and recognition, see Shaviro, Daniel N. *Efficiency Analysis of Realization and Recognition Rules under the Federal Income Tax, An*, TAX L. REV. 48 (1992): 1.

Chetty and Szeidl (2007)[45] demonstrate that an individual who experiences a negative income shock would most prefer, in the absence of adjustment costs, to reduce her consumption of both food and housing. In the presence of housing adjustments costs, however, it may be optimal for the individual to reduce only her consumption of food if the income shock is moderate. Her consumption of housing (in general, a good that can only be adjusted at a cost) follows what is known as an "(S,s) policy," remaining fixed for wealth fluctuations within a specified band given by the lower and upper bounds s and S, respectively.[46] Chetty and Sziedl report that more than 50% of household budgets are fixed over moderate income shocks and that unemployment shocks are associated with greater reductions in food consumption for homeowners than renters, likely because it is less costly for renters to reduce their housing consumption so they can spread the negative income shock across food and housing. In the year of job loss, renters reduce food consumption by 6.7% and housing consumption by 4.3%. Homeowners reduce food consumption by 9.1% and reduce housing consumption by less than 0.1%.

Chetty and Szeidl also show that concentrating the effect of an income shock on food consumption results in greater risk aversion, and welfare loss, over moderate shocks than would be the case if both food and housing consumption could be costlessly adjusted. Only if the income shock is sufficiently large will it be preferable for the individual to incur the cost of adjusting her housing consumption. In addition to explaining two longstanding puzzles in consumer behavior: (1) that individuals are much less risk averse over large gambles than would be predicted from the amount of risk aversion they exhibit over medium gambles, and (2) that

[45] Chetty, Raj, and Adam Szeidl. "Consumption commitments and risk preferences." *The Quarterly Journal of Economics* 122.2 (2007): 831-877. For other two-good adjustment cost models see Flavin, Marjorie, and Shinobu Nakagawa, "A Model of Housing in the Presence of Adjustment Costs: A Structural Interpretation of Habit Persistence," Mimeograph, University of California, San Diego, 2003; Fratantoni, M. C., "Homeownership, Committed Expenditure Risk, and the Stockholding Puzzle," *Oxford Economic Papers*, 53 (2001), 241–259; Li, R., "Household Portfolio Choice with Precommitment," Working paper, University of Toronto, 2003; Postlewaite, A., L. Samuelson, and D. Silverman, "Consumption Commitments and Preferences for Risk," Working Paper, Penn Institute for Economic Research, 2004; Gollier, Christian, "Does flexibility enhance risk tolerance?" Mimeograph, University of Tolouse, 2005; and Shore, Stephen, and Todd Sinai, "Commitment, Risk, and Consumption: Do Birds of a Feather Have Bigger Nests?" Mimeograph, U-Penn, Wharton, 2005.

[46] See also Eberly, J., *Adustment of Consumers' Durables Stocks: Evidence from Automobile Purchases*, Journal of Political Economy, 102 (1994), 403–436; Attanasio, Orazio, "Consumer Durables and Inertial Behavior: Estimation and Aggregation of Ss Rules for Automobiles," Review of Economic Studies, 67 (2000), 667–696; Martin, Robert, "Consumption, Durable Goods, and Transaction Costs," FRB
International Finance Discussion Papers No. 756, 2003.

individuals who have insurance also purchase lottery tickets, their model has implications for the income replacement rate under social insurance programs, suggesting that the replacement rate may be higher for moderate wealth shocks than for large wealth shocks.

Consumption commitments make it costly to adjust a taxpayer's consumption plan following a shock to their income, which can result in their consuming a different bundle of goods than they would choose optimally in the absence of adjustment costs. The model in Section II extends this framework to incorporate taxes, and shows that the imposition of cash taxes on non-cash income transmits positive phantom income shocks to negative cash consumption shocks, and vice versa. This changes the effects of consumption commitments on risk-taking preferences and welfare. In the housing context, the model shows that larger increases in home values will, prior to any household adjustments, represent larger distortions from a household's optimal consumption bundle and increase the likelihood that the household will convert that increase in housing consumption to other forms of consumption. However, larger increases in home values will, in general, also be associated with larger increases in property taxes.[47] That increase in taxes will amplify the distortion created by the change in home prices, reducing cash consumption at the same time that housing consumption increases. If the resulting distortion is large enough relative to the costs of adjustment, it will trigger an adjustment to non-housing consumption. Thus, the effect of changes in property taxes on cash consumption, holding changes in housing wealth constant, is ambiguous. If adjustment costs are sufficiently large then the increase in taxes will cause the taxpayer to reduce her cash consumption, compared with her consumption before the tax (and property value) increase, but if adjustment costs are sufficiently small then the increase in the property taxes will result in a distortion sufficient to cause the homeowner to convert some of her imputed housing income to non-housing consumption. To motivate this model, the remainder of this section reports evidence on how households adjust their consumption following income shocks in the form of home value appreciation or depreciation.

I report evidence from the Health and Retirement Study (HRS) to shed light specifically on the liquidity constraints faced by older households and how those constraints affect the

[47] Because many jurisdictions impose limitations on annual property tax increases, property taxes may be only weakly increasing in property values. In certain extreme cases, it is even possible for a homeowner's property taxes to decline, if her property appreciates less than other properties in the taxing jurisdiction.

relationship between taxable phantom income shocks and consumption.[48] The HRS surveys a representative sample of over 26,000 Americans over the age of 50 every two years.[49] I use these data because the HRS collects information on a wide range of household income and asset characteristics, including estimated home values and mortgage debt, as well as food consumption.

A few questions that were added to the HRS in 2008 are of particular interest. These questions specifically address how households respond to changes in housing wealth and to changes in their mortgage payments. Homeowners were asked how the values of their homes had changed between survey waves and whether they had changed their consumption because of any increase or decrease in home value (*i.e.*, not merely whether they had changed their consumption coincidentally with the change in home value). Respondents were also asked whether the size of their mortgage payment had changed between waves and whether any such change had caused a change in their spending on other goods. These variables make the 2008, 2010 and 2012 waves particularly useful for looking how household consumption varies with changes in home values and changes in mortgage payments. If respondents answered these questions honestly, then the subjective causal link between home value or mortgage payment shocks and consumption is embedded in their answers. There are 41,493 survey responses from homeowners in these three years. After limiting the sample to households that both owned their home and remained intact for consecutive waves, there are 24,043 household/year observations in my sample.

When asked about whether the value of their home had increased, decreased or remained the same since the previous wave, 15% of households reported home price increases and 28% reported home price declines. The period from 2006 to 2009 was, of course, characterized by a dramatic collapse in the national housing market. 42% of respondents reported a decline in their home values from 2008-2010. When asked to specifically estimate what their home would sell for, however, a number of households reported home price estimates that were inconsistent with their answer to the question about the direction in which their home value had changed. For

[48] For a discussion of the quality of HRS data see Venti (2011). Although the HRS data are fairly reliable, there are significant measurement issues create problems for longitudinal analysis. Because of the serial correlation in most variables in the HRS data, annual changes should be small, but if they are reported with error then large variation is artificially generated. As Ventri notes, "[a]t the very least the "changes" created by the inaccurate reports of ownership or inaccurate reports of asset balances are typically much larger than changes that do not involve misreporting and thus the noise can overwhelm the signal."

[49] Data are available at http://hrsonline.isr.umich.edu/.

example, 6.7% of households said that their home value fell from one wave to the next but reported a *higher* value than in the current wave than in the prior wave. 3.6% of households said that their home value went up from one wave to the next but reported a *lower* home value than in the previous wave. Although these percentages are not large, they raise questions about the reliability of respondents' estimates of their home values, and the correspondence between actual market values and subjective reports. However, because of the nested nature of the survey questions in the HRS, it is the respondents' answers to the question of whether the value of their home increased, decreased, or remained the same between waves that is relevant. Respondents are asked this question first, and then are asked about changes in their spending based on their response to that question.

1. Households for Which Housing Wealth Affects Spending

Of the 3,700 reports of appreciating home values since the previous wave, only 243, or 6.6%, reported increasing their spending in response.[50] Of the 6,693 reports of falling housing prices, 22.8% reported cutting their spending as a result. Thus, household consumption is more responsive to declines in home values than to increases in home values. What accounts for this asymmetry, and what explains whether a homeowner will change her consumption in response to change in housing wealth? Table 1 reports summary statistics for the homeowners who experienced increasing and decreasing home values during the sample period, by whether the household reported increasing, or decreasing, respectively, its spending on items other than home improvement or mortgage payments in response to that change in home value. Differences between groups that changed and did not change their consumption that are significant at the 10% level are identified in bold.

Looking first at homeowners who reported increases in home values, how do the ones who increased their spending differ from those who did not? In part because of the relatively small number of households that increased their spending out of home price increases, many of the differences are not statistically significant at conventional levels. However, the households that increased their spending following a home price increase have lower incomes and are less

[50] Specifically, the questions asked about changes in spending other than changes in mortgage payments (including property taxes and insurance) and home repairs or remodeling.

wealthy than those that did not increase their spending following a home price increase. Households that increase spending have a lower average income by nearly $12,000; they have less valuable homes and nearly $80,000 less in non-housing assets, on average; and they have more than $30,000 less in liquid assets, on average. Moreover, for these households, their primary residence represents 76% of the total value of their assets, whereas the primary residence represents only 68% of the wealth of households that did not adjust their consumption. Differences in debt characteristics between the two groups are not statistically significant. Finally, households that spend out of home price appreciation tend to have lower property taxes than households that do not. Where did the households that spend out of their home price increases get the cash? One possibility is that they reduced their liquid asset holdings. Another is that they were able to spend more because they paid lower property taxes. Although the differences are not statistically significant, there is weak evidence that the households may have financed the increased consumption because they have more consumer debt, larger increases in consumer debt, more HELOCs, more second mortgages, and more of them carry credit card balances than households that did not spent out of their home appreciation.

What about households that saw the values of their homes fall during this period? Compared with households that did not reduce their consumption because of a negative home wealth shock, households that reduced spending had homes worth $20,000 less, on average. In addition to having less housing wealth, they have lower incomes and are much less wealthy than households that do not adjust consumption; on average they have $18,400 less in cash, $129,000 less in non-housing assets, and $74,000 less in liquid assets. These households are also much less liquid. Their primary residences makes up 77% of their total assets and only 11% of their total assets are liquid, compared with 64% and 19%, respectively, for the households that did not reduce consumption. There is not a statistically significant difference in average property taxes paid by the two groups, although households that reduced their consumption do have larger mortgage payments than those who did not reduce their consumption. Thus, in terms of their income and wealth, households that reduce their consumption following negative housing wealth shocks look similar to households that increase their spending because of positive housing wealth shocks. Both groups tend to have lower incomes, less wealth, less liquid wealth, and tend to have a greater share of their wealth invested in their primary residence, compared with households whose consumption is not as sensitive to housing wealth fluctuations. Moreover, they

both have more onerous cash commitments associated with their home, property taxes in the case of households that increase their consumption following a positive home wealth shock and mortgage payments in the case of households that reduced their consumption following a negative home wealth shock.[51]

But the data on households experiencing negative home wealth shocks reveals that those that reduce their consumption also have different credit characteristics than those that do no reduce their consumption. The former group tends to have more consumer debt, larger increases in consumer debt (although this difference is not statistically significant), larger HELOC balances, and are more likely to carry credit card balances and to carry larger balances. These differences are qualitatively in the same direction as the differences among households that experience home price appreciation, although they are only statistically significant among households with declining home values. Taken together, it appears that households that change their consumption in response to home price fluctuations tend to be more highly leveraged, with more debt of various kinds and larger balances.

2. Some Estimates of Why Housing Wealth Affects Spending

In order to describe the roles that liquidity-related factors play in the decision to increase or decrease spending out of home price changes, Table 2 reports the results from a series of OLS regressions on the pooled cross section of households reporting home value increases or decreases in 2008, 2010 or 2012. Equations (1)-(3) were estimated on the subsample of observations for which the household reported an increase in home value since the prior wave and the dependent variable is whether the homeowner reported increasing spending as a result of that price increase. Equations (4)-(6) restrict the sample to households reporting home value decreases and the dependent variable is whether the homeowner reported a decrease in spending as a result. The independent variables include the household's amount of liquid assets (cash, stocks, bonds and CDs) and whether the homeowner has a HELOC. These variables enter into

[51] Among households that experienced a positive home wealth shock, 38% of those that did not adjust consumption have a primary mortgage and 42% of those that increased their consumption have a primary mortgage. Among households that experienced a negative home wealth shock, 39% of those that did not adjust consumption have a primary mortgage and 56% of those that reduced their consumption have a primary mortgage. Property taxes may be measured with greater error for households with mortgages, which could result in a failure to identify a significant difference in property taxes across groups experiencing negative home wealth shocks.

equations (1) and (4) separately from two other variables of interest: the homeowner's estimate of her home value and the annual amount paid in property taxes. In the other equations these measures are fully interacted with the home value and the amount of property taxes paid. The other independent variables included in all regressions are the household's total income in the current wave, the ratio of home value to income in the prior wave, which is a proxy for housing preferences, and whether the homeowner carries a balance on her credit card. Year dummy variables were included in all specifications, but I do not report those coefficient estimates.

Ideally, and in order to test the implications of the model set forth in Part III, the independent variables in these regressions would include *changes* in home values and property taxes from one wave to the next. As Ventri (2011) notes, however, the measurement errors that plague survey responses, particularly with respect to level values of assets, are especially problematic for attempts to use the panel feature of the HRS data because many of the variables will be strongly serially correlated and measurement error will significantly reduce the efficiency of the estimates. Because of the loss of efficiency due to measurement error, I report results from the pooled cross section, noting that there are likely to be biases on account of omitted variables. I emphasize the suggestive nature of these results.

The first three regression models are estimated on the sample of households that reported housing value increases and explain the decision to increase consumption as a result of that increase in home wealth. Across all three models, households with a home equity line of credit were more likely to increase their consumption, suggesting that at least some of the increase in consumption was financed with home debt. By contrast, there is no correlation between the availability of liquid assets or carrying a credit card balance and increasing consumption. Because home equity indebtedness is tax favored,[52] it is perhaps not surprising that households chose to finance their consumption in this way rather than by running down their liquid assets or borrowing on their credit card. This result is also consistent with the popular narrative of households using their homes as "ATM machines." Households with HELOCs were between 3 percentage points and 4.5 percentage points more likely to increase their spending in response to increases in housing wealth. A second source of cash for increased spending appears to be available for households with lower property taxes. Across all three models, a $1,000 increase in

[52] See 163(h)(3) (interest on qualified residence indebtedness, including home equity indebtedness, generally deductible).

property taxes is associated with a 1 percentage point reduction in the likelihood of spending out of increases in home wealth. This difference is statistically significant at the 1% level. Finally, households with more valuable homes were more likely to increase their spending in response to an increase in home values. This could be because higher home values are a proxy for larger increases in home values, because households with more valuable homes have cheaper access to home equity borrowing, or because more valuable properties are correlated with more permanent increases in home wealth. The coefficient estimates on the interaction terms are not statistically significant. None of the other covariates are statistically significant at conventional levels.

Turning to the households that experienced housing wealth declines, it appears that households with the least liquidity are the ones that are most likely to reduce their spending as a result. Households with more liquid assets are less likely to reduce their spending across all three models following a decline in their home values, although the economic magnitude is small. Two other measures of household liquidity tell a similar story. Households with a higher ratio of home value to income and households carrying credit card balances are more likely to reduce their spending following a housing price decline. The effect of carrying a credit card balance is especially large. Households with a balance are 15% more likely to reduce their consumption compared to households that do not carry a balance. The effect of property taxes on reducing spending following a decline in housing wealth is statistically significant and of the same magnitude as the effect of property taxes on increasing spending out of a housing wealth increase. A $1,000 increase in property taxes is associated with a 1 percentage point increase in the likelihood of reducing spending.

3. Households for Which Mortgage Payments Affect Spending

Sections 1 and 2 shed light on how households respond to changes in home prices, but looked only at whether household consumption moves in the same direction as changes in housing wealth. They do not address the specific outcome in which households experience increases in housing wealth and negative liquidity shocks at the same time. This section examines these outcomes by focusing on households with mortgages. Mortgage payments can vary for a number of reasons, including changes in interest rates or in the contributions that mortgagors must make to escrow accounts for property insurance, mortgage insurance, and

property taxes. Property taxes are positively correlated with home prices and 57% of households in the sample with primary mortgages include property taxes with their mortgage payments.[53] For such homeowners, changes in their property taxes will appear to them as changes in their mortgage payments. As the table below shows, home values, property taxes and mortgage payments are all correlated at the 1% level.

Correlation Between Home Value, Annual Property Taxes and Monthly Mortgage Payments

	Home Value	Property Tax	Loan Payments
Home Value	1.00		
Property Tax	0.38*	1.00	
Loan Payments	0.27*	0.17*	1.00

16.6% of all respondents in the sample who had a mortgage (6,656) reported mortgage payments that increased since the prior wave. 67.3% of respondents reported that their mortgage payments remained the same since the prior wave and 15.1% reported declining mortgage payments. Household consumption was much more responsive to increases in mortgage payments than decreased in mortgage payments. 47.3% of the homeowners who reported increasing mortgage payments decreased their spending on other things in response, while only 10.3% of the homeowners who reported that their mortgage payments had fallen increased their spending as a result. If we restrict our attention to households that reported a home price increase, we find that 134 out of 303 households, or 44%, *decreased* their spending due to higher mortgage payments. For those that reported home price decreases, only 35 out of 483 reported increasing their spending due to falling mortgage payments.[54]

[53] These households may not be as aware of their property taxes as households that do not pay their property taxes as part of their mortgage payments. Hayashi, Andrew. *The Legal Salience of Taxation*, U. Chi. L. Rev. (forthcoming 2014), Cabral, Marika, and Caroline Hoxby. *The hated property tax: salience, tax rates, and tax revolts*. No. w18514. National Bureau of Economic Research, 2012; Ordeshook, Peter C. "Property tax consciousness." *Public Choice* 34.3 (1979): 285-295 (not finding an effect). In fact, the HRS contemplates this, instructing survey administrators that if the homeowner is unsure of her property taxes on account of paying them out of her mortgage, then it should be coded as "unknown."

[54] Note that mortgage payments do not necessarily fall when home prices fall, because property taxes sometimes go up even when values are falling.

Table 3 reports descriptive statistics for households that experienced rising mortgage payments and households that experienced falling mortgage payments, broken out by whether the households decreased or increased, respectively, their consumption as a result of the changes in mortgage payments. A scarcity of observations makes it difficult to compare households that increased and did not increase their spending following a fall in their mortgage payments. However, it is clear that, following an increase in mortgage payments, households that reduced their consumption were much less liquid than households that did not reduce their consumption. Households that cut spending had $14,000 less in cash balances, $33,000 less in liquid assets and $17,000 less in income, on average, than households that did not cut spending. Households that chose to reduce consumption also had less valuable homes and nearly $100,000 less in non-housing assets. But households that cut spending are not only poorer in absolute terms; their homes make up a greater share of their assets – 83%, compared with 71% for households that did not cut spending – and the share of their assets that are liquid is 8%, on average, compared with 11% for households that did not cut consumption. Households that cut consumption are also more likely to carry credit card balances than households that did not cut consumption.

In sum, households whose consumption is sensitive to mortgage payment shocks tend to be liquidity constrained: they have fewer liquid assets, both in absolute terms and as a share of their household balance sheet, and they are more likely to be credit constrained as measured by carrying a credit card balance. Where do households cut consumption? The HRS does not provide detailed consumption data; however, it does report information on how much households eat out. The final three rows of Table 3 show that households that cut their spending after their mortgage payments increased spend $12 less per week eating out, on average, and they were both 5 percentage points more likely to eat out less, and 7 percentage points less likely to eat out more, than households that did not cut spending.

These facts about household liquidity and the effects of phantom income shocks on consumption provide the backdrop for the formal analysis of the liquidity problem in the next Part.

III. A Model of Cash Taxes and Consumption Commitments

A. A Graphical Illustration

In this Section I present a simple graphical illustration of the simple economics of base/tax differences in order to help fix intuitions before providing a more rigorous account in Section B. That account can be used to interpret the empirical results in Part II. Consider a taxpayer T who owns a durable, non-depreciating home with a value of H that generates in each period a flow of housing consumption h, which is proportional to H, and a cash property tax liability τh. The property tax can be viewed in this case as an excise tax on housing consumption. T also receives a fixed cash income of y at the beginning of each period that is spent on food consumption f, after property taxes have been deducted. Letting the price of food and housing be 1 and $1+\tau$, respectively, T consumes $f = y - \tau h$ of food each period. In order to focus on the effects of unexpected changes in phantom income and the tax liabilities associates with those changes, I assume that the consumption bundle (f, h) is optimal.

Assume that the value of T's home is stochastic, and that that changes in the value of her home are attributable to some factor that she values as much as the marginal entrant in the housing market, so that any change in the value of the home results in an equal change in the flow of housing consumption she enjoys. For example, the change in her home's value may be due to capitalized changes in the local crime rate, school quality, or amenities that she cares about. In particular, Figure A illustrates the case in which T's realized home value H' is higher than expected so that both her wealth and housing consumption h' are also greater than expected, shifting her budget constraint out and involuntarily changing her consumption bundle from (f, h) to (f, h').

If the increase in property value were not taxed, and if food and housing could be adjusted costlessly, then T would move to point A on her new budget constraint. If adjusting housing consumption (say, by renting a part of T's home or selling and moving out entirely) incurs a fixed cost κ, then T will adjust her consumption only if κ is sufficiently small, because paying the adjustment cost shifts T's budget constraint inward but allows her to consume her optimal consumption bundle given that constraint.

Suppose that the increase in the value of T's home is taxed and consider the effects of collecting the tax in-kind or in cash, before any adjustments are made by T. If the tax could be collected in-kind, then this would move T from $(f, h')$to consumption bundle $(f, h'')^{IK}$, where $h'' = h' - \tau(h' - h)$. If the tax is collected in cash, on the other hand, then this would move T to $(f', h')^{C}$. Taxpayer T is better off under the in-kind tax than under the cash tax if no adjustments are made because $(f, h'')^{IK}$ lies on a higher indifference curve than $(f', h')^{C}$.

Let $(f^*, h^*)_{\kappa}$ be T's optimal consumption plan given h', τ and adjustment cost κ. Let $\overline{\kappa}$ be such that the taxpayer is indifferent between $(f', h')^{C}$ and $(f^*, h^*)_{\overline{\kappa}}$. Let $\underline{\kappa}$ be such that the taxpayer is indifferent between $(f, h'')^{IK}$ and $(f^*, h^*)_{\underline{\kappa}}$. Adjustment costs have the following effects.

(1) For $\kappa \geq \overline{\kappa}$, T will not adjust her consumption under either the cash tax or the in-kind tax. She will consume $(f', h')^{C}$ if facing a cash tax and $(f, h'')^{IK}$ if facing the in-kind tax and will be better off under the in-kind tax.

(2) For $\kappa \leq \underline{\kappa}$, T will pay κ and adjust her consumption regardless of how the tax is collected, and consume $(f^*, h^*)_{\kappa}$ in both cases. She will be equally well off regardless of which tax she faces.

(3) For $\underline{\kappa} < \kappa < \overline{\kappa}$, T will adjust her consumption if she is subject to cash tax but not if she is subject to an in-kind tax. She will consume $(f^*, h^*)_{\kappa}$ if subject to the cash tax and $(f, h'')^{IK}$ is subject to the in-kind tax, and she will be better off under the in-kind tax.

Figure B illustrates the effects of adjustment costs and cash taxes in the case in which T suffers a negative shock to her home value. The labeling is reversed. A decline in T's home value causes an involuntary reduction in her housing consumption, moving her from the bundle (f, h) to (f, h'). However, the reduction in her home value results in a reduction in her tax liability. If the tax is refunded in-kind, then she moves to $(f, h'')^{IK}$, dampening the reduction in housing consumption that would have otherwise occurred. If the tax is collected in cash, then the decline in home value results in an increase in cash income and an increase in food consumption,

moving her to $(f', h')^C$. If she does not adjust her consumption, she is worse off under the cash tax than under the in-kind tax. For $\kappa \geq \overline{\kappa}$, T will not adjust her consumption regardless of how the tax is collected and she will be better off under the in-kind tax than the cash tax. For $\kappa \leq \underline{\kappa}$, T will pay κ and consume $(f^*, h^*)_0$ regardless of how the tax is collected, and be equally well of in either case. For intermediate values of κ, T will adjust her consumption if she is subject to the cash tax but not the in-kind tax and be better off under the in-kind tax.

When adjustment costs are small, the tax/base discrepancy does not affect the consumption bundle enjoyed by taxpayers following a shock in the tax base and both will adjust their consumption to choose their optimal bundle given their new budget constraint. When adjustment costs are large taxpayers consume different bundles and are worse off under a cash tax than under an in-kind tax, following either a positive or a negative shock to the tax base. For extreme adjustment costs, it is even possible that taxpayers may even be worse off following a positive phantom income shock than they were before. For intermediate adjustment cost values, taxpayers will adjust their consumption following a shock to the tax base under a cash tax but not under an in-kind tax, but always be better off under an in-kind tax.

B. Description of the Model

In this Section I describe formally the decision faced by a taxpayer who receives a stochastic flow of phantom income that is subject to a cash tax and who must incur some cost to convert that phantom income into cash. I first consider a situation in which the phantom income is imputed income from a durable asset, like a home, and the income is consumed by the taxpayer in the current period. I then show how the same model can be used to analyze phantom income that accrues in the current period but is not reduced to cash and consumed until the next period, the traditional phantom income problem.

1. Property Taxes

Consider a taxpayer T who receives cash income y and owns a home that yields a flow of imputed income h^*, which is taxed at rate τ. For example, τ might be the property tax rate. That imputed income is consumed, and the taxpayer derives utility from the flow of housing

consumption and also from consumption c, which is purchased with cash. Let $h^* = argmax_h\, u(h, c(h))$ so that T's consumption of h^* units of housing and $c^* = y - \tau h^*$ of cash consumption is optimal given y and τ.[55] Assume that u is twice continuously differentiable and concave in both housing and cash consumption.

Although T plans to consume (h^*, c^*), the imputed income from her home is stochastic and realizes a value of $h_\epsilon = h^*(1+\epsilon)$, where ϵ is mean-zero shock.[56] Fluctuations in the imputed income from her home may be due to change in neighborhood conditions, such as crime rates, school quality, and the availability of local amenities, for example. This shock to T's home value changes her pre-adjustment consumption bundle away from (h^*, c^*). T now faces the choice to either consume $(h_\epsilon, y - \tau h_\epsilon)$, or change her holdings of the durable asset, and her consumption of housing, which she can do by paying cash cost κ. For example, T might take on a tenant and use the rental income to supplement her cash consumption, or sell the property, purchase a less valuable home, and use the difference to increase c. Or, following a negative shock to the value of her home, she might choose to reduce c and use the extra money to make home improvements or move into a better neighborhood. Formally, T solves the problem

$$\max_h \; u(h, c(h)) \;\; \text{where} \;\; c = y - \tau h_\epsilon + (h_\epsilon - \mathrm{h}) - \kappa \cdot 1\{\mathrm{h} \neq \mathrm{h}_\epsilon\} \tag{1}$$

If the tax were collected in kind, on the other hand, she would solve the following problem:

$$\max_h \; u(h, c(h)) \;\; \text{where} \;\; c = y - \tau h^* + (h_\epsilon - \mathrm{h}) - \kappa \cdot 1\{\mathrm{h} \neq h_\epsilon\} \tag{2}$$

[55] Note that the solution $(h^*, y - \tau h^*)$ does not depend on whether the tax is collected in cash or not. Also note that, in choosing h^*, T is acting myopically and not taking anticipating the effect of phantom income shocks. My focus is on the adjustment decision and from the perspective of T, h^* is a state variable. I intend to extend this decision to a two period model to more realistically model the initial choice of h, as well as incorporate precautionary savings.

[56] It will not always be the case that changes in home values are associated with changes in housing consumption for the current owner/occupant. Chetty and Szeidl, for example, contemplate that changes in home values might correspond to changes in housing consumption only in the case of remodeling. This too is a strong assumption. The relationship between changes in home prices and changes in the flow of imputed income/housing consumption will depend on the cause of the price changes.

T will adjust her housing consumption, setting $h \neq h_\epsilon$, if the utility from doing so exceeds the utility from not adjusting her housing consumption. This adjustment depends on T's income, the amount of expected imputed income and the magnitude of the income shock, the cost of adjustment, the tax rate, and whether the tax is collected in cash or in kind. For a taxpayer who adjusts her consumption, her utility does not depend on how the tax is collected. However, a taxpayer who does not adjust her consumption is always worse off under a cash tax than a consumption tax. If T does not adjust her housing consumption, her utility under a cash tax and under an in-kind tax are, respectively:

$$u^{CT}(h_\epsilon, c) = u(h_\epsilon, y - \tau h) \quad \text{and} \quad u^{IK}(h_\epsilon, c) = u(h_\epsilon - \tau\epsilon h^*, y - \tau h^*)$$

$u^{CT}(h_\epsilon, c)$ will always be greater than $u^{IK}(h_\epsilon, c)$. To see this, recall that given $y, \tau,$ and h^*, T maximizes her utility by consuming h^* and $y - \tau h^*$, so that $u_1\big(h^*, c^*(h^*)\big) = u_2(h^*, c^*(h^*))$ and the marginal utility of one more unit of housing equals the marginal utility of one more unit of cash consumption. Under a cash tax, a positive phantom income shock increases housing consumption by ϵh^* and decreases cash consumption by $\tau\epsilon h^*$. Under an in-kind tax, a positive phantom income shock increases housing consumption by $\epsilon h^*(1 - \tau)$. Because marginal utility is strictly decreasing in both housing and cash consumption, the utility loss from paying $\tau\epsilon h^*$ is larger when the tax is deducted from a positive housing consumption shock.[57] Similarly, the benefit of a tax reduction is greater when it cushions a negative housing consumption shock than when it increases T cash consumption. Because utility is greater under an in-kind tax then under a cash tax, for any given collection of parameter values, T is more likely to adjust her consumption following a phantom income shock if she is subject to a cash tax.

2. Taxing Phantom Income

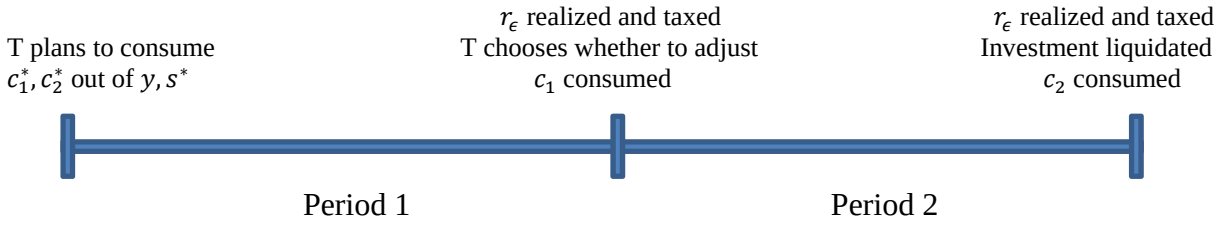
Although I have described T's problem in terms of the imputed income from home ownership and cash consumption, the problem can be reframed in terms of present and future

[57] $\tau\epsilon\, u_1\big(h^*(1+\epsilon), c^*(h^*)\big) < \tau\epsilon\, u_2(h^*(1+\epsilon), c^*(h^*))$.

consumption to analyze the effect of taxing phantom income. Suppose T lives two periods and is initially endowed with cash income y and savings of s^*.

T's cash holdings do not earn a return but s^* is invested in an asset that realizes a stochastic return $r_\epsilon = r(1+\epsilon)$ in each period, where ϵ is a mean zero shock. Let $s_\epsilon^* = s^*(1+r_\epsilon)$. Assume that the uncertainty about r_ϵ is resolved in period 1, so that the asset generates the same return in both periods. Under an accrual regime, r_ϵ is taxed at rate τ in both periods 1 and 2 even though the investment only matures and is reduced to cash at the end of period 2. For example, r_ϵ may be appreciation in the value of a security that is marked to market, allocations of income to a partnership interest, or income derived from an investment in a mutual fund, in each case where the investment matures in the following period. Under a cash method of accounting, the income earned on s^* is taxed only in period 2 when the investment is liquidated.

As in the previous example, I do not model the initial choice of s^*, in order to focus on the effects of taxing phantom income on consumption plan adjustments. However, the choice of s^* pins down T's *ex ante* consumption plan, c_1^* and c_2^*, in periods 1 and 2, respectively. In period 1, T plans to consume her cash income, net of any taxes due. In period 2, T plans to liquidate her savings and consume the after-tax amount. The timeline below illustrates the timing of the taxpayer's problem.



Under an accrual regime, T plans to consume $c_1^* = y - s^* r\tau$ and $c_2^* = s^*(1+r)(1+r(1-\tau))$ and expects to derive lifetime utility $u(c_1^*) + \beta u(c_2^*)$. However, a positive shock in the return to T's savings would result in T consuming more in period 2 (and less in period 1) than she would prefer, and a negative shock would result in T consuming less in period 2 (and more in period 1) than she would prefer. The shock causes T's period 2 consumption to change,[58] but it also causes T's period 1 consumption to change in the opposite direction because a portion of

[58] The change is equal to $s^*\left[r\epsilon + (1-\tau)\left(r_\epsilon(1+r_\epsilon) - r(1+r)\right)\right]$

the phantom income that is paid in period 2 accrues and is taxed in period 1.[59] At this point, T can adjust her consumption plan by either adding to her savings or liquidating some of her savings to spend on current consumption. Either adjustment incurs cost κ. T solves the problem:

$$\max_s u\big(c_1(s)\big) + \beta u\big(c_2(s)\big) \text{ where } c_1 = y - s^* r_\epsilon \tau + (s_\epsilon^* - s) - \kappa \cdot 1\{s \neq s_\epsilon^*\} \text{ and}$$
$$c_2 = s(1 + r_\epsilon(1-\tau))$$

If the entire tax were collected in period 2, when the income were paid, on the other hand, T would solve the following problem:[60]

$$\max_s u\big(c_1(s)\big) + \beta u\big(c_2(s)\big) \text{ where } c_1 = y + (s_\epsilon^* - s) - \kappa \cdot 1\{s \neq s_\epsilon^*\} \text{ and}$$
$$c_2 = s(1 + r_\epsilon)^2(1-\tau) + s\tau$$

T will adjust her savings, setting $s \neq s_\epsilon$, if the utility from doing so exceeds the utility from not adjusting her savings. If T does not adjust her savings, her utility under accrual taxation and cash taxation are, respectively:

$$u^{AT}(c_1, c_2) = u(y - s^* r_\epsilon \tau, s_\epsilon^*(1 + r_\epsilon(1-\tau)))$$
$$u^{CT}(c_1, c_2) = u(y, s_\epsilon^*(1 + r_\epsilon)^2(1-\tau) + s_\epsilon^*\tau)$$

Analogously to the property tax case, u^{AT} will always be less than u^{CT} and, in fact, T's utility under a cash tax will always be at least as large under a cash tax as under an accrual tax.

C. Simulations

The decision model in Section B.1 both helps illustrate the costs of taxing imputed income and makes a number of predictions about how certain variables affect the likelihood that

[59] The period 1 change is equal to $s^* r \epsilon \tau$.
[60] Note that I assume here that T is able to liquidate a portion of her savings without triggering the tax in period 1. That is, she does not trigger a realization event.

a homeowner will adjust her cash consumption in response to a shock to her home value. In order to explore those relationships, I conducted a series of simulations of the taxpayer's housing adjustment problem. I assume that T has the CES utility function $u(h,c) = (\alpha h^{-\rho} + (1-\alpha)c^{-\rho})^{-1/\rho}$.[61] Let $\sigma = \frac{1}{1+\rho}$, the (constant) elasticity of substitution, and let $\gamma = \left(\frac{\alpha}{1-\alpha}\right)^{\sigma}$, which represents T's relative preference for housing and cash consumption, then T's utility if she adjusts her housing consumption is

$$u^{A}(h,c) = \left(\alpha\left(\frac{y + h_{\epsilon}(1-\tau) - \kappa}{1+\gamma}\right)^{-\rho} + (1-\alpha)\left(\frac{\gamma(y + h_{\epsilon}(1-\tau) - \kappa)}{1+\gamma}\right)^{-\rho}\right)^{-1/\rho}$$

T will adjust her housing consumption if this utility is greater than the utility from not adjusting her consumption. In the case of an in-kind tax and a cash tax, respectively, these utilities are

$$u^{IK}(h_{\epsilon},c) = (\alpha(h_{\epsilon} - \tau\epsilon h^{*})^{-\rho} + (1-\alpha)(y - \tau h^{*})^{-\rho})^{-1/\rho} \quad \text{and}$$

$$u^{CT}(h_{\epsilon},c) = (\alpha {h_{\epsilon}}^{-\rho} + (1-\alpha)(y - \tau h_{\epsilon})^{-\rho})^{-1/\rho}.$$

The simulations involved 10,000,000 random draws of the model parameters, sampled as follows: α was assigned values from 0.1 to 0.9 in 0.1 increments with equal probability; ρ was assigned values between -1.8 and -0.3 in 0.3 increments with equal probability, which implies elasticities of substitution ranging from 0.36 to 0.77; τ was assigned values from 0 to 0.2 in 0.01 increments with equal probability; $\kappa \in [0,500]$; and $\epsilon \sim N(0,0.1)$. In all cases $h^{*} = \$20{,}000$ so that T had phantom income (and housing consumption) of $20,000 before the phantom income shock. T's income y is fixed by h^{*}, t, and α.

[61] Note that α represents the relative weighting of the two forms of consumption, σ captures the curvature of the indifference curve. As $\sigma \to 0$ the two goods become perfect complements and as $\sigma \to -\infty$ they become perfect substitutes.

1. Effects on Adjustment Probabilities and Utility for Cash Taxpayers

Figures 1-6 in the appendix show how α, the elasticity of substitution $\sigma, \epsilon, \kappa, \tau$, and y affect the probability that a homeowner will change her home consumption following a shock to her home value. Figures 1 and 2 show how the two parameters of T's utility function affect the probability of adjustment. Figure 1 shows that the higher is α, the stronger T's preference for housing consumption (the form of consumption that arrives as imputed income but on which cash taxes must be paid), the less likely that T will be to respond to home price shocks in order to adjust her cash consumption. Figure 2 shows that as the elasticity of substitution becomes larger, there is a lower probability of T adjusting her consumption following a home value shock. The intuition is straightforward: the more easily T substitutes between the form of consumption that is taxed and the form of consumption in which the tax is paid, the more the cash tax operates as an in-kind tax. The more perfect substitutes are housing and cash consumption, the less beneficial it will be to incur the costs of adjustment. In the opposite and extreme case of Leontief preferences ("perfect complements"), T's utility falls with either a positive or negative imputed income shock. If housing and cash consumption are perfect complements, then the utility cost of a negative imputed income shock cannot be offset at all by lower cash tax liabilities, and the utility cost of higher cash tax liabilities cannot be offset at all by positive imputed income shocks.

Figure 3 shows that larger phantom income shocks have larger effects on the probability of adjustment. Larger phantom income shocks, positive or negative, move T further away from her optimal consumption bundle and increase the gains from adjustment. Figure 4 shows that the probability of adjustment fall as adjustment costs increase. The tax rate τ has a positive effect on the probability of adjustment, as Figure 5 shows. The intuition behind this result is that higher tax rates increase the distortion of T's consumption further away from her optimal bundle at her new budget constraint. In the limiting case where $\tau = 1$ and the entire amount of change in phantom income is taxed, the income shock serves to redistribute ϵh^* of consumption from one form to another. Figure 6 plots adjustment probabilities as a function of T's income. Interestingly, the relationship between income and the probability of adjustment exhibits an upside-down "u" shape. Households with very low cash incomes and who have the greatest share of their income in the form of imputed housing income are least likely to adjust their cash

consumption following an imputed income shock. Because the cost of adjustment must be paid in cash, such households may not be able to afford adjustment following a negative housing price shock or a small positive housing price shock.

2. Effects on the Relative Welfare Costs of Cash Taxation

A taxpayer is always at least as well off if their imputed or phantom income is subject to an in-kind tax than if that income is subject to cash tax collection, and the taxpayer is always more likely to incur adjustment costs to change their consumption if they are subject to a cash tax. Figures 7-12 illustrate how the average effects of being subject to cash tax vary with the variables and parameters of the decision model. The dependent variables in each plot are the relative likelihood of adjusting housing consumption under a cash tax and under an in-kind tax, and the average utility costs of being subject to a cash tax.[62]

α parameterizes the weight between housing and cash consumption for T. Figure 7 shows that as T's preference for housing consumption increases, the costs associated with cash taxation increase and cash taxation pushes more taxpayers into housing adjustments. Households with higher values of α prefer housing over cash consumption, and as this preference gets stronger, the insurance for housing consumption that is provided by in-kind taxation becomes more valuable and the costs of cash taxation increase. Figure 8 examines the effect of T's (constant) elasticity of substitution between housing and cash consumption. As housing and cash consumption become more perfect substitutes, the cash tax has a greater effect on the adjustment probability, but a decreasing utility cost because, as noted, above, increasing the elasticity of substitution renders the cash tax more like an in-kind tax.

Figure 9 shows the effects of ϵ, the size of the shock to T's imputed income. As the magnitude of the shock (positive or negative) increases, T becomes increasingly better off under an in-kind tax than under a cash tax. Imputed income shocks have two effects on the costs of cash taxation: (1) for homeowners that do not adjust they directly lower T's utility compared with the utility that T would have under an in-kind tax for the reasons described in Section B,

[62] Utility is normalized by the maximum feasible utility given the relevant parameter values and no adjustment costs. For extreme parameter values, under a cash tax, it is possible for T to have an increase in phantom income that leads to a reduction in overall utility. For adjustment costs of $5,000 one simulation finds that 0.1% of the sample fell into this category. Individuals in this category have low incomes, high tax rates, and large shocks.

and (2) they cause some taxpayers to adjust their housing consumption and incur cost k who would not adjust under an in-kind tax. Larger shocks impose greater utility costs on those taxpayers who do not adjust their consumption. For very large imputed income shocks the difference in adjustment probabilities under cash and in-kind taxation are smallest, because most households will adjust. Figure 10 shows that increasing adjustment costs increase the costs of cash taxation and also increase the relative likelihood of adjustment under a cash tax. Again, cash taxation imposes greater costs on taxpayers when they do not adjust their consumption. As adjustment costs increase, taxpayers become less likely to adjust and so cash taxation becomes more burdensome.

Recall that Figure 5 showed that increasing the tax rate increases the probability that T will adjust her housing consumption. Figure 11 shows that increasing the tax rate also increases the relative probability that T will adjust consumption under a cash tax compared with an in-kind tax. Moreover, the welfare costs of cash taxation increase with the tax rate. Figure 12, shows that the welfare costs of cash taxation, and the relative effect of cash taxes on adjustment probabilities, are greatest for taxpayers with the lowest incomes.

In order to explore how tax rates interact with other variables, Figures 13-16 show how phantom income shocks and cash income affect the relative benefits of cash and in-kind taxes, broken out by tax rate. Figure 13 shows that the benefits of in-kind taxes that arise from large positive and negative imputed income shocks are the largest for the highest tax rates, and lowest for lowest tax rates. Figure 14 shows that higher tax rates are associated with higher level differences in the probability of adjustment across the range of imputed income shocks, with a dip for small shocks and a large increase for the 20% tax rate. Small positive phantom income shocks can lead to relative large effects on adjustment under a cash tax but not under an in-kind tax. Figure 15 shows that the welfare costs of cash taxes decline as cash incomes increase, and that at low cash incomes larger differences in tax rates give rise to larger differences in the benefits of an in kind tax. Figure 16 shows that differences in the probability of adjustment track the benefits of an in kind tax, so that as incomes increase the effect of the cash tax above the in-kind tax on adjustment probabilities diminishes.

DISCUSSION

Income taxes, property taxes, estate taxes, and gift taxes all impose cash taxes on non-cash bases; the difference between the tax and the tax base is a difference in kind. Accrual taxation creates a similar discrepancy. When cash taxes must be paid on income as it accrues, although that income will only be reduced to cash and available for consumption at some future date, the tax imposed on future consumption must be paid out of current consumption.[63] This too is a difference in kind. If the welfare costs of paying tax on one kind of consumption in the form of another kind of consumption are too great, taxpayers will incur adjustment costs to re-optimize their consumption of the good being taxed and current cash consumption. Descriptions of the tax liquidity problem focus on the fact that taxpayers may be compelled to incur the costs of liquidating appreciated property in order to discharge their tax liabilities. However, the model in Part III shows how this description is incomplete, and draws attention to the hidden welfare costs associated with imposing cash taxes on non-cash bases, like phantom income. The costs incurred by liquidity-constrained households to divest themselves of assets generating phantom income are an upper bound on the welfare costs created by illiquidity and cash taxes, but geneath the surface are potentially painful cash consumption adjustments. In fact, 90% of the welfare costs of cash tax collection in the property tax context arise from taxpayers who do not move, and the remaining 10% arises from the adjustment costs of taxpayers who move under a cash tax regime but would not move under an in-kind tax.

Focusing on the case of imputed income from homeownership, a household that experiences a positive home value income shock is predicted to increase her cash consumption if she adjusts, and reduce her cash consumption if she does not adjust, because the increase in property value will tend to result in higher property tax payments. Simulations based on the model predict that households will be less likely to re-optimize following a shock to their home values as (1) the size of those shocks decreases, (2) the costs of adjustment increase, (3) tax rates fall, (4) those households' preferences for housing consumption over cash consumption increases, and (5) housing and cash consumption become more perfect substitutes. Households with very high or very low incomes are also less likely to adjust their cash consumption following a shock. These predictions roughly align with the data from the HRS reported in Part II. Table 3 shows that, among households that experienced rising mortgage payments, those that

[63] Not discussed here, but worth further consideration, is cancellation of indebtedness income. In that case, cash is received before the taxable income.

reduced their consumption were those with lower incomes. Households that reduced their consumption also had less liquid assets and were more likely to carry a credit card balance, which may be a proxy for the cost of accessing credit to finance current cash consumption. Moreover, these households also had a much greater share of their assets invested in housing, which may signify a preference for housing consumption over cash consumption.

The model can also help identify which taxpayers are most burdened by cash tax collection and which taxpayers might benefit most from targeted relief. The first factor is the share of the taxpayer's income that is imputed income or phantom income. In the case of homeowners, these are those taxpayers who consume the largest share of their income in the form of housing, and for which homeownership makes up the largest share of their assets. These could be older individuals on low, fixed incomes, but also working families that have allocated a large share of their income to housing because, for example, they have children and want to live in a location with desirable amenities such as schools and parks. Because the price of these amenities will tend to be capitalized into home prices, housing consumption will often include a mix of other attributes, such as school quality. In the case of investments, the most vulnerable taxpayers are those with the largest share of their income coming from investments generating phantom income. These could be partners who contribute their services and derive most of their income from an operating partnership, such as professional partnerships. Individuals who derive most of their income from passive investments yielding phantom income, such as mutual funds or debt instruments, would also qualify.

Taxpayers for whom phantom income and current cash are more perfect substitutes generally suffer less under cash tax collection. For example, households in cities, in close proximity to restaurants, laundromats, and entertainment that can serve as substitutes for having a home with eating, cleaning and entertainment space, may be better able to substitute cash services for domestic home production. All else equal, these homeowners are less in need of relief from cash tax collection. In the case of phantom income, households that are happier to substitute more freely between future and present consumption suffer less. These may be households that expect to have relatively flat consumption profiles in the future, such as retirees. On the other hand, households with a particular need for cash today (or tomorrow) will suffer more under a cash tax.

Naturally, taxpayers with higher costs of converting phantom income to current cash will suffer more from cash tax collection, not just because they incur more of those costs, but because those costs also force them to bear higher costs in the form of consumption distortions. This factor suggests targeting for relief those taxpayers for whom it is more costly to access capital markets or for whom it is more costly to adjust their holdings of assets generating phantom income. For example, households with two homes might find it less costly to rent out their second home than a household that must rent out a room in their only property in order to reduce their housing consumption. Partners in partnerships that do not make tax distributions, or investors in funds with severe restrictions on when investments can be liquidated or sold, are also candidates for relief on account of this factor.

The volatility of the phantom income stream is another important factor influencing the amount that a taxpayer will suffer under cash tax collection. The greater the variability in income, the greater the welfare costs imposed on the taxpayer under cash tax collection. This factor suggests that homeowners in more volatile housing markets may be good candidates for targeted relief. Investors in assets or funds with more variable returns would be more worthy of targeted relief than, for example, investors in debt issued with original issue discount, or partners in professional partnerships, which may have less variable income streams. Finally, households that are subject to higher taxes on their phantom income or that have lower cash incomes will tend to benefit more from relief from cash taxation. These factors suggest, for example, that providing liquidity relief under the property tax is more important in jurisdictions that impose high property taxes and for homeowners with low cash incomes.

One way to ameliorate the costs of cash taxation is to develop administrative alternatives to the form and timing of current cash collection. In the case of traditional phantom income, this could take the form of current accrual of tax liability and deferral of the payment obligation, with interest. In other cases, however, it may be difficult to imagine administrable in-kind taxes. In such cases, the welfare costs of cash taxation can provide an additional argument against policies that already distort household choices. For example, eliminating policies that encourage homeownership, increase volatility, or raise the costs of borrowing against appreciated investment assets and home equity, will have the additional benefit of reducing the costs of cash tax collection.

Table 1: Mean Characteristics of Households Changing Spending as a Result of Home Value Changes

Spending out of price change	Home price increase				Home price decrease			
	No change		Increase		No Change		Decrease	
	Mean/%	Obs	Mean/%	Obs	Mean/%	Obs	Mean/%	Obs
Home values								
Home value	215,708	2,824	180,254	195	**230,713**	**4,361**	**210,314**	**1,275**
Chg. Home value	25,400	1,740	23,050	109	-44,231	3,250	-48,609	954
Other assets								
Home share of assets (t-1)	**68%**	**2,839**	**76%**	**191**	**64%**	**4,444**	**77%**	**1,267**
Checking account balance	29,212	2,305	24,359	135	**35,111**	**3,625**	**16,778**	**1,014**
Non-housing assets	**219,741**	**2,970**	**142,550**	**199**	**254,785**	**4,603**	**125,990**	**1,349**
Liquid assets	**88,058**	**2,407**	**56,259**	**146**	**116,811**	**3,796**	**42,404**	**1,043**
Liquid share of assets (t-1)	17%	2,455	15%	158	**19%**	**3,864**	**11%**	**1,017**
Debt								
Consumer debt	9,499	1,001	13,122	87	**10,438**	**1,392**	**13,749**	**628**
Chg. Consumer debt	-147	600	946	50	843	841	1,844	403
HELOC	22%	3,383	27%	239	22%	5,087	24%	1,497
HELOC amount	33,449	363	33,736	28	**41,903**	**614**	**50,109**	**205**
Chg. HELOC amount	3,243	218	724	17	3,652	402	3,417	141
Second mortgage	3%	3,457	4%	243	3%	5,168	4%	1,525
Carries CC balance	25%	3,451	28%	243	**23%**	**5,157**	**37%**	**1,523**
Amount of CC balance	7,016	751	7,802	62	**8,343**	**1,032**	**10,610**	**487**
Taxes and mortgage payments								
Property tax	**2,026**	**2,798**	**1,596**	**199**	2,478	4,506	2,449	1,277
Chg. Property tax	242	2,499	281	175	51	4,130	55	1,138
Loan payments (annual)	3,709	3,435	4,110	241	**4,297**	**5,115**	**6,613**	**1,481**
Chg. Loan payments (annual)	-208	3,408	262	236	-224	5,048	-66	1,442
Income								
Home value/Income (t-1)	6.47	2,575	6.10	168	**7.41**	**4,047**	**7.78**	**1,122**
Income	**51,163**	**2,980**	**39,792**	**206**	**53,505**	**4,518**	**46,578**	**1,347**
Chg. Income	680	2,906	-2,828	203	-1,021	4,409	335	1,325
Consumption								
$ Eat out/week	30	3,295	30	228	**35**	**4,912**	**26**	**1,477**
Eat out less	33%	3,457	30%	243	**34%**	**5,168**	**37%**	**1,525**
Eat out more	40%	3,457	41%	243	**40%**	**5,168**	**33%**	**1,525**

Differences that are significant under t-tests at 10% level in bold.

Table 2: Change in Consumption from Home Price Changes (variables truncated at top and bottom 0.1%)

	Home value up			Home value down		
	(1)	(2)	(3)	(4)	(5)	(6)
	Inc. Spend	Inc. Spend	Inc. Spend	Dec. Spend	Dec. Spend	Dec. Spend
Liquid assets ($10000)	-0.000139	-0.000111	-0.000152	-0.00151***	-0.00254***	-0.00151***
	(0.000166)	(0.000319)	(0.000166)	(0.000236)	(0.000341)	(0.000238)
HELOC	0.0308**	0.0308**	0.0458**	0.00909	0.0237	0.00587
	(0.0121)	(0.0121)	(0.0196)	(0.0152)	(0.0154)	(0.0241)
Home value ($10000)	0.000488*	0.000622*	0.000706**	-0.000394	-0.000949**	-0.000362
	(0.000289)	(0.000319)	(0.000350)	(0.000405)	(0.000465)	(0.000528)
Home value * Liq. assets		-6.29e-06			1.76e-05**	
		(5.88e-06)			(8.32e-06)	
Home value * HELOC			-0.000626			-8.64e-05
			(0.000575)			(0.000769)
Property tax ($1000)	-0.00925***	-0.0106***	-0.00946***	0.0106***	0.0108***	0.00996**
	(0.00280)	(0.00308)	(0.00326)	(0.00317)	(0.00366)	(0.00390)
Property tax * Liq. Assets		5.63e-05			-6.27e-05	
		(6.25e-05)			(8.71e-05)	
Property tax * HELOC			0.000722			0.00182
			(0.00601)			(0.00659)
Income ($10000)	0.000301	0.000365	0.000302	-0.00206*	-0.00117	-0.00207*
	(0.000803)	(0.000802)	(0.000803)	(0.00106)	(0.00107)	(0.00106)
Home value/Income (t-1)	0.000135	0.000148	0.000140	0.000865***	0.000818***	0.000864***
	(0.000389)	(0.000390)	(0.000390)	(0.000291)	(0.000296)	(0.000292)
Carries CC balance	0.0126		0.0124	0.150***		0.150***
	(0.0119)		(0.0119)	(0.0149)		(0.0149)
Observations	1,732	1,733	1,732	3,573	3,576	3,573
R^2	0.014	0.014	0.014	0.055	0.031	0.055

OLS standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Mean Characteristics of Households Changing Spending as a Result of Mortgage Payment Changes

Spending out of mortgage change	Mortgage payment up				Mortgage payment down			
	No change		Decrease		No change		Increase	
	Mean/%	Obs	Mean/%	Obs	Mean/%	Obs	Mean/%	Obs
Home values								
Home value up (report)	29%	587	25%	527	19%	910	25%	104
Home value down (report)	37%	587	43%	527	49%	910	34%	104
Home value	**243,964**	**533**	**220,125**	**460**	250,113	821	267,265	94
Chg. Home value	-13,045	411	-14,907	347	-23,927	642	-23,859	71
Other assets								
Home share of assets	**71%**	**538**	**83%**	**455**	72%	802	76%	92
Checking account balance	**23,934**	**449**	**9,560**	**354**	20,926	680	18,800	79
Non-housing assets	**192,991**	**546**	**94,064**	**470**	194,599	835	209,954	93
Liquid assets	**54,800**	**464**	**21,983**	**364**	67,342	692	67,917	79
Liquid share of assets	**11%**	**464**	**8%**	**372**	10%	710	10%	80
Debt								
Consumer debt	13,785	256	11,919	279	12,885	415	12,714	47
Chg. Consumer debt	1,293	176	-253	177	-72	286	-4,234	32
HELOC	26%	580	24%	510	26%	902	27%	103
HELOC amount	32,324	72	33,391	55	**39,528**	**125**	**15,079**	**14**
Chg. HELOC amount	4,843	42	1,858	31	**5,289**	**79**	**-3,550**	**8**
Second mortgage	3%	587	4%	527	5%	910	3%	104
Carries CC balance	**40%**	**585**	**51%**	**526**	40%	906	38%	104
Amount of CC balance	9,549	213	8,673	230	10,278	332	8,155	36
Taxes and mortgage payments								
Property tax	2,651	482	2,461	395	2,814	762	2,666	81
Chg. Property tax	259	421	552	344	79	686	-167	77
Loan payments (annual)	12,115	571	12,348	508	11,514	887	10,825	100
Chg. Loan payments (annual)	1,744	561	2,251	492	-535	875	-428	98
Income								
Home value/Income	5.7	503	6.7	406	5.8	730	4.8	89
Income	**70,854**	**524**	**53,122**	**454**	70,209	827	63,455	94
Chg. Income	709	511	1,967	446	-2,408	799	-2,385	96
Consumption								
$ Eat out/week	**38**	**569**	**26**	**508**	37	888	36	101
Eat out less	**35%**	**587**	**40%**	**527**	**34%**	**910**	**26%**	**104**
Eat out more	**40%**	**587**	**33%**	**527**	37%	910	45%	104

Differences that are significant under t-tests at 10% level in bold.

Figure A: Positive Home Value Shock with Cash and In-Kind Taxes

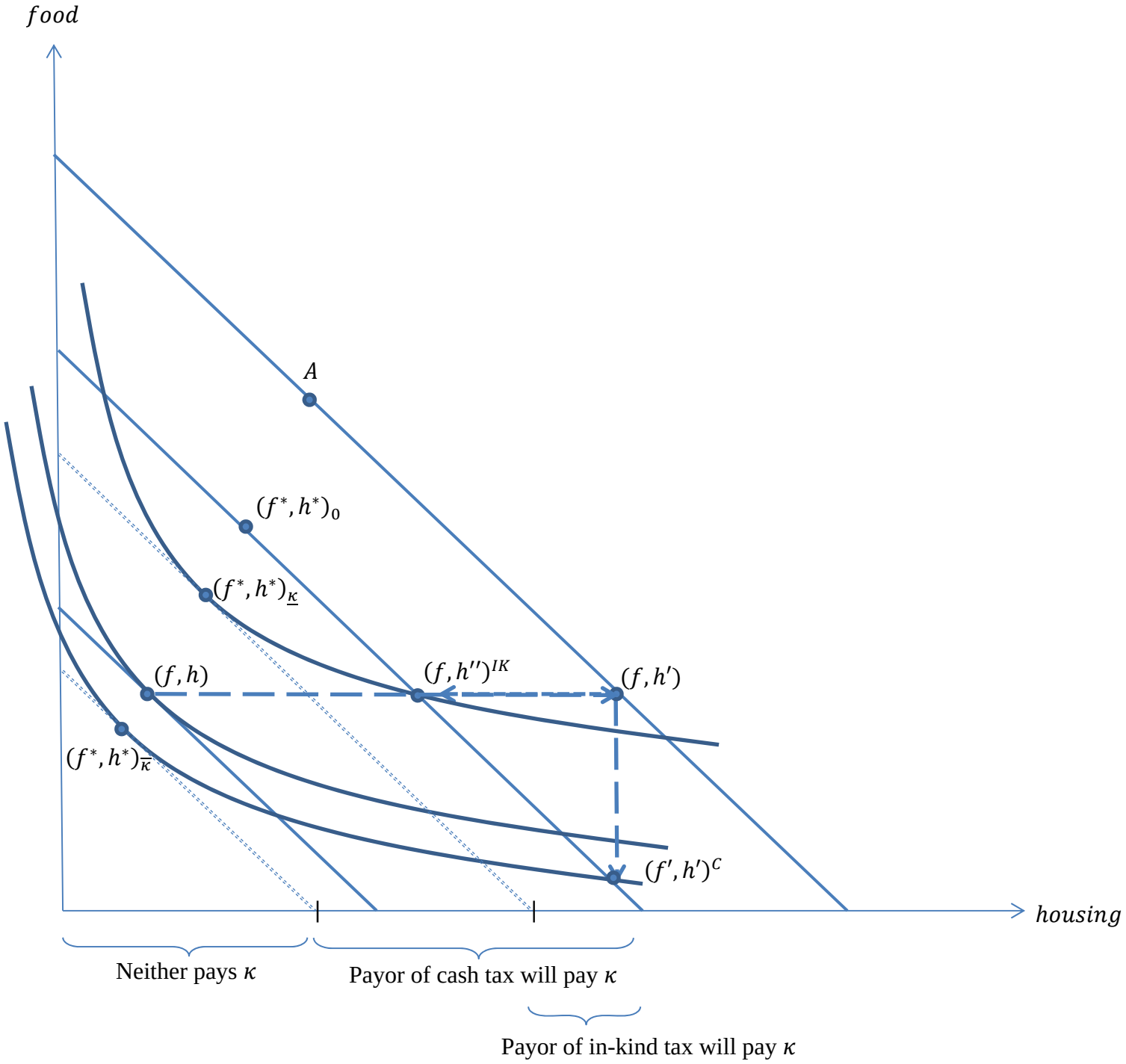
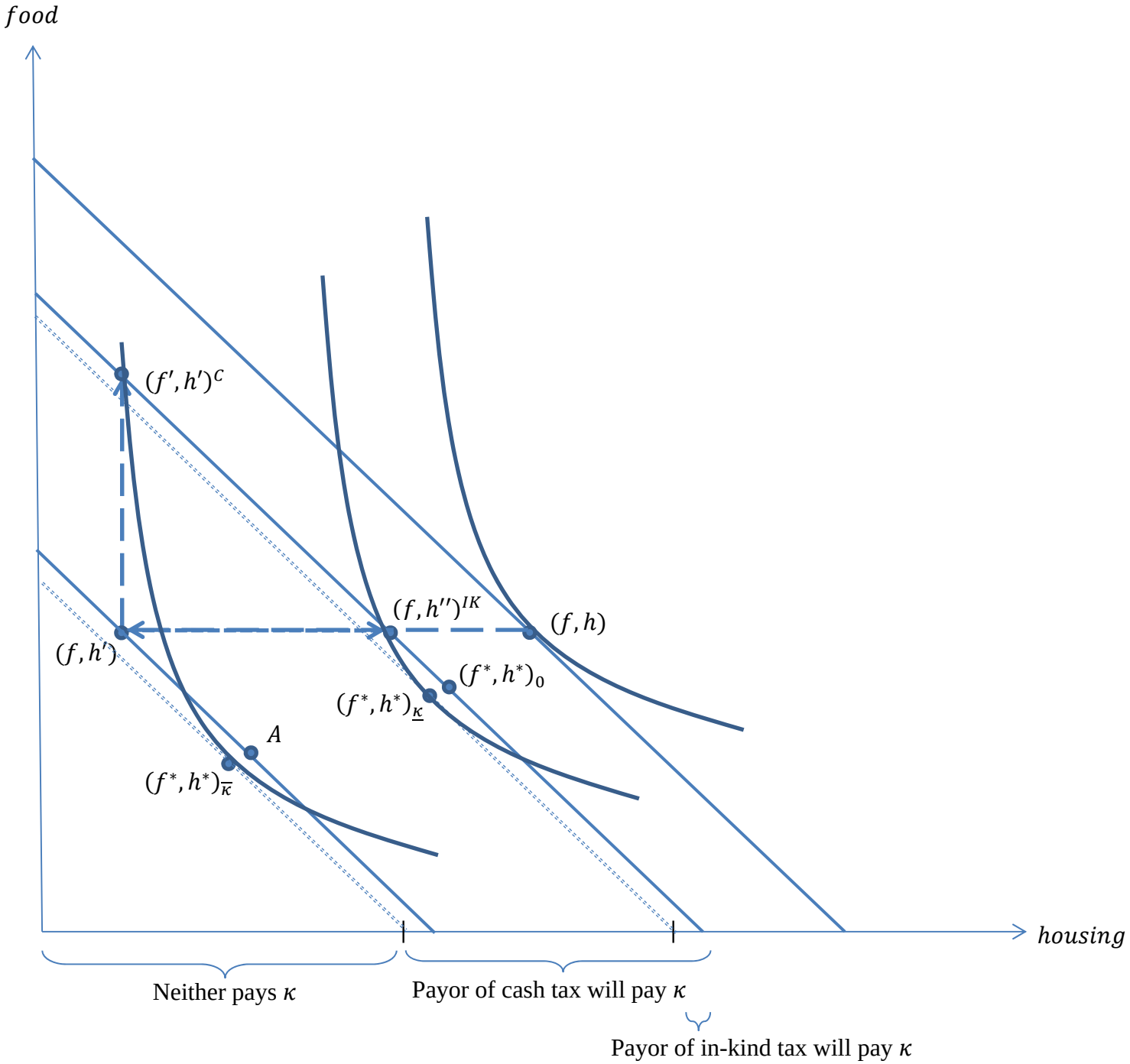


Figure B: Negative Home Value Shock with Cash and In-Kind Taxes



Figures 1-6: Effects on Adjustment Probabilities for Cash Taxes

Figure 1: Effect of α

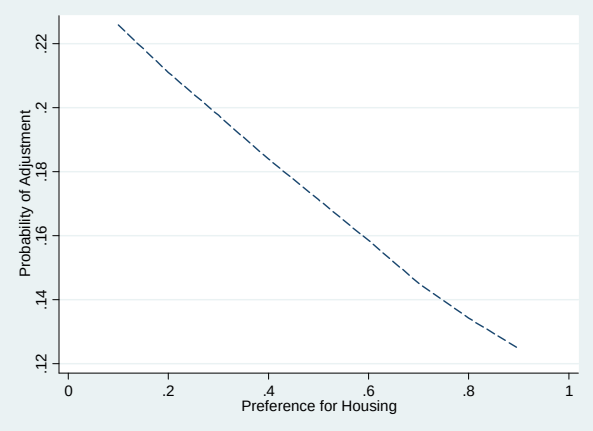


Figure 2: Effect of σ

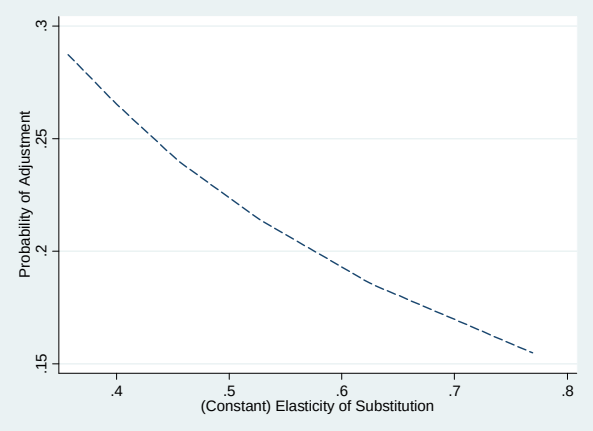


Figure 3: Effect of ϵ

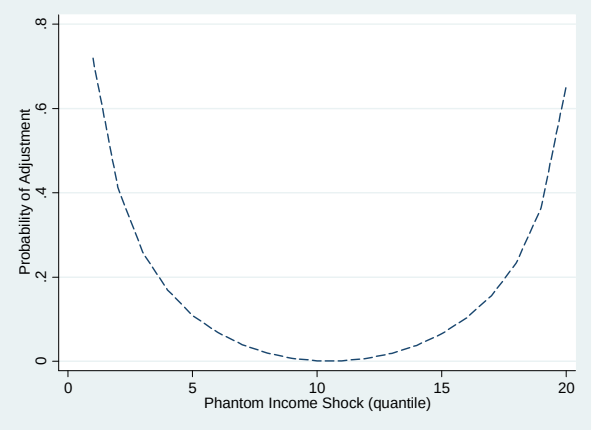


Figure 4: Effect of κ

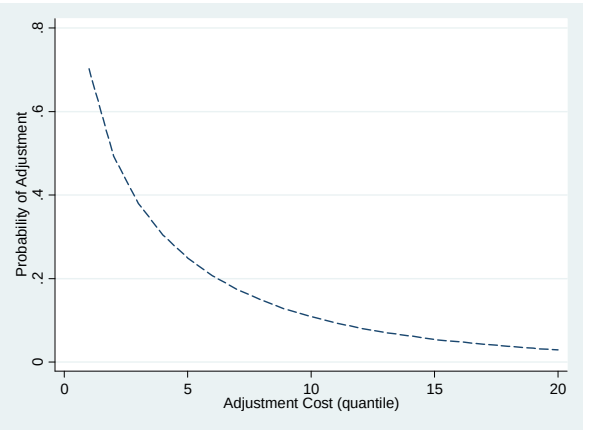


Figure 5: Effect of τ

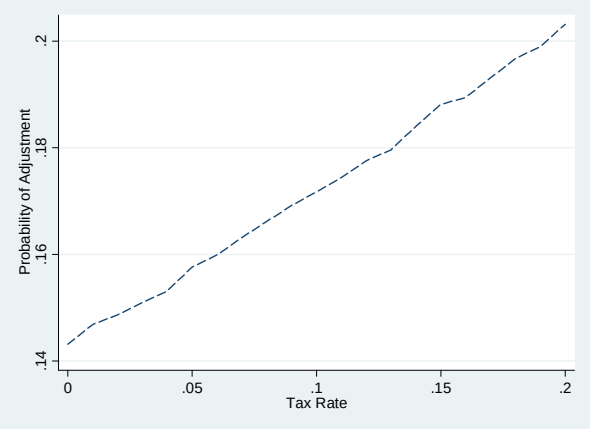
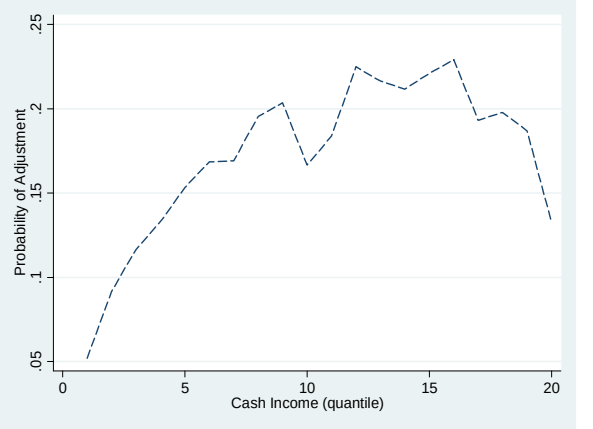


Figure 6: Effect of y



Figures 7-13: Effects on In-Kind Tax Benefit and Difference in Adjustment Probabilities

Figure 7: Effect of α

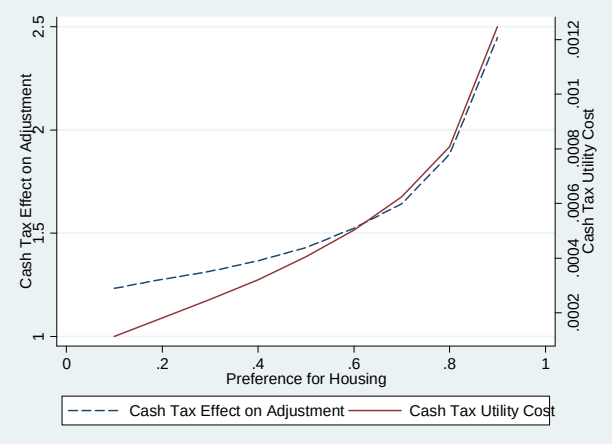


Figure 8: Effect of σ

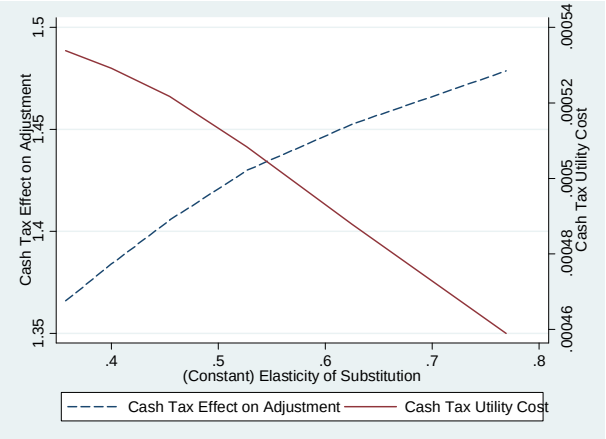


Figure 9: Effect of ϵ

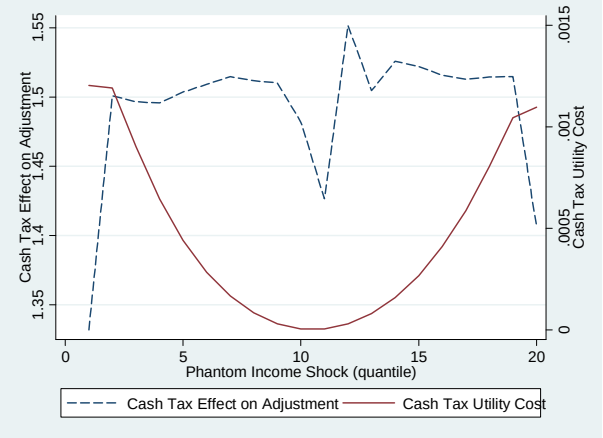


Figure 10: Effect of κ

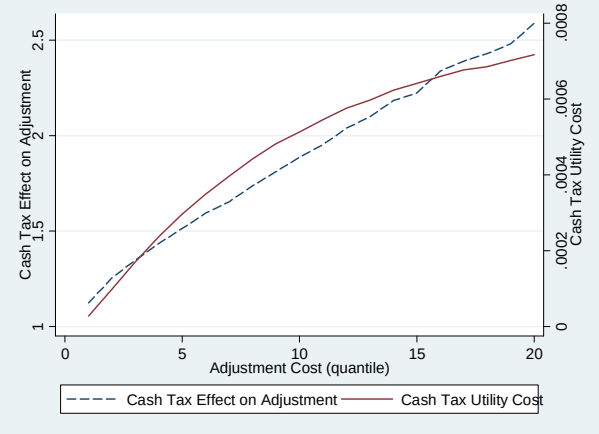


Figure 11: Effect of τ

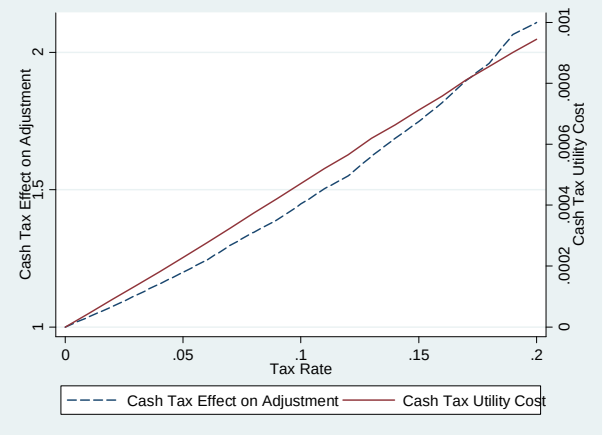
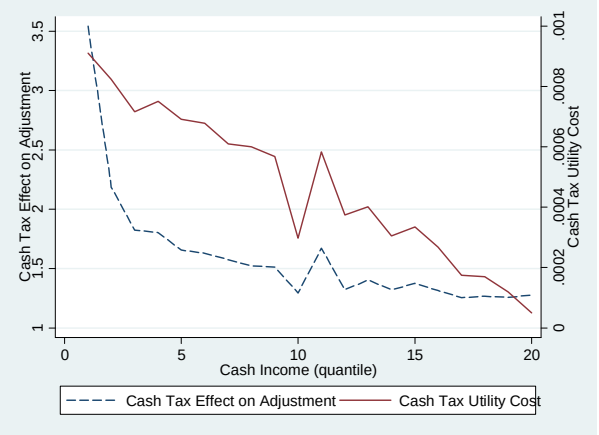


Figure 12: Effect of y



Figures 13 and 14: Effect of ϵ by τ

Figure 13: Effect on In-Kind Tax Benefit

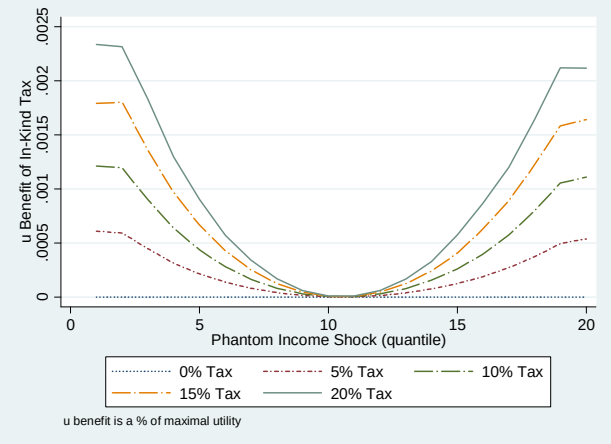
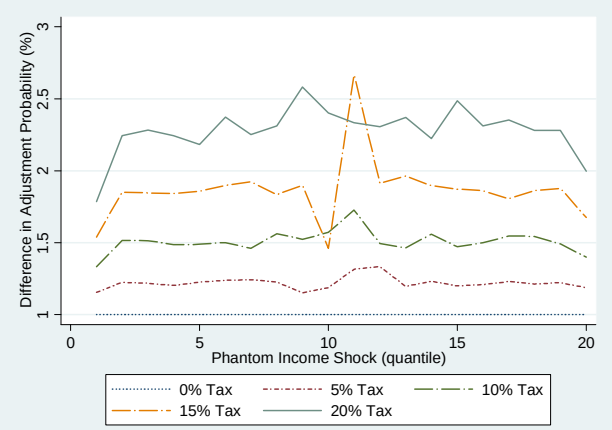


Figure 14: Effect on Adjustment Probabilities



Figures 15 and 16: Effect of y by τ

Figure 15: Effect on In-Kind Tax Benefit

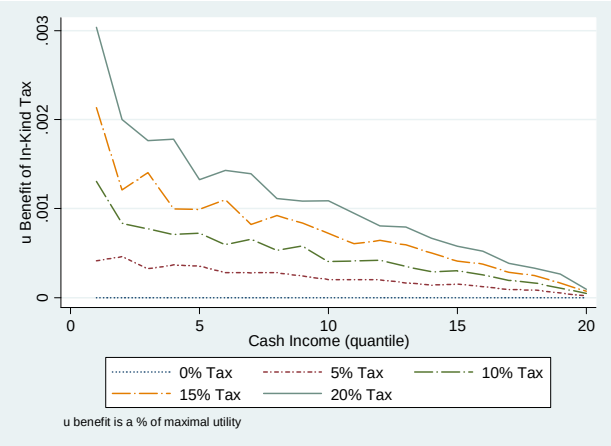


Figure 16: Effect on Adjustment Probabilities