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Dynamic Implications of the Bankruptcy Waiting Period

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Abstract

Following the 2005 bankruptcy reforms in the U.S., households that discharge debt in Chapter 7 must wait eight years to refile instead of the previously mandated six years. This policy is unique to U.S. law and creates an unusual combination of contemporaneous costs and benefits for households. On the one hand, households temporarily lose their partial insurance against financial distress. On the other hand, post-bankruptcy households may receive improved credit offers as a result of increased expected repayments. To analyze the dynamics of the waiting period, I develop a quantitative theory of unsecured credit with default and endogenous credit scoring. I find that the change from six to eight years decreased default rates by 9.72%. This result leads to higher borrowing and lower interest rates. This result suggests the increased costs of default offset the benefits. To understand the mechanisms driving this result, I investigate the dynamic consequences of default under various waiting periods. I show that defaulting households under longer waiting period regimes suffer larger drops in their credit scores and borrowing. More importantly, I show that these consequences persist such that a one year increase in the waiting period results in 2.1% lower credit scores 20 years after default. Thus, while a longer waiting period may provide for better credit offers during a household's time without the option, it ultimately depresses its credit score, borrowing, and consumption long after default.

JEL Codes: D14, G51, K35

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1 Introduction

Under U.S. bankruptcy law, a household under financial distress may discharge their debts using Chapter 7 "fresh start" protection. However, this right cannot be exercised more than once every eight years. From 1898-2005, households were required to wait six years between discharges. In 2005, the waiting period was increased to eight years under the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA).

Unlike other features of the bankruptcy code, and policy changes resulting from BAPCPA, the waiting period has received scant discussion and even less evaluation. This dearth is surprising given that this policy is unique to the U.S. and has countervailing forces whose effects are not obvious *a priori*. On the one hand, a waiting period acts as a punishment for filing. A household that defaults temporarily loses the option to default again, making it particularly vulnerable to future expense shocks. On the other hand, losing the option acts as a commitment device such that creditors may receive a higher expected recovery, thereby improving their credit offers to households and improving the ability of these households to smooth consumption across time [1].

In other words, households considering default must evaluate the value of maintaining the option in the future before exercising the option in the present. I examine this policy by developing a quantitative theory of unsecured credit with default and temporary exclusions from default.

To introduce default in equilibrium, I subject households to stochastic persistent income and transitory expense shocks. I endogenize the credit schedules available to households using credit scoring which is determined for each household by the household repayment decision, conditional on the household's state. To distinguish households along a credit scoring dimension, I construct two types of households: those that are high credit risks and those that are low risk. A high-risk household type is associated with an increased probability of receiving an expense shock in any given period, whereas low-risk households are less susceptible. Neither creditors nor households observe the risk type of individual households. Instead, the beliefs about their types are formed via Bayesian updating after observing aggregate data about the repayment decisions of high and low-risk households.

Finally, to evaluate the implications of the policy in the context of the life-cycle, I create three age-cohorts which transition from young to middle-aged, middle-aged to old, and receive a retirement felicity, at the end of old age before being repopulated as young households. The remainder of the model is standard such that households choose consumption,

[1] See Zame (1993) for the proposition that allowing default can lead to efficiency improvements by allowing borrowers to enter into contracts for which they are not 100% certain about their future ability to repay

next period borrowing, and whether to default in each period. Intermediaries price household debt according to a zero-profit condition for each household in each period.

The quantitative model matches the data on several useful moments; most importantly, the default rate. I use the model to study the dynamic implications of the waiting period policy. I find that a lengthened waiting period is associated with a lower default rate. This result is partially driven by an eligibility effect. A longer waiting period increases the periods that defaulting households are removed from the set of eligible households in any given period.

I show that the impact on the default rate is also driven by an increased cost of filing. In addition to the risks faced by defaulting households who temporarily lose their partial insurance, the results in this paper show that a longer waiting period has dynamic effects which make default more costly in the face of a longer waiting period. Specifically, defaulting households have lower credit scores five, ten, and twenty years after default under longer waiting periods. This effect is associated with lower borrowing and consumption at each of these periods as well. This suggests that a longer waiting period makes it more difficult for households that do default to recover as quickly as defaulting households in shorter regimes.

While the waiting period has received little attention in the literature, there is extensive research more generally evaluating the implications of the default option and the various policies associated with BAPCPA. With respect to the default option, Athreya (2002), in a quantitative model with income shocks, analyzes the effects of eliminating the default option altogether. It concludes that eliminating the option improves welfare by drastically decreasing the interest rates available to households[2] . It further analyzes the effects of a means-testing proposal (which was ultimately adopted as law in BAPCPA). Means-testing limits the availability of default for households with above-median income. Athreya (2002) concludes that this policy leads to modest welfare consequences as long as the default option remains. Chatterjee et al. (2007) also quantitatively analyzes the effects of means-testing. It shows that this policy leads to a decrease in interest rates charged on unsecured loans, and an increase in the volume of debt and the number of borrowers. These result

Livshits et al. (2007) highlight the main trade-off between smoothing consumption over states and consumption over time. It compares the consumption effects of a "fresh start" default regime versus a repayment-based regime, and finds that the effects depend upon the nature of the income shocks introduced in the model. In particular, greater variance in persistent income shocks increases the demand for smoothing across states whereas a greater variance in transitory shocks increases the demand for consumption smoothing borrowing

[2]See also Athreya (2008) which finds that eliminating default lowers consumption inequality among the young, but will increase it among the old.

across time.

2 Dynamic Model

2.1 Introduction

I consider a discrete time, stochastic life-cycle model in which the economy is composed of a unit mass of young, middle-aged, and old households such that the sample space for age cohorts is $n \in \mathcal{N} \equiv \{n_y, n_m, n_o\}$. Households transition across cohorts with probabilities ρ_y, ρ_m, $\rho_o \in (0,1)$ where the probabilities represent, respectively, the transition from young to middle-aged, middle-aged to old, and old to young to repopulate the working population as follows:

$$p(n_i, n_j) = \begin{bmatrix} (1-\rho_y) & \rho_y & 0 \\ 0 & (1-\rho_m) & \rho_m \\ \rho_o & 0 & (1-\rho_o) \end{bmatrix}$$

These transition probabilities are the inverse of the number of periods a household spends in each cohort so that $E[(\rho_y + \rho_m + \rho_o)^{-1}]$ closely approximates the total years worked by households in the United States.[3]. This feature combines the life-cycle approach of Livshits et al. (2007) with the perpetual youth model in Chatterjee et al. (2007).

This hybrid approach is valuable in that older households cannot predict exactly when they will perish. As such, they cannot know, under any of the waiting period regimes, whether they will regain the option during their life. At the same time, maintaining some semblance of a life-cycle allows households in the various cohorts to make independent optimization determinations based on their differential likelihood of regaining the option. Thus, older households should expect the chances of regaining the option (or needing the option) to be much lower than younger households.

2.2 Income Endowment

At the beginning of each period, households receive an endowment of the single consumption good. Young and middle-aged households receive either high or low income $y \in \mathcal{Y}_{-o} \equiv \{y_\ell, y_h\} \subset \mathcal{Y}$. In addition to drawing high or low income, old households may also draw retirement - by reaching the end of old age with probability ρ_o - such that $y \in \mathcal{Y} \equiv \{y_\ell, y_h, y_r\}$

[3]While old households in the model retire at the end of old age, they have no choice variables, and, therefore, receive a retirement felicity as in Athreya et al. (2010)

where y_r is retirement income. Households are taxed at rate τ with disposable income $\tilde{y} = y(1-\tau)$. The taxes paid by working households instantaneously fund retirement income:

$$y_r = \frac{E[T_y + T_m + T_o]}{T_r}. \tag{1}$$

$$R(a) = \sum_{t=0}^{T_r-1} \beta^t u(c = y_r + \frac{a}{T_r}) \tag{2}$$

where $R(a)$ represents a household's retirement felicity. Equation (2) shows that a household's felicity is a function of its debt a upon retirement spread out across the years in retirement T_r. In each period, young and middle-aged households may receive an income shock which is realized through the transition from high income to low income or vice versa with probability ξ.

$$p(y_i, y_j | n \in \{n_y, n_m\}) = \begin{bmatrix} 1-\xi & \xi \\ \xi & 1-\xi \end{bmatrix}$$

Old households may alternatively transition to receiving their retirement endowment.

$$p(y_i, y_j | n = n_o) = (1-\rho_o) \begin{bmatrix} 1-\xi & \xi \\ \xi & 1-\xi \end{bmatrix} + \rho_o[y_r].$$

2.3 Credit Markets

Households have access to a competitive, unsecured credit market where they may borrow or save. Indebted households generally have the option to repay their debt or default, where the default option mimics the Chapter 7 bankruptcy system. Households have standard CRRA utility functions where the period utility function is $u(c) = \frac{c^{1-\sigma}-1}{1-\sigma}$. Household's maximize:

$$EV^{Old} = E_0\Big[\sum_{t=0}^{T_o-1} (\beta(1-\rho_o))^t u(c_t) + \rho_o R(a)\Big]$$

$$EV^{Middle} = E_0\Big[\sum_{t=0}^{T_m-1} (\beta(1-\rho_m))^t u(c_t) + \rho_m EV^{Old}\Big]$$

$$EV^{Young} = E_0\Big[\sum_{t=0}^{T_y-1} (\beta(1-\rho_y))^t u(c_t) + \rho_y EV^{Middle}\Big]$$

2.4 Expense Shocks

In addition to income shocks, households are also subject to idiosyncratic expense shocks in each period[4]. There are two potential shocks: a big and small shock. The two shocks occur independently. The big shock represents catastrophic, out-of-pocket medical expenses as estimated by Livshits et al. (2007). The small shock includes events such as divorce, unexpected pregnancy, and other non-catastrophic expenses. The sample space for all shocks is $\kappa \in \mathcal{K} = \{No\ Shocks,\ Small\ Shock,\ Big\ Shock\ ,\ Both\ Shocks\}$. A household's probability of receiving a shock is a function of its risk type: $\omega \in \Omega \equiv \{\omega_\ell, \omega_h\}$ where ω_ℓ is low risk and ω_h is high risk and the probability of being assigned to the low risk type is $P(\omega_\ell = 1) = \pi_\omega$. The unconditional probabilities of receiving the shocks are $P(\kappa_S) = \pi_S$ and $P(\kappa_B) = \pi_B$. The conditional probabilities are the function of a multiplier, ι, such that:

$$P(\kappa_{S,B}|\omega_L) = (1 - \iota) \times \pi_{S,B}$$

$$P(\kappa_{S,B}|\omega_H) = (1 + \iota) \times \pi_{S,B}$$

2.5 Default Option

In each period, households choose to borrow or save. Indebted households have the option to repay the debt or default, where $I^D = 1$ and is zero otherwise. However, not all households may default. The availability of the default option is denoted by the indicator function ϕ, where $\phi = 1$ indicates that the household possesses the option, and is zero otherwise. The availability of the option depends upon whether the household has previously defaulted. Households without the default option must make the maximum repayment they can without falling below an exogenous minimum consumption level, c_{min}. I model the loss of the default option using a lottery such that households regain their option according to a Bernoulli trial with parameter λ. This feature allows the model to mimic the average length of time a household is prevented from refiling.[5] The availability of the default option transitions as follows:

$$p(\phi_i, \phi_j|n \in \{n_y, n_m\}) = \phi(1 - I^D) \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} + \phi I^D \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix} + (1 - I^D)(1 - \phi) \begin{bmatrix} (1-\lambda) & \lambda \\ 0 & 1 \end{bmatrix}$$

$$p(\phi_i, \phi_j|n = n_o) = (1 - \rho_o)p(\phi_i, \phi_j|n \in \{n_y, n_m\})$$

[4]These shocks are introduced to ensure the possibility of default in equilibrium. Equally important, expense shocks are commonly cited reasons for default (see Domowitz and Sartain (1999), Jacoby et al. (2001), Sullivan et al. (2006))

[5]This mechanism is used by Athreya (2002) to model a credit exclusion following default.

Old households may only regain or maintain the default option if they remain in the old age cohort (i.e., $(1-\rho_o)$) since default is not an option in retirement in the model.

2.6 Credit Profile

While a household's exposure to expense shocks is based on its type, neither the household nor creditors observe this information. They can, however, observe aggregate statistics about each type's borrowing and repayment decisions. From this, creditors update their beliefs about the household's type via Bayesian updating. Chatterjee et al. (2020) uses a similar credit scoring mechanism to infer a household's default risk. In that case, heterogeneity is introduced through various levels of patience assigned to households and which transition over time. In the present model, the household's credit profile, $\delta \in (0,1)$, is the prior probability that the household is a low-risk type given its repayment decision, income, current period asset position, age, and prior probability. To make the model more tractable, I assume that the household's type is persists from birth until death.

$$\delta' = P(\omega_\ell | I^D, y, a, \delta, n, \phi) = \frac{\delta P(I^D, y, a, \delta, n, \phi | \omega_\ell)}{\delta P(I^D, y, a, \delta, n, \phi | \omega_H) + (1-\delta) P(I^R, d, y, \delta, n | \omega_L)}$$

This feature endogenizes the household's access to credit, given its credit score. It also mimics existing credit markets in that credit decisions are made, in part, on a household's credit score, which is an incomplete measure of the household's actual default risk. Finally, it endogenizes the costs of default in that household's with high credit scores have more to lose as a result of a default.

2.7 The Household's Problem

I define the household's problem recursively. In each period, households choose current consumption, next period's asset position, and decide whether to repay their debts or default. The default decision allows the household to maintain a share of its disposable income in exchange for the discharge of all remaining debt. The model uses the value function $V = max\{V^R, V^D\}$ where V^R is the value of repaying, and V^D is the value of default. The value of repaying debts for an age n consumer with asset position a, y income, credit score δ, with default option ϕ is

$$V^R(s) = \max_{c,a'} \left[u(c) + \beta E \max_{I^D} \{V^R(s'), V^D(s')\} \right] \tag{3}$$

such that

$$c \leq \phi c_{\phi=1} + (1-\phi) \max\{c_{\phi=0}, c_{min}\} \tag{4}$$

where

$$c_\phi = \tilde{y} + q(a', \delta, y, n, \phi)a' - a - \kappa \tag{5}$$

and the observable state space for households is $s = (y, a, \delta, \phi, \kappa)$. Practically speaking, households without the default option are not forced to repay all their debts under all circumstances. Instead, garnishment law ensures that household consumption never falls below a minimum consumption level. I denote this parameter c_{min}. This also means that creditors cannot expect to recover 100% of household debt even when households no longer have their default option and must price their credit offers accordingly. The value of default is

$$V^D(s) = u(c) + \beta E[V^R(s' : a' = 0)] \tag{6}$$

such that

$$c = \alpha\tilde{y} \tag{7}$$

where α is the percent of disposable income that bankruptcy courts allow households to maintain during default.

2.8 The Intermediary's Problem

Competitive credit intermediaries take the risk-free rate of return r^f with transactions costs of υ such that price of a bond with zero default probability is $\bar{q} = \frac{1}{1+r^f+\upsilon}$. The bond price for each loan satisfies the zero expected profit condition. The price of a loan with the default option is

$$q(\gamma^{\phi^1}, a') = \bar{q}\big[\delta\theta(\gamma^{\phi^1}, a', \omega_\ell) + (1-\delta)\theta(\gamma^{\phi^1}, a', \omega_h)\big] \tag{8}$$

where $\gamma \in \Gamma \equiv (\delta, y, \phi, n)$ is the state space observable to creditors and γ^{ϕ^1} is in the subset of Γ for which $\phi = 1$. The function

$$\theta(\gamma, a', \omega_\ell) = P(I^D = 0|\gamma, a', \omega) \tag{9}$$

returns the aggregate equilibrium repayment rate ($I^D = 0$) for households with type *omega* given state γ and next period borrowing a'. The price schedule available to households without the default option is

$$q(\gamma^{\phi^0}) = \bar{q}(1-\lambda)x + \lambda q(\gamma^{\phi^1}) \tag{10}$$

where

$$x \in X(\gamma^{\phi^0}, a') = \max\Big\{\min\{\frac{\tilde{y} - \kappa - c_{min}}{a'}, 1\}, 0\Big\} \tag{11}$$

is the percent of debt the household repays when it does not have the default option. The minimum and maximum operators set bounds on the repayment such that a household does not repay more than 100% of the debt and cannot repay less than 0% of the debt.

2.9 Equilibrium

DEFINITION 1. Given a default rule, bond pricing function, $q(\gamma, a')$, credit scoring function, δ', and risk-free bond prices $(\bar{q})$, the recursive competitive equilibrium is defined as value function $V = \max\{V^R, V^D\}$, policy functions c, a', I^D, complete repayment probabilities $\theta(\gamma, a', \omega)$, and a partial repayment function $X(\gamma^{\phi^0}, a')$ such that:

1. Households choose optimal policy functions c, d', and I^D to maximize expected lifetime utility;
2. The complete repayment probabilities are correct such that $E(I^D = 0|\gamma, a') = \delta\theta(\gamma^{\phi^1}, a') + (1-\delta)\theta(\gamma^{\phi^0}, a')$.
3. The partial repayment probabilities are correct such that $E[x \in X(\gamma^{\phi^0}, a')] = \delta\theta(\gamma^{\phi^1}, a') + (1-\delta)\theta(\gamma^{\phi^0}, a')$.
4. The bond prices $q(\gamma, a')$ are determined by the zero-profit conditions (6) and (8); and
5. Markets clear.

2.10 Parameterization

The model has 20 parameters. I impose baseline restrictions on all the parameters, but will relax these restrictions to estimate the model in later work. The model crudely mimics the life-cycle by stochastically transitioning households from young to middle-aged, middle-aged to old, and back to young again. By design, the transition ensures equal expected lengths of time spent in each age-cohort with $(\rho_y = \rho_m = \rho_o = \rho_r = 0.0666)$ such that, in expectation, households work for 45 years prior to retiring for, on average, 15 years. I set the magnitudes and probabilities for the small and large expense shocks equal to those estimated in Livshits et al. (2007). To create hetereogeneity among households' risk of receiving shocks, I impose an expense shock multiplier, $\iota = 0.33$, to reflect that high risk households are twice as likely to receive an expense shock as compared to low risk households. I set the probability of being assigned to a low risk type at birth, π_ω, equal to 0.5 such that there are an even number of high risk and low risk households. This parameter is estimated to match the repeat filing rate in the data and model.

I normalize mean-income $\bar{y} = 1$ and set income-persistence, ξ, to 0.85. Low income, y_ℓ is set to 0.85 whereas high income, y_h, is set to 1.15.

With regard to the default decision, the percent of disposable income which courts allow households to keep in bankruptcy, α is 0.4. In the fully estimated model, α will be chosen to match the default rate in the data with that in the model. The expense shock multiplier, ι, will help match the Relative Default Rate (RDR) of young households, minimum consumption, c_{min}, will help match the RDR of middle-aged households, and the retirement income, y_r, will be used to match the RDR of old households.

Table 1: Baseline Model Statistics and Parameter Values

Target	Data	Model	Parameter	Value
Determined Independently				
Mean Years in Each Cohort	15	15	ρ_y, ρ_m, ρ_o, ρ_r	0.666
Coefficient of Risk Aversion	2.0	2.0	σ	2.0
Mean Years to Regain Default	8	8	λ	0.111
Risk-free rate of return	1.4%	1.4%	r^f	0.014
Discount Factor	0.94	0.94	β	0.94
Period Income Tax Rate	12.4%	21.66%	τ	0.2166
Retirement Income ($\%\bar{y}$)	70.17%	64.98%	y_r	0.6498
Determined Jointly - Default				
Default Rate	7.46%	8.91%	α	0.4
RDR (Young)	0.61	0.92	ι	0.33
RDR (Middle)	1.43	1.08	$P(\kappa_s)$	0.03
RDR (Old)	0.97	1.02	κ_s	0.264
Unsecured Debt-at-Discharge	0.96	0.68	κ_b	0.8218
Mean Income in Default	0.71	0.95	$P(\kappa_b)$	0.005
Repeat Filing Rate	7.1%	6.18%	π_ω	0.5
Determined Jointly - Credit Markets				
Average Interest Rate	14.4%	10.95%	υ	0.04
Average Aggregate Unsecured Debt	0.137	0.22	y_ℓ	0.85
Average Unsecured Debt ($\phi = 0$)	0.21	0.282	c_{min}	0.1
Average Savings	0.382	0.189	y_h	1.15

2.11 Baseline Results

As we can see from a closer examination of the model results in Table 2, the model fits quite well with the data on the equilibrium default rate and repeat filing rate which measures the percent of total defaulters who file more than once. These moments are an important piece of this analysis of the dynamics of the waiting period in that the reform from six to eight years was designed to decrease both of these measures. Although the interest rate levels do not match as closely to the data, this does not act as an impediment to the analysis. Instead,

Table 2: Baseline Model Statistics

Statistic	Data	Model
Default Rate	7.46%	8.91%
Repeat Filing Rate	19.20%	20.79%
Average Interest Rate	14.4%	10.95%

Table 3: Baseline Equilibrium Outcomes ($\phi = 1$ vs. $\phi = 0$)

	Aggregate	$\phi = 1$	$\phi = 0$
Net Debtors	8.22%	8.15%	9.59%
Net Savers	55.13%	55.79%	44.60%
Average Borrowing	0.220	0.215	0.282
Average Interest Rate	10.95%	11.28%	6.55%

what matters with respect to the waiting period is the percent changes in rates resulting from waiting period policy experiments.

Table 3 reports baseline equilibrium outcomes comparing households with and without the option. Note that households without the option are more likely to be net debtors. Additionally, among the households that do borrow, households without the option borrow 31.2% more. In Table 1 above, we see that defaulting households have a mean income of 0.95 at the time of default. This means that nearly two-thirds of these households received a low income endowment, y_ℓ. This provides one explanation for the higher borrowing rates among households with the option. The final row, showing average interest rates, provides a second, important reason. Households with the option were charged an interest rate that was nearly twice as high as those without the option.

This is qualitatively consistent with the results in Athreya (2002) and Livshits et al. (2007) in which the option to default was also associated with a higher interest rate. Importantly, Athreya (2002) and Livshits et al. (2007) considered legal environments in which the default option was completely eliminated. By contrast, the option is never removed from the model environment in the instant paper. Thus, while the previous literature highlighted important implications along the two extremes, the waiting period allows us to study the implications of a policy which can be dialed in either direction to tighten or loosen the default constraint.

Given the various explanations for the average interest rates observed in Table 3, I ran a Monte Carlo simulation and used this data to regress interest rates on possession of the default option, income, log leverage, and credit score. Table 4 reports the results of this regression. As expected, it shows that possession of the default option is associated with a 5.1% level increase in interest rates. The coefficients for the remaining covariates are also consistent with expectations as higher income and higher credit scores are associated with lower interest rates and higher leverage is associated with higher interest rates. As the credit score represents the imputed probability that a household is low risk to receive an expense shock, the coefficient for log credit score states that a 10% increase in the credit score is associated with a 0.15% decrease in interest rates. Put another way, a household with $\delta = 0.3$ pays a 3% higher interest rate than a household with $\delta = 0.9$, all else equal.

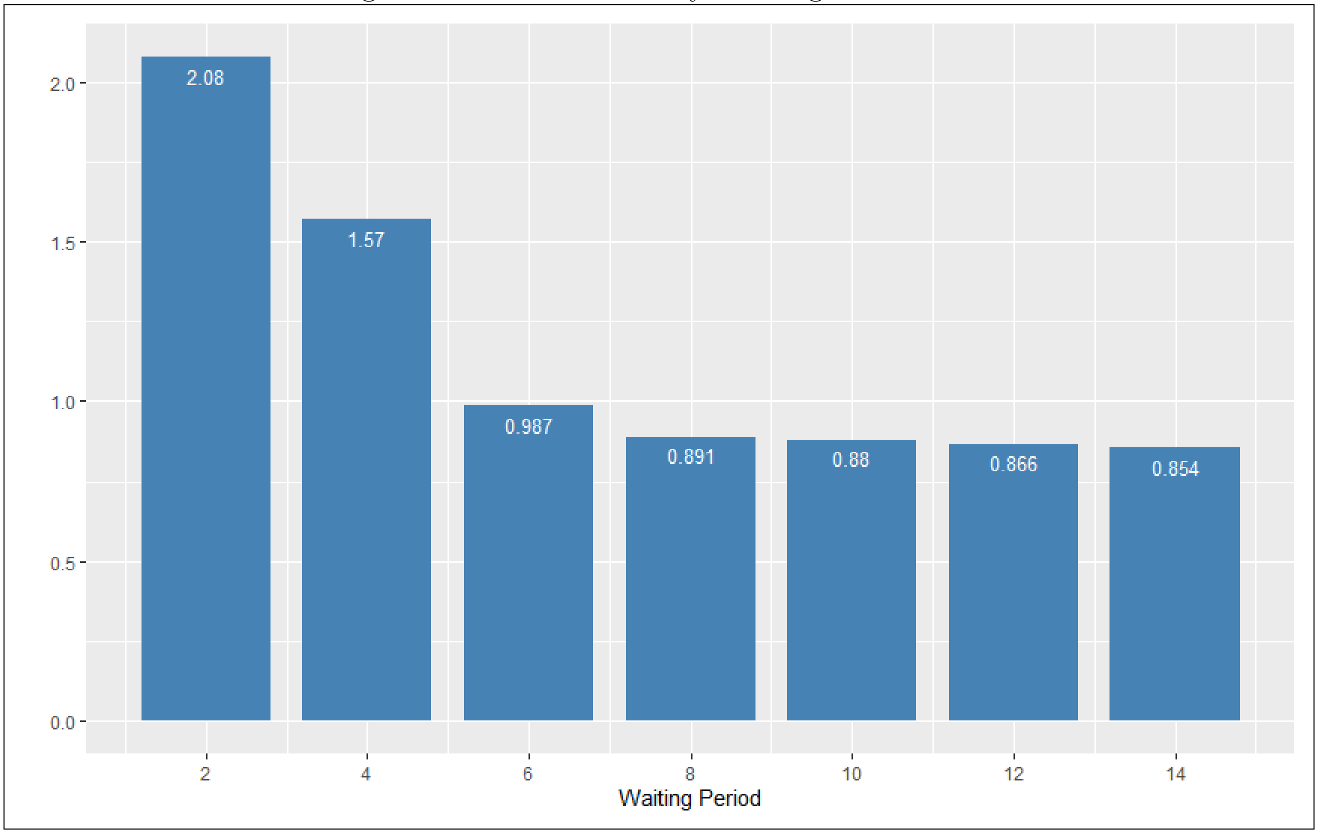
Table 4: Interest Rate Determinants

	Dependent variable:
	Interest Rate
Default Option ($\phi = 1$)	0.051^{***}
	(0.0003)
High Income ($y = y_h$)	-0.061^{***}
	(0.0001)
Log Leverage	0.089^{***}
	(0.001)
Log Credit Score (δ)	0.015^{***}
	(0.00003)
Observations	75,392

3 Policy Experiment

In Section 2 above, I showed that this model fits the data quite well along some key moments, and functions as expected with respect to the implications of the default option under an environment with an eight-year waiting period. This makes it fruitful to analyze the consequences of various waiting period policies. Starting with Figure 1, we see that the default rate decreases as the waiting period increases. As it relates to the reform from six to eight years from BAPCPA, we see a decrease in the default rate from 0.987% to 0.891% which represents a 9.73% decrease in defaults following the policy change. This result is expected for two reasons. The first is trivial. The longer waiting period decreases the share of households eligible to default as the average amount of time each household remains ineligible increases. We can see from Figure 2 that the share of filers who are repeat offenders increases with the waiting period. The rate starts at 21.69% under a two-year waiting period, drops to 6.18% at eight years, and settles at 5.31% at the fourteen-year mark. This result demonstrates

Figure 1: Default Rates By Waiting Period



that a significant reason for a higher filing rate under a shorter waiting period is the refiling effect. As the waiting period increases, and the opportunity to file multiple times decreases, the overall default rate decreases.

To the extent the default rate is the driving force of the decrease, it tells us very little about how the waiting period effects households' choices. This leads us to the second reason to have expected this result: the waiting period acts as an increased cost to filing. Under a longer waiting period, households considering the default decision must weigh the value of default with the increased risk of receiving an expense shock without the default option. To disentangle this effect from the eligibility mechanism, I examine how default effects households under the various policy alternatives.

Starting with Figure 3, we see that the interest rate spread between households with the default option and without increases with the waiting period. This result shows that the two groups of households are offered increasingly similar interest rates as the waiting period decreases such that the distinction between the two groups disappears as the waiting period approaches zero. As it relates to BAPCPA, we can see that the spread increased from 4.33% with a six year waiting period to 4.72% at eight years, representing a 9.01% relative

Figure 2: Refiling Rates By Waiting Period

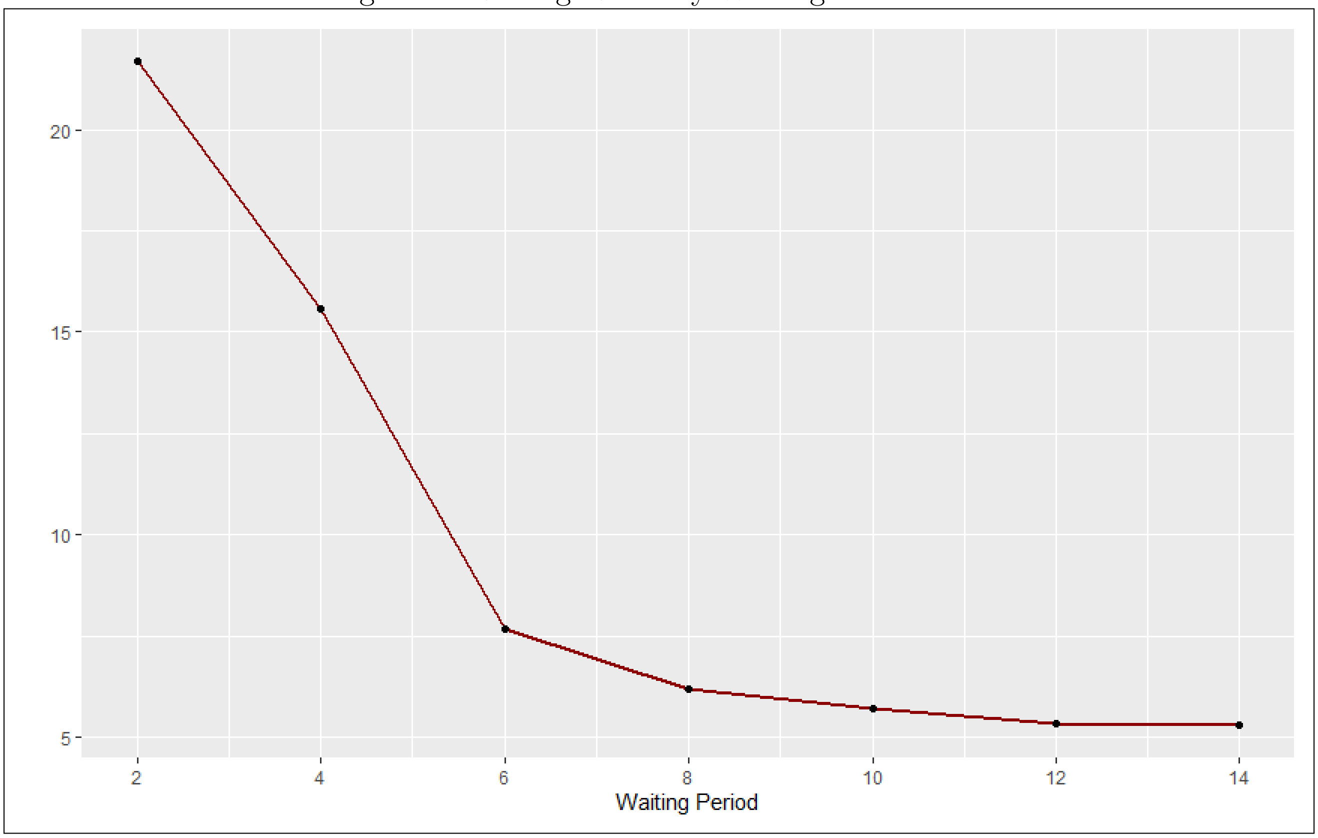
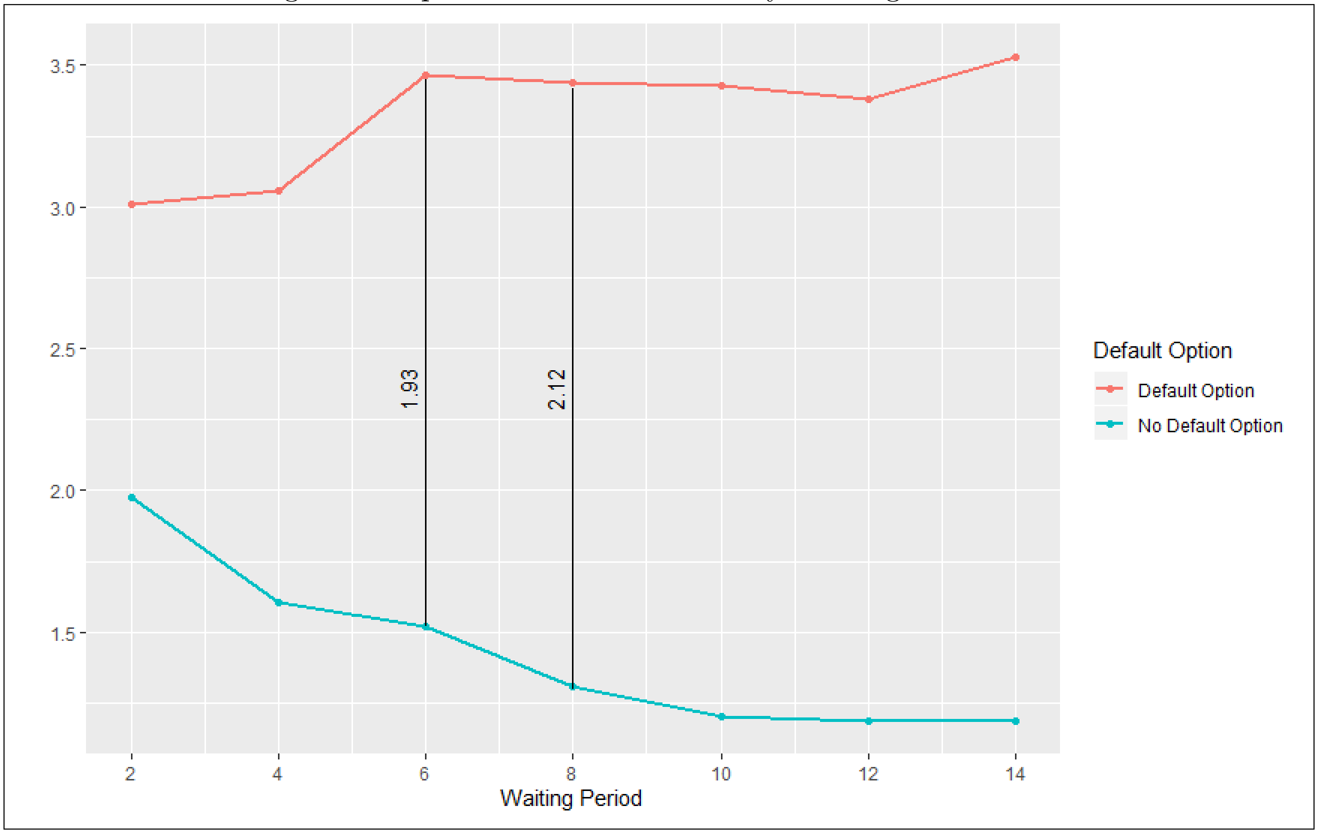


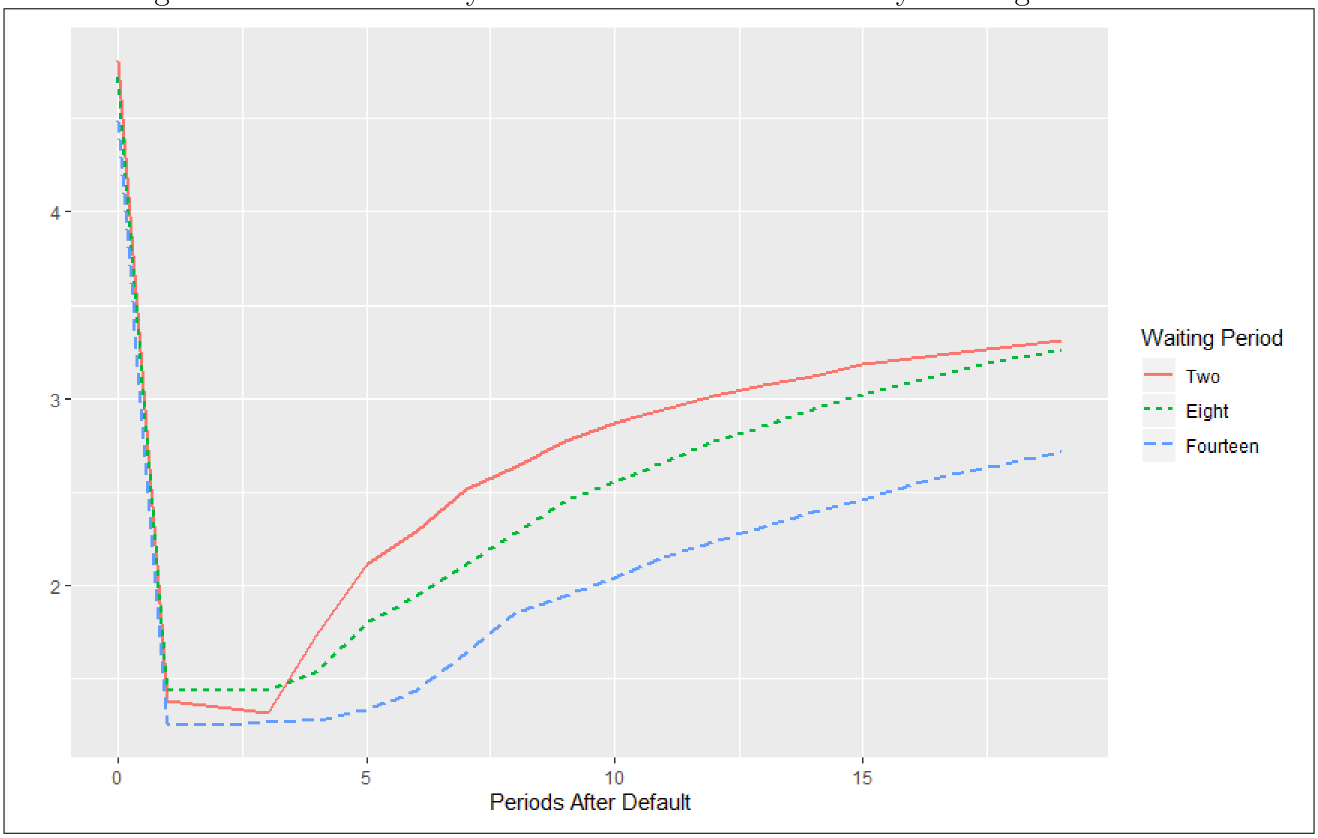
Figure 3: Equilibrium Credit Score By Waiting Period



increase in the spread. Interestingly, this result demonstrates that one of the benefits of default under a longer waiting period is improved credit offers during the time without the option. This is because, at any given period, a household without the option can better commit to repayment. On the other hand, Figure 4 showcases a cost of the longer waiting period. We can see that as the waiting period increases, the credit score spread between the two groups grows larger. For example, in the increase from six to eight years, the credit score spread increases from 1.93 to 2.12 which is associated with a 9.84% increase in the credit score spread resulting from the policy change.

While the previous figures demonstrate the consequences of changing the waiting period as they relate to households with and without the option, they do not tell us anything about the outcomes for households that default and subsequently regain their option. That is, to better understand the implications of the policy, we need to compare households that share the option and only differ in that some of the households defaulted in the past. To assist in this exercise, I plot the average credit score for households in the 20 years following a default under two-year, eight-year, and fourteen-year waiting periods to see how the credit score transitions over time. As we can see, the average credit score plunges for all households after

Figure 4: Credit Score Dynamics After Default Under By Waiting Period



they default at $t = 0$. In the case of the two-year waiting period, the credit score recover much quicker than the other two time-series starting after $t = 3$. This suggests that the credit score recovers more quickly after the household regains its option.

While this helps us to understand the credit implications of the various waiting periods overall, it doesn't explain why the spread increases between households with and without the option as the waiting period increases. However, by looking at the eight and fourteen year waiting periods, we see that the credit score recovers more quickly under the eight-year regime starting after $t = 4$, well before the average household would regain the option under either regime. Interestingly, this recovery persists through the entire time-series. These dynamics suggest that the negative credit score associated with default persists longer as the waiting period increases. However, by only looking at how the average credit score transitions, we cannot be sure that there are no conflating issues. To address this concern, I regress log credit scores, log consumption, and log borrowing on the waiting period.

I repeat this exercise at the five, ten, and twenty year marks following default and report the results in Tables 6-8. The results in Table 6 are consistent with the time series averages from Figure 4. Here we see that a longer waiting period is associated with a lower credit score five, ten, and twenty years after default. Not only that, but the effects are larger at the ten and twenty year marks than at the five year mark, suggesting a strong persistence in the credit score drop with a longer waiting period. Similarly, a longer household is associated with decreased borrowing from households in the periods following default. The same is true for consumption although the magnitude of the decrease is not dramatic and represents a 0.1% decrease in consumption five years after default and a 0.04% decrease twenty years after default. Nonetheless, these results demonstrate the lasting effects of default, and, in particular, show the increased costs of default as the waiting period increases. Thus, in addition to the eligibility effect documented in Figure 2, these results highlight the additional mechanisms responsible for the decreased default rate.

Table 5: Credit Score After Default by Waiting Period

	Log(Credit Score)		
	Years After Default		
	Five	Ten	Twenty
Waiting Period	-0.002***	-0.022***	-0.021***
	(0.001)	(0.001)	(0.001)
Observations	29,993	25,242	21,982

Table 6: Borrowing After Default by Waiting Period

	Log(Borrowing)		
	Years After Default		
	Five	Ten	Twenty
Waiting Period	-0.003***	-0.004***	-0.004***
	(0.0003)	(0.0003)	(0.0003)
Observations	29,993	25,242	21,982

Table 7: Consumption After Default by Waiting Period

	Log(Consumption)		
	Years After Default		
	Five	Ten	Twenty
Waiting Period	-0.001***	-0.001***	-0.0004***
	(0.0001)	(0.0001)	(0.0001)
Observations	29,993	25,242	21,982

Table 8: Average Equilibrium Consumption by Waiting Period

Waiting Period	Two	Four	Six	Eight	Twelve
Average Consumption	0.7903	0.7911	0.7907	0.7905	0.7903

4 Conclusion

This paper contributes to the theoretical literature on bankruptcy by examining the dynamic implications of the Chapter 7 waiting period. In so doing, it became the first quantitative model of unsecured credit and default to expressly model a temporary exclusion from default following a prior instance. It also became the second paper of its kind to endogenous the default decision through the use of a credit scoring mechanism. These features establish a robust framework for evaluating the waiting period in a dynamic setting which sheds lights on the implications of the policy. As a result of this construction, I am able to show that a longer waiting period is associated with lower default rates. The focus of this paper was to elucidate the mechanisms driving this result. I show that a longer waiting period is costly to defaulting households in that a default under such regimes is associated with larger drops in the household credit score, but also that this decreased credit score persists for 20 years after default. This credit score effect is ultimately accompanied by decreased borrowing and decreased consumption in the 20 years after default. This suggests that the costs of default under a longer waiting period regime is not strictly limited to the consequences of receiving an expense shock without the default "insurance." Instead, the costs exist dynamic as defaulting households continue to pay for their default long after. As such, we can conclude that a longer waiting period, while potentially beneficial for non-defaulters, extracts additional costs from the remaining defaulters.

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