2010

Is Cap-and-Trade Fair to the Poor? Short-Sighted Households and the Timing of Consumption Taxes

Manuel A. Utset
Florida State University College of Law

Brian Galle
Boston College Law School

Is Cap-and-Trade Fair to the Poor? Shortsighted Households and the Timing of Consumption Taxes

Brian Galle*
Manuel Utset**

TABLE OF CONTENTS

INTRODUCTION

Who should pay to prevent catastrophic climate change?[1] Should it be the rich, who can more easily bear the costs?[2] Or the poor, whose poverty makes them more vulnerable to dramatic changes in

---

[1] For an overview of the scientific consensus on the dangers of climate change, see INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SPECIAL REPORT ON EMISSIONS SCENARIOS (2000), INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS (2007), and INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY (2007) [hereinafter IMPACTS].

[2] Rumi Shammin & Clark W. Bullard, *Impact of Cap-and-Trade Policies for Reducing Greenhouse Gas Emissions on U.S. Households*, 68 ECOLOGICAL ECON. 2432, 2436 (2009).

the environment,[3] and so arguably have more to gain? These are chal-lenging questions, and contemporary advocates of major policies aimed at preventing climate change have attempted to avoid them through proposals that claim to be "distributionally neutral."[4] For ex-ample, some of those who suggest increasing the price of greenhouse gas production to account for its damage to the global climate claim that, though their schemes would fall more heavily on the poor, this burden can be balanced out by providing a tax rebate to households with the lowest incomes.[5] Pending legislation incorporates a similar rebate feature.[6] In this Article, we argue that although these rebate schemes are nobly intentioned, as currently designed, they do not ac-tually achieve distributional neutrality. We go on to proffer more carefully tailored alternatives that might get closer to true equality.

To see the central problem of the rebate scheme, consider: Would you rather be poor for eleven months and rich for one, or middle-class the whole year round? From the way they behave, it looks like most people would prefer the latter—a "smooth" income is better than an income with the same total value but more peaks and valleys.[7] That is because the pain of the lows is, typically, worse than the satisfaction of the pinnacles.[8] Thus, we save up for rainy days, or insure against them, transferring money from ourselves when we are wealthy to our-selves when we are poor.[9]

The carbon tax rebate schemes neglect this basic point.[10] The tax raises prices for households throughout the year, reducing their stan-

---

3   IMPACTS, *supra* note 1, at 19.

4   Gilbert E. Metcalf & David Weisbach, *The Design of a Carbon Tax*, 33 HARV. ENVTL. L. REV. 499, 516 (2009); Gilbert E. Metcalf, *A Proposal for a U.S. Carbon Tax Swap: An Equita-ble Tax Reform to Address Global Climate Change* 16 (Brookings Inst., Discussion Paper No. 2007-12, 2007), *available at* http://www.brookings.edu/~/media/files/rc/papers/2007/10carbontax_metcalf/10_carbontax_metcalf.pdf.

5   Terry Dinan & Diane Lim Rogers, *Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers*, 55 NAT'L TAX J. 199, 206 (2002); Metcalf & Weisbach, *supra* note 4, at 514 n.66 (endorsing Metcalf's earlier proposal); Metcalf, *supra* note 4, at 11–20; *see also* David A. Super, *From the Greenhouse to the Poorhouse: Carbon Emissions Control and the Rules of Legislative Joinder*, 158 U. PA. L. REV. 1093, 1190–96 (2010) (presenting and discussing proposals to "offset the regressive effects of higher energy costs").

6   American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 764 (2009); CONG. BUDGET OFFICE, CONGRESSIONAL BUDGET OFFICE COST ESTIMATE: H.R. 2454 AMERI-CAN CLEAN ENERGY AND SECURITY ACT OF 2009, at 20 (2009).

7   ANDREU MAS-COLELL ET AL., MICROECONOMIC THEORY 187–88 (1995).

8   *Id.* at 186.

9   *Id.* at 187–88.

10   An exception is David Super, who briefly acknowledges that poor households may face higher energy costs during different parts of the year that borrowing cannot satisfy. *See* Super, *supra* note 5, at 1185–87. He urges policymakers to target assistance to those times. *Id.*

dard of living. In the case of households of very low incomes, even a modest tax—carbon tax estimates tend to run in the vicinity of $1200 per household annually—could represent a substantial loss in wealth.[11] The drop from $1000 per month in household income to $900 is a steep one; it can mean the difference between making rent or not, or eating three meals a day versus two. A repayment of $1200 at year's end does not fully alleviate this lower standard of living; empty stomachs cannot be retroactively filled.

Of course, the proponents of these schemes probably did not just overlook a fundamental tenet of modern economics. Instead, they likely assume that households can convert the lumpy tax-rebate combination into a smooth income stream simply by borrowing against it.[12] If that were true, then we would have little objection to the claim that the tax-rebate combination is distributionally neutral.

Unfortunately, as we review here, the evidence shows overwhelmingly that low-income households cannot easily borrow, even against a guaranteed future payment.[13] For one thing, poor households generally lack a credit history.[14] Since lenders cannot easily tell conscientious borrowers from deadbeats who will skip town before their checks arrive, they must charge exorbitant rates to break even. And because the borrowers have few alternatives, and may not even

---

Although we adopt the common lingo in terming these levies a "carbon tax," most proposals would also include taxes on the production of greenhouse gases other than carbon dioxide. Metcalf, *supra* note 4, at 12.

[11] *See* Cong. Budget Office, Trade-Offs in Allocating Allowances for CO_2 Emissions 2 tbl.1 (2007) (estimating costs of a 15% reduction in carbon emissions for median households at $960, or $1184 in 2009 dollars); Robert Greenstein et al., Ctr. on Budget & Pol'y Priorities, Designing Climate-Change Legislation that Shields Low-Income Households from Increased Poverty and Hardship 1–2 (2008), *available at* http://www.cbpp.org/files/10-25-07climate.pdf (putting estimated cost for lowest quintile of homes at $750 and increasing over time); Dinan & Lim Rogers, *supra* note 5, at 212 tbl.4 (estimating the average household cost for a 15% reduction at $1209, or $1488 in 2009 dollars). All 2009 dollar calculations are by your present authors; for inflation calculations, see The Inflation Calculator, http://www.westegg.com/inflation (last visited Sept. 26, 2010).

[12] *See infra* Part II.A.2.

[13] We are not the first to observe that credit markets and the timing of taxation can affect social welfare. *See* Lee Anne Fennell & Kirk J. Stark, *Taxation over Time*, 59 Tax L. Rev. 1, 34 (2005) ("[B]ehavioral factors and capital market imperfections limit the ability of taxpayers to fully smooth consumption."). We build on Fennell and Stark's work by adding, for the first time in the legal literature, a comprehensive survey of the evidence in support of their claim that there are failures in the market for credit for low-income households. We also explain how those failures affect the design of consumption taxes. Stark and Fennell limit their discussion to the income tax.

[14] For discussion of the points in this paragraph, see *infra* Part II.B.

recognize the high cost of the complex fees they face, there is little price competition among lenders who serve poor communities.

Another problem with the rebate is that it strains the limits of many households' cognitive abilities. Borrowing to offset an expected tax increase requires a certain amount of awareness of household finances, as well as a modest amount of sophistication and enterprise to understand them and translate that knowledge into the act of applying for a loan. Again, evidence suggests that these problems have prevented many families from borrowing even against guaranteed future income.[15]

One solution to the dilemma of delayed rebates is to accelerate payments. The climate bill passed in 2009 by the U.S. House of Representatives, for example, would make rebates available monthly via direct deposit.[16] Other proposals would parcel out rebates biweekly by reducing workers' payroll tax contributions.[17] But these structures, too, can create serious havoc for some households. Households are excessively impatient—they spend sudden windfalls, rather than saving them.[18] Thus, a prepaid rebate, or "prebate," would, like one that comes at the end of the year, leave families with excess cash for one month and poorer for the other eleven. Moreover, excessive or "hyperbolic" impatience leads to procrastination—because the present is more valuable than the future, many taxpayers would not invest in efforts to understand a carbon tax or in technologies to reduce their future carbon consumption. Both these sets of problems, as we explain, are more acute for low-income families.[19]

Prepayment not only affects the fairness of a carbon tax, but also may undermine its environmental goals. Carbon taxes and other similar policies, such as cap-and-trade regimes, are designed to force users and producers of carbon to take account of the social cost of their decisions.[20] By increasing the price to reflect the harms carbon does to others, the taxes aim to reduce carbon production to a socially opti-

---

15   *See infra* notes 100–09 and accompanying text.

16   American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 431 (2009).

17   Michael J. Graetz, *100 Million Unnecessary Returns: A Fresh Start for the U.S. Tax System*, 112 YALE L.J. 261, 288 (2002).

18   For discussion of this paragraph, see *infra* Part III.

19   *See infra* Part IV.

20   Paul Ekins & Terry Barker, *Carbon Taxes and Carbon Emissions Trading*, *in* ISSUES IN ENVIRONMENTAL ECONOMICS 75, 77–79 (Nick Hanley & Colin J. Roberts eds., 2002); Nicholas Bull et al., *Who Pays Broad-Based Energy Taxes? Computing Lifetime and Regional Incidence*, 15 ENERGY J. 145, 147 (1994).

mal level.[21] As we model here, however, hyperbolic households who receive a prepayment may well *increase* their consumption of carbon-intensive goods.[22]

It is worth emphasizing that our goal is not to argue against carbon pricing, but is instead to improve the design of any pricing system. Thus, after we have identified the likely timing problems of current rebate proposals, we suggest a set of alternatives that would mitigate these problems, as well as offer some other side benefits to poorer communities.[23] For example, the government could disburse rebates through a self-directed debit card, or "SDD." The SDD allows recipients to draw down their rebate throughout the year, without having to incur massive fees from the "fringe" lending industry. The amount of funds available each week, however, is by default limited in advance, subject to modification by the cardholder. Thus, a taxpayer who fears she will overspend once she gets access to her rebate can precommit herself to spreading the rebate out over the course of the year. That commitment could be undone, but only through a cumbersome process. This proposal preserves consumer choice, while helping to nudge taxpayers away from temptation.[24] Issuing debit cards also has the useful benefit of expanding access to electronic transactions and other everyday banking services many of us take for granted, but which are unavailable to most of the poorest households.

Although the discussion here is framed around carbon pricing, our analysis could also be readily translated to any other form of consumption tax. Many leading proposals for national sales taxes or value-added taxes ("VAT") include some kind of rebate to soften their disproportionate impact on low-income households.[25] These proposals, too, have ignored the timing and cognitive problems we outline here. And they also could benefit from our proposed improvements.

The Article proceeds in five Parts. Part I first explains the basic "welfarist" economic analysis of distributive justice and its implications for saving and borrowing behavior. It then sketches the distributive consequences of various consumption tax proposals, including

---

[21] That is, the carbon tax is a "Pigouvian" tax, a levy priced according to the size of the negative externality the product creates for others. Bull et al., *supra* note 20, at 147.

[22] *See infra* Part III.C.

[23] *See infra* Part IV.

[24] Our methodology here owes an obvious debt to Richard H. Thaler & Cass R. Sunstein, Nudge: Improving Decisions About Health, Wealth, and Happiness 105–20 (2009).

[25] For a survey, see *infra* Part I.B.

carbon taxes and cap-and-trade regimes, and notes their dependence on the assumption that taxpayers smooth their incomes across the entire year. Part II considers the true distributive effects of a combined consumption tax rebate regime, arguing that it is unlikely many poor households could smooth their incomes without very high costs. It also shows that a prebate regime will have analogous shortcomings. Part III relaxes the assumption in Part II that households have stable preferences over time and shows that time inconsistency will only exacerbate the general problems identified in Part II. Part IV sets out our proposed reforms. Lastly, Part V considers some general objections to our framework, in particular the possible claims that our approach is paternalist, and that our approach is irrelevant because the only important measure of distributive justice is over a lifetime, not annually.

I.   Consumption Taxes and "Distributionally Neutral" Rebates

This Part introduces the basics of how economists usually approach questions of distributive justice. Under the standard approach, consumption taxes are widely acknowledged to impose an excessive burden on poor taxpayers. Thus, as we outline, most major consumption tax proposals include some mechanism for softening that blow, typically in the form of a rebate for taxpayers below a given income threshold. Readers already familiar with these proposals may safely skip to Part I.C.

A.   Distributive Justice in a "Welfarist" Framework

There are many different ways to decide how to fairly distribute the burden of paying for government. This Article focuses mostly on "welfarism," the analytical tool of choice for many economists and other policy analysts.[26] We emphasize welfarism because it is the metric used by those who propose the consumption taxes we criticize, and our goal is to engage those proposals on their own terms.[27]

---

[26] Jonathan Gruber, Public Finance and Public Policy, at G-11 (2d ed. 2007).

[27] In addition, virtually all ethical systems agree that welfare has at least some moral weight. Mark Kelman, *Hedonic Psychology and the Ambiguities of "Welfare,"* 33 Phil. & Pub. Aff. 391, 391 (2005).

Welfarism is a variant of utilitarianism.[28] As in Bentham's original utilitarian approach,[29] it aims to measure the sum of every individual's utility, which is usually defined in turn as the degree to which each person is able to achieve their subjective preferences.[30] The sum total of every person's preferences is the "social welfare function," or SWF.[31] Welfarism departs somewhat from Bentham, though, in permitting each person's preference for the fair distribution of goods to itself count in the SWF.[32] For instance, if some people would be troubled by a society in which wealth were highly concentrated, those feelings of demoralization would lower overall welfare.[33] The welfarist would say that, given such an SWF, a society with more equitably distributed wealth would be preferable to the inequitable one.[34]

In addition to incorporating other ethical systems, welfarism itself recommends redistribution from rich to poor in many circumstances. The basic premise is that each person, on average, has a diminishing marginal utility of wealth.[35] That is, the richer people already are, the

28 *See* MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 25 (2006) (explaining that a welfarist decision procedure "is a rough-and-ready proxy for overall well-being").

29 *See generally* THE WORKS OF JEREMY BENTHAM (John Bowring ed., 1962).

30 *See* LOUIS KAPLOW & STEVEN SHAVELL, FAIRNESS VERSUS WELFARE 16 (2002). There is some controversy on whether subjective preference satisfaction is the best measure of an individual's well-being. *See generally* ADLER & POSNER, *supra* note 28, at 29–35 (sketching the controversy); Lawrence B. Solum, *To Our Children's Children's Children: The Problems of Intergenerational Ethics*, 35 LOY. L.A. L. REV. 163, 192–93 (2001) (same). Some scholars argue instead that simple happiness is the best measure. John Bronsteen et al., *Welfare as Happiness*, 98 GEO. L.J. 1583 (2010). Others maintain that, in light of the possibility that people will not choose what is best for themselves, the better metric would be the extent to which society achieves a more objective view of the good life. *See generally* Amartya Sen, *Capability and Well-Being, in* THE QUALITY OF LIFE 30 (Martha C. Nussbaum & Amartya Sen eds., 1993). Although both these views have points in their favor, neither is mainstream among policy analysts. *See* ADLER & POSNER, *supra* note 28, at 29 (noting that "many welfare economists" adopt "the simple preference-based account"). Thus, this Article will generally take welfare to mean the satisfaction of subjective preferences.

31 ADLER & POSNER, *supra* note 28, at 23.

32 KAPLOW & SHAVELL, *supra* note 30, at 17, 21, 31. On the indifference of utilitarians to distribution, see Solum, *supra* note 30, at 191–93. Some welfarists also distinguish themselves from Bentham on the grounds that Bentham believed utility should be measured according to happiness rather than satisfaction of preferences. *See* ADLER & POSNER, *supra* note 28, at 29–32.

33 *See* David W. Pearce, *Framework for Assessing the Distribution of Environmental Quality, in* THE DISTRIBUTIONAL EFFECTS OF ENVIRONMENTAL POLICY 23, 62–63 (Yse Serret & Nick Johnstone eds., 2006) (describing how the SWF takes account of preferences for fairness).

34 *See* KAPLOW & SHAVELL, *supra* note 30, at 17; Dale W. Jorgenson et al., *Carbon Taxes and Economic Welfare, in* BROOKINGS PAPERS ON ECONOMIC ACTIVITY: MICROECONOMICS 1992, at 393, 396 (Martin Neil Baily & Clifford Winston eds., 1992).

35 GRUBER, *supra* note 26, at 29–30.

less each additional dollar gained or lost is worth in utility. For example, if Charlie has $1000 and loses $500, he is in serious trouble, and may face hunger or eviction. If he has $1 million and loses $500, he is mildly bummed. Thus, welfarists agree that some degree of transfer from the richest to the poorest is often likely to increase social welfare.[36]

The idea of the diminishing marginal utility of wealth also has important implications for saving and borrowing. If Charlie is rational, he will attempt to smooth his expenditures to move the pain of losing money from his poorest times to his richest times.[37] For example, if Charlie knows he will retire one day, and earn only one-tenth of his current income, he should put money in the bank to reduce the utility cost of the dollars he must spend for upkeep in retirement.[38] In saving, Charlie gives up consumption today, but that does not hurt as much because today he is rich. Charlie's net utility across his life will be higher when he saves because the cost of putting money away is smaller than the gain of being able to spend it later.

Borrowing is similar, but with time's arrow reversed. Borrowing increases our wealth now but decreases it later. If people expect to be richer when payment comes due, this should increase their welfare. The problem is that many people may be liquidity-constrained; they cannot borrow the full, utility-maximizing amount.[39] For example, people may have private information about their own future earning potential that would be difficult for a lender to obtain or verify.[40] This is the rationale behind, for example, government subsidies for student loans.[41]

Finally, it is important for our later discussion to emphasize that there can be complex interactions between the welfarist arguments for redistribution, savings, and borrowing. In particular, note that many

---

[36] ADLER & POSNER, *supra* note 28, at 23. We qualify the language in the text because most welfarists argue that redistribution also creates transaction costs, such as the possibility that taxes on high earners might discourage work. *See, e.g.*, Louis Kaplow & Steven Shavell, *Why the Legal System Is Less Efficient than the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667, 680–81 (1994).

[37] Martin Browning & Annamaria Lusardi, *Household Saving: Micro Theories and Micro Facts*, 34 J. ECON. LITERATURE 1797, 1799–800 (1996); *see also* Lee Anne Fennell, Taxing Willpower 8 (Dec. 4, 2008) (unpublished manuscript), *available at* http://www.law.columbia.edu/null/download?&exclusive=filemgr.download&file_id=162354.

[38] *See* Browning & Lusardi, *supra* note 37, at 1800.

[39] *See* Fennell & Stark, *supra* note 13, at 12.

[40] Daniel Shaviro, *Beyond the Pro-Consumption Tax Consensus*, 60 STAN. L. REV. 745, 770 (2007).

[41] *See* GRUBER, *supra* note 26, at 288.

people who look relatively poor by some measures today may in fact have the ability to borrow against ample future earnings—consider medical students.[42] Others may look wealthy because they have borrowed heavily, but in the long run will in fact be poor. So the question whether redistribution today will increase society's current welfare may depend on our ability to determine individuals' abilities to save or borrow.

B.   *Existing Tax and Rebate Proposals*

Consumption taxes may have undesirable distributive consequences when evaluated under a welfarist framework. A consumption tax is a tax on the purchase or use of goods and services.[43] Sales taxes are a typical example.[44]

Consumption taxes are more burdensome for poorer taxpayers in two distinct ways. First, the poor consume a larger portion of their income.[45] Because they spend more and save less, consumption taxes will occupy much more of the budgets of the indigent than the relatively better-off.[46]

Even if rich and poor saved comparable amounts, consumption taxes would still be harder on the poor because of the diminishing marginal utility of wealth.[47] A tax that demands an equal percentage

---

[42]   *See* Henrik Klinge Jacobsen et al., *Distributional Implications of Environmental Taxation in Denmark*, 24 Fiscal Stud. 477, 478 (2003) ("[M]any households with low current incomes are students or pensioners with higher lifetime income.").

[43]   Barbara H. Fried, *Fairness and the Consumption Tax*, 44 Stan. L. Rev. 961, 961 (1992).

[44]   Walter Hellerstein et al., State and Local Taxation: Cases and Materials 605–14 (9th ed. 2009). A point worth noting for any "tax geeks" among our readers is that we use the term "consumption tax" to refer to what is more technically known as a "transactional consumption tax." George K. Yin, *Accommodating the "Low Income" in a Cash-Flow or Consumed Income Tax World*, 2 Fla. Tax Rev. 445, 450 (1995). The transactional tax should be distinguished from a "cash-flow consumption tax," which is simply a consumption tax collected out of income, i.e., an income tax with a deduction for savings. *Id.* at 451–52. The timing mismatches we alluded to in the Introduction are perhaps avoidable under a cash-flow consumption tax. For one thing, a cash-flow consumption tax could achieve progressivity by changing its rate structure. *See* Joseph Bankman & David A. Weisbach, *The Superiority of an Ideal Consumption Tax over an Ideal Income Tax*, 58 Stan. L. Rev. 1413, 1428–30 (2006).

[45]   Dinan & Lim Rogers, *supra* note 5, at 209.

[46]   Greenstein et al., *supra* note 11, at 1; Dinan & Lim Rogers, *supra* note 5, at 210; Daniel R. Feenberg et al., *Distributional Effects of Adopting a National Retail Sales Tax*, 11 Tax Pol'y & Econ. 49, 86 (1997); Yin, *supra* note 44, at 459. Poor households also spend a higher portion of their incomes on carbon-intensive products. Shammin & Bullard, *supra* note 2, at 2436.

[47]   *Cf.* Joseph M. Dodge, The Logic of Tax: Federal Income Tax Theory and Policy 88 (1989) (discussing vertical equity and how fairness concerns allow for different tax treatment for differently situated persons).

of the budgets of two different people will impose a greater utility loss on the one who is poorer.[48] For example, suppose Raheem earns $1 million per year and Parvati $10,000. Both spend all their income on consumption, which is taxed at ten percent. Raheem will pay $100,000 in taxes, leaving him with a quite comfortable $900,000 for consumption. Parvati will be left with $9000 after taxes and may have to trim back her grocery budget. More technically, Parvati's ten-percent tax comes out of very high-priority goods, and hence goods that provide a very large amount of utility, while Raheem's comes out of goods from which the average consumer would derive very small utility.[49]

Most existing consumption taxes recognize this disparity and attempt to correct for it. For example, the sales tax laws of most U.S. states exempt from tax rent and food prepared in the home, in order to mitigate the burden of the sales tax on those whose expenditures are mostly food and shelter.[50] In Europe, modern VATs—a form of transactional consumption tax imposed on both consumer goods and their inputs—follow a similar approach.[51] Previously, some European VATs exempted taxpayers below a certain income threshold from any VAT liability.[52] Canada currently issues VAT rebates to low-income families.[53]

Proponents of new major consumption taxes offer more sophisticated versions of these mitigation efforts. Michael Graetz argues in favor of a U.S. VAT, and proposes to render it distributionally neutral by reducing payroll tax withholding for low-income workers.[54]

---

48 John C. Harsanyi, *Cardinal Utility in Welfare Economics and in the Theory of Risk-Taking*, 61 J. Pol. Econ. 434, 435 (1953).

49 *See* Gruber, *supra* note 26, at 29–30.

50 Donald Bruce & William F. Fox, *E-Commerce in the Context of Declining State Sales Tax Bases*, 53 Nat'l Tax J. 1373, 1375–76 (2000); Robert F. van Brederode, *Introduction to the U.S. States Sales and Use Taxes*, 19 Int'l VAT Monitor 270, 271–72 (2007).

51 *See* Richard Thompson Ainsworth, *Biometrics: Solving the Regressivity of VATs and RSTs with "Smart Card" Technology*, 7 Fla. Tax Rev. 651, 656–57 & nn.8–9 (2007) (surveying U.S. sales tax and European VAT exemptions).

52 *See* William J. Turnier, *Designing an Efficient Value Added Tax*, 39 Tax L. Rev. 435, 438–39 (1984). A "flat tax," as proposed by Robert Hall and Alvin Rabushka, takes a VAT-like approach in exempting some income from any tax; for a family of four, they suggest the first $25,500 in earnings would be untaxed. Robert E. Hall & Alvin Rabushka, The Flat Tax 59 (2d ed. 1995).

53 Robert E. Hall, *Guidelines for Tax Reform: The Simple, Progressive Value-Added Consumption Tax*, *in* Toward Fundamental Tax Reform 70, 73 (Alan J. Auerbach & Kevin A. Hassett eds., 2005).

54 *See* Graetz, *supra* note 17, at 290–91; s*ee also* Joseph Bankman & Thomas Griffith, *Social Welfare and the Rate Structure: A New Look at Progressive Taxation*, 75 Cal. L. Rev. 1905, 1908 n.5 (1987) (explaining the use of "demogrants" to achieve a desirable level of progressivity in a tax system with regressive rates).

George Yin has also described other methods for assuring that a cash-flow consumption tax could putatively avoid regressivity problems, such as through a payroll tax rebate and refundable income tax credit.[55] And proponents of the so-called "fair tax" urge the United States to adopt a national sales tax and claim that they can balance out any resulting unfairness either through an annual payroll tax rebate or through a prebate to poor households.[56]

   Many carbon tax or cap-and-trade proposals contain similar features.[57] In the most basic model, each individual taxpayer would simply receive a lump-sum tax rebate, consisting of some fraction of the total revenue brought in by the carbon tax.[58] Metcalf and Weisbach

---

The most significant component of payroll taxes is the Social Security tax, which is a flat 6.2% assize on the first $106,000 or so of salary received by the employee, plus an additional 6.2% tax on each dollar of salary paid by the employer. I.R.C. §§ 3101, 3111 (2006); 42 U.S.C. § 430 (2006) (authorizing the Commissioner of Social Security to determine the amount of wages subject to the Social Security tax); *Social Security and Medicare Taxes*, IRS.gov, http://www.irs.gov/formspubs/article/0,,id=177943,00.html (noting the cap amount for 2009 and 2010). Medicare taxes add an additional 1.45% on each side for a total of 15.3%. I.R.C. §§ 3101(b), 3111(b). For a helpful overview of the Social Security tax system, see Jonathan B. Forman, *Making Social Security Work*, 65 Ohio St. L.J. 145, 149–55 (2004).

   [55] *See generally* Yin, *supra* note 44, at 466–90 (evaluating tax proposals to accommodate low-income people). Yin, however, is skeptical that these proposals are worth pursuing. *Id.* at 490–91.

   [56] Paul Bachman et al., *Taxing Sales Under the FairTax: What Rate Works?*, 113 Tax Notes 663, 668 (2006) (prebate); David R. Burton & Dan R. Mastromarco, *Emancipating America from the Income Tax: How the National Sales Tax Would Work*, CATO Inst., n.42 (Apr. 15, 1997), http://www.cato.org/pubs/pas/pa-272.html (rebate).

   [57] Legislators can design a cap-and-trade mechanism to be economically equivalent to a carbon tax. *See* Ekins & Barker, *supra* note 20, at 79–80. A carbon tax imposed on energy producers usually consists of a set price per unit of carbon emitted by the producer. *See* Metcalf, *supra* note 4, at 14. Under cap-and-trade, energy producers must acquire a permit in order to produce each unit of carbon. *See* Super, *supra* note 5, at 1106–07. Since there are a limited number of permits available, if permits are tradeable, the market will determine a price for each unit of carbon. *See id.* at 1107; *see also* Dinan & Lim Rogers, *supra* note 5, at 202–03 (illustrating the effects of carbon restrictions on the market). The government can set the number of available permits so that, at equilibrium, the market price per unit will be the same as it would be under a direct carbon tax. With that said, there are design differences between the two models. *See* Metcalf, *supra* note 4, at 22–27 (arguing that a carbon tax is superior to cap-and-trade); *cf.* Ethan Yale, *Taxing Cap-and-Trade Environmental Regulation*, 37 J. Legal Stud. 535, 548 (2008) (explaining that corporate income taxes may distort the intended carbon-abatement properties of a cap-and-trade regime). These differences, however, are not pertinent to our discussion.

   We note, though, that the conventional analysis of the choice between carbon taxes and cap-and-trade depends on the information available to policymakers. Gruber, *supra* note 26, at 143–46. To the extent that behavioral responses to different forms of carbon pricing introduce new uncertainties, these responses might also alter the choice between pricing instruments. We are grateful to Mitchell Kane for this point.

   [58] *See* Metcalf, *supra* note 4, at 18 (modeling but not endorsing this approach). Despite

suggest a somewhat more complex scheme, in which each worker will receive a rebate on her payroll tax.[59] In practice, the worker pays most of the employer-side tax because the employer reduces salary to account for the cost of the tax.[60] Metcalf proposes rebating the full fifteen percent to workers, but capping the rebate at about $560.[61] Alternatively, Metcalf suggested that low-wage earners might get a credit against their federal income tax.[62]

According to Metcalf and Weisbach, their rebate plan helps ensure that carbon taxes would be distributionally neutral.[63] Because the rebate is capped, it will have much larger proportional value to low-income households.[64] This disproportionate benefit aims to offset the disproportionate burden of their cap-and-trade regime.[65]

The bill passed by the U.S. House of Representatives in 2009 adopts a similar approach to Metcalf. If enacted, the bill would authorize repayments to households under 150% of the federal poverty line in an amount equal to the expected average cost of carbon pricing for those households.[66] Payments would be made monthly, either via direct deposit to existing bank accounts, or through deposits to accounts for the receipt of government benefits, such as the "EBT" account used by recipients of food stamps.[67]

Many forms of consumption tax, then, recognize the dangers of regressivity and make some efforts to eliminate them. In many cases, the safeguard mechanism is some form of annual rebate. As we now

---

the rebate, consumers would still have incentives to reduce their use of carbon-intensive products. Since everyone receives the same rebate, but taxes depend on carbon usage, households that do a better job reducing their carbon footprint will end the year with more money. Shammin & Bullard, *supra* note 2, at 2437.

59 *See* Metcalf & Weisbach, *supra* note 4, at 513–14 & n.66 (citing Metcalf, *supra* note 4, at 14).

60 *See* John A. Brittain, *The Incidence of Social Security Payroll Taxes*, 61 Am. Econ. Rev. 110, 111 (1971); Jonathan Gruber, *The Incidence of Payroll Taxation: Evidence from Chile*, 15 J. Lab. Econ. S72, S78–79 (1997).

61 Metcalf, *supra* note 4, at 14.

62 Gilbert E. Metcalf, *A Distributional Analysis of Green Tax Reforms*, 52 Nat'l Tax J. 655, 663 (1999).

63 Metcalf & Weisbach, *supra* note 4, at 516; Metcalf, *supra* note 4, at 16.

64 Metcalf, *supra* note 4, at 16.

65 *Id.*; *see also* Dinan & Lim Rogers, *supra* note 5, at 213 tbl.6 (estimating the distributional effects of various rebate models); Dallas Burtraw et al., *The Incidence of U.S. Climate Policy: Alternate Uses of Revenues from a Cap-and-Trade Auction* 2, 19 (Res. for Future, Discussion Paper No. 09-17-REV, 2009) (projecting that several versions of a carbon tax rebate could be distributionally neutral, but finding that a payroll tax rebate might not).

66 American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 431 (2009) (adding a new § 2201(d) to the Social Security Act).

67 *Id.*

argue, however, the timing of rebates may matter as much as their amount.

C. *Importance of Income Smoothing*

An important, albeit implicit, caveat to claims of many distributionally neutral consumption taxes is that they assume households are capable of perfectly smoothing their incomes over time. That is, they presume that money received in one lump can be spread out more evenly through borrowing or saving. Again, where there is a diminishing marginal utility of wealth, both borrowing and saving are critical to maximizing each person's utility.

To take an admittedly extreme example, suppose that taxpayers must consume their rebate checks in full within a month of receipt. Now take a household with $1000 in monthly income, $100 in monthly consumption tax costs, and a $1200 rebate check. For eleven months of the year, the household will have a standard of living of a family with a net income of $900, meaning that they will have a small home, eat only essentials, and skimp on other expenses. In the rebate month, they must consume $2100 worth of goods, meaning that they will have to purchase many things to which they assign relatively low utility—true luxuries.[68] In the absence of the spending requirement, the family could instead live at a $1000-per-month standard of living year-round. The family could devote the extra $100 to high-utility recurring expenses, such as food and rent.

Thus, the time-limited rebate, although apparently distributionally neutral, in fact reduces the welfare of recipient households. Households that cannot smooth their rebate over the year will lose utility relative to those that can. The size of the loss will depend on the degree to which the marginal utility of wealth diminishes for that household—how much more well-being the family gets from safer housing and better nutrition than, say, from going to the movies.

While no one is proposing to enact a time-limited rebate, there are many conditions in the real world that result in imperfect household income smoothing. For a family of modest means, being poor for 364 days and rich for 1 is often not the same as being middle-class for the whole year. We explore some of the sources of imperfect smoothing over the next two Parts.

---

[68] Of course, it is possible that the family could prepay its rent or purchase some durable goods and, in that way, improve its standard of living for subsequent months. Purchase of durable goods, in effect, is a form of savings. But let us rule out durable-goods purchases to be true to the spirit of our hypothetical.

II.   Liquidity Constraints, Hidden Taxes, and Rebates in Time-Consistent Households

In this Part, we begin our analysis of the effects of rebate timing on household welfare. A single annual rebate can be modeled as occurring either before or after the year's consumption, corresponding to a beginning-of-year or end-of-year rebate date.[69] Alternatively, the reader can conceive of the two models both as representing December 31st rebates, but the end-of-year model captures what happens in the first year of the tax (if the tax is effective January 1st of the same year), while the beginning-of-year model represents what would occur in subsequent years for taxpayers who treat the first year of the tax as a pure loss. We call the beginning-of-year payment a "prebate" and use the term "reimbursement" to describe payments at any time of the year.[70]

The central problem with the rebate is that households may not be able to draw on the wealth it represents until the date they actually receive it. For example, households may be unable to borrow as much as they would prefer, or may fail to realize their need or ability to borrow until after they have been hit by unexpectedly high consumption costs. In these situations, the year-end increase in wealth may fail to offset the lost welfare the household experiences during the year. These same problems arise when the lump sum is converted into a prebate; taxpayers still face costly or unavailable mechanisms for moving money from one time to another and must be cognizant of their need to do so.

Throughout this Part, we assume that households' preferences are stable across time. That seems like a simple assumption, but in fact it is contrary to much recent evidence.[71] In Part III, we revisit our analysis with the assumption of time consistency relaxed.

A.   Liquidity Constraints and Time Discounting

Recent studies of spending by poor households suggest very strongly that a year-end rebate will not adequately compensate those households. While these studies can be interpreted in several ways, each of these different interpretations likely implies that, on net, low-income families will lose welfare under a distributionally neutral rebate scheme. First, the evidence shows that poorer households are

---

[69]   Burton & Mastromarco, *supra* note 56, at n.42 (discussing rebates).

[70]   Bachman et al., *supra* note 56, at 668 (discussing prebates).

[71]   *See infra* text accompanying notes 172–86.

liquidity constrained—they cannot borrow effectively.[72] Even where individuals were able to borrow, they often paid remarkably high interest rates, implying that the opportunity to smooth income had very high welfare benefits.[73] Second, and alternatively, willingness to pay high borrowing costs might be evidence not of the gains from smoothing, but simply of impatience—a desire to consume sooner rather than later.[74] But if this is a valid preference that policy analysts ought to include in their calculation of welfare, the inability to satisfy this impatience would be a strike against a year-end rebate.

1. Evidence of Liquidity Constraints

Although it seems an intuitive point that the very poor cannot easily borrow, it is theoretically ambiguous how severely any borrowing constraint would bind. For one, some individuals who are poor now may not be in the future and might potentially borrow against "human capital"—their ability to bring in additional revenues in the future.[75] Whether this prospect is realistic depends on how effectively lenders can discern human capital and motivate borrowers to make full use of it to repay.[76] Additionally, households may have sources of fiscal and other support that do not show up on their balance sheets, such as parents and children outside the home, friends, neighbors, or simply the kindness of strangers.[77] Thus, it is useful to have evidence on whether these kinds of alternatives are important in the real world.

While the empirics do not rule out these factors for some, they do show that many households are severely liquidity-constrained to the point where they could not easily borrow the hundreds of dollars represented by a consumption tax rebate.[78] A key set of data is a series of

---

[72] *See infra* Part II.A.1.

[73] *See infra* Part II.A.2.

[74] *See* David B. Gross & Nicholas S. Souleles, *Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data*, 117 Q.J. Econ. 149, 179–81 (2002).

[75] *See supra* Part I.A.

[76] *See* Gruber, *supra* note 26, at 288 (describing obstacles to borrowing against future earnings potential).

[77] Angela Littwin, *Beyond Usury: A Study of Credit-Card Use and Preference Among Low-Income Consumers*, 86 Tex. L. Rev. 451, 460 (2008); *see also* Tullio Jappelli et al., *Testing for Liquidity Constraints in Euler Equations with Complementary Data Sources*, 80 Rev. Econ. & Stat. 251, 252 (1998) (explaining that "sample splits based on wealth are bound to be highly imperfect because assets and asset income are often poorly measured").

[78] *See* David S. Johnson et al., The Response of Consumer Spending to Rebates During an Expansion: Evidence from the 2003 Child Tax Credit 2 (Apr. 2009) (unpublished manuscript), *available at* http://finance.wharton.upenn.edu/~souleles/research/papers/JPSChildTaxCreditApril 2009.pdf. Until relatively recently, studies of liquidity constraints were largely inconclusive, ow-

studies showing consumer responses to a predictable, one-time future spike in income, usually in the form of a tax rebate.[79] For a consumer who could borrow, and expected no other fluctuations in income, the rational behavior would be to smooth that spike across time—borrowing in order to spend some before the rebate and saving to spend some after.[80] Strikingly, many consumers did not increase spending much before the spike and then spent a significant amount of their rebate in the few months afterward.[81] In most studies, that pattern was most pronounced for households with low incomes and low wealth.[82] The pattern held true for those who confirmed that they an-

---

ing to problems in the available data and difficulties in sorting cause from effect. *See* Browning & Lusardi, *supra* note 37, at 1833–34 (critiquing earlier studies on these grounds); Angela C. Lyons, *How Credit Access Has Changed over Time for U.S. Households*, 37 J. CONSUMER AFF. 231, 232–33 (2003) (same); Nicholas S. Souleles, *The Response of Household Consumption to Income Tax Refunds*, 89 AM. ECON. REV. 947, 947–48 (1999) (same).

[79] Sumit Agarwal et al., *The Reaction of Consumer Spending and Debt to Tax Rebates— Evidence from Consumer Credit Data*, 115 J. POL. ECON. 986, 987 (2007); David S. Johnson et al., *Household Expenditures and the Income Tax Rebates of 2001*, 96 AM. ECON. REV. 1589, 1589 (2006); Matthew D. Shapiro & Joel Slemrod, *Consumer Response to Tax Rebates*, 93 AM. ECON. REV. 381, 381 (2003); Souleles, *supra* note 78, at 947; Shawn A. Cole et al., *Where Does It Go? Spending by the Financially Constrained* 1 (Harv. Bus. Sch., Working Paper No. 08-083, 2008); Julia Lynn Coronado et al., *The Household Spending Response to the 2003 Tax Cut: Evidence from Survey Data* 1 (Fed. Res. Bd., Working Paper No. 2005-32, 2005); Claudia R. Sahm et al., *Household Response to the 2008 Tax Rebates: Survey Evidence and Aggregate Implications* 1 (Fed. Res. Bd., Working Paper No. 2009-45, 2009); Christian Broda & Jonathan Parker, The Impact of the 2008 Tax Rebates on Consumer Spending: Preliminary Evidence 1–2 (July 29, 2008) (unpublished manuscript), *available at* http://faculty.chicagobooth.edu/christian.broda/ website/research/unrestricted/Stimulus%20Payments%20and%20Spending.pdf.

[80] *See* Johnson et al., *supra* note 79, at 1595. In some situations, this prediction is not as robust. *See* Browning & Lusardi, *supra* note 37, at 1801.

[81] Johnson et al., *supra* note 79, at 1597; Sahm et al., *supra* note 79, at 6, 14–15; Broda & Parker, *supra* note 79, at 3; Johnson et al., *supra* note 78, at 9–10.

[82] Johnson et al., *supra* note 79, at 1603, 1604 tbl.5; Souleles, *supra* note 78, at 956; Coronado et al., *supra* note 79, at 12; Broda & Parker, *supra* note 79, at 3; Johnson et al., *supra* note 78, at 14. *But see* Shapiro & Slemrod, *supra* note 79, at 385 (finding that poorer households were less likely to spend their rebate than others). Sahm et al. find a more complex pattern in which poorer households spent faster but over time spent less of their rebate than the richest. Sahm et al., *supra* note 79, at 6–7, 10–11. The contrary results may be explainable as an aspect of debt burdens. Shapiro and Slemrod find that paying off debt far exceeded either spending or saving for all categories of respondents. Shapiro & Slemrod, *supra* note 79, at 385 tbl.2. Paying off debt may be more important for low-income households. Since these households have diffi-culty saving, maintaining an open line of credit is vital to them in surviving future crises. *See* ANGUS DEATON, UNDERSTANDING CONSUMPTION 197 (1992) ("The precautionary motive for saving . . . is strengthened by the existence of liquidity constraints."). Thus, paying off debt is a form of saving for future liquidity needs. *Cf.* Johnson et al., *supra* note 78, at 14 n.19 (arguing that some observed data can also be explained by the fact that poor households need to accumu-late a "buffer stock" of savings in the event of future crises). This story implies that debt repay-ment is itself evidence that households expect themselves to be liquidity-constrained in the future. *Cf.* Gross & Souleles, *supra* note 74, at 153 (arguing that borrowers' refusals to use all of

ticipated the income spike,[83] although some data also suggest that those who were unaware of their rebate did not spend it.[84]

Similar recent investigations found a strong relationship between the timing of income tax refunds or minimum wage hikes and the ability to take out auto loans.[85] The authors of these investigations suggest that the key barrier to credit for some households is a down payment, often quite modest, that lenders demand as security for the loan.[86] The tax refund is a large enough lump to overcome the down-payment problem, greatly facilitating borrowing for major purchases.[87]

In another study of auto loans, a separate set of authors found different evidence suggestive of liquidity constraints.[88] In that case, lower-income buyers paid premiums for extending their loans over a longer period of time.[89] The inference is that what drives borrowing behavior for those families is the ability to make monthly loan-service payments.[90] That implies that households cannot borrow infinitely

---

their credit limits is evidence of liquidity constraints where it is motivated by fear that credit will be needed more urgently in the future).

83 *See* Coronado et al., *supra* note 79, at 1.

84 That is, Coronado et al. find no difference in the marginal propensity to spend out of either mailed-out rebates or reduced withholding, *id.* at 1, even though economic theory suggests that spending out of the mailings should be lower, *id.* at 20. But they also report that a smaller proportion of households knew that they had received a tax benefit delivered through lower withholding. *Id.* at 9–10. That suggests that the lower salience of the withholding may have depressed spending among the population receiving it, leaving the two populations' propensities to spend roughly equivalent.

85 William Adams et al., *Liquidity Constraints and Imperfect Information in Subprime Lending*, 99 Am. Econ. Rev. 49, 59 (2009).

86 *Id.* at 63; *see also* Daniel Aaronson et al., *The Spending and Debt Response to Minimum Wage Hikes* 23–24 (Fed. Res. Bank of Chi., Working Paper No. 2007-23, 2008), *available at* http://www.chicagofed.org/digital_assets/publications/working_papers/2007/wp2007_23.pdf (finding that increases in the minimum wage rate allow households to buy goods requiring down payments).

87 Adams et al., *supra* note 85, at 59. An average tax refund represents about 6.5 weeks of net income for a low-income family. Cole et al., *supra* note 79, at 1. For additional evidence on the importance of rebates in overcoming the down-payment problem, see Souleles, *supra* note 78, at 954 (explaining how constrained consumers save up for durables), and David W. Wilcox, *Social Security Benefits, Consumption Expenditure, and the Life Cycle Hypothesis*, 97 J. Pol. Econ. 288, 303 (1989) (finding that actual receipt of higher Social Security benefits increases auto purchases, but announcement of benefits increase does not).

88 Orazio P. Attanasio et al., *Credit Constraints in the Market for Consumer Durables: Evidence from Micro Data on Car Loans*, 49 Int'l Econ. Rev. 401, 402 (2008).

89 *See id.* at 404.

90 *Id.* at 406, 427.

against future income, but instead are constrained by their ability to make current payments.[91]

Finally, other research documents the use and availability of credit cards for income smoothing. In general, the evidence shows that many households cannot easily borrow all that they would prefer.[92] For instance, when credit limits increase, the carried balances for significant numbers of cardholders increase.[93] But these results offer only limited support for the notion that households are credit-constrained in general, rather than simply showing that they are constrained from using credit cards. The studies do not generally observe other forms of household debt,[94] so credit balances, or inability to obtain a card or a higher limit, might still leave a household with other credit alternatives, albeit alternatives that are perhaps less convenient or more expensive.

Overall, most economists interpret these results as evincing significant liquidity constraints among poorer households.[95] Thus, if households do not smooth their incomes, it is most likely because they cannot. There may also be a complicated story here, however, about impatience and self-restraint, which we set out shortly.

---

[91] *See id.* at 433; *see also* Gross & Souleles, *supra* note 74, at 168 (offering additional evidence that higher interest rates limit borrowing).

[92] *See* Agarwal et al., *supra* note 79, at 1005–07 (describing the effects of rebate on low-limit credit card holders, and arguing they demonstrate "binding liquidity constraints"); Donald Cox & Tullio Japelli, *The Effect of Borrowing Constraints on Consumer Liabilities*, 25 J. Money, Credit & Banking 197, 198 (1993) (employing a survey to identify borrowers who were denied credit); Gross & Souleles, *supra* note 74, at 151–52 (using a data set of credit card use, and finding that borrowing increases together with limit increases); Lyons, *supra* note 78, at 248–49 (examining patterns of credit-application denials); James X. Sullivan, *Borrowing During Unemployment: Unsecured Debt as a Safety Net*, 80 J. Hum. Resources 383, 384–85 (2008) (using survey data to link spending patterns with periods of unemployment); Cole et al., *supra* note 79, at 11–15 (suggesting that high fees paid by taxpayers to accelerate their refunds by a few weeks indicate that borrowers lack "lower-cost credit alternatives").

[93] Gross & Souleles, *supra* note 74, at 164 fig.I; Lyons, *supra* note 78, at 252.

[94] *E.g.*, Gross & Souleles, *supra* note 74, at 159.

[95] George-Marios Angeletos et al., *The Hyperbolic Consumption Model: Calibration, Simulation, and Empirical Evaluation*, 15 J. Econ. Persp. 47, 62–64 (2001); Marianne Bertrand & Adair Morse, *What Do High-Interest Borrowers Do with Their Tax Rebate?* 1 (Chi. Booth Sch. of Bus., Working Paper No. 29, 2009), *available at* http://ssrn.com/abstract=134489; Jeffrey R. Campbell & Zvi Hercowitz, *Liquidity Constraints of the Middle Class* 16 (Fed. Res. Bank of Chi., Working Paper No. 2009-20, 2008), *available at* http://ssrn.com/abstract=1344489. For yet other evidence of liquidity constraints, see David Card et al., *Cash-on-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market*, 122 Q.J. Econ. 1511, 1553–55 (2007).

The data also suggests that black households and those headed by unmarried women are especially constrained. *See* Lyons, *supra* note 78, at 241.

One point worth emphasizing about existing research is that it fails to examine the poorest households. Studies of tax rebates, by definition, can collect data only on those who are entitled to a rebate.[96] Thus, groups such as retirees with little Social Security income[97] and individuals with disabilities may be too poor even to appear in the research.[98] Theory suggests that these kinds of households would be even more liquidity-constrained,[99] but there are no data to confirm this.

2. Borrowing Against the Rebate

It might be argued that, although poorer families are often liquidity-constrained as a general matter, this problem should disappear when there is a year-end distribution. That is, the claim would be that even the least creditworthy household should be able to borrow against their expected rebate. This, however, has not proven true empirically. Further, theory suggests that intermediaries will capture at least some of the value of borrowing for highly constrained households, and the available data bear this out.

The same studies that suggest liquidity constraints generally also demonstrate that consumers cannot easily borrow, even against a certain rebate. Again, most of the studies we mention examine exactly the situation where the taxpayer was certain to receive her rebate.[100] But those studies found incomplete income smoothing, particularly among poorer households.[101] Of course, some failure to borrow might result from the household's failure to recognize that the rebate is coming.[102]

---

96 For example, in one experiment, the rebate was only available to working households or to households with "qualifying" income of at least $3000. Sahm et al., *supra* note 79, at 1; *see also* Agarwal et al., *supra* note 79, at 987 n.1 (noting that about 23 million households did not file an income tax return and so were not covered by their study); Johnson et al., *supra* note 78, at 4 n.7 (acknowledging that the credit they study flows mostly to families making in excess of $20,000).

97 In order to qualify for Social Security benefits, an individual must meet certain salary and years-worked targets, or must be married to an individual who does. *See generally* Soc. Sec. Admin., Pub. No. 05-10035, Retirement Benefits (2010) (discussing Social Security benefit eligibility requirements).

98 Indeed, car loans and credit cards are usually unavailable to the very poor. *Cf.* Littwin, *supra* note 77, at 463 (describing studies on access to credit cards for low-income families).

99 Shapiro & Slemrod, *supra* note 79, at 385.

100 *See* Johnson et al., *supra* note 79, at 1592; Sahm et al., *supra* note 79, at 2.

101 *See* Johnson et al., *supra* note 79, at 1603 (discussing spending increases when there are expected increases in income); Sahm et al., *supra* note 79, at 6–7 (same).

102 *See* Coronado et al., *supra* note 79, at 11 (finding that income tax rebates were a genu-

Even well-informed families often failed to smooth their rebates, however, suggesting that liquidity constraints remained an obstacle despite the certain influx of income.[103] There are a number of possible causes for this problem. Some individuals might remain poor credit risks despite a guarantee of income.[104] Others might commit the same funds to multiple creditors, or prove to have more urgent expenses when their checks arrive.[105] Persons who work only part-time or temporary jobs might also be thought to be risks to relocate,[106] incurring more costs in collection than the value of any interest payments.[107] Lenders face high fixed costs of verifying all this information, costs that may be prohibitively high for small loans.[108] Thus, since so much of the likelihood of these kinds of risks will remain known only to the borrower, market failure due to information asymmetry is likely.[109]

In some situations, theory would predict that the lending market would not fail, but that lenders would capture much of the value of borrowing. The standard information asymmetry story assumes that only "low quality" customers—the riskiest borrowers—would accept

---

ine surprise to more than a quarter of households, and about a third of households in the case of a payroll tax rebate).

    103 *See id.* at 14–15.

    104 Examples include individuals who could file for bankruptcy, or who might quickly spend their rebate proceeds and render themselves effectively judgment-proof.

    105 *Cf.* Keith Ernst et al., Ctr. for Responsible Lending, Quantifying the Economic Cost of Predatory Payday Lending 3 (2004), *available at* http://www.responsible lending.org/payday-lending/research-analysis/CRLpaydaylendingstudy121803.pdf (finding that payday borrowers often fail to repay when their paychecks arrive because they must instead pay "basic living expenses, such as electricity, rent, and groceries").

    106 *Cf.* Julia J. Bartkowiak, *Trends Toward Part-Time Employment: Ethical Issues*, 12 J. Bus. Ethics 811, 812 (1993) ("A fundamental aspect of the low wage/high turnover model is that employees are expected to leave the company on a regular basis.").

    107 *Cf.* Michael S. Barr, *Banking the Poor*, 21 Yale J. on Reg. 121, 146 (2004) (noting that transient workers and undocumented immigrants have difficulty opening bank accounts).

    108 Ronald J. Mann & Jim Hawkins, *Just Until Payday*, 54 UCLA L. Rev. 855, 864–65 (2007); *see* Barr, *supra* note 107, at 155 (explaining that high fees for fringe lenders are associated in part with costs of origination, follow-up, and loan losses).

    109 William H. Meckling, *Financial Markets, Default, and Bankruptcy: The Role of the State*, 41 Law & Contemp. Probs. 13, 24–27 (1977); Sumit Agarwal et al., Adverse Selection in the Credit Card Market: Evidence from a Natural Experiment 14–15 (unpublished manuscript), *available at* http://ushakrisna.com/CreditCardAdvSelection.pdf (explaining that low-income individuals "have fewer option for acquiring funds to smooth consumption"). That is, borrowing by low-asset individuals often produces a "market for lemons." Without knowing the riskiness of a borrower, rational lenders will offer rates only the riskiest borrowers would accept. Since these are the only customers the lender attracts, she ends up losing money on many of her loans, leading her to charge higher rates, which in turn leads to riskier borrowers, and so on.

the unfavorable rates offered by the uninformed counterparty.[110] That analysis, however, is strictly accurate only at the margin. Where there are enough inframarginal high-quality customers,[111] lenders should be able to find a market without driving up their own costs above price.[112] The new equilibrium point will fall at an interest rate that looks unfair—a price no comparably risky marginal borrower would stomach. Ordinarily, this possibility would not be of much use to the lender, as competition and the costs of driving away customers closer to the margin would make it impractical to price at this high level.

If, however, the lender can charge separate prices to different portions of the market, it can profit on risky loans without driving away other customers.[113] Modern finance now allows lenders to separate borrowers into pools, if not to identify the riskiness of any particular credit applicant.[114] For example, the rise of credit-reporting agencies has divided consumers between those with established credit histories and those without.[115] Lenders can identify the riskiness of those with credit histories, while those without—generally those who are young, poor, or both—remain unknowable and presumptively risky.[116] This bifurcation, together with a looser legal price control regime, permits lenders to set two tiers of prices, so that they can charge high rates from high-demand, high-risk borrowers without driving away the pool of safe bets.[117] Market concentration among

---

[110] Joseph E. Stiglitz & Andrew Weiss, *Credit Rationing in Markets with Imperfect Information*, 71 Am. Econ. Rev. 393, 402–03 (1981); Agarwal et al., *supra* note 109, at 3.

[111] Inframarginal purchasers are those who are willing to pay more than the equilibrium price for a good because they value it more than the customer who values it least (the marginal customer). *See* Ivan Png & Dale Lehman, Managerial Economics 230–31 (3d ed. 2007).

[112] That is, although there remain "lemons" in the market, if inframarginal demand is high enough, the high-demand, high-quality borrowers may be profitable enough to overcome losses from low-quality borrowers. *See* Richard R.W. Brooks, *Credit Past Due*, 106 Colum. L. Rev. 994, 998 (2006) (stating that lending to "fringe" customers is made possible by cross-subsidies from safe but unknown customers to risky borrowers).

[113] *See, e.g.*, Adams et al., *supra* note 85, at 66–68 (demonstrating that lenders can break even in the presence of asymmetric information by offering contracts that force borrowers to reveal their own riskiness, such as through different tiers of down payments).

[114] Mann & Hawkins, *supra* note 108, at 911.

[115] John P. Caskey, Fringe Banking: Check-Cashing Outlets, Pawnshops, and the Poor 107 (1994); Brooks, *supra* note 112, at 997–98.

[116] Susan Block-Lieb & Edward J. Janger, *The Myth of the Rational Borrower: Rationality, Behavioralism, and the Misguided "Reform" of Bankruptcy Law*, 84 Tex. L. Rev. 1481, 1511–12 (2006); *see* Adams et al., *supra* note 85, at 82 ("[M]odern credit scoring can go a significant distance toward mitigating adverse selection problems . . . .").

[117] *See* Block-Lieb & Janger, *supra* note 116, at 1488, 1516–17 (observing that innovations in fringe lending practices allow lenders to charge prices that "would have been viewed as usuri-

lenders, and cognitive or informational challenges to price shopping among borrowers, would also help to keep borrowing costs high.[118]

If borrowers are fully rational, the diminishing marginal utility of wealth might make even these very high-interest loans welfare-increasing, albeit only narrowly. Because the value of income smoothing is so high at the extreme low end of the income distribution—where smoothing means survival or not, homelessness or not—it makes sense that there would be many potential borrowers willing to pay very high rates of interest.[119] For very high demanders, that price may still increase utility.[120] However, the utility those borrowers receive will be much smaller than what they would have received had they been able to borrow at a "market" rate—the price of funds available to those for whom it is easier for the lender to verify creditworthiness.[121] In effect, the lender expropriates what would have been the borrower's consumer surplus had there not been market failure.[122]

---

ous" in an earlier era); Mann & Hawkins, *supra* note 108, at 889 (explaining that a key development allowing bifurcation of the loan market was a legal change allowing very high rates).

118 *See* Oren Bar-Gill & Elizabeth Warren, *Making Credit Safer*, 157 U. Pa. L. Rev. 1, 8–9 (2008) (arguing that consumers' "imperfect rationality" reduces price competition among lenders); Block-Lieb & Janger, *supra* note 116, at 1525–58 (arguing that cognitive failures allow lenders to exploit low-income borrowers); Brooks, *supra* note 112, at 1010–11 (noting that conventional lenders avoid the fringe market, reducing competition for small lenders). *But see* Oren Bar-Gill, *The Law, Economics and Psychology of Subprime Mortgage Contracts*, 94 Cornell L. Rev. 1073, 1083 (2009) (arguing that increased competition might actually increase efforts to mislead borrowers).

119 *Cf.* Littwin, *supra* note 77, at 457–58 (explaining the importance of credit in allowing low-income families to cope with and even survive crises, and noting that "[t]iming is especially crucial for low-income families"); Bertrand & Morse, *supra* note 95, at 2, 10 (finding that certain payday borrowers use funds to "avoid . . . having the gas connection turned off or to catch up with late rent payments" and "buy[ ] groceries"). We are also sympathetic to claims that many borrowers are not acting rationally at all, but instead are making serious mistakes that reduce their own subjective well-being. *E.g.*, Block-Lieb & Janger, *supra* note 116, at 1489–90. Markets may contain a mix of rational and irrational actors. *See* Bar-Gill, *supra* note 118, at 1123–24. Indeed, we believe that mistaken borrowing can be a serious problem for tax rebates, as we elaborate. *See infra* Part III.G. For now our only point is that, even if all borrowers are fully rational, there is still a strong basis for government intervention.

120 *See* Mann & Hawkins, *supra* note 108, at 885 (suggesting that some borrowers who pay high fees are acting rationally and use funds to "purchase food or medicine").

121 *See* Richard A. Musgrave & Peggy B. Musgrave, Public Finance in Theory and Practice 156 (5th ed. 1989).

122 *Cf.* Christopher L. Peterson, *Usury Law, Payday Loans, and Statutory Slight of Hand: Salience Distortion in American Credit Pricing Limits*, 92 Minn. L. Rev. 1110, 1126–27 (2008) ("[P]ayday lending has proven wildly profitable.").

Thus, allowing lenders to price for these inframarginal borrowers means that borrowers give up huge utility[123] in order to enrich the shareholders of lenders by a comparatively nominal amount. As we will describe, government interventions that made borrowing easier for these kinds of poor households would therefore increase social welfare by large amounts at relatively little cost in absolute dollars.[124]

Other research confirms that there is a market for loans to very poor borrowers, but only at exorbitant interest rates.[125] Many tax return preparers offer customers entitled to a tax refund expedited access to the funds in exchange for several small fees, each in the range of $30 to $135.[126] Because the client only receives her money a few weeks early, the effective annual rate of interest paid on these loans averages between 150% and 300%,[127] although prices have come down slightly in the past few years.[128] Similarly, so-called "payday lenders" will advance money to borrowers on the condition that the borrowers allow the lenders to automatically debit their accounts on the date of the next paychecks.[129] Here, too, nominal fees are modest but, over the course of a year, translate to effective interest rates of 300% or higher.[130] Other forms of credit, such as pawnshop loans, can carry effective rates as high as 1000%.[131] In one study, the receipt of a tax rebate reduced taxpayers' uses of these other forms of borrowing, strongly implying that no other cheaper sources of credit were available for the household.[132]

3. Impatience

It should be noted at this point that the evidence on liquidity constraints can also be interpreted to imply that year-end rebates would increase welfare for some households. Failure to smooth an expected revenue spike might be the product not of externally imposed limits

---

123 *See* Block-Lieb & Janger, *supra* note 116, at 1489–90.

124 *See infra* Part IV.B.

125 *See* Bertrand & Morse, *supra* note 95, at 1.

126 Chi Chi Wu & Jean Ann Fox, Nat'l Consumer Law Ctr., Inc., Consumer Fed'n of Am., Coming Down: Fewer Refund Anticipation Loans, Lower Prices from Some Providers, but Quickie Tax Refund Loans Still Burden the Working Poor 8–12 (2008); Barr, *supra* note 107, at 168–69.

127 Barr, *supra* note 107, at 169.

128 Wu & Fox, *supra* note 126, at 4.

129 Barr, *supra* note 107, at 149. For an overview of the industry, see generally Caskey, *supra* note 115, at 36–67.

130 Barr, *supra* note 107, at 154–55.

131 Mann & Hawkins, *supra* note 108, at 892.

132 Bertrand & Morse, *supra* note 95, at 1.

on borrowing, but instead of deliberate choices to save.[133] At first glance, the savings story is hard to reconcile with data that households spent much of their rebate paying down debt,[134] and that many were willing to pay very high effective rates of interest to accelerate the receipt of the rebate.[135] The savings story also is puzzling for families that spent some of their rebate on what looked like luxuries, such as vacations and apparel.[136] Although it would be strange to defer consumption of essentials to save for luxuries, it may be more sensible for certain impatient households—families who struggle to save and know it. Those families might use the delayed tax rebate as a way of forcing themselves to overcome impatience.[137] We return to these issues in Part III.

B.   Low Salience of Energy Costs

Another factor that may contribute to imperfect smoothing is households' possible failures to recognize the increased costs of a consumption tax. Because consumption taxes are likely to be relatively "low salience," or "hidden," families might be surprised by budgets that prove tighter than expected, leaving less money available for top priorities.[138] In addition to compounding the budget woes of those who are liquidity-constrained, salience also affects borrowing. For example, a taxpayer who does not know she will get a refund at the end of the year will not think to borrow against it.

1.   Welfare Costs of Hidden Taxes

In the classic household budgeting model, families know how much each of their options costs when they decide how to divide up their limited funds.[139] The model therefore assumes that within each

---

133   *See* Fennell & Stark, *supra* note 13, at 19–20 (explaining that what look like failures to smooth may be the product of deliberate but unusual preferences); Johnson et al., *supra* note 78, at 14 n.19 (noting that their data can also be interpreted as evidence of households deliberately choosing to accumulate a "buffer stock" against uncertain future outcomes).

134   *See supra* note 82 and accompanying text.

135   *See* Cole et al., *supra* note 79, at 11–13.

136   Bertrand & Morse, *supra* note 95, at 7–8; Broda & Parker, *supra* note 79, at 3–4.

137   *See* Angeletos et al., *supra* note 95, at 49; *see also* Michael S. Barr & Jane K. Dokko, Paying to Save: Tax Withholding Among Low- and Moderate-Income Taxpayers 2–4 (Aug. 2009) (unpublished manuscript) (on file with author) (considering this argument).

138   For a review of the empirical evidence on whether transactional consumption taxes are more difficult for shoppers to detect, see Brian Galle, *Hidden Taxes*, 87 Wash. U. L. Rev. 59, 72–77 (2009).

139   *See* Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 Stan. L. Rev. 1471, 1476 (1998) (explaining the rational planning model of economic behavior).

time period families allocate their money first to the highest priority items, and then to the next highest, and so on, until the budget is exhausted.[140] That technique maximizes the family's welfare—every item purchased produces more utility than any item that was not.[141]

There is recent evidence, however, that consumers sometimes do not know the true prices they are paying. For instance, in one study, people bought less of a good when the sales tax was computed for them and displayed on the shelf.[142]

We expect, though, that carbon pricing will not be hidden in precisely the same manner as other sales taxes. Producers of energy-intensive products will likely charge higher prices to reflect their own higher carbon expense, meaning that much of the cost of carbon will be included in the prices faced by consumers. Utility companies might well include carbon taxes directly in each household's monthly bill. Thus, in many instances, consumers will be able to see the after-tax price when they make a consumption decision. But when a consumer must make a decision before seeing the price tag—such as in the first month after a new energy tax is enacted—she might face some temporary difficulties in making the right decision.[143]

Planning for budget shortfalls is also likely to be challenging in scenarios where the size of the expected tax is very difficult to predict. Studies suggest that many people cannot predict accurately their own willpower and, instead, overestimate their own future restraint.[144] Carbon taxes (and their cap-and-trade equivalents) fall more heavily on households that use large amounts of carbon-intensive products. Willpower—the ability to put on a sweater, to bike instead of drive, to turn off the television—will be a significant determinant of the amount of tax the household pays. More generally, for any consumption tax, the resolution to save instead of spend allows a household to

---

140 *See* B. Douglas Bernheim & Antonio Rangel, *Beyond Revealed Preference: Choice Theoretic Foundations for Behavioral Welfare Economics* 23–24 (Nat'l Bureau of Econ. Res., Working Paper No. 13737, 2008), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1086986.

141 *See id.* at 24.

142 Raj Chetty et al., *Salience and Taxation: Theory and Evidence*, 99 Am. Econ. Rev. 1145, 1146 (2009).

143 *Cf.* Littwin, *supra* note 77, at 477–78 (describing how poor women learn techniques for managing tight finances, and noting that these techniques are imperiled by rapid changes in household finance).

144 *See* Ted O'Donoghue & Matthew Rabin, *Self-Awareness and Self-Control*, *in* Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice 217, 218–19 (George Loewenstein et al. eds., 2003); George Loewenstein et al., *Projection Bias in Predicting Future Utility*, 118 Q.J. Econ. 1209, 1209 (2003).

defer paying tax, giving them the benefit of the time value of the taxes they save. Consequently, if families are bad at predicting whether they will be able to exert willpower, they will also be unable to estimate their tax.

Finally on this point, households may struggle to make accurate tax-avoiding investment decisions. One of the objectives of a carbon tax is to encourage households to invest in energy-efficient appliances and lifestyles.[145] In order to decide, however, whether to spend an extra $500 for a new air conditioner, a family must have a fairly detailed sense of the expected future cost savings. In particular, the family must know that there is a shortfall in their monthly budget attributable to energy costs, calculate how much of the shortfall the investment would eliminate, and then discount that future savings to its present value. Our claim about hidden taxes is that these kinds of calculations are either beyond the capacity of some households or are perceived not to be worth the mental effort of engaging in them.[146] There may also be a significant procrastination component to a taxpayer's unwillingness to think about the cost-effectiveness of her investments.[147]

These hidden taxes and other low-salience costs may have a negative impact on household welfare. Chetty et al. argue that hidden taxes potentially interfere with a family's budget allocation process.[148] Suppose the Ericsson family believes that heating their house this month will cost $100, but after tax they ultimately pay $110. That $10 shortfall must come from somewhere else in the monthly budget. If the Ericssons do not notice the $10 gap until the end of the month, they may find themselves without enough money to pay rent or buy the last week's groceries. If so, they likely would have been better off putting on sweaters and paying a smaller utility bill.

The hidden tax problem is more acute for the poorest families. Theory and empirics to date are unclear on whether taxes are more hidden from rich or poor households.[149] But unexpected costs are a greater danger to highly illiquid households; liquid households sur-

---

145 Stephen H. Schneider & Lawrence H. Goulder, *Achieving Low-Cost Emissions Targets*, 389 Nature 13, 13 (1997).

146 *See* Galle, *supra* note 138, at 85–89.

147 This will be explored in more detail in Part III.F.

148 *See* Chetty et al., *supra* note 142, at 1175–76.

149 Galle, *supra* note 138, at 100–04. That is, while wealthier taxpayers can acquire information about taxes more readily, the impact of a tax on them is smaller than it is on poorer individuals, which reduces their incentive to acquire information. So it is ambiguous which effect prevails.

prised by their energy bill can always put the groceries on a credit card.[150] Wealthier households also have a larger margin for error; when the family is already purchasing luxuries, an extra $100 per month is easier to absorb out of lower-priority items.[151]

In sum, if consumption taxes are at least somewhat hidden from consumers, they may prevent some households from smoothing their incomes over the course of the year. That is very likely to result in greater welfare losses for households that cannot smooth than for those that can.

Additionally, as others have recognized, hidden Pigouvian taxes lead to additional social loss.[152] The point of the Pigouvian tax is to change behavior by impounding the negative consumption externality of a good into its price.[153] But if consumers do not notice the tax, they do not reduce their usage of the good; in the case of a carbon tax, they do not reduce carbon emissions.[154]

2. Learning

It might be argued in response to these points that hidden taxes are, at worst, a short-term problem because households will quickly learn that their costs are higher than expected.[155] Alternatively, liquidity-constrained households might learn to avoid the worst kinds of credit, diminishing the extent to which the surplus from income smoothing would be diverted to lenders. While both of these are theoretically possible, based on available evidence, it is more likely that learning would be slow and partial, leaving many families vulnerable for extended periods.

Oren Bar-Gill and Elizabeth Warren have explained why learning can be ineffective in the credit market.[156] Consumers who do not understand credit may also be unaware of their need to educate themselves, be unable to comprehend new information, believe (wrongly) that the costs of learning outweigh the benefits, or expect that they can free ride on the information-gathering efforts of others.[157] Educa-

---

150 Bar-Gill & Warren, *supra* note 118, at 64.

151 Galle, *supra* note 138, at 101.

152 Amy Finkelstein, *E-ZTax: Tax Salience and Tax Rates*, 124 Q.J. Econ. 969, 981–82 (2009).

153 *See supra* text accompanying note 21.

154 *See* Ekins & Barker, *supra* note 20, at 77.

155 *See* Todd J. Zywicki, *The Economics of Credit Cards*, 3 Chap. L. Rev. 79, 138–42 (2000) (making this argument about credit card users).

156 Bar-Gill & Warren, *supra* note 118, at 11–25; Bar-Gill, *supra* note 118, at 1128–29.

157 Bar-Gill & Warren, *supra* note 118, at 12–14.

tion by interested third parties, such as consumer advocacy groups, may be difficult in part because of these same factors, but also because of the highly differentiated nature of credit.[158] Whether a loan is a good deal or not depends on how the household behaves, its tolerance for risk, and the exact features of the loan.[159] It is very hard for outsiders to gather this kind of information about millions of families.[160] Similarly, competitors would also struggle to educate potential customers sufficiently and might prefer not to, in any event, either in order to prey on the misinformed or alternatively out of fear that their rivals would capture any gains from education.[161] Bar-Gill and Warren also round up empirical evidence to support their theory: learning in the credit market is slow, and people who do learn often forget their lessons over time.[162]

As one of us has also detailed elsewhere, many of these same factors apply to learning about hidden taxes.[163] In addition, taxpayers often fail to make use of hints and clues about their own misjudgments, not only because household finance is complex and therefore these signals are "noisy," but also due to people's tendencies to perceive evidence as confirming rather than disproving what they already believe.[164] The fact that taxes are and remain hidden also seems to explain several features of our national tax system;[165] if learning about hidden taxes were easy, it would be difficult to understand why these features have persisted over time.

C. *Prebates Raise Similar Problems*

Switching from rebates to prebates does not eliminate the difficulties just described, although accelerating payment does somewhat change the nature of the problem. For one thing, a prebate may still

---

158 *See id.* at 14–17. Additionally, peer-to-peer learning may be slowed by the self-interest of informed peers. John Y. Campbell, *Household Finance*, 61 J. Fin. 1553, 1586–88 (2006).

159 *See* Bar-Gill & Warren, *supra* note 118, at 16, 24–25 (discussing the importance of use patterns).

160 *Id.* at 16. Similarly, where individual factors are important, families cannot easily learn just by observing others. *See* Browning & Lusardi, *supra* note 37, at 1846.

161 Bar-Gill & Warren, *supra* note 118, at 18–19.

162 *See id.* at 26–56. For similar surveys of persistent household ignorance in personal finance decisions, see Alexander L. Brown et al., *Learning and Visceral Temptation in Dynamic Saving Experiments*, 124 Q.J. Econ. 197, 200 (2009); Campbell, *supra* note 158, at 1579–85, 1588–89.

163 *See* Galle, *supra* note 138, at 89–93.

164 *Id.* at 90.

165 Joel Slemrod, *Old George Orwell Got It Backward: Some Thoughts on Behavioral Tax Economics* 5–6 (CESifo, Working Paper No. 2777, 2009), *available at* http://ssrn.com/abstract=1476210.

require costly income smoothing; instead of borrowing, the family now must save its money and use it to offset higher energy costs throughout the year. More generally, a lump-sum regime, whether in the form of a rebate or prebate, will fail to put poor and wealthy households on the same footing if the costs of smoothing consumption are greater for the poor. This will hold whenever the poor have to pay more to borrow or save, or are unable to do so.

In order to smooth consumption in a prebate regime, poor households will need saving technologies available that make it easier for them to save. If these are not available or have higher transaction costs than those available to wealthier households, then the poor will once again be at a relative disadvantage.[166] Although evidence here is less extensive than in borrowing, the data still suggest that many poor households have no access to conventional banking.[167] Instead, the poor use risky or expensive substitutes.[168]

For similar reasons, the hidden nature of consumption tax regimes will also affect households who receive prebates. In order to make optimal consumption and saving decisions, a household has to be able to incorporate information about the hidden tax regime, and do so in a timely fashion.[169] For instance, households may not realize that prebates are designed to offset increased energy costs. They may then fail to save enough to cover those costs later, again resulting in budget surprises that reduce welfare.

D.   *Summary*

On the whole, it appears so far that, as presently designed, many forms of transfers aimed at making consumption taxes more progressive are seriously flawed. To achieve distributional neutrality of welfare, and not simply of annual income, rebates and prebates must account not only for *how much* but also *when* households spend. But, as we have shown, smoothing consumption is neither cheap nor guaranteed. Compared to their wealthier counterparts, poor households pay more to borrow and get less when they save—a disadvantage exacerbated in turn by the hidden nature of a transactional consumption tax.

---

166   *See supra* notes 149–51 and accompanying text.

167   Barr, *supra* note 107, at 130–32; Sondra G. Beverly & Michael Sherraden, *Institutional Determinants of Saving: Implications for Low-Income Households and Public Policy*, 28 J. Socio-Econ. 457, 466–67 (1999).

168   Barr, *supra* note 107, at 124.

169   *See* Chetty et al., *supra* note 142, at 1145–48, 1174 (explaining the household budgeting process under uncertainty about tax rates).

III. Hyperbolic Households and the Limits of Reimbursement Regimes

So far, in establishing that the timing and frequency of reimbursements matters, we have assumed that households are impatient; they discount costs and benefits that are in the future. Importantly, we also have assumed that a household's discounting remains constant over time. Constant discounting guarantees that—barring new information—a household's long-term and short-term preferences will always coincide, a result that rules out self-control problems, such as overconsumption and procrastination.[170]

In this Part, we relax this time-consistency assumption. Evidence from numerous experiments and field studies by economists—not to mention simple intuition and common sense—suggests that many people come to regret their impatience or procrastination, so that their ex ante preferences are inconsistent with their sentiments after the damage is done.[171] We show that the shortcomings of lump-sum payout regimes identified in Part II become more pronounced once one allows for time-inconsistent households. Time inconsistency gets in the way of smoothing, leading households to save too little in a prebate regime or to procrastinate borrowing against an expected rebate. Moreover, the incentive to procrastinate will extend to two other important investment decisions: when to purchase more energy-efficient durable goods, such as appliances, automobiles, and home insulation, and when to acquire information about the impact of the tax and need to smooth consumption. More generally, we also show that, even if poor and rich households have identical self-control problems, the poor will fare worse on average due to their tighter budget constraints and the diminishing marginal utility of wealth.

Parts III.A and III.B provide a general overview of the quasi-hyperbolic model applied in the remainder of Part III; those familiar with the model can safely proceed to Part III.C.

A.   Intertemporal Decisions and the Evidence on Time Inconsistency

An intertemporal decision is one in which the costs and rewards that flow from the decision are not all incurred or received in the same

---

170 *See* George Loewenstein & Drazen Prelec, *Anomalies in Intertemporal Choice: Evidence and an Interpretation*, 107 Q.J. Econ. 573, 573–78 (1992) (describing the differences between the prediction of the standard discounting model and observed instances of overconsumption and procrastination).

171 *See infra* text accompanying notes 172–89.

time period.[172] The relative timing of costs and rewards matters because, as a general matter, people are impatient in that they prefer to receive benefits as early as possible and delay incurring costs until future periods.[173] A rational actor will choose her behavior to maximize the sum of her current and future well-being.[174] This can be modeled using an intertemporal utility function that sums up the instantaneous utility (the payoffs) in each relevant time period as discounted to account for an actor's time preference.[175] Early work in formalizing intertemporal choice used an exponential discount function, which, while easier to use, has an important (but, in hindsight, undesirable) side effect: it implies that actors have a constant level of impatience.[176] In short, an exponential discounter will never give added weight to immediate costs and rewards, and thus will always act in a time-consistent manner.[177] But there is a large body of empirical evidence showing that people routinely exhibit time-inconsistent preferences, stemming from a short-term preference for immediate gratification that leads them to override their long-term preferences.[178] It is this asymmetry between long-term and short-term impatience that leads people to procrastinate and overconsume.[179]

The principal challenge to the time-consistency assumption of neoclassical theory originated in a series of experiments finding that

---

[172] George Loewenstein & Richard H. Thaler, *Anomalies: Intertemporal Choice*, 3 J. Econ. Persp. 181, 181 (1989).

[173] Loewenstein & Prelec, *supra* note 170, at 573.

[174] *Id.*

[175] *Id.*

[176] *See* Shane Frederick et al., *Time Discounting and Time Preference: A Critical Review*, *in* Advances in Behavioral Economics 162, 166–67 (Colin F. Camerer et al. eds., 2007) (stating that the exponential function is the only one that ensures that actors will exhibit constant levels of impatience).

[177] *Id.* at 170 ("Constant discounting implies that a person's intertemporal preferences are *time-consistent*, which means that later preferences 'confirm' earlier preferences.").

[178] *See, e.g.*, *id.* at 172–79; Loewenstein & Thaler, *supra* note 172, at 183–87.

[179] Importantly, economists embraced exponential discounting because it made their models more tractable mathematically, not because they believed that real-world actors use exponential functions. *See* Gary S. Becker, Accounting for Tastes 11 (1996) ("The assumption of consistent preferences is clearly not a literal description of much actual behavior . . . but it is an extremely useful simplification of behavior."); Frederick et al., *supra* note 176, at 167 (noting that earlier economists adopted the model for its ease of use, not its accuracy). Unlike the large body of evidence supporting the time-inconsistency assumption, there is no systematic evidence finding that people have constant discount rates. *See* Warren K. Bickel & Matthew W. Johnson, *Delay Discounting: A Fundamental Behavioral Process of Drug Dependence*, *in* Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice, *supra* note 144 (stating that "[e]xponential discounting . . . has *not* been empirically supported by behavioral research" conducted in humans and animals); *see also infra* Part III.C (describing evidence that real-world actors have declining discount rates).

people value immediate gratification and therefore exhibit declining, instead of constant, discount rates.[180] In short, people discount immediate payoffs more steeply than they discount those same payoffs from a long-term perspective.[181] A common type of experiment to test whether people have time-inconsistent preferences asks subjects to choose between a smaller, earlier reward and a higher, delayed one, where in some instances the smaller reward can be received immediately and in others both the smaller and larger rewards are delayed until future periods.[182]

In an early study, the economist Richard Thaler told subjects to imagine that they had won a lottery and could choose either to receive the money immediately or leave it in the bank earning interest.[183] He then asked them how much interest they would require to make them indifferent between receiving $15 immediately or in three, twelve, and thirty-six months.[184] The required median returns were $30, $60, and $100, which translates into continuously compounded discount rates of 277%, 139%, and 63% for the three, twelve, and thirty-six month delays, respectively.[185] As can be seen, the implicit discount rate declined as the delay in receiving the money increased; the sooner subjects could get their money, the more impatient they were for it.[186]

B.   *Overconsumption and Procrastination*

It is helpful to compare the way that time-consistent households ("TC households") and time-inconsistent households ("TI households") make intertemporal decisions. We will assume that a household will choose a consumption path that takes into account its long-term impatience, as captured by a discount factor, δ. Moreover, the decisions of TI households will also be affected by their preference for immediate gratification, as captured by a short-term discount factor, β,

---

[180]   *See, e.g.*, GEORGE AINSLIE, PICOECONOMICS 63–80 (1992) (describing evidence of declining discount rates and using hyperbolas to model them).

[181]   *See id.* at 64 fig.3.2 (illustrating that as the time-delay increases, people require a higher reward value); Christopher Harris & David Laibson, *Hyperbolic Discounting and Consumption*, *in* ADVANCES IN ECONOMICS AND ECONOMETRICS 258, 258 (Mathias Dewatripont et al. eds., 2003) (explaining that generalized hyperbolic discount functions decline at a faster rate in the short-run than in the long-run, matching a key feature of experimental data); Loewenstein & Prelec, *supra* note 170, at 579–81 (setting forth the hyperbolic discount function).

[182]   *See* RICHARD H. THALER, *Some Empirical Evidence on Dynamic Inconsistency*, *in* QUASI RATIONAL ECONOMICS 127, 128 (Richard H. Thaler ed., 1991).

[183]   *Id.*

[184]   *Id.* at 129.

[185]   *Id.* at 130 tbl.2.

[186]   *Id.* at 129.

set to less than 1. It is applicable only when the household is making a short-term decision: it either has to incur an immediate cost or grab an immediate reward.

From the long-term perspective of period *0*, when all costs and benefits are delayed, both types discount future payoffs using a standard exponential function. That is, from the perspective of period *0*, a TC household will choose the future course of action that will maximize the sum of its instantaneous utility in periods *1* through *n*: $\delta u_1 + \delta^2 u_2 + \delta^3 u_3 + \ldots \delta^n u_n$. A TI household will reach the same exact conclusion, since in period *0*, it discounts periods *1* through *n* by $\delta u_1 + \delta^2 u_2 + \delta^3 u_3 + \ldots \delta^n u_n$, which reduces to the standard exponential function.

However, in period *1*, the TC household will act to maximize: $u_1 + \delta u_2 + \delta^2 u_3 + \ldots \delta^{n-1} u_n$, while its TI counterpart will maximize $u_1 + \delta u_2 + \delta^2 u_3 + \ldots \delta^{n-1} u_n$. Since $\beta\delta < \delta$, in period *1*, the TI household will give greater weight to the instantaneous utility, u_1, than would its TC counterpart or its own previous self. That is, given its preference for immediate gratification, the TI household will value present utility more now than it did from the long-term perspective of period *0*. As we will now see, if that immediate utility is a benefit, a TI household will have a greater incentive to overconsume. If the immediate utility is a cost, the TI household has a greater incentive to procrastinate.

1. *Overconsumption Scenario: Immediate Benefits and Delayed Costs*

Smoking, eating tasty but unhealthy foods, indulging in one's youth instead of saving for retirement—all require a tradeoff between an immediate benefit and delayed consequences. We will refer to a consumption scenario as one in which a household can grab an immediate benefit, but doing so triggers a cost that it will bear in the future. We will also say that a household overconsumes whenever it has a long-term preference to abstain, but makes one or more short-term decisions to override that preference, solely due to the added weight it gives to immediate gratification. It follows that TC households will never overconsume in this manner because, in TC households, short-term decisions are consistent with long-term preferences.

More formally, suppose that consuming in period *1* provides an immediate benefit, v_1, but triggers a delayed cost in the following period, c_2. From the perspective of period *0*, TC and TI households will both decide not to consume in period *1* whenever $v_1 + \delta c_2 < 0$. Since TC households give no added weight to immediate gratification, they will keep to their plan, but their TI counterparts will override their

original decision whenever $v_1 + \beta\delta c_2 = 0$ (assuming that it consumes if it is indifferent). Moreover, it follows that, all other things being equal, a household's incentive to overconsume will increase the higher the immediate benefits and the greater its preference for immediate gratification.

2. *Procrastination Scenario: Immediate Costs and Delayed Benefits*

An investment scenario is one in which an actor has to incur a cost in the present to create a future benefit: exercising, writing a paper, getting a divorce, entering into a contract, or acquiring information to reduce transactional risks. A household procrastinates when it has a long-term preference to complete task A in period t, but makes one or more short-term decisions to delay doing so, solely due to the added weight it gives to the immediate costs it must incur to complete A.

Suppose that completing A in period *1* requires an immediate investment of c_1, yielding a reward in period *2*, v_2. From the perspective of period *0*, TC and TI households will both decide to complete A in period *1* whenever $c_1 + \delta v_2 = 0$. TI households, however, will choose to procrastinate whenever $c_1 + \beta\delta v_2 < 0$. As with overconsumption, households are more likely to procrastinate the higher the immediate costs of completing A and the greater their short-term impatience.

3. *Repeated Overconsumption and Procrastination*

At any one point, a household will be guided by its overall goal of maximizing the sum of its current and future welfare. In order to do this, it will have to predict how it expects to act in the future. It follows that TI households must try to predict the short-term discount factor that they expect to use in future periods when making short-term consumption and investment decisions.

More formally, at time t, a household will try to predict the β that it will use at $t + 1$. If we let $\hat{\beta}$ be its prediction, then a correct prediction is one in which $\hat{\beta} = \beta$. Such a sophisticated household will make a correct assessment of its future propensity to overconsume and procrastinate, and adopt commitment devices to assure that it keeps to its long-term preferences.[187] On the other hand, a naïve household is one

---

[187] Commitment devices are mechanisms that restrict an actor's ability to yield to the pull of immediate gratification. More generally, a commitment device is a type of externally imposed self-regulation mechanism adopted to overcome self-control problems when relying on internal sources of self-regulation is not sufficient. *See* ROY F. BAUMEISTER ET AL., LOSING CONTROL:

that period after period incorrectly believes that in the future it will exhibit perfect self-control—that is, it believes that it will act in a time-consistent manner and thus has a $\hat{\beta} = 1$, notwithstanding the fact that it has a $\beta < 1$. It follows that naïve households will repeatedly overconsume and procrastinate, believing each time that they are doing so for the last time. It is unlikely that actual households are completely naïve or sophisticated.[188] More likely, they know that they have a preference for immediate gratification—a $\beta < 1$—but are overly optimistic of their future willpower.[189] A partially naïve household is one that has $\beta < \hat{\beta} < 1$. Importantly, even a relatively small misprediction can lead partially naïve households to repeatedly overconsume or procrastinate—i.e., to act in the same way as if it were fully naïve.

We will now lay out the implications of these findings for a consumption tax reimbursement regime.

C. *Overconsumption in Prebate Regime*

On its face, a lump-sum payment at the beginning of the year seems like a plausible mechanism to achieve tax neutrality. Because the poor household receives the prebate before incurring the tax liability, it will not have to borrow, as in the case of a rebate. Nonetheless, in order to smooth consumption—to use the prebate to pay the carbon taxes as they become due—the poor household will have to save. We now show that, all other things being equal, TI households will consume the prebate faster than TC households and thus faster than they want to from a long-term perspective. It follows that TI households that are liquidity-constrained will overconsume carbon products at the beginning of the year and be forced to cut back once they have gone through the prebate funds. Moreover, under a prebate regime, TI households that are not liquidity constrained will overconsume at the beginning of the year and continue down their long-term consumption path the rest of the year. In short, a prebate can have the perverse effect of leading some households to overcon-

---

How and Why People Fail at Self-Regulation 6–7 (1994) (describing the ability among human beings "to exert control over one's own inner states, processes, and responses" and defining "self-regulation" as "any effort by a human being to alter its own responses" so as to override the push to act in ways that diverge from what they really want).

    188 *See generally* Ted O'Donoghue & Matthew Rabin, *Choice and Procrastination*, 116 Q.J. Econ. 121 (2001) (developing a model of partially naïve households).

    189 *See id.* at 150 (suggesting that earlier findings support a model of optimism about future willpower).

sume carbon products, which goes against the basic goal of reducing consumption.

1. *Smoothing Problem: Liquidity-Constrained Households*

In order to focus on the overconsumption problem, it is helpful to limit our attention to a prebate regime in which households receive the funds on December 31st and make a long-term plan setting forth how much electricity to consume during the coming year, keeping all other liabilities fixed. We begin with households that are liquidity-constrained; if they run out of funds before the year is through, they will have no other choice but to cut back their electric consumption.[190] To simplify matters, we will assume that they receive a prebate of $1200 and decide to consume the same amount of electric power each month, leading to a monthly tax liability of $100. In other words, in order to maximize their intertemporal utility over the whole year, the household needs to smooth their electricity consumption. While they anticipate that this consumption plan will require sacrifices—using fans instead of air conditioning and blankets instead of electric heaters—they believe that it is the one that will minimize these shortfalls in utility.

Consider a TC versus a TI household. To isolate the effect of short-term discounting, assume that they both have a long-term discount factor, $\delta = 1$ (which does not affect the general results in any way), and the TI household has a short-term discount factor, $\beta = 0.5$. Each time they use electricity, they receive an immediate benefit— e.g., using air conditioning instead of a fan—but each month that they spend more than $100 in taxes (the "excess carbon"), they trigger a delayed cost, borne in the following months when they are forced to consume less electricity than they had wanted. Let $v_1 = \$500$ be the immediate benefits of consuming more electricity than the allotted monthly amount, and $c_1 = \$900$ the delayed cost of exceeding the allotment—i.e., due to the electricity shortfall after the household has exhausted the prebate. From the long-term perspective of December 31st, both households will plan to keep to the allotment given that $\$500 + (-\$900) < 0$. But while the TC household keeps to its optimal consumption plan, come January, its TI counterpart does not because it now compares an immediate benefit of $500 with a delayed, discounted cost of $0.5 \times \$900 = \$450$. While this is a relatively simple example, it does provide the underlying intuition: all other things be-

---

190   *See supra* Part II.A.

ing equal, a TI household will go through the prebate funds sooner than what it believes is optimal. Additionally, policymakers who fail to take this into account, and instead adopt the standard time-consistency assumption, will fail to realize the way that the prebate can distort the consumption decisions of real households.[191]

As we saw above, a fully sophisticated household will anticipate its future propensity to overconsume and adopt commitment devices if available and affordable.[192] On the other hand, since naïve households always conclude that in the future they will act in a time-consistent manner, they will overconsume each month, believing that they are doing so for the last time, and will go without electricity once they have exhausted the prebate funds. For example, suppose that a partially naïve household has a $\hat{\beta} = 0.556$, which is a relatively small misprediction, given that its true $\beta = 0.5$. That household will nonetheless overconsume each month, since it believes incorrectly that it will later decide that it will keep to its consumption plan—i.e., *(0.556 × $900) = $500.40 > $500.*

There is evidence that households behave in this manner with respect to other lump-sum payments, e.g., food stamps and Social Security benefits.[193] Shapiro found that caloric intake in households receiving food stamps declines as the month goes on, and after considering various possible explanations, opted for one similar to our prebate explanation; sufficiently naïve TI households will overconsume earlier in the month and have to curtail their food consumption as the month progresses.[194] There is also evidence that purchases tend to increase on paydays, particularly for leisure goods that provide an immediate benefit, including food, alcohol, and drugs.[195] And, most on

---

191 In technical terms, this change in behavior can be thought of as representing both income and substitution effects. The TI household perceives itself as wealthier because it believes the future costs of indulging are lower, expanding its budget constraint. Under a prebate regime, or for households that are not liquidity-constrained that expect a rebate, there is also an actual increase in wealth in the amount of the reimbursement. Additionally, there is a substitution effect, as the household shifts its consumption towards tempting goods—goods whose costs are delayed and which therefore seem cheaper per unit than other consumption choices. The reimbursement does not contribute to this second effect, but the added wealth represented by the reimbursement enlarges its impact.

192 *See supra* text accompanying notes 186–87.

193 *See* Jesse M. Shapiro, *Is There a Daily Discount Rate? Evidence from the Food Stamp Nutrition Cycle*, 89 J. Pub. Econ. 303, 315–16 (2005); *see also* Bertrand & Morse, *supra* note 95, at 7–9 (finding that taxpayers whose other behavior suggests a susceptibility to "temptation" are most likely to spend their tax rebate on indulgences rather than paying bills).

194 *See* Shapiro, *supra* note 193, at 321–22.

195 *See* Carlos Dobkin & Steven Puller, *The Effects of Government Transfers on Monthly Cycles in Drug Abuse, Hospitalization and Mortality*, 91 J. Pub. Econ. 2137, 2145–49 (2007);

point for this Article, Ayres et al. found that energy consumption rises on Fridays (after controlling for weather and other likely causal factors),[196] which could be explained by a payday effect.

2. Overconsumption: Non-Liquidity-Constrained Households

Suppose now that the TI household is not liquidity-constrained; if in any month it does not have enough cash to consume the monthly allotment of electricity, it can meet that shortfall by borrowing. Borrowing, however, is expensive.[197] Thus, assume that, given finance costs, a household will want to borrow to meet the allotment shortfall, but no more. In other words, the immediate utility of consuming the whole allotment of electricity is sufficiently high to meet the delayed finance costs.

More specifically, assume that to pay for the full monthly allotment, a household will have to borrow funds and incur a delayed finance charge of $2000, and that the utility of consuming that full allotment translates to $1200. From a long-term perspective, a TI household with a $\beta = 0.5$ will want to avoid the finance charges, but, given its short-term preferences, it will ultimately find it worthwhile to borrow the funds. Under this scenario, the TI household will start the year with a long-term preference never to exceed the monthly allotment of electricity. Nonetheless, if one continues to work with the numbers from the example above, this household will overconsume during the early part of the year, and when it has exhausted the prebate, will borrow to meet the shortfall. It will do so even though borrowing funds creates a welfare loss that it had wanted to avoid.[198]

Unconstrained and impatient households not only reduce their own welfare, but may also frustrate the goals of the carbon tax. Liquidity-constrained households can only overconsume for as long as

---

Melvin Stephens Jr., *"3rd of the Month": Do Social Security Recipients Smooth Consumption Between Checks?*, 93 AM. ECON. REV. 406, 419 (2003); David Huffman & Matias Barenstein, *Riches to Rags Every Month? The Fall in Consumption Expenditures Between Paydays* (Inst. for the Study of Lab., Discussion Paper No. 1430, 2004), *available at* http://ssrn.com/abstract=636 622. It should be noted that while all these sources find a pattern that can be explained, at least in part, due to time inconsistency, the authors provide a number of possible explanations.

[196] Ian Ayres et al., Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage 11 fig.8 (July 16, 2009) (unpublished manuscript), *available at* http://ssrn.com/abstract=1434950. For yet more evidence that impatience impairs savings, see Brown et al., *supra* note 162, at 199.

[197] *See supra* Part II.A.2.

[198] *See* Sumit Agarwal et al., *Payday Loans and Credit Cards: New Liquidity and Credit Scoring Puzzles?*, 99 AM. ECON. REV. 412, 415 (2009) (offering evidence that credit cards may lead to overconsumption out of impatience).

they have access to funds. Unconstrained households can borrow to continue their overconsumption. Thus, the unconstrained households have a greater capacity to increase carbon emissions.

Finally, time inconsistency can be compounded by poor planning. So far we have assumed that the household can accurately predict the amount of electricity that it will want to consume in each month. In reality, the household will face unforeseen shocks—a summer far warmer or winter far colder than usual—and will have to adjust its consumption plan accordingly.[199] Given their liquidity constraints, households will want to guard against unexpected contingencies by saving during months with unforeseen lower consumption needs. However, TI households that give in to temptation and overconsume will save less than optimal during those months, which will put them in a more precarious position when outside shocks lead them to prefer using a greater amount of energy than they had anticipated.

D. *Procrastination and Consumption Smoothing*

While the impulse to overconsume has relatively straightforward implications for a prebate, procrastination behaviors interact with a tax reimbursement regime in several complex ways. First, as we explain in this Section, procrastination may impact the extent to which households smooth their consumption over time. In Parts III.E and III.F, we note two other effects of procrastination: lower investments in carbon-reducing technologies and lower investments in learning about the tax's incentives to reduce carbon consumption.[200]

Time inconsistency compounds the obstacles to consumption smoothing we surveyed in Part II. TI households may fail to smooth consumption because they repeatedly procrastinate borrowing or saving funds. These two types of financial transactions require households to expend time and effort, along with a myriad of other transaction costs, including comparing intermediaries, identifying transactional hazards, and disclosing information that they prefer to keep quiet, such as their immigration status.[201] While all of these costs are incurred immediately, the benefits from smoothing are not all re-

---

199 The ambient temperature at the time households plan may itself distort planning. People tend to mispredict their future preferences because when they project, they give undue weight to their current state when making such predictions. For example, someone who has just had a large breakfast may order a light lunch because she projects her current sated state in trying to ascertain how hungry she will feel by lunch. *See* Loewenstein et al., *supra* note 144, at 1209–10 (discussing projection bias).

200 *See infra* Part III.E–.F.

201 *See* Barr, *supra* note 107, at 134–35 (discussing the transaction costs of borrowing).

ceived immediately.[202] It is this combination of immediate costs and delayed rewards that creates the specter of procrastination. Although at first glance it may appear that a household that borrows funds gets an immediate benefit, this is the case only when it leads to immediate consumption. A payday loan used to acquire groceries or for some leisure activity is different than one used to pay bills—the benefit from paying bills is avoiding the future disutility associated with collection agencies or having one's utilities shut off.

Procrastination is particularly damaging for low-income families. There is evidence that poor households have less access to financial institutions and the full panoply of credit and savings products that are readily available to higher-income households.[203] While commentators have generally acknowledged that such a state of affairs will make it more difficult for poor households to get out of the poverty trap,[204] once one allows for TI households, it is easy to see that the problem goes deeper; even relatively small hurdles can lead to repeated procrastination. If a poor household and a rich household have identical short-term discount factors, but the poor one faces higher transaction costs when entering financial transactions, it follows that it will have a greater incentive to procrastinate. In other words, both households may procrastinate, but the higher immediate costs faced by the poor household will lead it to procrastinate longer and in a greater number of transactions.[205] These higher transaction costs will lead poor households to smooth less than they believed optimal, from a long-term perspective, and less than otherwise equivalent households who face lower transaction costs.

Thus, TI households may have lower welfare under either a rebate or a prebate. Both mechanisms assume families will smooth consumption, but the impulse to procrastinate may prevent them from doing so.

Present bias also can raise the cost of income smoothing. When choosing between financial institutions, TI households are more likely to enter into transactions offering lower up-front costs, even if they have higher long-run costs.[206] There is evidence that consumers react to teaser rates from credit card companies in just this manner—choos-

---

202 *See* O'Donoghue & Rabin, *supra* note 188, at 148–49 (explaining why partially naïve TI households might not invest optimally for their future).

203 *See* Campbell, *supra* note 158, at 1563–64; Littwin, *supra* note 77, at 463.

204 *E.g.*, Barr, *supra* note 107, at 123.

205 *Cf.* Campbell, *supra* note 158, at 1563, 1568–69 (noting that the fixed costs of learning about financial markets tend to reduce participation by less-wealthy households).

206 *See* Bar-Gill, *supra* note 118, at 1119.

ing cards that provide greater benefits up front, even though once the introductory period is over the cards have higher interest rates.[207]

One can extend this general intuition to explain why poor households resort to payday lenders who charge exorbitant rates. There are two important characteristics of payday loan providers: (1) their location and advertisement makes them very convenient, and (2) the transaction costs associated with getting a loan are very low compared to other sources of funds.[208] This may explain why poor households rely on them instead of credit cards; applying for and receiving a credit card takes time and effort and must be timed so that it occurs at a point in time in which the household has sufficient income security to be approved.

E.   *Procrastination in Making the Transition Away from Carbon Dependence*

One of the goals of the carbon tax is to encourage households to invest in making the transition away from carbon dependency.[209] We now argue that TI households face an incentive to procrastinate investing in carbon-abatement technology, e.g., energy-efficient appliances, hybrid automobiles, and better home insulation.[210] As with any other investment, this requires an immediate expense to create a valuable future income stream. Again, TI households are likely to procrastinate in the face of even small present costs.[211] This delay has important implications for both the efficacy and incidence of carbon taxes.

Indeed, a number of recent studies have found that time-inconsistent preferences can lead individuals to procrastinate making analogous exit decisions even when the immediate costs are much lower than those required to make the transition out of a high-carbon lifestyle.[212] If these same dynamics are at play in a carbon tax, procrastina-

---

207   *See* Haiyan Shui & Lawrence M. Ausubel, Time Inconsistency in the Credit Card Market 8–9 (May 3, 2004) (unpublished manuscript), *available at* http://ssrn.com/abstract=586622.

208   *See* Mark Flannery & Katherine Samolyk, *Payday Lending: Do the Costs Justify the Price?* 10 (FDIC Ctr. for Fin. Res., Working Paper No. 2005-09, 2005), *available at* http://www.fdic.gov/bank/analytical/cfr/2005/wp2005/CFRWP_2005-09_Flannery_Samolyk.pdf.

209   *See* Metcalf & Weisbach, *supra* note 4, at 516–17 (arguing for dedicating some of the revenue from a carbon tax for this purpose).

210   Since businesses need to make the same type of transition investments, they too have an incentive to procrastinate, but this more general problem is beyond the scope of this Article.

211   *See supra* Part III.B.2.

212   *See* Stefano DellaVigna & M. Daniele Paserman, *Job Search and Impatience*, 23 J. Lab. Econ. 527, 569 (2005) (finding that impatient unemployed workers expended less effort to find a new job); Teela Sanders, *Becoming an Ex–Sex Worker: Making Transitions Out of a Deviant*

tion will both reduce the amount of carbon reduction from the tax and also shift the incidence of carbon taxes towards TI households over time. Carbon emissions remain higher with procrastination because families repeatedly fail to invest in carbon reduction since the benefit of avoiding taxes is always largely in the future.[213] And as other households respond more rationally to the tax, the relative amount of carbon produced by TI households—and the concomitant share of tax they pay—will increase.

Although these two effects are true at all income levels, they once more are especially pronounced at the lowest incomes. Assume, as we have throughout, that the poor and rich have the same level of short-term impatience and level of awareness about their self-control problems. Nonetheless, carbon tax will leave a poor household worse off because the household faces higher immediate costs of making the transition to a lower carbon-consumption lifestyle.[214] Households that are liquidity-constrained will need to save before they can invest in these more efficient durable goods, but this will require them to divert funds away from higher-utility products, such as food or shelter.[215] Because of this, poor households are more likely to procrastinate in making the transition away from carbon consumption than wealthier households.

This general inequality is exacerbated by the fact that the transition to more energy-efficient durable goods has been going on for a long time and rich households are more likely to replace appliances and automobiles.[216] In fact, many poor households live in rental units and have to make do with the appliances provided by the landlord.[217] Given that, as a general rule, renters are responsible for paying utili-

Career, 2 FEMINIST CRIMINOLOGY 74, 75 (2007) (describing studies finding that women delay leaving the sex trade because of the immediate economic costs of exiting, such as the loss of funds to finance drug use and the lack of available alternative work); Hanming Fang & Dan Silverman, *Time-Inconsistency and Welfare Program Participation: Evidence from the NLSY*, 50 INT'L ECON. REV. 1043, 1065–70 (2009) (finding that impatient women exerted less effort to transition from welfare to work); Francesco Drago, *Career Consequences of Hyperbolic Time Preferences* 3 (Inst. for the Study of Lab., Discussion Paper No. 2113, 2005), *available at* http://ssrn.com/abstract=706281 (finding that impatient employees expended less effort to get promoted).

   213   *See supra* Part III.B.1 (discussing overconsumption and delayed benefits).

   214   *Cf.* Super, *supra* note 5, at 1149 (noting that the costs of energy efficiency may be a bar for low-income families, even with some government assistance).

   215   *See* GRUBER, *supra* note 26, at 29–34 (discussing marginal utility and budget constraints).

   216   *Cf.* Shammin & Bullard, *supra* note 2, at 2436 (finding that poorer households make use of more carbon-intensive products).

   217   *See* Richard Counihan and David Nemtzow, *Energy Conservation and the Rental Hous-*

ties, landlords are unlikely to replace existing appliances with energy-efficient ones.[218] And even if renters prefer energy-efficient housing, energy efficiency may be difficult to determine before move-in.[219] In conclusion, one would expect that at the very start of a carbon tax regime, poor households will already be at a relative disadvantage—they are more likely to own "clunker" appliances and automobiles.

F. *Procrastination in Acquiring Information*

To make a decision to smooth consumption, a household needs more than the general awareness that a carbon tax is in place and that a rebate is forthcoming; it needs the right type of information, at the right time. We now show that TI households have an incentive to procrastinate in acquiring information that could reduce the hidden-taxes problem or put them in a better position to make long-term financial decisions.

Transacting parties—including taxpayers who are in a long-term transaction with the taxing authority—acquire information to inform themselves of transactional hazards and to help them reduce those hazards.[220] In the same way, a household subject to carbon taxes will need to determine how much information to acquire about the costs and benefits of investing in carbon abatement, about future shocks that may make it sensible to save some of the prebate, about providers of credit who will help it smooth consumption, and about more general information regarding the carbon tax itself.[221] Once a household determines that the benefits of acquiring a piece of information exceed the costs, it must still decide when to follow through.[222] As in

---

ing Market, 2 SOLAR L. REP. 1103, 1105 (1981) (explaining that "rentals tend to be older and more energy-inefficient than owner-occupied properties").

218 *Id.*

219 *See id.*

220 *See* Ronald J. Gilson, *Value Creation by Business Lawyers: Legal Skills and Asset Pricing*, 94 YALE L.J. 239, 269–71 (1984) (analyzing the incentives of transacting parties to acquire and reveal information).

221 *See* Stephan Meier & Charles Sprenger, *Discounting Financial Literacy: Time Preferences and Participation in Financial Education Programs* 2–3 (Inst. for the Study of Lab., Discussion Paper No. 3507, 2008), *available at* http://ssrn.com/abstract=1139877 (explaining that households must decide how much effort to invest in acquiring information about financial matters).

222 While sometimes it is beneficial to acquire information immediately, at other times it is valuable to wait, given that uncertainty regarding the value of that information may be reduced over time. As Kenneth Arrow argues, investments in information often represent irreversible investments that depreciate over time in the same fashion as capital investments in tangible assets. KENNETH J. ARROW, THE LIMITS OF ORGANIZATIONS 39–41 (1974). An implication of the irreversibility of investments in information is that waiting to acquire information until some

any procrastinating context, a household will have an incentive to procrastinate acquiring information whenever the gains from delaying for one period exceed the (discounted) lost benefits from that one-period delay (for example, in the form of a decline in the value of that information). Procrastination in acquiring information can lead households to underappreciate the need to react to the carbon tax, to fail to seek out alternate sources of funds, and to neglect the value of investing in carbon abatement.[223]

Importantly, households may procrastinate not only in acquiring information about the external world, but also about themselves, such as information about their own skills and talents or even their propensities to procrastinate.[224] In addition to the actual costs of acquiring this information, one must account for various collateral, often immediate, costs associated with acquiring negative self-evaluative information. For example, the information may challenge an individual's positive self-image or undermine her self-confidence.[225] Households may thus procrastinate on opportunities to receive *free* information about themselves if possessing that information creates immediate collateral disutility.[226]

---

of the uncertainty regarding the information has been resolved may be valuable in the same fashion that waiting to make irreversible investments in hard assets may provide the decisionmaker with an option value. On the creation of option values in waiting to make irreversible investments, see AVINASH K. DIXIT & ROBERT S. PINDYCK, INVESTMENT UNDER UNCERTAINTY 6–9 (1994).

223 *See* Meier & Sprenger, *supra* note 221, at 3–4 (reporting evidence that households procrastinate acquiring costly information).

224 In addition to the *external* informational asymmetries discussed in the law and economics literature on contracting (for example, asymmetrical knowledge about the other party's characteristics), transacting parties also face what one can call *internal* informational asymmetries—an individual's informational deficits about *herself*. These can include imperfect information about her talents; her past actions, and their motivations; and her propensity to succumb to self-control problems. *See* Roland Bénabou & Jean Tirole, *Self-Knowledge and Self-Regulation: An Economic Approach*, *in* 1 THE PSYCHOLOGY OF ECONOMIC DECISIONS 137, 137–38 (Isabelle Brocas & Juan D. Carrillo eds., 2003) (discussing economic actors with "imperfect self-knowledge, imperfect willpower and imperfect recall").

225 A positive self-image is something that individuals value, and self-confidence and optimism play an important role in preserving and bolstering those self-images. *See* Roy F. Baumeister, *The Self*, *in* 1 THE HANDBOOK OF SOCIAL PSYCHOLOGY 680, 688–92 (Daniel T. Gilbert et al. eds., 4th ed. 1998) (providing an overview regarding the body of literature on how individuals construct and maintain their sense of self, and how they protect it against negative information that may challenge their self-esteem). In fact, one way of understanding an individual's self-image is as an additional argument to that individual's utility function. *See* Bénabou & Tirole, *supra* note 224, at 142.

226 Economic actors may engage in such "strategic ignorance" aimed at preserving their current levels of self-confidence. Bénabou & Tirole, *supra* note 224, at 144. As Baumeister states: "Given the powerful motivation to think well of oneself, it is necessary to ask how people

It follows, therefore, that one important type of procrastination is what could be called "meta-procrastination." For the large part, commentators have implicitly assumed that actors will undertake repeated cost-benefit analyses to ascertain whether it is sensible to procrastinate.[227] People, however, often experience an immediate disutility from thinking about the fact that they are procrastinating—whenever the thought appears in their minds, they quickly dispose of it without incorporating it into their general deliberation.[228] Meta-procrastination can thus increase people's propensities to procrastinate by making them less aware that yielding to immediate temptation will carry later costs.

G. *Relative Access to Commitment Devices*

We have just seen that even if poor and wealthy households have the same level of short-term impatience, poor households will face greater welfare losses from their time inconsistency whenever they face higher transaction costs to enter into valuable transactions. The same argument applies to overconsumption; households with greater opportunities to consume goods that provide an immediate reward are more likely to overindulge. Individuals with easier access to addictive products, for instance, are more likely to become and remain addicted, even if they have a long-term preference to break the addiction.[229] But there is an additional reason why poor households may suffer greater welfare losses: they are less likely to have easy access to low-cost commitment devices, which are mechanisms for overcoming time-inconsistent behavior.[230]

Some of the strongest evidence of time inconsistency, and real world actors' awarenesses of it, comes from the fact that people routinely resort to using commitment devices.[231] Such devices are costly

---

manage to maintain such self-flattering views in the face of mixed and even contrary evidence." Baumeister, *supra* note 225, at 690.

227 *See, e.g.*, O'Donoghue & Rabin, *supra* note 188, at 123–24 (modeling individuals who periodically calculate expected future costs of procrastination in each successive period).

228 *Cf.* Patrick Bolton & Antoine Faure-Grimaud, *Thinking Ahead: The Decision Problem* 1–3 (Nat'l Bureau of Econ. Res., Working Paper No. W11867, 2005), *available at* http://ssrn.com/abstract=872723 (claiming that deciding how to act in the future is experienced as a present cost).

229 George Ainslie, *A Research-Based Theory of Addictive Motivation*, 19 Law & Phil. 77, 79–91 (2000).

230 *See infra* notes 236–39 and accompanying text.

231 *See* Ted O'Donoghue & Matthew Rabin, *Doing It Now or Later*, 89 Am. Econ. Rev. 103, 105 (1999) (noting that economists use commitment devices as evidence—"smoking guns"—of time-inconsistent preferences).

to implement, and, even if they were available at zero cost, people are reluctant to restrict their future ability to act freely,[232] unless they believe that precommitment is otherwise worthwhile.[233] As a result, in a world of time-consistent actors, commitment devices would not exist.[234] Nonetheless, people with long-term preferences to eat healthy, exercise, and lose weight join health clubs and go to special weight-loss spas, both of which require costly up-front commitments. Students and professors use deadlines (preferably externally imposed) to combat the temptation to procrastinate completing papers.[235]

Many of the most effective devices for committing to savings are largely unavailable to poor households.[236] For example, retirement accounts and certificates of deposit come with built-in penalties for early withdrawal.[237] Time-inconsistent customers appear to appreciate this feature.[238] Again, because poor families have only limited access to

---

[232] One cost of commitment is that people generally value their autonomy and find disutility in having their wills constrained unnecessarily. *See* CHARLES FRIED, CONTRACT AS PROMISE: A THEORY OF CONTRACTUAL OBLIGATION 13–14 (1981) (discussing the cost of commitment and autonomy in the realm of interpersonal contracts).

[233] Once we introduce the potential of uncertainty regarding future payoffs, an intertemporal decisionmaker may find it valuable to have an option to reverse her original decision. On the creation of option values by waiting to make irreversible investments until a decisionmaker has acquired greater information, see DIXIT & PINDYCK, *supra* note 222, at 6–9. *See also* Daniel T. Gilbert & Jane E. J. Ebert, *Decisions and Revisions: The Affective Forecasting of Changeable Outcomes*, 82 J. PERSONALITY & SOC. PSYCHOL. 503, 510–11 (2002) (finding that, although the individuals who were given the choice to change their minds about which photography prints to keep liked their choices less than those individuals who had no ability to change, individuals still preferred having the option to change).

[234] *See* Dan Ariely & Klaus Wertenbroch, *Procrastination, Deadlines, and Performance: Self-Control by Precommitment*, 13 PSYCHOL. SCI. 219, 223 ("A rational decision maker with time-consistent preferences would not impose constraints on his or her choices.").

[235] *See, e.g.*, T. C. Schelling, *Egonomics, or the Art of Self-Management*, 68 AM. ECON. REV. 290, 290 (1978) (discussing externally imposed self-control devices, such as creating an inaccessible savings account and understating dependents for tax purposes to reduce tax liability in April); *see also* Ariely & Wertenbroch, *supra* note 234, at 220–23 (analyzing the role of self-imposed deadlines in addressing the temptation to procrastinate); Klaus Wertenbroch, *Consumption Self-Control by Rationing Purchase Quantities of Virtue and Vice*, 17 MARKETING SCI. 317, 318 (1998) (describing the strategic self-imposition of constraints in the context of purchasing cigarettes). Drug and alcohol rehabilitation programs require minimum stays and full payment up-front for the required treatment period, a part of which it keeps if the patient checks out early. For example, the Cirque Lodge, a well-known facility of this type, has a thirty-day minimum stay and requires patients to pay for that thirty-day period at the time that they check in. *Admission Guidelines*, CIRQUE LODGE, http://www.cirquelodge.com/Admission/AdmissionGuidelines.php (last visited Sept. 26, 2010) ("A deposit for 30 days is due upon admission.").

[236] Littwin, *supra* note 77, at 470.

[237] For an overview, see Richard A. Kaplan, *Retirement Funding and the Curious Evolution of Individual Retirement Accounts*, 7 ELDER L.J. 283, 292–303 (1999).

[238] *See* Nava Ashraf et al., *Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines*, 121 Q.J. ECON. 635, 636–37 (2006).

modern banking and finance, IRAs and CDs are often out of their reach.[239] To the extent that wealthy households have easier access to a greater number of lower-cost financial products that have commitment qualities, they will again have a competitive advantage over poorer households, even if they both have the same level of short-term impatience.

Illiquid investments can also provide commitment. The economist David Laibson has argued that people with long-term preferences to set enough money aside for retirement make highly illiquid investments in their youth—purchasing homes, for example—to prevent themselves from overconsuming early in life, much like an IRA.[240] But this strategy often requires down payments to acquire the illiquid durable good.[241] As we have noted, evidence suggests that down payment requirements are significant obstacles for poor households.[242] So, again, there are disparities across income levels in families' abilities to self-commit.

It might be argued that a carbon tax rebate is itself a useful commitment device for recipients.[243] In this view, the year-end rebate increases welfare for some impatient households; the family would prefer to save, but lacks the willpower to do so.[244] Delaying payment until year's end, on this assumption, would be a soft-paternalist intervention leading to higher social welfare.

There are several flaws with this welfare-increasing logic. First, it likely describes only some households. Others may be genuinely liquidity-constrained and would suffer large welfare losses from delayed payment. The policy challenge then becomes either balancing the gains of delay against the losses, or designing a regime that allows the government to sort the two kinds of households and offer delayed payments only to those for whom delay would increase welfare. We take up this challenge in Part IV. The second flaw is that postponing

---

239 *See* Barr, *supra* note 107, at 130–32; Beverly & Sherraden, *supra* note 167, at 466–67.

240 *See* David Laibson, *Life-Cycle Consumption and Hyperbolic Discount Functions*, 42 EUR. ECON. REV. 861, 868 (1998) (discussing commitment devices to deal with procrastination in saving for retirement, including channeling funds to illiquid assets such as defined benefit pensions, 401(k)s, Social Security contributions, and home equity).

241 *See* Adams et al., *supra* note 85, at 57.

242 *See supra* text accompanying notes 85–87.

243 *See* Barr & Dokko, *supra* note 137, at 2–3 (considering the argument that tax rebates are a commitment device, and reporting that many taxpayers claim that they intentionally overwithhold for this reason); *see also* Richard H. Thaler, *Anomalies: Saving, Fungibility, and Mental Accounts*, 4 J. ECON. PERSP. 193, 193–95 (1990) (suggesting this behavior as an aspect of mental accounting).

244 Barr & Dokko, *supra* note 137, at 5–6, 14.

rebates to year's end may actually not be a long enough delay for many households; their need is to save for the much longer term, such as for retirement.[245] We are thinking here of the families that quickly spend their rebates on luxuries. In these households, delay has simply moved spending from one low-utility usage to another. Here, too, we think there are possibilities for government intervention. We set out these possibilities in Part IV as well.

A final flaw is that self-imposed illiquidity is a highly inefficient response to impatience. Impatient households can prevent overconsumption by denying themselves access to funds.[246] But they also thereby deny themselves the benefits of income smoothing.[247] The better mechanism would be one that gave the family access to just enough money to smooth its income without tempting them to spend too much. This is a tall order, but government policies can perhaps approximate it.

Lastly, one important characteristic of commitment devices that has been largely overlooked by the literature is that they require an immediate expenditure at the time of adopting them and produce a benefit in the future when the actor keeps to her long-term preferences. As a result, households that are sufficiently sophisticated may have a long-term preference to adopt commitment devices, but if they require a sufficiently large up-front investment, they will have an incentive to procrastinate.[248] Of course, they may adopt commitment devices to assure that they adopt commitment devices, but the same problem arises. As we will see in Part IV, this "meta-procrastination" problem is one reason why governments can increase social welfare by providing off-the-rack commitment devices that parties can opt into at a lower cost than if they had to create them from scratch.

---

[245] *See* Barr, *supra* note 107, at 123 (describing the failure of low-income families to save for long-term goals).

[246] *See* Angeletos et al., *supra* note 95, at 48–49 (analogizing to actors who place an alarm clock out of reach to force themselves not to press snooze).

[247] *See id.* at 59 (finding that hyperbolic households hold less liquid wealth and, accordingly, "smooth consumption less successfully over the life cycle"); *cf.* Barr & Dokko, *supra* note 137, at 20 (finding that intentional overwithholding is inefficient unless the household places an extremely high value on present consumption over deferred consumption); *id.* at 22 (noting that the commitment to defer refunds can cause households to use high-cost debt for unexpected short-term needs).

[248] *See supra* notes 203–08 and accompanying text.

H.   Immediate Versus Delayed Taxes

It is not just the timing of a rebate that matters; the timing of the tax itself can also affect its level of effectiveness. Compare two types of tax schemes. In the first, the consumer experiences the tax immediately, e.g., a gasoline tax. In the second scenario, the consumer gets the benefit of consumption before she incurs the disutility of the tax, as with electricity, which is billed at the end of the month. Assuming normal long-term discounting, a delay of one day, one week, or even one month between getting the benefit of consumption and incurring the added cost of the tax should not matter much. As a result, models that assume TC households predict that the tax will in essence work the same in both instances. On the other hand, our model predicts that the immediate tax will lead to a greater reduction in consumption than a delayed tax that is otherwise equivalent. In fact, assuming a short-term discount factor of 0.5, a TI household will perceive an immediate tax of $1 as providing a disutility of $2.

I.   Summary

Shortsighted households will respond far differently to a combination of taxes and reimbursements than standard economic theory predicts. As we have shown here, even if shortsightedness is evenly distributed across incomes, the consequences of present bias will be especially disadvantageous to poor households facing a tax-rebate or tax-prebate system. Impatient spending can leave households with little money for end-of-the-year necessities and increase carbon usage overall. Commitment devices for overcoming this problem are expensive, and those afflicted by present bias may procrastinate investing in them or even learning about their need for them. And procrastination will likely slow poor households' investments in reducing their carbon usage, leading to a vicious cycle in which the burden of a carbon tax shifts more and more towards those families. Taken together, all these features point to an urgent need for policymakers to take cognitive factors into account in designing a rebate scheme. We take up that challenge in the next Part.

IV.   DESIGN OF FAIRER CARBON TAX SYSTEMS

Thus far, we have shown that annual repayments to poor households do not achieve distributional neutrality of welfare. We do not propose, though, to maintain fairness even if it means the polar ice-caps melt. Instead, drawing on existing research into behavioral economics, we suggest in this Part alternative formulations of

transactional consumption taxes that we expect to perform better at recompensing poor households. First, though, we must say a few words about the inadequacy of some other versions of the consumption tax offset we have not yet covered.

A.   *Problems with Other Consumption Tax Offsets*

To this point, we have mainly critiqued the annual reimbursement approach to distributional neutrality. As we noted earlier, other transactional consumption taxes use different methods to deal with the regressivity problem. These solutions, too, are unsatisfying.

First, the standard approach of exempting certain categories of expenditures, common to both U.S. sales taxes and other nations' VATs, is inefficient and particularly unsuited to a carbon tax. As is well known, taxing some forms of consumption but not others encourages shoppers to switch to the untaxed options, reducing their welfare without generating any tax revenue for the government.[249] In addition, taxing some products more than others leads to difficult line-drawing problems, resulting in needless uncertainty and transaction costs.[250] For instance, there is caselaw on whether ice cream pops are "food" (exempt) or "candy" (not exempt).[251] There is also a current European Union dispute over whether arcade-type machines that show pornographic films are "automated recreation devices" (heavily taxed) or "cubical cinemas" (lightly taxed).[252] And, of course, in the special case of a Pigouvian tax, such as the carbon tax, exempting consumption of the item that policymakers wish to discourage would be counterproductive.[253]

Some jurisdictions have also tried to simply exempt persons below a certain income threshold from having to pay consumption taxes.[254] This is not a viable option for a carbon tax. For one, again, exempting consumption of a good with negative externalities is counterproductive. More generally, such a scheme also creates

---

[249]   *See* Metcalf & Weisbach, *supra* note 4, at 513–14.

[250]   *See* Kirk J. Stark, *The Uneasy Case for Extending the Sales Tax to Services*, 30 FLA. ST. U. L. REV. 435, 446–48 (2003) (explaining the distortive effect of sales taxes on some goods but not others).

[251]   To choose but one of many such cases, see, for example, *O'Boyle's Ice Cream Island, Inc. v. Pennsylvania*, 553 A.2d 1033, 1034–35 (Pa. Commw. Ct. 1989) (answer: candy).

[252]   Charles Forelle, *A Peep at EU Tax Law. Read On. Really.*, REAL TIME BRUSSELS, (Mar. 12, 2010, 11:14 AM), http://blogs.wsj.com/brussels/2010/03/12/a-peep-at-eu-tax-law-read-on-really/.

[253]   Metcalf & Weisbach, *supra* note 4, at 514–15.

[254]   *See* Turnier, *supra* note 52, at 438–39.

"cliffs": sharp discontinuities in tax treatment at certain income levels.[255] That creates significant distortions in either actual or reported labor effort near the threshold.[256] Another kind of fraud is also a problem: the use of straw purchasers to buy goods tax-free for those who ought to pay the consumption tax.[257]

Lastly, other authors, evidently somewhat cognizant of the problem of some timing mismatches, have proposed rebates more frequently than once per year. Graetz suggests reducing payroll taxes in each paycheck; some versions of the "fair tax" would grant monthly prebates.[258] As we have shown, the problem of income smoothing does not arise solely across gaps of eleven months, but also from paycheck to paycheck.[259] In addition, these kinds of up-front payments continue to raise similar dangers to those that we identified for prebates more generally: impulsive spending and other difficulties in saving for anticipated future costs.[260] In Graetz's case, there is the further problem that he offers no obvious solution for those who do not work or work in the "informal economy," and so already pay no payroll taxes.[261]

In short, other solutions are still needed.

B. *Self-Directed Debit Cards*

In the absence of other effective solutions, consumption tax designers must walk a narrow path between two opposing sets of problems. On the one hand, making rebate funds available too early can tempt TI households into spending too soon, leaving them with insufficient funds to cover their later tax and essentials, and potentially raising carbon emissions overall. On the other, locking funds away may leave those households that would prefer not to have saved worse off and will make all of them more vulnerable to short-term

---

[255] Fennell, *supra* note 37, at 56.

[256] *See id.* at 55–56 (noting that this problem arises for any sharp income threshold).

[257] That is, low-income buyers can resell their purchases to high-income purchasers and divide the tax savings.

[258] *See supra* text accompanying notes 54–56; *see also* Thomas Merrill & David M. Schizer, *Energy Policy for an Economic Downturn: A Proposed Petroleum Fuel Price Stabilization Plan*, 27 YALE J. ON REG. 1, 13 & n.25 (2010) (recommending quarterly rebates of the authors' proposed gasoline tax in order to mitigate any potential income-smoothing problems).

[259] *See supra* text accompanying notes 103–32.

[260] *See* Part III.C.

[261] In his book, Graetz does note that rebates could also be made available via "smart" cards, which could help in reaching the unemployed. MICHAEL J. GRAETZ, 100 MILLION UNNECESSARY RETURNS: A SIMPLE, FAIR, AND COMPETITIVE TAX PLAN FOR THE UNITED STATES 178–79 (2008).

fiscal crises. What is needed, then, is an instrument that will make the rebate available throughout the year, but not *too* available, and especially not so available as to tempt the impatient.

We suggest that self-directed debit cards, or "SDDs," can fill this need. Angela Littwin has previously suggested the creation of what she calls "self-directed credit cards": cards that would enable cardholders to choose in advance to limit the amount of credit that would be available to them.[262] Littwin's solution is similar to a proposal by David Laibson, who suggested "a bank account that requires advance notification for withdrawals" as a way to limit impulsive spending.[263] The SDD fits squarely in between these two ideas. The card would grant the holder access to any account into which the government would deposit the holder's tax rebate. However, the card would by default permit only a limited amount of money to be withdrawn each week, e.g., 1/52 of the total.[264] Holders could change this default to increase or decrease the amount of money available, but only with some minor but cumbersome effort—filling out and mailing in a form or making a phone call to a slightly understaffed calling center. This opt-out procedure would grant access to additional funds a short time later, such as twenty-four hours.

This combination of defaults offers the benefits of income smoothing to all taxpayers, while reducing the likelihood of impulsive spending by those who are present-biased. Taxpayers who place only a small discount on future costs and benefits will easily bypass the minor impediments to obtaining extra credit. But these taxpayers are not those who are likely to overspend. Overspenders, as we have modeled, are those with a $\beta < 1$; that is, they value immediate costs and gains considerably more than equivalent gains and losses in the future. That is the psychological dynamic that causes them to spend their rebate, even though they may know they will need the money later to pay their tax or other important bills. This same dynamic also causes procrastination: even a small, immediate cost looms much larger than substantial future gains. As Laibson explains, the annoy-

---

262 Littwin, *supra* note 77, at 485–88.

263 *See* David I. Laibson, *Hyperbolic Discount Functions, Undersaving, and Savings Policy* 21 (Nat'l Bureau of Econ. Res., Working Paper No. 5635, 1996), *available at* www.nber.org/papers/w5635.

264 We emphasize that we have chosen this figure for illustrative purposes only. Given the difficulty of balancing between liquidity and temptation, the amount of money that should be available in a given time period is a key design question for any SDD program. We cannot offer a precise number in the abstract because the best balance will depend on the empirics of how households respond to their reimbursements.

ance of having to opt out of the credit limit *now* appears much more significant than the benefit of getting extra money *tomorrow*.[265] The delay in any gratification also limits tendencies towards impulsive spending. But, in cases of genuine need, the money is still there for the household to use.

We also want to emphasize the usefulness of allowing cardholders to decrease the amount of money available on the card for any given period. This has several advantages. Sophisticates, those who know that they have a $\beta < 1$, may wish to set their limit even lower than the default to prevent any impulsive purchases. As we noted, many taxpayers attempt to use tax rebates as a form of forced savings, but that technique sacrifices liquidity that may be vital in the event of emergencies. Many taxpayers also immediately spend the rebate when it becomes available.[266] The SDD can overcome both these problems: money is available when needed, but psychologically difficult to access. And we would also suggest a feature allowing cardholders to commit in advance (albeit with a cumbersome opt-out process) to transfer any year-end balance to a linked savings account so that they will not be as tempted to spend the funds.[267]

An alternative version of this plan would simply allow the government itself, or qualified intermediaries, to loan rebate proceeds to recipients. The loan program could include many soft limits similar to those that would exist with the debit card, such as a default cap, waivable with some effort by the recipient, on the amount of loan funds available in any one week or month. The debit card is preferable, however, because it would also have the significant advantage of giving access to modern banking to the large segment of poor households that currently lack it.[268]

Each of these alternatives offers a number of significant benefits. For one, they provide affordable income smoothing together with accessible commitment devices for households that usually cannot easily pay for either, increasing welfare with little government expenditure.[269] Expanding access to credit could save government dollars in other programs, such as food stamps and free healthcare, as families

---

[265] Laibson, *supra* note 263, at 3.

[266] *See supra* note 81 and accompanying text.

[267] This plan can be similar to the automatic mechanism employed in Thaler and Sunstein's "save more tomorrow" plan, which invites employees to commit to a program that automatically inserts excess money into a savings account. *See* THALER & SUNSTEIN, *supra* note 24, at 104–19.

[268] On the advantages of expanding banking access, see Barr, *supra* note 107, at 126–28.

[269] *See* Fennell & Stark, *supra* note 13, at 47 (noting that a tax system that facilitated income smoothing could increase welfare cost-effectively).

will be better able to pay their own way.[270] Though a debit card program might carry some administrative costs, it could also be piggybacked on existing government e-payments, such as the "EBT" program used to deliver food stamps.

Other commentators have also suggested the use of electronic debiting as a means for delivering tax refunds.[271] Indeed, the climate bill passed by the House encourages electronic payment where possible.[272] In the absence of the additional cognitive features we suggest, however, a debit card is perhaps even worse than a simple year-end cash rebate. Combining the card's ease of use with the availability of a large portion of the rebate balance—under the House bill, one month's payment—would be a severe temptation to overconsume. The debit card is an important component of a successful design, but it should be accompanied by rules that take account of possible cognitive responses.

Indeed, these plans seem so sensible to us that we see no reason to limit them to consumption tax rebates. In particular, offering income smoothing through a government-issued self-limited debit seems an excellent vehicle for delivering the Earned-Income Tax Credit ("EITC"), a form of social insurance designed for poor working families and administered through the federal income tax.[273] Currently, many households use refund anticipation loans ("RAL") to get early access to their EITC payment, with the result that much of the value of the EITC is skimmed off by RAL providers.[274] Admittedly, government provision of the loan services would diminish the providers' profits,[275] effectively transferring wealth from the RAL providers' shareholders to poor households. Assuming, however, that the shareholders are on average much wealthier than the rebate recipients, that transfer should substantially increase overall social welfare.[276]

---

[270] *See* Sullivan, *supra* note 92, at 384.

[271] GRAETZ, *supra* note 261, at 178–79; GREENSTEIN ET AL., *supra* note 11, at 13–14.

[272] American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 431 (2009).

[273] I.R.C. § 32 (2006).

[274] *See* WU & FOX, *supra* note 126, at 12.

[275] *But see id.* at 32–34 (discussing state attempts to limit RALs and the legal challenges to these attempts).

[276] Alternatively, society could reduce the total transfer to rebate recipients to leave them at the same level as they formerly received, net of RAL fees. This might be superior in welfare terms to shifting all the money to recipients in the event that society has some third use for the money that generates more welfare than either other option. This could include a more efficient means of improving the well-being of the rebate recipients.

C.   Accelerate the Costs of Carbon

As we have described, in the special case of a Pigouvian consumption tax, such as a cap-and-trade regime, present-biased consumers may overconsume the undesirable good, especially if given a rebate in addition to their existing funds.[277] Here, again, it is possible to nudge consumers away from socially undesirable behavior. In particular, because the problem stems from consumers overvaluing the present, policymakers should attempt to shift the costs of carbon consumption forward. This can be done while maintaining distributional neutrality.

If the government adopts the SDD, one approach to accelerating the apparent costs of carbon might be to "penalize" carbon-intensive purchases. The carbon-tax component of any purchase might count double or triple against the card's weekly allocation. That will make it harder to make large, impulsive, carbon-intensive purchases, and even small purchases will threaten to force the holder to engage in an unpleasant opt-out procedure.[278]

Whether or not debit cards are in use, the government could also require the "purchase" of a license to use carbon-intensive products, such as gasoline. The money for the license would be rebated, plus interest, at the end of the month or year.[279] Because present-biased consumers have a discount rate much higher than the market rate, however, this exchange will feel like a loss, making high-intensity carbon consumption much less attractive.

V.   Objections and Questions

To this point, we have argued that putatively distributionally neutral consumption taxes may reduce welfare for shortsighted households and have suggested some "nudge"-like solutions. In this Part, we consider two important objections. Both objections go to the foundations of our project. First, it might be argued that distributive fairness should be measured not annually, but instead across the entire span of each individual's lifetime.[280] In the long gaze of a lifetime

---

277 *See supra* Part III.C.

278 Of course, cardholders can always use noncard funds for their carbon-intensive purchases. But these other funds might be limited, and the inconvenience of planning how to make each purchase could itself discourage this kind of arbitrage.

279 *Cf.* Merrill & Schizer, *supra* note 258, at 12, 37 (recommending that the authors' proposed gasoline tax be refundable to consumers, albeit in an amount equal to average per capita, rather than actual, cost).

280 *See infra* Part V.A.

view, brief timing mismatches between income and expenditures might be no more than a blink of a welfarist's eye. Second, it could be claimed that individuals who choose to forego borrowing against a rebate, or quickly consume their prebate, are simply maximizing their own preferences, and therefore that it would be paternalistic to change those outcomes.[281] We believe both these objections are misplaced, but recognize that, for others, they retain strong appeal.

A. Lifetime Versus Annual Equity

Metcalf and other environmental economists argue that the best measure of the burden of an emissions tax would be based on its total effects over a lifetime.[282] Thus, for example, a few studies claim that, seen from a long-term perspective, carbon taxes are not as regressive as others claim.[283] The lifetime perspective is said to mitigate inequality for several reasons. Most simply, if individuals can save and borrow perfectly, the economic burden of any one year could be spread out over their life, so that any nonrecurring expense affects welfare only if it reduces total lifetime income.[284] We have already shown, however, considerable evidence that individuals cannot effectively smooth the impact of a tax-and-reimbursement system over even short periods, let alone their lifetimes. As a result, whatever its general merits, this version of the lifetime-equity theory offers no reason to set aside the distributional consequences of a consumption tax.[285] The other versions are more challenging, as we now explain.

1. Problems Identifying High Marginal Utility Households

A second argument in favor of lifetime equity suggests that, even if saving and borrowing is imperfect, there frequently remains a mis-

---

[281] *See infra* Part V.B.

[282] Bull et al., *supra* note 20, at 145; Jorgenson et al., *supra* note 34, at 395; Kevin A. Hassett et al., *The Consumer Burden of a Carbon Tax on Gasoline* 3 (Am. Enter. Inst., Working Paper No. 147, 2009), *available at* http://www.aei.org/docLib/Consumer%20Burden%20AEI%20 WP%20147.pdf; *see also* Don Fullerton & Diane Lim Rogers, *Lifetime Versus Annual Perspectives on Tax Incidence*, 44 NAT'L TAX J. 277, 277–78 (1991) (making this argument about taxes generally).

[283] *See* Bull et al., *supra* note 20, at 146, 161; Jacobsen et al., *supra* note 42, at 486; Burtraw et al., *supra* note 65, at 22; Hassett et al., *supra* note 282, at 9.

[284] *See* Hassett et al., *supra* note 282, at 3–4.

[285] *See* Dinan & Lim Rogers, *supra* note 5, at 217 (suggesting that since capital markets are not perfect, annual incidence is also important); Shaviro, *supra* note 40, at 771 (explaining that where some taxpayers cannot borrow fully, lifetime income mismeasures welfare since a dollar may have different utility to the taxpayer at different times). Some lifetime equity proponents acknowledge this point. Bull et al., *supra* note 20, at 149.

match between income and true wealth, so that a person with low income this year might still derive relatively little marginal utility from government transfers.[286] This would raise the possibility that current income, and even current measurable wealth, do not clearly predict an individual's marginal utility from money. A distributionally neutral tax tries to make certain that the welfare effects of a tax scheme are shared equally across the population.[287] To make such a scheme work, the government must make assumptions about how much utility a household will lose by expending a given amount. Conventionally, we assume that households with the least wealth will suffer the most from a set amount of tax.[288] But if some households have immeasurable wealth, those assumptions are untrue.[289] Proposals aimed at helping the poor might be too generous to these families.

To take a concrete example, consider two different three-person households with annual earnings of $20,000, the Busdrivers and the Students. The Busdriver family has a head of household in the middle of her career and at the peak of her earning potential. The Student family is headed by a young woman enrolled in law school (her annual income comes from three months at a law firm). If the households are hit by a consumption tax, both may be able to rely on credit to get them through their tight times. The ultimate burden of paying off those loans, however, will be far lighter for the Students. For the Busdrivers, the additional payments will always be a significant chunk of household income, while someday the Students' credit card bills will represent only a tiny fraction of their budget.[290] So the welfare effect of the tax this year is equal for both households, but in time, the Busdrivers struggle more. If society has many more Students than Busdrivers, what looks like an unfair tax this year may turn out to be a minor nuisance.

---

286 *See* Bull et al., *supra* note 20, at 148; Jacobsen et al., *supra* note 42, at 478; Hassett et al., *supra* note 282, at 2–4; *see also* Fullerton & Lim Rogers, *supra* note 282, at 278 (observing that workers with "average permanent income" but volatile incomes may be misidentified as poor).

287 *See* Metcalf, *supra* note 4, at 14 (describing a distribution-neutral tax scheme).

288 *See* Harsanyi, *supra* note 48, at 254.

289 *See* Hassett et al., *supra* note 282, at 2–3; *see also* Bull et al., *supra* note 20, at 148 ("[E]lderly people drawing down their savings in retirement will look poor when in fact they may be comfortably well off in a lifetime context.").

290 Of course, it is also possible that the Busdriver family will not borrow to make up for lost present consumption—for example, because they anticipate their future liquidity crunch and thus refrain from incurring more debt. But in that case, we can easily measure the difference between the two families based on their borrowing behavior. The more difficult case, which we take the lifetime-equity proponents to be focused on, is the one in which present observers cannot distinguish the well-being of the two families.

One problem with this argument is that it appears to assume that the social welfare function is based on long-term rather than current utility. To remind our readers, the social welfare function is the sum of everyone's preferences, including their preferences for the distribution of other goods.[291] In this way, the hardships of poor families can enter the social welfare function two ways: directly, and also through others' preferences for societies with much or little such hardship.[292] Thus, a society in which most people would prefer to see extensive redistribution from rich to poor might be made worse off by a policy change that increased total wealth by transferring money from poor to rich.[293]

Accordingly, by asserting that lifetime well-being is more important than current utility, lifetime-equity proponents make two separate claims: one normative and the other descriptive. On the normative side, the proponents are assuming that future welfare effects should be counted as part of the total welfare effect of a current-year policy.[294] We agree that that is a sensible thing to do—no one would want to make everyone one dollar richer today by bankrupting us all next year—but it raises the question whether there should be a time discount. For example, most bankers would rather have money now than next year.[295] Should the social welfare function count effects fifty years hence as having the same value as those that happen now? There is complex literature on this question, which we want only to flag and sidestep for now.[296]

On the descriptive side, preferences for fair present distributions might outweigh any other welfare effects. Even if lifetime equity is superior as a normative matter, it is possible that popular distributive preferences rest on judgments about *current* welfare.[297] That is, peo-

---

[291] ADLER & POSNER, *supra* note 28, at 23.

[292] *See id.* at 25.

[293] *See* Inge Mayeres & Stef Proost, *Marginal Tax Reform, Externalities and Income Distribution*, 79 J. PUB. ECON. 343, 355–56 (2001) (arguing that the social welfare function should include a measure of society's aversion to inequality).

[294] That is, the lifetime-equity position seems to be that, in deciding whether a consumption tax is unfair, we must measure not by what happens this year, but instead what happens over the entire lifetime of those affected.

[295] Solum, *supra* note 30, at 196–97.

[296] For extended discussion, see generally Nancy J. Altman, *Social Security and Intergenerational Justice*, 77 GEO. WASH. L. REV. 1383 (2009); Neil H. Buchanan, *What Do We Owe Future Generations?*, 77 GEO. WASH. L. REV. 1237 (2009); Daniel Shaviro, *The Long-Term U.S. Fiscal Gap: Is the Main Problem Generational Inequity?*, 77 GEO. WASH. L. REV. 1298 (2009).

[297] *See* Solum, *supra* note 30, at 199 (noting that presentists would count welfare of future lives only to the extent that the current generation has preferences for the treatment of the future); *cf.* David A. Dana, *Valuing Foreign Lives and Civilizations in Cost-Benefit Analysis: The*

ple may care that others suffer now, even if those same others will be better off later (or vice versa). That preferences might be present-oriented in this way strikes us as both plausible and morally defensible.[298] If people care about what their society looks like, they may care about what it looks like *now*, or what it looks like by measures that are more readily observable than lifetime welfare. In any event, for a welfarist who takes preferences largely as given, whether society prefers to measure distribution on a yearly or lifetime basis is a descriptive question—a question of fact. A society with strong preferences for current distributions might view itself as worse off as a result of a consumption tax even if the directly entering lifetime-utility portion of the social welfare function is positive. Neither we nor lifetime-equity proponents can resolve the issue through abstract debate.

Even if lifetime wealth were the appropriate theoretical yardstick for household welfare, the policy implications would likely be small. Again, the upshot of the lifetime-equity critique we are discussing now is that current wealth or income is sometimes a poor predictor of welfare. According to the literature, however, these errors are all false positives—instances where a family that looks poor is not.[299] But false positives here are much less significant for policy design than false negatives. The cost of a false positive is relatively small—society grants a rebate to a family that does not need one.[300] The cost to soci-

---

Case of the United States and Climate Change Policy 8–14 (Nw. U. Sch. of Law & Econ., Research Paper No. 09-47, 2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=15 24337 (arguing that U.S. citizens' preference for improving the well-being of other nations should count in the cost-benefit analysis of U.S. climate policy).

298   While the moral question is, again, one that we wish largely to bracket, we should say a word or two to suggest the plausibility of the presentist view. *See* Solum, *supra* note 30, at 199 (calling "preference-satisfaction utilitarianism, 'presentism'"). One possibility is that moral obligations to provide for the welfare of others are cabined by our ability to know others' well-beings. We cannot be held responsible for what we cannot reasonably know. Lifetime utility may be so unknowable that it cannot serve as the basis for our responsibilities. *See* Dinan & Lim Rogers, *supra* note 5, at 218 ("It is not possible to actually observe lifetime income for individual households . . . ."). Another possibility would be that our obligations flow to others with whom we are engaged in an ongoing project of mutual governance. We share that project only partially with those who will follow us; perhaps they will honor our decisions, but perhaps not. If not, it may be reasonable for us to assume that the long-term results of our decisions are largely out of our hands in the same way that the welfare of citizens of other nations is only tenuously connected to our own acts. *But cf.* John Rawls, Justice as Fairness: A Restatement 160 (Erin Kelly ed., 2001) (arguing that members of a community owe an obligation to leave as many resources to the next generation as its members would have wanted the previous generation to leave to them).

299   Bull et al., *supra* note 20, at 148; Hassett et al., *supra* note 282, at 3–4.

300   Note that the amount of the erroneous transfer to the Student family is not a loss to society because the Students' welfare also counts towards the social welfare function.

ety is the opportunity cost of the use of these funds—that is, the money for the rebate reduces general funds available for other uses. So we must either give up that much in other programs or raise taxes by an equivalent amount. If we choose to raise taxes, the cost of the false positive is the incremental deadweight loss of the higher tax rate.[301] Unless false positives are large relative to the size of the entire population, the change in tax rates needed to pay for them will be minor.[302]

In contrast, the utility losses from false negatives are large. We define a false negative here as a failure to award a rebate to a family that would suffer disproportionately from a consumption tax in the absence of the rebate, i.e., failing to recognize a poor household as poor. Thus, the social cost of a false negative is the amount of welfare that would have resulted from transferring the rebate to a poor family.[303] As we have discussed, evidence from the cost of credit and other factors suggests that the welfare consequences of these accidental redistributions can be dramatic for impoverished families.[304] And

---

[301] "Deadweight loss" refers to the welfare cost to society of raising taxes. For example, if I prefer watching hockey to watching curling, but hockey is taxed, I may attend a curling match instead of a hockey game. That decision lowers my welfare without raising any additional revenue for the government. This loss of welfare is the deadweight loss of the tax. MUSGRAVE & MUSGRAVE, *supra* note 121, at 280.

   Measuring the deadweight loss of carbon taxes is a complex undertaking because of the way in which carbon taxes can interact with existing taxes and policies. Ekins & Barker, *supra* note 20, at 81–89. However, there is no particular reason society must use higher carbon taxes to pay for extra rebates. In theory, a policysetter should choose the revenue instrument with the least deadweight loss. Estimates of U.S. taxes have found deadweight losses of some forms of tax as low as seventeen percent. Charles L. Ballard et al., *General Equilibrium Computations of the Marginal Welfare Costs of Taxes in the United States*, 75 AM. ECON. REV. 128, 128 (1985).

   Even if carbon tax revenues will pay for the increased costs, that choice might actually increase welfare. It seems likely that any carbon price will initially be set below optimal because of political opposition from industries that will bear some of the burden of the tax. *Cf.* James Murray, *Climate Bill Democrats Unveil Free Pollution Permit Proposals*, BUSINESSGREEN.COM, Oct. 26, 2009, http://www.businessgreen.com/business-green/news/2251963/climate-bill-demo-crats-unveil (reporting the likelihood of free distribution of carbon dioxide permits in proposed legislation). In that case, increases in the carbon tax rate will actually improve overall efficiency.

[302] For example, suppose a rebate of $1200, the average current estimate. *See supra* note 11. At seventeen percent, *see* Ballard et al., *supra* note 301, at 128, that implies a deadweight loss per error of $204. We assume here that recipients of false-positive rebates are, on average, no richer or poorer than the general population, so that the erroneous redistribution has no other welfare effects.

[303] Put another way, the cost of the false negative is the utility of the rebate in the poor family's hands minus the average utility of that same amount in the hands of other taxpayers.

[304] Recall that many households are willing to pay fees on the order of $30 to $135 to accelerate a paycheck by no more than two weeks for an annual percentage rate between 150% and 300%. *See supra* text accompanying notes 125–32. At the lower bound, that is roughly twenty to thirty times what middle-income borrowers would pay. Although some of these excess

in addition to the cost to these families directly, society would also experience a loss of welfare from failing to achieve its own subjectively defined preferred fair distribution.[305]

The relative sizes of false positives and negatives are important because they imply that policies aimed at eliminating false positives are quite likely to be misguided. For a false-positive-reducing policy to increase social welfare overall, we would need to be confident that we eliminated many more false positives than false negatives with the policy. Considering that the very premise of the false positives argument is that measurements are difficult and take generations to assess,[306] it is hard to believe we could draw that conclusion with any confidence. So, for instance, a policy aimed at denying rebates to families with long-term borrowing potential would likely be a welfare loser; while it would cut off the rebate from some Students, it would also accidentally deny rebates to some needy Busdrivers. Unless the policy successfully finds many more Students than Busdrivers, it will reduce social welfare. It may be true that some families that look poor by some measures in fact would not be heavily burdened by a consumption tax. But that is small comfort to those that are persistently poor.

2. *"Even Steven" Theories*

A third version of the lifetime-equity claim, albeit one mostly inchoate in the economics literature, seems to assume that inequalities even out over time regardless of whether income smoothing is possible.[307] *Seinfeld* fans might call this the "even steven" theory.[308] In this

---

payments may be due to mistakes, for rational borrowers, this price differential implies a substantial difference in the perceived utility of additional funds. *But cf.* Alvin Warren, *Would a Consumption Tax Be Fairer than an Income Tax?*, 89 YALE L.J. 1081, 1100 (1980) (doubting that preferences for present over deferred income can be used to measure the utility of use of that income).

305 We acknowledge, however, that by assumption society will not be able to determine that a rebate has been erroneously denied. We meant to take no position here on whether planners should consider the welfare effects of policies whose outcomes cannot be known by those who prefer them.

306 *See* Bull et al., *supra* note 20, at 148.

307 For example, the so-called "additive lifetime utility function" presumes that we should compare individuals simply by adding up all the good and bad that happens to them throughout their life. *See* Matthew D. Adler, *Future Generations: A Prioritarian View*, 77 GEO. WASH. L. REV. 1478, 1491 (2009) (noting that the additive utility function is the "standard assumption"); Jorgenson et al., *supra* note 34, at 400 (measuring the equity of carbon tax assuming an "additive intertemporal utility function"). Thus, the claim that a carbon tax is not regressive over the lifetime, utilizing an additive utility function, assumes that good events happening later in life can counterbalance bad events earlier, and vice versa.

view, lifetimes have more moral significance than any arbitrary unit of measured time, so that a policy that is unfair to some is justifiable if it is later unfair in favor of those same individuals.[309] For example, though the elderly are hit harder by a consumption tax because they spend a larger portion of their budget,[310] we should not be concerned because in their youths they mostly saved and so avoided much of the burden of the tax.[311]

This theory, however, has several potential holes. First, it presumes that what happens to a person later in life is morally relevant to their earlier experiences; however, this is not necessarily the case.[312]

Next, we agree with Lee Fennell that any sophisticated "even steven" theory must explain how to account for gaps in time between good and bad events.[313] Even putting aside the diminishing marginal utility of wealth, families may prefer to have good events happen sooner and bad events later. Studies suggest that most people have preferences for the timing of their consumption.[314] If government policy disrupts this pattern, it should arguably overpay to compensate for the time value of the misplaced consumption.[315] In addition, of

---

308 *Seinfeld: The Opposite* (NBC television broadcast May 19, 1994).

309 *See* Fullerton & Lim Rogers, *supra* note 282, at 278 (asserting that one measure of distributive fairness of a tax is its total lifetime burden). We assume this view does not contemplate the Calvins of the world, who justifiably ask, "Why isn't [life] ever unfair in my favor?" Bill Watterson, The Essential Calvin and Hobbes 82 (1988). We concede that this may be a straw-man version of the argument, but we are unaware of any more sophisticated articulation in the welfarist literature.

310 Malcolm Gillis et al., *Indirect Consumption Taxes: Common Issues and Differences Among the Alternative Approaches*, 51 Tax L. Rev. 725, 747 (1996).

311 *See* Bull et al., *supra* note 20, at 161 ("[B]ecause energy taxes have different incidence effects across the life cycle, it is important to measure the burden of taxes in terms of lifetime incidence . . . ."); Fullerton & Lim Rogers, *supra* note 282, at 278 (stating that patterns of income and spending across age groups should be factored into an analysis of the fairness of the incidence of a tax).

312 *See* Lawrence Zelenak, *Tax Policy and Personal Identity over Time*, 62 Tax L. Rev. 333, 338, 357–62 (2009). *But see* Adler, *supra* note 307, at 1486 ("[B]ecause personhood endures over a human lifetime, the 'currency' for individuals' claims should be lifetime rather than sublifetime well-being.").

313 Fennell, *supra* note 37, at 12–13; *see also* Adler, *supra* note 307, at 1492–93 (acknowledging that the possibility of preferences for the ordering of benefits and burdens over a lifetime is an "empirical question"); Neil H. Buchanan, *The Case Against Income Averaging*, 25 Va. Tax Rev. 1151, 1178–81 (2006) (doubting that multiyear comparisons between most taxpayers are meaningful).

314 *See* Browning & Lusardi, *supra* note 37, at 1811; *see also* Fennell & Stark, *supra* note 13, at 51–52 (summarizing other studies).

315 *See* Brian Galle, *Federal Fairness to State Taxpayers: Irrationality, Unfunded Mandates, and the "SALT" Deduction*, 106 Mich. L. Rev. 805, 849–50 (2008) (arguing that in order for the

course, there is the basic question of the time value of gains and losses.[316]

Lastly, the "even steven" analysis assumes a perfectly designed set of transition rules.[317] At the time of implementation, a new consumption tax will affect households at all stages of life. Thus, if the tax evens out only over a lifetime, many will never even out. For lifecycle balancing to work, already-existing households must get special rules, whether grandfathering, extra rebates, or something else.

B.   Paternalism

Another common argument against government policies aimed at remedying cognitive or willpower failures is that they are paternalistic. In the strongest form of the paternalism objection, the complaint is that the government cannot second-guess choices other individuals make; if an individual acts, we must presume that her actions maximize her welfare.[318] A less sweeping version of the objection acknowledges that people can make mistakes with their own choices, but claims that government should not help to correct those errors because government intervention reduces our incentives to learn to

---

benefits and burdens of government to even out over time, government must compensate citizens who must wait for the benefits). Further, both planning for and adjusting to misfortunes may carry additional costs, *see* Shaviro, *supra* note 40, at 772–73, which would also have to be accounted for to balance the welfare ledger.

316 *See* Joseph E. Stiglitz, *Utilitarianism and Horizontal Equity: The Case for Random Taxation*, 18 J. Pub. Econ. 1, 23 (1982) (observing that the opportunity for savings implies that lifetime smoothing of year-to-year inequalities may still be inequitable).

 At a presentation of this paper, Matt Adler observed that all of these same objections can be raised against annual equity, or indeed any measurement of utility over time. We agree, but each of the criticisms becomes more acute as the span of time that is to be added together increases. For example, it is more likely that the durability of ourselves as discrete moral agents is sturdier across minutes than decades. Further, as a descriptive matter we think it more plausible that society would be capable of forming preferences about utilities over shorter, more measurable periods.

317 *Cf.* Adler & Posner, *supra* note 28, at 20–21 (stating that the Kaldor-Hicks claim that utilities can even out over time fails to account for transition costs). *But see* Adler, *supra* note 307, at 1493–97 (arguing that the social welfare function should not include an additional discount factor for events happening in the future, but instead can incorporate some of the consequences of the passage of time in other ways).

318 *See* Claire A. Hill, *Anti-Anti-Anti Paternalism*, 2 N.Y.U. J.L. & Liberty 444, 445 (2007) (arguing that consumer choice is the best available evidence of what consumers want); Robert Sugden, *On Nudging*, 16 Int'l J. Econ. Bus. 365, 367 (2009) (reviewing Thaler & Sunstein, *supra* note 24) (claiming that "nudging" allows policymakers to substitute their own preferences for those of the public). *But cf.* On Amir & Orly Lobel, *Stumble, Predict, Nudge: How Behavioral Economics Informs Law and Policy*, 108 Colum. L. Rev. 2098, 2120–23 (2008) (acknowledging the claim that nudges impose the normative judgment of public officials, but arguing that this is both inevitable and desirable).

make better decisions for ourselves.[319] We have both taken issue with these kinds of arguments in more detail elsewhere.[320]

For our purposes here, we simply accept the possible validity of either form of the paternalism objection, but note that neither has much bite in the context of the consumption tax problem and the solutions we recommend for it. In the case of the strong form of the objection, claiming that government should not second-guess revealed preferences is futile because second-guessing here is inevitable. As Sunstein and Thaler have pointed out, designers of a government service must make decisions about how to structure their program, and every possible structure may well have cognitive implications.[321] Responsible designers who wish to maximize welfare must attempt to assess the welfare consequences of each alternative. In Sunstein and Thaler's example, a cafeteria must decide which food to put nearest to the register; those foods will sell better than others.[322] So, does the cafeteria want to sell more fruit or more Twinkies? It is no answer to say that we should simply respect consumers' revealed preferences because which preference is revealed depends (literally, in the cafeteria example) on the architecture of the choice.[323]

Similarly, designing a consumption tax rebate offers a choice of evils. If the rebate is issued at the end of the year, some individuals will fail to smooth that income forward over the course of the year.[324] Arguably, that failure is evidence of a preference for savings, which an antipaternalist would say should be respected.[325] If, instead, the government issues a prebate, some individuals will spend the money immediately, again failing to smooth over the year.[326] That decision, too, is a preference arguably entitled to respect. So a responsible welfare-maximizing planner, choosing between these alternatives (or, as we

---

[319] *See* Jonathan Klick & Gregory Mitchell, *Government Regulation of Irrationality: Moral and Cognitive Hazards*, 90 Minn. L. Rev. 1620, 1626, 1633–41 (2006). Additionally, Professor Glaeser argues that, in the abstract, governments will be less apt at identifying cognitive errors. Edward L. Glaeser, *Paternalism and Psychology*, 73 U. Chi. L. Rev. 133, 142–49 (2006). But this argument is less trenchant as a reason to oppose responses to an already-identified error, although it does suggest that any third party should be appropriately modest in its beliefs that its solution is the right one.

[320] *See* Galle, *supra* note 315, at 819–23; Manuel A. Utset, *Procrastination and the Law*, *in* The Thief of Time: Philosophical Essays on Procrastination 253, 262–63, 266–67 (Chrisoula Andreou & Mark White eds., 2010).

[321] Thaler & Sunstein, *supra* note 24, at 240–41.

[322] *Id.* at 1–3.

[323] *Id.* at 3.

[324] *See supra* Part III.D.

[325] Of course, this assumes we are confident that there are no liquidity constraints.

[326] *See supra* Part III.C.

have suggested, some hybrid combinations) must necessarily make a judgment about which set of preferences she would prefer to satisfy.

Sunstein and Thaler also emphasize that the paternalism objection is blunted when government policies preserve opportunities for choice.[327] No one has to buy a banana just because it sits, all yellow and temptingly packed with potassium goodness, beside the register.[328] Similarly, prebate recipients need not spend down their prebate in the month after it hits their mailbox. Policy options that merely structure, rather than determine, outcomes are more consistent with individual freedom.[329]

In an important recent draft, Lee Fennell largely agrees with these points but argues that "an unheeded nudge leaves the opter-out worse off than before."[330] She claims it is unclear whether the cost of this added burden for those who (wrongly) override the government's default outweighs the benefits of nudging others in the right direction.[331] We think this worry is overstated. As we have argued, part of the efficacy of defaults is that they trade on the inherent present bias of time-inconsistent actors.[332] The actual cost of overcoming the default is tiny; it is only the fact that it must be incurred *now* that makes it loom large.[333] Thus, while we agree that the costs of opting out can be deadweight losses for some individuals, those losses are likely to be small (viewed ex post) relative to the benefits that would accrue to those who abide by the default.

Under the second form of paternalist objection, though, even choice architecture and default rules are suspect. For example, Klick and Mitchell aver that default rules weaken our ability to correct our own errors by rendering us mentally lazy, dependent on the govern-

---

327 *See* THALER & SUNSTEIN, *supra* note 24, at 240 (distinguishing their suggestions from other forms of paternalism because they still "retain freedom of choice").

328 *See* J.J. Strain & Kevin D. Cashman, *Minerals and Trace Elements*, *in* INTRODUCTION TO HUMAN NUTRITION 177, 192–93 (Michael J. Gibney ed., 2002) (noting the need for potassium and its presence in bananas).

329 We acknowledge that this position does not fully answer the objection that government lacks adequate information to set the correct default position. *See, e.g.*, Glaeser, *supra* note 319, at 151 (claiming that libertarian paternalism is unattractive to those who think that the problem with paternalism is government errors). The opportunity for individual choice, however, will tend to limit the size of any government error because if the default is wrong by a sufficiently large amount, then we should expect a larger portion of the population to reject it.

330 Fennell, *supra* note 37, at 42.

331 *See id.* at 45–46.

332 *See supra* Part IV.B.

333 This feature allows policymakers to design defaults that are specifically targeted at people who are present-biased; individuals who do not heavily discount future costs and benefits simply override the default and choose their own rule.

ment to spot our mistakes.[334] That is, government aid induces a kind of moral hazard that makes individuals fail to invest in efforts to reduce cognitive errors because the government is insuring them against cognitive losses.[335]

Klick and Mitchell acknowledge, though, that preventing some cognitive errors may be welfare-enhancing.[336] Insurance that induces moral hazard is not always welfare-reducing, depending on the costs of underinvestment and the value of insurance.[337] So the appropriate cognitive policy analysis depends on a balancing between hazard costs and "insurance" benefits.

While we admit hazard costs are difficult to specify, there is reason to think that the "insurance" benefits of a well-designed consumption tax are very large. For one thing, as we have seen, errors in income smoothing can be very costly in utility terms for low-income families. Perhaps more importantly, there is evidence that self-help mechanisms for overcoming those errors are simply ineffectual.[338] If taxpayers are using their rebates as a form of forced savings to overcome their temptations to spend immediately, they are doing an extremely poor job of it—many save only until the end of the year and then quickly dissipate the rebate.[339] Yet, there is little reason to think that May of the following year is consistently the best time to spend a year's savings.

In the face of such persistent failures, it would not be surprising if a hands-off government policy actually weakened willpower by demoralizing those who try and repeatedly fail to restrain themselves. A well-designed policy might actually increase incentives to invest in willpower by increasing the returns to investment. We hope that our proposals would move policy in that direction.

---

334 Klick & Mitchell, *supra* note 319, at 1626; *see also* Fennell, *supra* note 37, at 28 (noting this possibility).

335 Klick & Mitchell, *supra* note 319, at 1626.

336 *Id.* at 1645–46.

337 On the tradeoffs between insurance and moral hazard, see generally Martin Neil Baily, *Some Aspects of Optimal Unemployment Insurance*, 10 J. Pub. Econ. 379 (1978).

338 *See* George Ainslie, Breakdown of Will 143–60 (2001) (discussing commitment devices and their failures); Angeletos et al., *supra* note 95, at 59 (explaining that the use of illiquid investments as a commitment device lowers overall welfare); Barr & Dokko, *supra* note 137, at 20–21 (finding that taxpayers are inefficiently overwithholding to generate tax rebates).

339 Barr & Dokko, *supra* note 137, at 16.

Conclusion

Overall, it seems clear that the consumption tax literature has yet to truly grapple with the welfare implications of major transactional consumption taxes. That is especially true of economic dislocations that will surely attend any efforts to slow the onset of global climate change. We have attempted to set out here evidence that, at a minimum, human cognition and credit markets will play large roles in the ultimate fairness of any carbon tax. We have also suggested several novel solutions that could mitigate these distributional impacts while still allowing climate change prevention to move forward. No doubt, however, there are other and better solutions; we hope our contributions offer a small step towards finding them.

We have focused here on carbon pricing as the most politically salient example of the importance of timing in the delivery of government benefits, but it may not be the most significant in terms of overall welfare. Other government programs, such as the EITC, create similar dilemmas for low-income families and may involve several times as much money. Yet, existing efforts to deal with income smoothing and cognition in these programs remain crude, with current commentary failing to recognize the importance of the cognitive features of the programs' designs.[340] Thus, in addition to nudging the design of carbon pricing, we hope our contributions here will spark conversations about reform of payments to poor households more generally.

---

340 For example, Graetz notes that workers have the option to accelerate receipt of their EITC payment and expresses puzzlement that few have taken advantage of that opportunity. GRAETZ, *supra* note 261, at 171–72. Our theory here suggests that this failure to use existing but cumbersome mechanisms for accelerating payments is a compelling example of how procrastination can impede income smoothing. Underutilization of the acceleration option may also reflect some households' efforts to force themselves to save. The design alternatives we have suggested address both these problems.