

# Empirical determinants of intertemporal choice

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**Abstract:** We provide new evidence on the empirical determinants of intertemporal financial decisions. We use an exogenously imposed choice affecting nearly all Croatian retirees to study characteristics associated with choosing a larger, deferred stream of payments over a smaller, more immediate payment. Individuals are more willing to defer if they have higher incomes and are not liquidity constrained, have a longer time horizon because of better health and longer life expectancy, and have stronger bequest motives. Individuals who expect currency devaluation or political risk to reduce the value of future income are more likely to take the earlier income stream.

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# Empirical determinants of intertemporal choice

## 1. Introduction

Models of intertemporal decision-making permeate economics and finance, and have implications for savings, asset prices, and economic growth, among many other topics. Although many consumption-based models, dating at least back to Samuelson (1937), summarize intertemporal decisions through a single discount rate parameter, the reality is more complex. Intertemporal decisions can be affected by a wide range of attitudes, subjective beliefs, cognitive biases, and financial constraints. In this paper, we provide new evidence on the empirical determinants of intertemporal decisions and the ways in which they vary across the population. Using an exogenously imposed choice affecting nearly the entire population of Croatian retirees about whether to accept a smaller, more immediate pension payment or a larger stream of delayed payments, we show that individual decisions are correlated with income, liquidity constraints, longevity expectations, bequest motives, and perceptions of economic and political risk. We also show that some of these effects, particularly some of the perceptions of economic and political risk, are more muted among liquidity-constrained individuals, consistent with their having less financial flexibility to choose the longer but more generous payout stream.

Our choice is an exogenously-imposed decision made by all eligible Croatian retirees in late 2005 as the result of a 1998 ruling by the Constitutional Court of Croatia. The ruling ordered the government to make substantial payments to retirees as compensation for an unconstitutional benefit cut that had occurred during and

immediately after the war in the former Yugoslavia in the early- to mid-1990s. In late 2005, eligible retirees were offered a one-time, irrevocable choice between a more immediate (but partial) and a more deferred payment stream. Although the deferred payment option offered a nominal internal rate-of-return in excess of 26 percent relative to the more immediate payment option, 71 percent of retirees chose the more immediate option.

We empirically examine the determinants of this choice using micro data from a nationally representative survey that we designed and fielded for this purpose in the period from late 2008 to early 2009. This survey allows us to assess the relative importance of a wide range of factors that are predicted by theory to be important for intertemporal decision-making.

Our study contributes to the large literature on intertemporal decision-making. Most prior papers frame the question in terms of estimating discount rates, and find mixed results. For example, whereas several efforts to measure discount rates from surveys and experiments have found evidence of very low (and even negative) discount rates (e.g., Loewenstein, 1987; Loewenstein and Thaler, 1989; Loewenstein and Prelec, 1991 and 1992; Barsky, Juster, and Kimball, 1997), a number of other studies have estimated discount rates that are extremely large (e.g., Hausman, 1979; Lawrance, 1991; Samwick, 1998; Warner and Pleeter, 2001). Some authors have suggested that unobserved differences in liquidity constraints may be important for reconciling these strands of the literature, a factor that we can directly examine in our setting. A number of other papers examine how intertemporal decisions correlate with various demographic characteristics such as income, education, and race (e.g., Gilman, 1976;

Black, 1984; Lawrance, 1991; Samwick, 1998; Warner and Pleeter, 2001; Harrison, Lau, and Williams, 2002). Many of these studies, however, have been hampered by methodological concerns, including sample selection issues, the hypothetical nature of the choice (in case of some surveys and experiments), and a host of omitted variables.

In comparison to the existing literature, our setting offers at least three important advances. First, this setting allows us to examine actual, rather than hypothetical, choices over an amount of money large enough to be quite meaningful to the typical retiree: on average, the monetary value of the settlements was roughly equivalent to a year of household income for the average Croatian retiree. Thus, our study shares an advantage of the Warner and Pleeter (2001) study in that it does not suffer from the bias that may arise when studying hypothetical decisions over small stakes, an issue that plagues many experimental studies.

Second, the policy decision about the size of this repayment and the population to receive it was determined by a Constitutional Court decision and a subsequently passed law. Thus, we have a fairly clean experimental setting that is not contaminated by concerns about representativeness or self-selection, issues that are common in many other experimental or empirical studies of intertemporal choice. For example, Warner and Pleeter (2001) analyze the intertemporal decision made by those who opted to separate voluntarily from military service, a group that may differ from those who chose to continue military service.

Third, we examine a broader range of determinants than any prior study. Through data collected from a comprehensive survey, we combine economic, demographic, preference, and expectations variables, while also controlling directly for

factors that have hampered many previous studies, including liquidity constraints. Our data allow us to disentangle and assess the relative importance of many characteristics and attitudes upon intertemporal choice. For example, we are able to examine how self-reported beliefs about economic and political risk to future benefits are correlated with a real and economically important decision, an advance over prior studies of political risk, such as Luttmer and Samwick (2011), that rely on survey responses to hypothetical trade-off questions.

We find that willingness to defer payments in this setting correlates with a number of demographic characteristics in a manner consistent with the predictions of standard life cycle models. For example, we find that individuals are more likely to take the deferred payment if they are younger, in good health, and have longer life expectancies, and thus can expect to receive payments for more years. We find that those with children and who express a stronger bequest motive are also more likely to take the deferred payment, consistent with them knowing that if they pass away before receiving all the benefits, their children will continue to receive the higher benefit. We also show that individuals are more likely to defer if they have higher income and are not liquidity-constrained. Individuals also take the broader macroeconomic environment into consideration: those more concerned about future inflation and those more concerned about the possible devaluation of the Kuna (the Croatian currency) were more likely to take the immediate payment option. Individuals who express a lower level of confidence that the government will make good on the committed payments are more likely to choose the immediate payment option. We show that many of these factors interact in important ways with liquidity constraints. In particular, we

find that liquidity-constrained individuals are less responsive to differences in bequest motives, expectations of inflation, and perceptions of political risk.

Although the institutional details of our setting are specific to Croatia, the findings are of much more general interest. Nearly every developed country faces long-term shortfalls in the financing of old-age entitlement programs. This has led some countries to consider ways of allowing participants voluntarily to opt out of a portion of their benefits in exchange for a private account.<sup>1</sup> Knowing which individual characteristics are correlated with a willingness to accept a substantial reduction in the present value of benefits in order to receive payments early is important for understanding both the fiscal and distributional implications of such proposals. This is also true at the sub-national level. The underfunded status of many of the U.S. public defined benefit pension plans has led to an erosion in confidence that benefits will be paid. For example, Novy-Marx and Rauh (2009) calculate that state public pensions are under-funded by \$3.23 trillion. The presence of political risk in such systems may lead participants in these systems to discount future benefits at a higher rate (e.g., Shoven and Slavov, 2006; Luttmer and Samwick, 2011). If so, the cost of these programs may exceed the perceived value to the participants, and offering lump-sum options in return for a substantial actuarial reduction in the present value of benefits may be a plausible path to reform. Indeed, exactly this approach has been taken over the past few years by a number of large private-sector defined benefit plans, including General Motors.

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<sup>1</sup> In the U.S., for example, the 2001 President's Commission to Strengthen Social Security proposed allowing individuals to redirect part of their payroll taxes into personal accounts in exchange for a future reduction in their defined benefit income from Social Security.

Understanding the distributional implications of such options requires an appreciation of who is most likely to choose the expedited payout.

This paper proceeds as follows. Section 2 provides background on the Croatian pension repayment choice. Our research methodology and summary statistics are presented in Section 3. Section 4 presents empirical results, and Section 5 concludes.

## **2. Background on the Croatian pension repayment choice**

### *2.1 Legal background*

After declaring its independence from the former Yugoslavia in 1991, Croatia became embroiled in a war, with military activity ending by August 1995. During this period, the Croatian government operated under considerable pressure and with a scarcity of resources—it faced the need to finance the war effort, absorb the effects of war destruction, bear a severely challenged economy, as well as perform a simultaneous transition toward a market economy and democracy in the post-communist era. Under these circumstances, one of the steps the government undertook at the time to secure additional resources was altering the manner in which public pension benefits were calculated. The change in the benefit took the form of a switch from wage-indexing to price-indexing of benefits, which had the effect of lowering the amount of money retirees had received. This alteration was in place from late 1993 to the end of 1998, at which point wage-indexing resumed.

Shortly after the cessation of military operations in 1995, organized groups representing the interests of affected pensioners filed a series of lawsuits questioning the constitutionality of this pension change. In 1998, the Constitutional Court of Croatia

agreed that the benefit change was unconstitutional and ruled that the government must reimburse retirees for the benefit shortfall. However, the Court did not prescribe how this remediation program was to be implemented. Six years of political negotiations followed, with legislation finally being passed on July 21, 2004. This legislation stipulated that retirees should receive the difference between what they were owed under the law and what they had actually received, along with interest. The payments were to be made from an investment fund established solely for this purpose, with funding guaranteed by the state.

## *2.2 The size and timing of payments under the two options*

Another year had passed before the manner of the payment and the payment options were fully developed. Finally, in December 2005, approximately 430,000 individuals (a substantial fraction of the Croatian retiree population and about one-tenth of the total population of Croatia) were given a choice between two options for receiving their payments. In this section, we first discuss the fact that the amount owed to the typical retiree was economically meaningful. We then discuss the two options in more detail.

Table 1 shows the distribution of the pension repayment amount for the full sample, as well as by income groups (both the pension repayment amount and the income level are self-reported). On average, the pension repayment amount roughly equates to a year of household income for the typical respondent. For example, among respondents in the 2,000-4,000 Kuna monthly income bracket (annual income of 24,000 to 48,000 Kuna), both the median and mean pension repayment amounts are around 36,000 (about \$7,000 U.S. dollars, as measured at the time of the survey). As expected,

higher-income individuals are owed a higher pension-repayment amount because they likely had larger pensions.

Retirees were presented with a choice, designated by the government and communicated to retirees as choosing between option A and option B. Individuals who chose option A were promised four semi-annual payments—totaling 50% of the nominal value of the calculated amount owed—that were to commence in mid-2006 and terminate in December 2007. Those who chose option B were promised six annual payments—totaling 100% of the nominal calculated amount owed—that were to commence in December 2007 and terminate in December 2012.

Table 2 presents the breakdown and timing of the payments that would be made under option A (the more immediate payments) and option B (the more deferred payments) for someone with a pension repayment amount of 60,000 Kunas. As shown in the bottom row of Table 2, the break-even nominal discount rate that equates these two payment streams is approximately 26.6%. Despite the high nominal return from choosing option B, about 71% of participants chose option A, the earlier, smaller stream of payments.<sup>2</sup>

To put this nominal 26.6% return into perspective, we consider how this relates to other rates of return available to Croatian citizens at the time and to inflation. As illustrated in Fig. 1, the 26.6% return is quite high in comparison with other savings instruments. In the years around the time of the pension choice, rates on certificates of

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<sup>2</sup> Večernji List reported on June 27, 2007 that 299,910 retirees received their third payment under Option A in late June 2007. Večernji List reported on December 16, 2008 that 123,321 retirees received their second payment under Option B in mid-December 2008.

deposit (CDs), savings, and government bonds—be they denominated in Kunas or in foreign currencies—were substantially below 26.6%.

Post-war inflation has been relatively stable, reaching a high of approximately 8% in 1998, and hovering around 4% for much of the past decade. However, this period of relatively low and stable inflation is coming on the heels of a period of extremely high inflation. Thus, although the 26.6% nominal return corresponds, *ex post*, to a very high real return, it will be important to control for heterogeneity in individual views about inflation risk (accomplished by using our survey instrument, as discussed below). Overall, by virtually any measure, the internal rate of return provided by delaying pension payments was quite substantial.<sup>3</sup>

### **3. Research methodology and summary statistics**

#### *3.1 Survey methods*

Fielding our own survey of retirees was both necessary and desirable for two primary reasons. First, Croatia does not have a nationally-representative, household data set that could be used for this purpose, and Croatian privacy laws rendered administrative data unavailable. Second, all of the data needed for this study (e.g., pension choice, demographic data, and, particularly, data on liquidity constraints, preferences, attitudes toward government, and the like) would not have been included in standard household data sets.

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<sup>3</sup> Given the high internal return on deferral, a natural question is why a formal market for financial intermediation of these benefits did not arise. A more patient investor (such as a financial institution) would have had an incentive to provide pensioners with money up front in return for receiving the deferred payments, thus earning exceptionally high rates of return. Such institutional arrangements were explicitly outlawed in the legislation creating this program. Of course, retirees could have made such arrangements informally and privately with family members (such as children), suggesting that it is important to control for whether the pensioner had children in our regression analysis.

We hired a Croatian survey agency PULS (affiliated with the U.S. Gallup polling organization) to conduct our own survey of retirees concerning their pension choice. This survey was fielded from mid-November 2008 to mid-January 2009, at a time the pension choice was still fresh in the respondents' minds. Those who had chosen option A (the more immediate payment option) would have just about received their final payment, whereas those who had chosen option B would have been early in the repayment process. The survey, designed to be representative of the affected population and fielded accordingly, asked the respondents detailed questions about their pension choice, demographics (e.g., age, income, gender, family status), and a range of questions to assess knowledge, beliefs, and attitudes about economic and financial matters.

### *3.2 Sample representativeness*

We collected 2,619 survey responses.<sup>4</sup> In our contract with PULS, we requested that the sample be nationally representative of the Croatian retiree population. Given the agency's extensive experience in conducting surveys subject to such constraints, we have no reason to suspect that there are substantial deviations from this ideal. Nonetheless, we have conducted our own comparisons with other public data, such as the Croatian Census, where possible. However, we note that our comparisons are imperfect because Census data tend to split by age rather than by retiree status. Nonetheless, as discussed below, our comparisons give us considerable comfort that our sample is broadly representative of the Croatian retiree population.

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<sup>4</sup> When we turn to our Probit analysis, we lose a total of 129 observations because of missing values for variables included in our regression, resulting in the final sample size of 2,490 for our analysis.

Starting with our dependent variable, 1,818 respondents, or 69.4% of the sample, selected option A, whereas 801 respondents, or 30.6% of the sample, selected option B. These proportions match the division of choice within the population almost exactly (69.4% of the sample opting for option A, compared to 70.9% of the full population).

Turning to other demographic characteristics, we find that 87.6% of our sample self-reports their ethnicity as Croat, compared to 86.1% in the 2001 Census. 58% of our sample is female, compared to 58.9% of the Croatian population that is age 60 and over. Our comparisons suggest that our PULS sample may have slightly under-represented very-low-income households (9.1% of our sample versus 16.4% of the age 60+ population that have monthly income less than \$2000 Kuna) relative to households earning \$2-4 thousand Kunas per month (46.4% of our sample versus 37.5% of the age 60+ population), although the proportion making over \$4,000 Kunas per month in our sample quite closely matches the population (44.5% in our sample versus 46.1% in the population). Our sample appears to slightly over-represent Zagreb (the capital) and the Zagreb county, accounting for 31.3% of our sample versus 24.9% of the Croatian age 60+ population. The only substantial outlier appears to be with regard to education: 28.4% of our sample has greater than a high school education, compared with 13.2% of those over age 60 in the Croatian census.

Our overall conclusion from these comparisons is that, although our sample is not a perfect statistical representation of the full retiree population, it is broadly representative along key dimensions. Where there are differences, we note that we include a very extensive set of demographic controls (including all of the variables just

compared) in all of our specifications, so that these sample differences should not lead to bias in our estimated coefficients.

### *3.3 Summary statistics*

In Table 3, we report summary statistics for our sample, including all of the covariates that we include in our regressions of the pension repayment choice. The only exception is that our regressions also include 24 indicator variables depicting the individual's county of residence within Croatia, as well as 10 indicator variables for the ethnicity of the individual, none of which we provide in the table.

Our analysis will examine a wide range of factors that theory suggests as potentially important for intertemporal decisions. In Table 3, we divide these factors into six groupings: measures of income, wealth, and liquidity constraints (panel A), family structure and other demographics (panel B), health and longevity (panel C), subjective risks to the benefit stream arising from inflation, currency devaluation, and political risk (panel D), proxies for rate of time preference and risk aversion (panel E), and education, financial literacy, and financial self-assessment (panel F).<sup>5</sup> Table 3 suggests that our survey respondents exhibit substantial heterogeneity along most of these margins. Given the myriad of factors involved in making an intertemporal choice, we turn to regression analysis to sort out their relative importance.

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<sup>5</sup> Individuals were asked to respond to most questions on a scale of "1" to "5," with "1" typically representing "not at all important" and "5" typically representing "extremely important." We collapse these five potential responses into three categories: "Not Important" (responses "1" or "2"), "Moderately Important" (response "3"), and "Very Important" (responses "4" or "5").

### *3.4 Methodology*

The primary dependent variable for our analysis is a binary variable, “ChooseB,” set to one if the respondent had selected option B (the larger, more deferred payouts) and to zero if the respondent had selected option A (the smaller, more immediate payouts). If one were to interpret the choice of the repayment plan as driven solely by a comparison of one’s discount rate to the internal-rate-of-return, those with the dependent variable value of 1 (i.e., those who chose option B) would be viewed as having a discount rate below 26.6%, whereas those with the value of 0 (i.e., those who chose option A) would be viewed as having a discount rate in excess of 26.6%. As we stress below, however, we do not believe this is the appropriate interpretation because intertemporal choices are driven by a much larger number of factors.

We run a standard Probit model to analyze how this choice varies with a range of covariates. To aid in interpretation, our tables report the marginal effects of the Probit coefficients, evaluated at the mean. For convenience, we multiply all coefficients in the table by 100 to facilitate their interpretation as percentage points. Given our definition of the dependent variable, a positive coefficient associated with a covariate should be interpreted as an increased willingness to defer consumption, whereas a negative coefficient should be interpreted as a decreased willingness to defer consumption.

Our survey was conducted roughly three years after the pension repayment choice had been made and after several scheduled payments from the Croatian government have been completed. This timing raises the concern that individuals may have responded in a certain way to rationalize ex-post their choice. For example, those

who chose the immediate payment stream may seek to rationalize that choice by blaming, at the time of the survey, the factors that were not actually important at the time the choice was made. Of the many results in this paper, the finding regarding the mistrust of government is the one most likely subject to endogeneity bias. Although we discuss below why we believe that ex-post rationalization is unlikely to be driving our results, we nonetheless acknowledge this potential endogeneity and, therefore, are cautious to interpret the political risk finding as causal.

#### **4. Empirical analysis of the determinants of intertemporal choice**

In Table 4, we turn to our Probit analysis. We focus our discussion on four sets of results that are economically and statistically significant. The four groupings include: (i) resources, as measured by income and liquidity constraints, (ii) time horizon, as measured by health status and longevity expectations, (iii) the relative value of own-consumption versus bequests, and (iv) an assessment of various risks to the income stream, including inflation, currency devaluation, and political risk.

Although we focus on these four areas, we note that our regressions include the full set of variables from Table 3. The full set of marginal effects associated with these variables is presented in the Appendix (Table A.1).<sup>6</sup> Regression results indicate, for example, that proxies for risk aversion, financial literacy, gender, and marital status do not significantly predict intertemporal choice. We do find that within-household spousal choices are highly correlated, but we view this as an endogenous outcome of a

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<sup>6</sup> The only coefficients we do not report in Table A.1 are the 24 indicator variables capturing the respondents' county of residence and the 10 indicator variables for the respondents' ethnicity (e.g., Croat, Serb, Muslim/Bosniak). We do report the statistical significance of each of these two sets of indicator variables in the Probit model.

joint household decision rather than a causal relation. Nonetheless, we control for within-household spousal choices in all specifications, although the coefficients on other variables are virtually unchanged if we exclude the spouse's choice. Like many prior studies, we do not find that survey questions about current versus future money trade-offs predict actual behavior.<sup>7</sup>

#### *4.1 Income and liquidity*

In discussing why econometric studies of behavior often find very high subjective discount rates whereas experimental/survey results often find very low rates, Barsky, Juster, and Kimball (1997) note that a possible explanation is the difficulty of controlling for liquidity constraints in empirical studies. An advantage of conducting our own survey is that, in addition to controlling for income directly, we were able to include a question to help us proxy for liquidity constraints.

We begin in Column 1 of Table 4 with income. We find that, relative to those earning less than \$2,000 Kunas per month, middle and higher income households are 10 to 11 percentage points more likely to take the deferred payments.

To test for liquidity constraints, we ask respondents to rate on a scale from 1 (not at all important) to 5 (extremely important) how important to their payout choice was the factor "an immediate need for money to help pay some expenses, such as debts, medical expenses, bills, home or apartment repairs or renovation, replacement of major

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<sup>7</sup> Our question is similar to those of Kirby, Petry, and Bickel (1999) and Chabris, Laibson, Morris, Schuldt, and Taubinsky (2008). We describe a situation in which the individual has received 20,000 Kunas (just under \$4,000 U.S. dollars at the time of the survey). and is given a choice between keeping the money and "doing with it as you please," or depositing the money with an "extremely reputable bank as a CD for one year, so that you will be promised a certain annual interest rate, but will not be able to touch the money until the year expires." We then ask what interest rate, if any, they would need to be paid to defer access to the money for one year (we use branched response method for those who did not provide an initial response). These responses are not correlated with the A versus B choice.

appliances, or similar, for self, family, or friends.” One quarter of the respondents answered that liquidity constraints were not important (answers “1” or “2”), while one-half of the respondents answered that liquidity constraints were very or extremely important (answers “4” or “5”). A simple cross-tabulation suggests liquidity constraints are important: only 22 percent of liquidity-constrained individuals choose the deferred-payment option B, compared to 40 percent of unconstrained individuals. Turning to the multivariate analysis, we see in the first column of Table 4 that, conditional on all other factors, individuals who rate liquidity constraints as moderately important are 9 percentage points less likely to take the deferred payment option, whereas those who rate liquidity constraints as very important are 20.8 percentage points less likely to defer payments. Both coefficients are highly significant.

Given the theoretical (and, from the results just presented, empirical) importance of liquidity constraints, we report all subsequent results for two separate samples: the approximately one-half of the sample that is more liquidity constrained (answered the question with a 4 or 5), and the approximately one-half of the sample that is not constrained (answered 1, 2 or 3). These results are reported in column 2 (not constrained) and column 3 (constrained) of Table 4.<sup>8</sup> We indicate statistically significant differences between the effects for non-liquidity constrained and liquidity constrained at the 10-percent level (5-percent level) by italics (bold italics).

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<sup>8</sup> The sum of the numbers of observations reported in columns 2 and 3 is 2,412, falling short of 2,490, the overall number of observations in the first column. This discrepancy is a reflection of the fact that 78 respondents in our sample answered “Don’t know” to the question inquiring about their liquidity constraints.

## 4.2 Time horizon

We next turn to expectations about living long enough to receive the promised payments. This is a particularly relevant consideration in a sample of pensioners. Indeed, in standard consumption models, one can think of mortality rates as playing a similar role to discount rates, in that both lessen the present value of future income. However, in most studies of discount rate behavior, researchers have not had access to information about longevity expectations aside from a respondent's age, which does not encapsulate within-cohort heterogeneity in mortality expectations. In our survey, we are able to control for measures of health and subjective mortality in addition to age, and we find that both are significant determinants of choice.

For each additional year of age at the time the pension repayment choice was made, an individual was 1.1 percentage point less likely to defer consumption: this finding also holds in both liquidity-constrained and unconstrained sub-samples. Even after conditioning for age, individuals who rated their own health as good or excellent relative to peers were significantly more likely to defer payments. In the full sample, those in good or excellent health were 6.2 percentage points more likely to defer consumption, consistent with good health being associated with a higher likelihood of receiving and being able to enjoy the future payments. The coefficients in columns 2 and 3 show that this health effect is concentrated on the population that is not liquidity constrained, although differences in the magnitudes of the effects across the two groups are not statistically significant at conventional levels. Essentially, those who were both healthy and unconstrained were more likely to take advantage of the high implicit return from waiting. In contrast, those who were liquidity constrained were less

inclined to take advantage of the deferred payments even when they perceived their own health as better than average.

Finally, individuals who rated themselves as moderately or very likely to live at least another seven years (the horizon required to receive the full payouts from the deferred payment option) were 14-15 percentage points more likely to take the deferred option. This holds true regardless of whether the individual is liquidity constrained.

#### *4.3 Relative value of own-consumption versus bequests*

This discussion of longevity assumes that an individual cares primarily about own consumption. However, the legal provisions of the government payment scheme allows for payments to be inherited by “heirs of the first order,” including children. Thus, the presence of children and attitudes about the relative value of own consumption versus bequests should also matter for this decision. An individual who places a relatively greater value on bequests may be more likely to take the deferred payments and the larger rate of return implicit in this choice, knowing that their heirs will benefit even if they do not.

We included three measures of consumption-bequest trade-offs, and all are significant determinants of choice. Our first measure is simply the presence of children. Having children makes it 12 percentage points more likely that one will choose the higher-return, deferred payment option. The second measure asks about the importance of leaving money behind to heirs. Those who indicated that leaving money to heirs is very important to them were 19.5 percentage points more likely to pick option B relative to those for whom this was not an important consideration in their choice. The third measure asks about own consumption by asking the respondents to rate the importance

of receiving the most money while alive. Those who rated this consideration as important were 6.7 percentage points more likely to take the more immediate payment option (less likely to pick option B) than those for whom this was not important. Splitting the sample by liquidity constraints reveals that consumption versus bequest considerations were relatively more important for the respondents who were not liquidity constrained.

#### *4.4 Perceived risk to future benefits*

Risk averse agents will rationally place a lower value on a future stream of payments (Option B) if they perceive that payment stream as risky. There are three potentially important sources of risk to the real income stream being promised to pensioners under the deferred payment option: (i) high inflation, (ii) Kuna depreciation, and (iii) political risk.

##### *4.4.1 Inflation*

Given that the promised benefits are stated in nominal terms, retirees may have different perceptions of the risk to their real benefit stream due to heterogeneous views about inflation. After all, Croatian retirees eligible for compensation had witnessed two destructive wars, high inflationary periods lasting several years and accompanied by multiple “stabilization” attempts and recessions, and hyperinflation during the pre-war and war period of the late 1980s and early 1990s. In contrast, the decade immediately prior to the pension repayment choice was marked by fairly mild inflation. Thus, it is possible that there was substantial heterogeneity in beliefs about the purchasing power of the Kuna.

Our survey asked individuals “at the time you were making your A or B choice, how high did you think that annual inflation would be (that is, by how much would prices rise each year) over the period of the next several years from that time?” They were given several choices (0-4%, 5-8%, 9-12%, 13-16%, more than 16%), which we collapsed into three ranges (0-8%, 9-16%, more than 16%). Whereas only 2% of sample respondents expected inflation to be more than 16% per year, these individuals were 9.6 percentage points less likely to choose the deferred payment option than those who believed it would be 8% or less per year were (although the coefficient escapes standard levels of statistical significance). Among those who were not liquidity constrained, a belief in high inflation is associated with a highly significant 26.8 percentage point reduction in the probability of taking the deferred option. Once again, those who were liquidity constrained were significantly less responsive: liquidity-constrained individuals were no more or less likely to take the deferred option based on inflation concerns.

#### *4.4.2 Exchange rate risk*

The purchasing power of the Kuna is also affected by exchange rates. Croatia is a relatively small, open economy, and average citizens are aware of the importance of maintaining the Kuna’s purchasing power relative to other currencies (especially the Euro). Thus, we also asked “at the time you were making your A or B choice, what was your opinion about the movement of the Kuna relative to the Euro over the period of the next several years from that time?” Those who thought that the Kuna would decline relative to the Euro were 4.8 percentage points less likely to take the deferred payment

option. This effect does not statistically differ between constrained and unconstrained individuals.

#### 4.4.3 Political risk

Croatia's recent political history, including the events that led to this study (the government's decision to hold back partially on pension promises), individual perceptions of the government's likelihood of making good on its promised payments is a relevant consideration. To the extent to which respondents did not exhibit strong confidence that future payments indeed will be made, they may have behaved *as if* they were discounting the future more steeply.

We tested for the influence of political risk in two ways that differ in terms of whether the issue was raised in a more positive or a more negative frame. In the more positive frame, we asked the respondents "at the time you were making your A or B choice, how confident were you that the government would make all of the payments to all the retirees who selected option B?" They were given a 5-point scale, where 1 was "not at all confident" and 5 was "extremely confident." This extent of confidence has a quantitatively and statistically important effect on people's decisions. Relative to those who expressed little confidence in the Croatian government's ability to make all the payments, those who rated this factor as a 3 on the confidence scale ("moderately confident") were 10.5 percentage points more likely to choose the delayed payout option, while those who answered 4 or 5 on the confidence scale (grouped into the "very confident" category in the table) were 19.7 percentage points more likely to choose the delayed payout option. These effects are statistically similar across both liquidity-constrained and unconstrained groups.

We also asked a negatively-framed question. Specifically, in our list of factors that the respondents were asked to rate in terms of importance in their decision-making (a 5-point scale, on which 1 is “not at all important” and 5 is “extremely important”), we asked respondents to rate the importance of a “concern that the government might not honor its commitment to pay out all of the money owed.” Even after controlling for the confidence question above, the importance of this factor also has a significant effect. Those who rated this concern as a 4 or 5 on the importance scale (grouped into the “very important” category in the table) were 6.6 percentage points more likely to choose the more immediate payment option than those who rated it as not an important factor were. This effect occurred only among those who were not liquidity constrained, for whom the coefficient is -15.2. In contrast, the coefficient on the negatively framed question about confidence in government is much smaller (-1.2) and not statistically significant among those who were liquidity constrained (the difference between these two coefficients is statistically significant at the five-percent level).

We acknowledge and attempt to address three possible concerns with these political risk findings. The first concern is that individuals might have answered these questions on the basis of the beliefs they held *at the time of the survey*, rather than *at the time of the choice* (as we asked them to do). The evidence, however, is consistent with respondents taking the “at the time you were making your A versus B choice” request seriously while responding to our survey. We are able to test this hypothesis because approximately one-half of our respondents had been interviewed before the Croatian Postal Bank (HPB), the entity that administered the payments, announced and paid out the second B payment, and the other half of our respondents were interviewed after the

second B payment had been deposited.<sup>9</sup> If individuals' responses reflected their beliefs at the *time of the survey*, the reported confidence in receiving *all* the payments should have increased after the second payment of the six payments had been announced and deposited (i.e., when surveyed, respondents who had seen 1/6 of all payments under option B made would likely have had less confidence in all of the payments being made than those who had seen 2/6 of payments made). However, a comparison of the distribution of responses to the questions regarding confidence in all the B payments made and concern about government renegeing on its promises offered by those interviewed before the announcement of the second payment to those interviewed after the second payment reveals no change,<sup>10</sup> a finding consistent with the notion that the respondents had answered on the basis of their confidence in government *at the time of choice*.

The second concern, as we discussed earlier, is that individuals may have engaged in ex-post rationalization of their decision to take the early, partial payment. That is, after seeing the government follow through on the earliest payments of the deferred-payment option, individuals may have come to believe they had made a mistake in choosing the more immediate payment option and thus, ex post, have rationalized their decision by blaming a lack of trust in government. There are two

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<sup>9</sup> The Croatian Postal Bank (HPB) announced the second payment under Option B on December 16, 2008 and deposited it in retirees' accounts on December 17, 2008; 46.3% of the sample was interviewed before December 16 and 48.6% of the sample was interviewed after December 17.

<sup>10</sup> Of those interviewed after only one B payment had been made, 30.5% were very confident all six of the B payments would be made, while 38.0% were not confident this would happen. Of those interviewed after two of the B payments had been made, 33.6% were very confident all six of the B payments would be made, while 36.0% were not confident (with none of these figures statistically different across the two groups). Similarly, of those interviewed after only one (two) B payment(s) had been made, 44.8% (43.6%) rated the concern that government might not honor its commitment as very important, with 26.0% (26.4%) rating that concern as not important.

reasons, however, why we believe this possibility is not driving the entirety of our results. First, if embarrassment about making the “wrong” choice were a factor, one might expect some of the individuals who had chosen option A simply to state incorrectly that they had chosen option B instead. However, as noted earlier, the sample proportion matches nearly exactly the proportion of the population that chose option A versus option B (and this further holds whether people were interviewed before or after the second B payment was announced and deposited). Second, if individuals were more likely to regret their decision and blame the government as it became clearer that all the deferred payments would actually be made, we would expect that the magnitude of the coefficient on our confidence in government measures would increase after the second payment was made. However, in unreported analyses, the coefficients on *Choice time confidence all B payments will be made* being very confident and *Concern gov't might not honor its commitment* being a very important concern are virtually indistinguishable between those who took the survey before or after the second payment had been made.<sup>11</sup> Whereas these results are reassuring, the nature of the survey instrument implies that we remain unsure whether individuals responded in a certain way to justify their own behavior. Thus, we urge caution in drawing causal inferences from these correlations.

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<sup>11</sup> Among the respondents interviewed before the second B payment was announced, those who were very confident at the time of choice that all B payments would be made were 23.2 percentage points more likely to select option B than those who were not confident of this, while that figure was 18.0 percentage points for those interviewed after the second B payment was made. The *p*-value of the difference between these two coefficients is an insignificant 0.28. The difference in the coefficient on *Concern gov't might not honor its commitment* being a very important concern, based on when the respondents were interviewed, is also small in magnitude and highly insignificant. These results were obtained from augmenting our baseline regression in Table 4 with an interaction of our political-risk variables with whether the individual was interviewed after the second B payment was made. Similarly, the timing of the survey did not affect the results in either subsample defined by the respondents' liquidity constraints.

The third concern is whether findings about political risk in Croatia can be reasonably expected to extend to other countries, particularly given the country's recent political and economic history. To put these concerns in context, we used the 2005-2007 World Value Survey and the 2008 survey performed in Croatia by Gallup Balkan Monitor. For each country, we calculated the percentage of respondents who expressed at least some degree of confidence in government. The countries included in these calculations have had 2006 GDP per capita in excess of \$10,000, according to the data from the World Bank. Among this group, Croatia makes it into the top quartile of trust, ahead of both the United States and the United Kingdom. Thus, although we recognize that one must exercise caution in assuming that political risk findings in one cultural setting extend to all others, the fact that Croatia scores well on trust in government suggests that, if anything, other nations may find these factors even more important than what we find here.

The finding that political risk leads to a willingness to accept a payment discount has numerous implications for other settings in which political risk to benefits may be relevant. For example, if workers covered by a public pension system discount future benefits because of political risk, this could increase labor supply distortions and thus create efficiency costs if it reduces the perceived linkage between current taxes paid and expected future benefits (Summers, 1989). To the extent that there is political risk in the pensions of public employee pensions (e.g., Detroit), employees who do not fully value future benefits will not accept the same level of wage reductions in return for the pension promise, thus raising the cost of providing public services. Another implication of a "political risk premium" is that a public pension system might be able

to reduce its long-run liabilities by offering individuals an opportunity to exchange future benefits for (more steeply discounted) near-term benefits. Luttmer and Samwick (2011) provide evidence of a willingness to accept reduced benefits in the U.S. context in which, using survey data, they estimate that, on average, U.S. households would be willing to forego 4 to 6 percent of their scheduled Social Security benefits to remove the associated political uncertainty.

## **5. Summary and conclusions**

In this paper, we empirically examine the determinants of intertemporal choice. We exploit a unique policy change in Croatia whereby hundreds of thousands of eligible retirees were given the choice between two payment streams to compensate them for past underpayments from the pension system. One option offered more immediate, yet partial payments, while the other offered a more deferred payment structure (with an internal rate of return of more than 26% compared to the first option). Our use of micro-level survey data enables us to examine a wide range of possible determinants of this choice, including proxies for beliefs about various types of political risk.

Those who reported receiving higher income and not being liquidity constrained were more likely to accept the higher return offered by the deferred payment from the government. The respondents more likely to live long (and be healthy) enough to receive and enjoy the payments were also more likely to take the deferred payment option. Similarly, those who have children (who can inherit the account) and bequest motives were more likely to choose the deferred option. We also find that risk

perceptions are important. Those more concerned about currency depreciation were less likely to choose the deferred option, as were those less confident that the government would honor its payment scheme.

We also find that liquidity-constrained respondents were less responsive to concerns about bequest motives, high inflation, or political risk, presumably because they needed the money regardless of their views on these factors. In contrast, those who were not liquidity constrained had the flexibility to take into account a wider range of factors.

Overall, our findings underscore that intertemporal choices are the outcome of a rich set of factors. Although a few of the factors found to be important in this study (e.g., age, income) are commonly observed in most data sets, many others (e.g., liquidity constraints, longevity expectations, bequest motives, and subjective beliefs about economic and political risks) are often unobserved. These findings suggest caution in trying to infer or estimate discount rates in settings that are unable to control for these important factors.

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**Table 1**

Summary statistics of pension repayment amount by household income.

This table provides the distribution of the pension repayment amount owed to households in the survey, broken down by the self-reported income range of the household. Amounts are in Kuna (the Croatian currency). At the time of the survey, one Kuna was worth about \$0.19 U.S. dollars.

	<i>10th</i>	<i>25th</i>	<i>Median</i>	<i>75th</i>	<i>90th</i>	<i>Mean</i>
<i>Full sample</i>	12,000	25,000	38,938	50,000	66,000	39,668
<i>Lower income (less than 2,000 Kn/month)</i>	4,250	9,400	16,650	24,000	43,000	20,936
<i>Medium income (2,000 to 4,000 Kn/month)</i>	14,000	26,000	36,000	47,280	56,000	36,851
<i>Higher income (4,000 Kn/month or more)</i>	18,000	32,000	43,000	60,000	78,000	46,598

**Table 2**

Hypothetical example of payments under the two pension repayment options.

This table illustrates the breakdown and timing of the payments that would be made under option A (the more immediate payments) and option B (the more deferred payments) for a pension repayment amount of 60,000 Kunas. For reference, our survey was fielded between mid-November 2008 and mid-January 2009.

	<i>Option A</i>	<i>Option B</i>
<i>Mid-July 2005</i>	Government announces it will offer A/B choice	
<i>late December 2005</i>	Decision-making time	
<i>late June 2006</i>	7,500	
<i>late December 2006</i>	7,500	
<i>late June 2007</i>	7,500	
<i>late December 2007</i>	7,500	10,000
<i>late June 2008</i>		
<i>late December 2008</i>	Survey fielded mid-November 2008—mid-January 2009	
<i>late June 2009</i>		
<i>late December 2009</i>		10,000
<i>late June 2010</i>		
<i>late December 2010</i>		10,000
<i>late June 2011</i>		
<i>late December 2011</i>		10,000
<i>late June 2012</i>		
<i>late December 2012</i>		10,000
<i>Total paid:</i>	30,000	60,000
<i>The discount rate that equates the present value of the two payout streams</i>	26.6%	

**Table 3**

Summary statistics for key variables, in percent unless stated otherwise.

<i>Panel A: Income, wealth, and liquidity constraints</i>		<i>Panel B: Family structure and other demographics</i>	
<i>Living standards relative to average retiree</i>		<i>Female?</i>	58.0
Below	20.8	<i>Married at time of option choice?</i>	71.1
About the same	54.8	<i>Spouse picked A?</i>	18.9
Higher	20.6	<i>Spouse picked B?</i>	8.0
Don't know	3.8	<i>Any children?</i>	90.6
<i>Income (Croatian Kuna/month)</i>		<i>How important that money would go to heirs</i>	
Lower income (less than 2,000)	9.1	Not important	19.6
Medium income (2,000 to 4,000)	46.4	Moderately important	10.9
Higher income (4,000 or more)	44.5	Very important	60.3
Lives with children?	42.0	Don't know	9.2
Family helped?	31.6	<i>Important to receive most money while alive</i>	
<i>Owns...</i>		Not important	22.2
House?	87.7	Moderately important	20.5
Savings in Croatian Kuna?	30.2	Very important	49.8
Savings in foreign currency?	29.1	Don't know	7.5
Vacation home?	19.8	<i>Formerly employed state or local gov't?</i>	32.4
Rental real estate?	7.7	<i>How important is religion in your life?</i>	
Other real estate?	31.6	Not important	21.6
Stocks?	15.9	Moderately important	23.3
Mutual funds?	3.4	Very important	51.0
Bonds?	0.9	Don't know	4.0
<i>Reported pension repayment amount?</i>		<i>Croat nationality?</i>	87.6
Did not report	18.2	<hr/>	
Reported pension repayment amount	81.8	<i>Panel C: Health and longevity</i>	
<i>Pension repayment amount in Kunas, if reported</i>		<i>Age at time of choice (in years)</i>	
10th	12,000	10th	60
25th	25,000	25th	63
Median	38,938	Median	68
75th	50,000	75th	71
90th	66,000	90th	75
Mean	39,668	Mean	67.4
<i>Immediate need to pay for something</i>		<i>Health relative to peers (other retirees)</i>	
Not important	25.2	Very poor or poor	22.4
Moderately important	19.9	Average	45.0
Very important	51.4	Good or excellent	31.5
Don't know	3.5	Don't know	1.2
<hr/>		<i>Likelihood alive 7+ years beyond choice time</i>	
		Not likely	21.8
		Moderately likely	28.5
		Very likely	33.9
		Don't know	15.8
<hr/>		<hr/>	

**Table 3** (continued)

<i>Panel D: Macroeconomic risk and political risk</i>		<i>Panel F: Education, financial literacy, and financial self-assessments</i>	
<i>Inflation belief over several years at choice time</i>		<i>Education</i>	
Annual inflation in 0-8% range	43.6	High school or less	71.6
Annual inflation in 9-16% range	11.6	More than high school	28.4
Annual inflation more than 16%	2.1	<i>School exposure to acc., bank., bus., econ., fin.</i>	
Don't know	42.7	Not at all	46.1
<i>Exchange rate belief over several years at choice time</i>		A little	24.3
Kuna will remain the same or appreciate	51.3	A lot	27.4
Kuna will depreciate against Euro	21.7	Don't know	2.2
Don't know	27.0	<i>Job exposure to acc., bank., bus., econ., fin.</i>	
<i>Choice time confidence all B payments will be made</i>		Not at all	43.4
Not confident	36.9	A little	22.9
Moderately confident	29.1	A lot	30.0
Very confident	32.0	Don't know	3.7
Don't know	2.1	<i>Extensive financial calculations picking A or B</i>	
<i>Concern government might not honor its commitment</i>		Not extensive	57.6
Not important	26.1	Moderately extensive	22.1
Moderately important	22.1	Very extensive	11.0
Very important	44.4	Don't know	9.3
Don't know	7.4	<i>Good at calculations</i>	
<hr/>		Not good	6.3
<i>Panel E: Rate of time preference and risk aversion</i>		Moderately good	31.8
<i>Not willing to deposit for 1 year (no_CD)</i>		Very good	59.9
Willing (no CD=0)	71.2	Don't know	2.0
Not willing (no CD=1)	28.8	<i>Good at everyday finance</i>	
<i>Deposit rate for 1 year (if willing to deposit, in %)</i>		Not good	5.0
10th	5	Moderately good	11.3
25th	5	Very good	80.3
Median	7	Don't know	3.4
75th	10	<i>Financial skill relative to others</i>	
90th	15	Worse than others	4.2
Mean	8.7	About the same as others	56.0
<i>Risk level regarding income gamble</i>		Better than others	30.2
Take no gamble	52.9	Don't know	9.6
Take gamble 2x income for 10% loss	9.9	<i>Response to simple interest compounding question</i>	
Take gamble 2x income for 30% loss	15.2	Completely wrong	18.4
Take gamble 2x income for 50% loss	8.8	Almost correct	23.8
Don't know	13.1	Correct	32.0
<i>Self-perception of inclination to take risk</i>		Don't know	25.8
Not willing	59.6	<i>Response to simple inflation question</i>	
Moderately willing	25.4	Completely wrong	4.3
Very willing	12.2	Almost correct	7.6
Don't know	2.8	Correct	74.9
<hr/>		Don't know	13.2
		<i>Response to "doubling" compounding question</i>	
		Wrong	24.2
		Guessed 5-10 years to double at 10%	44.7
		Don't know	31.1

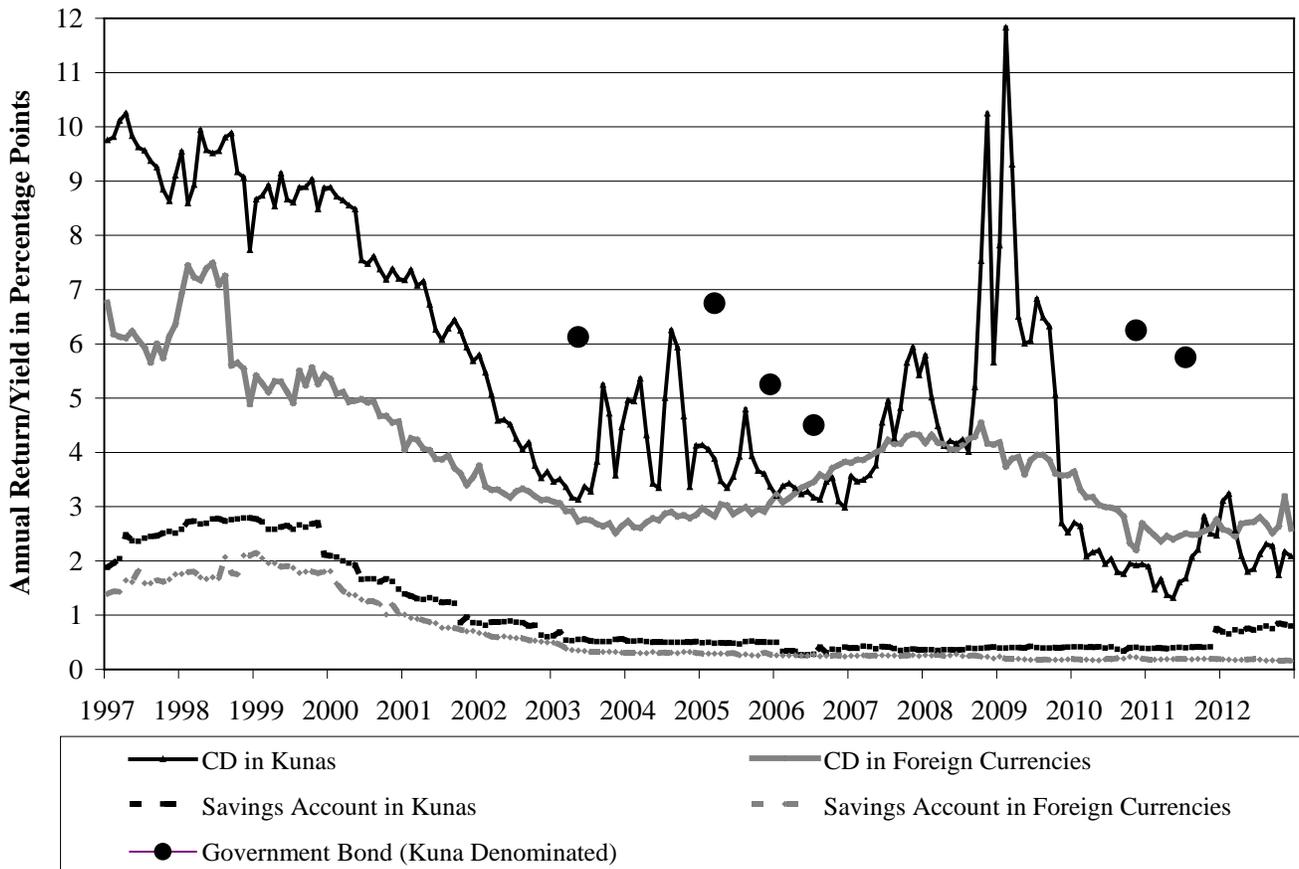
**Table 4**

Probit regression of decision to select option B (more deferred payment) for pension repayment – key regression coefficients.

The dependent variable is an indicator variable for whether the respondent selected pension repayment option B (the more deferred payment option). This variable is expressed as 0 if the respondent picked option A (more immediate payment) and 1 if the respondent picked option B. The reported results are the marginal effects from a Probit model evaluated at the mean of the independent variables. For convenience, we multiply all of the marginal effects in the table by 100, so that they can easily be interpreted as percentage points. Ten indicator variables for ethnicity and 24 indicator variables for residence county are also included in the Probit specification. The Probit regression in the first column is estimated on 2,490 observations. The regression reported in the second column is estimated on individuals who reported that liquidity constraints were not a very important factor in their pension repayment choice (1,128 observations). The regression reported in the third column is estimated on individuals who reported that liquidity constraints were a very important factor in their pension repayment choice (1,284 observations). We indicate statistically significant differences between the effects for non-liquidity constrained and liquidity constrained at the 10-percent level (5-percent level) by italics (bold italics). \*\*\*, \*\*, \* denote statistical significance of the underlying Probit coefficients at the 1-percent, 5-percent, and 10-percent levels, respectively.

**Table 4** (continued)

	Full sample		Non-liquidity constrained subsample		Liquidity- constrained subsample	
	Coef.	S.E	Coef.	S.E	Coef.	S.E
<b><u>Resources</u></b>						
<i>Income (Croatian Kuna/month)</i>						
Median income (2,000-4,000 Kn)	11.2 <sup>***</sup>	4.1	9.9	7.9	11.3 <sup>***</sup>	3.9
Higher income (4000 Kn or more)	10.5 <sup>**</sup>	4.5	11.3	8.1	12.1 <sup>***</sup>	5.2
<i>Immediate need to pay for something</i>						
Moderately important	-9.0 <sup>***</sup>	2.6				
Very important	-20.8 <sup>***</sup>	2.5				
<b><u>Time horizon</u></b>						
<i>Age at time of choice (in years)</i>	-1.1 <sup>***</sup>	0.2	-1.6 <sup>***</sup>	0.3	-0.7 <sup>***</sup>	0.2
<i>Health relative to peers (other retirees)</i>						
Average	2.4	2.8	5.9	4.9	-1.9	2.5
Good or excellent	6.2 <sup>**</sup>	3.1	7.3	5.2	0.9	2.8
<i>Likelihood Alive 7+ years beyond choice</i>						
Moderately likely	13.5 <sup>***</sup>	3.4	11.2 <sup>**</sup>	5.7	14.8 <sup>***</sup>	3.8
Very likely	14.6 <sup>***</sup>	3.3	14.9 <sup>***</sup>	5.6	14.1 <sup>***</sup>	3.7
<b><u>Own consumption vs. bequests</u></b>						
<i>Have any children?</i>	12.0 <sup>***</sup>	3.1	17.0 <sup>***</sup>	5.7	9.4 <sup>***</sup>	2.1
<i>How important money would go to heirs</i>						
Moderately important	9.9 <sup>**</sup>	4.4	12.8 <sup>**</sup>	6.5	4.6	5.0
Very important	19.5 <sup>***</sup>	2.5	24.0 <sup>***</sup>	4.4	11.7 <sup>***</sup>	2.3
<i>Important to receive most money while alive</i>						
Moderately important	-6.7 <sup>**</sup>	2.8	-12.1 <sup>**</sup>	4.6	1.2	3.5
Very important	-3.9	2.7	-3.2	4.2	-1.5	2.8
<b><u>Macro factors</u></b>						
<i>Inflation belief over several years at choice time</i>						
Annual inflation in 9-16% range	-2.4	3.2	-3.4	6.1	-1.1	2.8
Annual inflation more than 16%	-9.6	6.5	<b>-26.8<sup>**</sup></b>	<b>7.6</b>	<b>2.8</b>	<b>7.6</b>
<i>Exchange rate belief over several years at choice time</i>						
Kuna will depreciate against Euro	-4.8 <sup>*</sup>	2.4	-4.1	4.5	-4.5 <sup>**</sup>	2.0
<b><u>Attitudes toward government</u></b>						
<i>Choice time confidence all B payments will be made</i>						
Moderately confident	10.5 <sup>***</sup>	2.7	13.2 <sup>***</sup>	4.5	7.3 <sup>***</sup>	2.8
Very confident	19.7 <sup>***</sup>	2.8	22.2 <sup>***</sup>	4.7	16.0 <sup>***</sup>	3.2
<i>Concern government might not honor commitment</i>						
Moderately important	-0.2	2.8	-0.9	4.7	-1.2	2.7
Very important	-6.6 <sup>***</sup>	2.4	<b>-15.2<sup>***</sup></b>	<b>3.9</b>	<b>-1.2</b>	<b>2.4</b>
Other controls	Yes		Yes		Yes	
Pseudo R-squared	0.28		0.31		0.32	
Number of observations	2,490		1,128		1,284	



**Fig. 1.** Various rates of savings and investment returns in Croatia, 1997-2012. This figure presents various rates of savings and investment returns available in Croatia in the period from 1997 to 2012—rates on certificates of deposit (CDs), savings, and government bonds—be they denominated in Kunas or in foreign currencies.

## Appendix. Probit regression of decision to select option B

**Table A.1**

Probit regression of decision to select option B (more deferred payment) for pension repayment, full sample.

The dependent variable is an indicator variable for whether the respondent selected pension repayment option B (the more deferred payment option). This variable is expressed as 0 if the respondent picked option A (more immediate payment) and 1 if the respondent picked option B. The reported results are the marginal effects from a Probit model evaluated at the mean of the independent variables. For convenience, we multiply all coefficients in the table by 100, so that they can easily be interpreted as percentage points. Ten indicator variables for ethnicity and 24 indicator variables for residence county are also included in the regression. The regression is estimated on 2,490 observations and the pseudo-R-squared of the regression is 0.28. \*\*\*, \*\*, \* denote statistical significance of the underlying Probit coefficients at the 1-percent, 5-percent, and 10-percent levels, respectively.

<i>Panel A: Income, wealth, and liquidity constraints</i>				<i>Panel B: Family structure and other demographics</i>			
		Coef.	S.E.			Coef.	S.E.
<i>Living standards relative to average retiree</i>				<i>Female?</i>			
	About the same	-0.5	2.8			-2.7	2.4
	Higher	-1.2	3.6	<i>Married at time of option choice?</i>			
	Don't know	0.7	6.2			4.1	2.5
<i>Income (Croatian kuna/month)</i>				<i>Spouse picked A?</i>			
	Medium income (2,000 to 4,000)	11.2***	4.1			-20.3***	1.9
	Higher income (4,000 or more)	10.5**	4.5	<i>Spouse picked B?</i>			
<i>Lives with children?</i>						43.3***	4.5
		2.5	2.0	<i>Any children?</i>			
<i>Family helped?</i>						12.0***	3.1
<i>Owns...</i>				<i>How important that money would go to heirs</i>			
	House?	-1.1	3.0			9.9**	4.4
	Savings in Croatian Kuna?	-0.5	2.3			19.5***	2.5
	Savings in foreign currency?	4.0*	2.4			0.6	4.6
	Vacation home?	3.3	2.6	<i>Important to receive most money while alive</i>			
	Rental real estate?	1.2	3.8			-6.7**	2.8
	Other real estate?	1.5	2.2			-3.9	2.7
	Stocks?	4.8*	2.9			-9.2**	3.8
	Mutual funds?	4.9	5.8	<i>Formerly employed state or local gov't?</i>			
	Bonds?	1.2	11.9			1.4	2.1
<i>Did not report pension repayment amount</i>				<i>How important is religion in your life?</i>			
	<i>ln(Pension payment amount, if reported)</i>	32.5*	18.5			1.5	3.1
		3.5**	1.5			-0.1	2.8
<i>Immediate need to pay for something</i>						4.6	6.5
	Moderately important	-9.0***	2.6	<i>Ethnicity indicator variables</i>			
	Very important	-20.8***	2.5			<i>p</i> -value = 0.13	
	Don't know	-0.3	5.9	<i>Residence county indicator variables</i>			
						<i>p</i> -value = 0.06*	
<i>Panel C: Health and longevity</i>							
						Coef.	S.E.
<i>Age at time of choice (in years)</i>						-1.1***	0.2
<i>Health relative to peers (other retirees)</i>							
	Average					2.4	2.8
	Good or excellent					6.2**	3.1
	Don't know					2.6	9.9
<i>Likelihood alive 7+ years beyond choice time</i>							
	Moderately likely					13.5***	3.4
	Very likely					14.6***	3.3
	Don't know					11.2***	4.1

**Table A.1** (continued)

<i>Panel D: Macroeconomic risk and political risk</i>			<i>Panel F: Education, financial literacy, and financial self-assessments</i>		
	Coef.	S.E.		Coef.	S.E.
<i>Inflation belief over several years at choice time</i>			<i>Education</i>		
Annual inflation in 9-16% range	-2.4	3.2	More than high school	2.9	2.4
Annual inflation more than 16%	-9.6	6.5	<i>School exposure to acc., bank., bus., econ., fin.</i>		
Don't know	-2.5	2.4	A little	1.3	2.7
<i>Exchange rate belief over several years at choice time</i>			A lot	4.4	3.2
Kuna will depreciate against Euro	-4.8*	2.4	Don't know	-9.3	6.2
Don't know	0.2	2.6	<i>Job exposure to acc., bank., bus., econ., fin.</i>		
<i>Choice time confidence all B payments will be made</i>			A little	-4.3	2.6
Moderately confident	10.5***	2.7	A lot	-5.2*	2.8
Very confident	19.7***	2.8	Don't know	5.1	6.4
Don't know	-11.1	6.7	<i>Extensive financial calculations picking A or B</i>		
<i>Concern government might not honor its commitment</i>			Moderately extensive	0.3	2.5
Moderately important	-0.2	2.8	Very extensive	2.6	3.2
Very important	-6.6***	2.4	Don't know	-4.8	3.4
Don't know	6.3	5.2	<i>Good at calculations</i>		
<i>Panel E: Rate of time preference and risk aversion</i>			Moderately good	2.5	4.6
	Coef.	S.E.	Very good	3.3	4.4
<i>Unwilling to deposit for 1 year (no_CD)</i>	2.3	3.0	Don't know	16.2	11.9
<i>Deposit rate for 1 year (0 if unwilling, %)</i>	-0.1	0.2	<i>Good at everyday finance</i>		
<i>Risk level regarding income gamble</i>			Moderately good	-4.2	5.0
Take gamble 2x income for 10% loss	0.0	3.3	Very good	-8.8*	5.3
Take gamble 2x income for 30% loss	-2.3	2.8	Don't know	-12.6**	5.1
Take gamble 2x income for 50% loss	1.2	3.4	<i>Financial skill relative to others</i>		
Don't know	-1.5	3.2	About the same as others	-4.4	5.3
<i>Self-perception of inclination to take risk</i>			Better than others	-3.1	5.3
Moderately willing	0.9	2.3	Don't know	-1.1	6.0
Very willing	-0.8	3.3	<i>Response to simple interest compounding question</i>		
Don't know	5.8	7.7	Almost correct	3.6	3.1
			correct	0.1	2.9
			Don't know	1.9	3.4
			<i>Response to simple inflation question</i>		
			Almost correct	9.1	7.3
			correct	7.2	5.0
			Don't know	4.8	6.7
			<i>Response to "doubling" compounding question</i>		
			Gessed 5-10 years to double at 10%	-1.4	2.5
			Don't know	2.2	3.0