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Financial Flexibility, Risk Management, and Payout Choice

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Both risk management and payout decisions affect a firm's financial flexibility—the ability to avoid costly financial distress as well as underinvestment. We provide evidence of substitution between hedging and payout decisions using samples of both financial and nonfinancial firms. We find that a more flexible distribution, favoring repurchases over dividends, is negatively related to financial hedging within a firm, consistent with financial flexibility in payout decisions and hedging being substitutes. Our findings, which are robust to controlling for the endogeneity of hedging and payout choices, suggest that payout flexibility offers operational hedging benefits. (*JEL* G32, G35)

Financial flexibility—the ability to avoid underinvestment as well as financial distress—is a central concern for managers (Graham and Harvey 2001; Denis 2011). Two key components of financial flexibility are payout policy and risk management. The level and form of payout influence financial flexibility: choosing lower payouts or more repurchases, relative to dividends, increases financial flexibility. Likewise, risk management is fundamental to avoiding underinvestment and financial distress. Firms hedge to avoid raising costly external capital (Froot, Scharfstein, and Stein 1993), and optimal hedging minimizes financial constraints (Mello and Parsons 2000).

Given that both hedging and payout policy affect financial flexibility, this paper investigates whether and how these decisions are related. A simple connection between hedging and payout should exist if risk management activities reduce cash flow volatility and if lower volatility firms pay regular

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dividends. Consistent with this logic, prior studies consider this issue briefly in the cross-section and find that hedging firms have higher dividend yields (Nance, Smith, and Smithson 1993; Berkman and Bradbury 1996). However, numerous managers argue that payout policy and risk management decisions are jointly determined. The 2009 IPO prospectus of insurer Delta Lloyd states, "If continuing the Company's dividend policy would risk breaching the Group's targeted solvency thresholds, the Executive Board will consider various possible capital management alternatives [such as] hedging or other alternative strategies to reduce net exposure to key risks." Likewise, on October 22, 2010, the CEO of the power company Exelon noted that current risk management factored into the continuation of their dividend: "I expect that our strong balance sheet, our careful hedging practices and our operating performance will enable us to maintain the dividend."

Accordingly, this paper takes a broader perspective and investigates if payout is more than a function of posthedging cash flow volatility. The two policies would be joint risk management decisions if favoring repurchases increases financial flexibility and managers consider their financial flexibility options together. However, payout decisions and hedging could be independent instead. Even if both have hedging components, if firms use payout flexibility and derivatives to address separate components of risk exposure as in the spirit of Bolton, Chen, and Wang (2011), the two choices still can be uncorrelated. We are agnostic as to the connection between payout and hedging and view it as an empirical question. Specifically, we examine whether firms trade off financial hedging for a more or less flexible payout structure and whether a more or less flexible payout structure affects hedging decisions.

Because repurchases provide managers with more discretion than dividends in terms of the amount and timing of distributions, we define "payout flexibility" as the ratio of repurchases to total payout—although our results are also robust to alternative definitions. Using separate samples of financial and nonfinancial firms, we consider whether payout flexibility varies with hedging. We primarily focus on a sample of bank holding companies from 1995 to 2008. Unlike other publicly traded companies, bank holding companies are required to report the level of derivatives and to separate trading from hedging activity. Therefore, for a large sample of firms over an extended period of time, we can examine directly whether the amount of hedging affects payout choices within firms. Further, bank holding companies report the impact of derivatives on income and their interest rate exposure, the dominant hedgeable exposure. Hence, we can control for the risk profile of the firm using the income volatility calculated without the impact of hedging and the interest rate exposure. This ensures that hedging changes are not driven by changing risk exposures. We provide evidence that payout flexibility and financial hedging affect each other and are jointly determined.

We begin by showing a strong negative relationship between hedging and payout flexibility in the cross-section. However, documenting that payout decisions and risk management are jointly determined relies on rejecting the alternative that both are simply correlated with underlying firm characteristics. For example, perhaps the same types of firms that engage in active risk management programs also pay regular dividends, which would result in a cross-sectional relationship between hedging and dividends. To rule out the possibility that results are driven by time-invariant commonalities, we employ firm-level fixed effects, which allow us to examine how the same firm trades off hedging and payout flexibility over time.

The possibility remains that unmodeled time-varying firm characteristics drive both choices. We address this concern by exploiting shocks to the benefits of dividends and the cost of hedging, as well as using an instrumental variable approach. Lastly, we estimate a Heckman selection model to address the choice to hedge or distribute earnings, including both firm fixed effects and instrumental variables.

All of our empirical analysis documents that payout and hedging are jointly determined, consistent with payout flexibility being a risk management device. We are able to reject the proposition that causality runs only from hedging to cash flow volatility to payout policy in favor of substitution between the policies. These findings are robust to controlling for the effect of hedging on cash flow volatility, the level of total payout, other measures of financial flexibility (including capital levels and cash ratios), and the presence of a major blockholder and firm size, which are commonly cited as determinants of hedging and payout decisions (e.g., Grinstein and Michaely 2005; Becker, Ivković, and Weisbenner 2011).

We confirm our analysis using a panel of nonfinancial Compustat firms. Although the nonfinancial data are far less detailed, we can test whether our general conclusions extend to all publicly traded firms. We identify which publicly traded firms hedge from 2004 to 2010[1] and document a negative relationship between hedging and payout flexibility over both the short- and long-term. These results provide evidence that our conclusions apply to nonfinancials.

We extend the existing literature by using more detailed data on a large sample of firms over an extended period of time and by focusing on the econometric identification of the relationship between hedging and payout policy. Because of the lack of reported data on derivative use, risk management studies are generally limited to a small sample over a short period of time. In contrast with the existing literature, we are able to address the endogeneity and selection concerns, study within-firm relationships in a large industry, and document that these general relationships extend to all publicly traded firms.

Recognizing the relationship between payout and risk management fits into a growing body of literature that finds that managers substitute

[1] Compustat firms begin reporting gains and losses due to derivatives in 2004.

operational hedging for financial hedging: Geczy, Minton, and Schrand (1997), Petersen and Thiagarajan (2000), and Hankins (2011) show that corporate decisions that reduce cash constraints or cash flow volatility provide similar benefits to derivatives. John and Knyazeva (2006) argue that dividends significantly constrain managers and find parallels between dividends and debt obligations. If dividends are perceived as a constraint, favoring a more flexible payout structure increases financial flexibility and provides operational hedging. To the extent that payout decisions have an operational hedge component, they would be naturally viewed as a substitute to financial hedging.

This paper proceeds as follows. In Section 1, we introduce the hypothesis that hedging and payout policies are jointly determined and discuss the costs of payout flexibility. Section 2 describes the merits of using Federal Reserve filings to study hedging and presents summary statistics on our measures of hedging and payout and on our control variables. In Section 3, we present empirical evidence on the relationships between risk management and payout policy for our primary sample and extend our analysis to nonfinancial firms. Section 4 concludes.

1. Financial Flexibility and Hypothesis Development

1.1 Are payout flexibility and active risk management jointly determined?

DeAngelo and DeAngelo (2007) argue that the desire to maintain financial flexibility drives firms' financial policies. Financial flexibility is a broad concept, but it effectively means the ability to finance positive NPV projects and to avoid financial distress. Specifically, they argue that managers keep leverage low to maintain debt capacity and that profitable firms will pay high, regular dividends to develop a reputation that will allow them to sell new equity at prices close to intrinsic value. DeAngelo and DeAngelo (2007) support their argument by pointing out that it is consistent with both extant empirical evidence and with survey evidence from CFOs (Graham and Harvey 2001). A similar survey on payout policy by Brav et al. (2005) finds that CFOs view the flexibility of repurchases as one of its most important characteristics. This survey evidence is consistent with large sample empirical evidence by Guay and Harford (2000) and Jagannathan, Stephens, and Weisbach (2000), which supports the hypothesis that managers use repurchases to distribute transitory cash flows and to maintain flexibility.

Dividend payers historically were considered less constrained because dividends could be reduced to cover cash short falls (Fazzari, Hubbard, and Petersen 1988). However, more recent work by Brav et al. (2005) and Daniel, Denis, and Naveen (2010) document that managers would rather cut investments than dividends, consistent with dividends creating a constraint. Though firms are not legally obligated to continue past dividend payments, dividend cuts are generally viewed negatively by the market (Denis, Denis, and Sarin 1994; Yoon and Starks 1995), making managers reluctant to cut them (DeAngelo and DeAngelo 1990; Leary and Michaely 2011).

Financial managers set both hedging and payout policy, so the hypothesis that they consider them jointly is a natural one. Nance, Smith, and Smithson (1993) argue that hedging and other financial policies are related. The recent theoretical work of Bolton, Chen, and Wang (2011) formalizes this connection, modeling financial hedging and payout flexibility as components of a firm's financial flexibility. The authors emphasize that risk management is "tightly connected" to operational hedges, including payout choice. Lin and Paravisini (2013) conclude that their evidence supports the prediction of Bolton, et al. that risk management and financial policy are endogenously determined.

Alternatively, hedging and payout flexibility could be independent. Indeed, in Bolton, Chen, and Wang (2011), firms use derivatives to manage systematic risk and cash to manage idiosyncratic risk. If firms manage each source of risk separately and systematic risk and idiosyncratic risk are uncorrelated, then financial and operational hedges would be determined independently. Thus, to the extent that firms use payout flexibility to manage idiosyncratic risk, hedging and payout flexibility may be independent.

Because the relation between payout flexibility and hedging is theoretically ambiguous, we examine the hypothesis that payout flexibility and financial hedging are jointly determined. The primary testable implication is that changes to a firm's financial hedging program will affect the composition of total payout. Dependence between the decisions and two-way causality predict that payout flexibility will affect hedging needs as well. This joint causality fits with the Almeida, Campello, and Weisbach (2011) conclusion that there is an intertemporal component to financial flexibility decisions.

The connection between payout flexibility and financial hedging could take one of two forms. Payout flexibility and hedging could be substitutes. If dividends create a constraint and effectively reduce the mean level of cash available for investment (Brav et al. 2005; Daniel, Denis, and Naveen 2010), they increase the benefit of hedging for a given amount of cash flow variability. Firms favoring repurchases create flexibility, and this flexibility reduces the benefits of other forms of hedging, be they financial or operational. Similarly, hedging reduces cash flow variability, increasing the dividend level that can be sustained. Although it is less obvious why firms would simultaneously increase (or decrease) payout flexibility and hedging in the absence of a change to the firm's risk level or cost of distress, the two decisions may be complements if engaging in one activity lowers the cost of using the other. Our empirical tests allow for the possibility that the two choices are substitutes, complements, or unrelated.

We find that higher volatility predicts both repurchasing and hedging in univariate comparisons; however, our multivariate analysis, which controls for underlying volatility and other firm characteristics, strongly supports the hypothesis that payout flexibility and financial hedging are not only jointly determined but are indeed substitutes. After presenting between estimates to highlight the cross-sectional evidence, we focus on within-firm changes and control for the firm's underlying prehedged volatility. The evidence shows that the more the firm hedges, the less it uses payout flexibility and vice versa.

1.2 Why do firms hedge or pay dividends at all?

Hedging is costly—the direct cost being the price of the derivative instruments and of measuring and monitoring the underlying exposure and the indirect cost being potential forgoing of some future cash flows in a "good" state of the world. Absent frictions, the firm should not hedge. However, asymmetric information, managerial risk aversion and costs of financial distress, among other frictions, generate benefits to hedging, as discussed in prior literature, such as Smith and Stulz (1985), Nance, Smith, and Smithson (1993), and Minton and Schrand (1999). Empirically, it is clear that firms perceive the costs of completely hedging their exposures to be large; otherwise, we would observe more firms doing so.

If financial hedging and payout flexibility are substitutes as we find and if hedging is costly, firms should maintain full payout flexibility at all times unless doing so is also costly. Such payout flexibility implies that firms should not pay dividends and would need less active hedging. However, avoiding dividends to maintain maximum flexibility likely has a real cost. As noted above, DeAngelo and DeAngelo (2007) argue that dividend payments are needed to control agency costs and that a history of regularly paying significant dividends increases access to the equity market. Allen and Michaely (2002) note that managerial risk aversion and adverse selection costs potentially explain the continuation of dividends in payout policy. For managers with a nontrivial portion of wealth in their firms, dividend payments reduce their risk, whereas repurchases do not. Therefore, risk-averse managers will prefer dividends to repurchases. The preference for dividends also is related to the argument that a firm's cost of capital depends upon adverse selection costs (e.g., Easley, Hvidkjaer, and O'Hara 2002; Barclay and Smith 1988). Brennan and Thakor (1990) note that the adverse selection cost of the informed investor increases when a firm announces a share repurchase.

We do not attempt to answer the dividend puzzle in this paper. For the reasons cited above or perhaps others, firms choose to pay dividends. We argue in this paper that such payout policy choices have implications for, and are simultaneously affected by, the firm's hedging policy. Nonetheless, we are able to make use of some exogenous variation in the net benefit of dividends via the staggered implementation of Prudent Investor laws, replacing the Prudent Man laws that advantaged dividends. This case study confirms the inferences from our large-sample instrumental variable approach.

2. Data

Empirical studies on risk management are limited because of the difficulty of obtaining detailed data. Challenges in risk management research include extending results beyond specific industries, interpreting survey data that are potentially prone to selection biases, and observing changes in hedging behavior within firms across time.[2] Another issue is that hedging is more than a binary decision: Haushalter (2000) finds that continuous hedging data are necessary to fully examine risk management decisions, but continuous data are difficult to acquire.

We construct our primary sample from Federal Reserve quarterly Y-9C filings, which include the entire universe of bank holding companies with total consolidated assets of $150 million or more between 1995 and 2008. Only top-tier bank holding companies are examined because risk may be managed across subsidiaries. Quarterly Federal Reserve filings offer unique and detailed information on bank holding company risk management activity as well as underlying risk exposures. The Y-9C filings categorize derivatives into interest rate, foreign exchange, equity, and commodity/other contracts, and they separately report nontrading (hedging) versus trading positions. However, this paper focuses on interest rate derivatives as 90% of bank holding company hedging is concentrated in these transactions and information on the exposure to interest rate movements is available.

The bank holding company filings provide us with a long panel of detailed, quarterly data on hedging. We are able to study the level of hedging (as opposed to simply whether or not the firm hedges) and within-firm changes in hedging. In addition, we control for changes in the firm's risk with the prehedging income volatility of the firm as well as the underlying hedgeable risk exposure. Because bank holding company filings are mandatory, they are not prone to the selection biases of survey data. Though the filings data are limited to one industry, bank holding companies represent a large set of firms whose financial health can influence the economy as a whole—as we have observed in the recent financial crisis.

In addition to providing information on interest rate hedging, the bank holding company filings contain data on many variables that influence risk management and payout policy decisions. Table 1 presents quarterly summary statistics on bank holding companies between 1995 and 2008 for our variables of interest and all control variables. Interest rate hedging, the gross notional amount of nontrading interest rate derivatives use scaled by market cap, is our

[2] For example, Nance, Smith, and Smithson (1993) survey 169 Fortune 500 and S&P 400 firms in 1986; Tufano (1996) uses survey data on gold mining firms from 1991 to 1993; Berkman and Bradbury (1996) study derivative use reported in financial statements of 116 firms in 1994 in New Zealand; Geczy, Minton, and Schrand (1997) examine currency derivatives in 372 nonfinancial Fortune 500 firms in 1990; Haushalter (2000) examines hedging behavior of 100 oil and gas producers between 1992 and 1994; and Petersen and Thiagarajan (2000) focus on two firms in the gold mining industry.

Table 1
Summary statistics

		N	Mean	Median	Standard deviation
Risk management	Hedging	17,899	0.160	0.000	0.454
Payout policy	Repurchases	17,825	0.003	0.000	0.008
	Dividends	17,832	0.007	0.007	0.004
	Total payout yield	17,825	0.010	0.008	0.009
	Payout flexibility	17,366	0.173	0.000	0.282
Control variables	Volatility	13,687	0.006	0.004	0.014
	Tier 1 capital	16,746	0.605	0.527	0.464
	Exposure	17,886	0.633	0.581	1.891
	Securities	17,899	1.651	1.337	1.620
	Fed funds	17,899	0.138	0.0501	0.331
	Loans	17,899	4.783	4.068	4.236
	Premise	17,899	0.125	0.098	0.117
	Prehedging income	17,875	0.013	0.017	0.127
	Lagged return	17,840	2.035	2.027	0.152
	Log market cap	17,899	12.677	12.316	1.784
	M/B	17,755	0.614	0.557	0.337
	Cash	17,733	0.410	0.286	0.534
	Blockholder	17,899	0.265	0.000	0.441

This table presents summary statistics on quarterly variables related to risk management and payout policy decisions for a sample of bank holding companies between 1995 and 2008. *Hedging* represents the dollar value spent on interest rate hedging, scaled by market cap. *Repurchases* represent quarterly purchases of treasury stock (FR Y-9C code BHCK4783), scaled by market cap. *Dividends* represent regular cash dividends (CRSP codes 1212, 1222, 1232, 1242, and 1252), scaled by market cap. *Total payout yield* represents the ratio of the sum of regular cash dividends, special dividends (CRSP code 1272), and repurchases, scaled by market cap. *Payout flexibility* is repurchases divided by total payout. *Volatility* is cash flow volatility, defined as the standard deviation of the ratio of total prehedging income to market cap over the twelve prior quarters. *Tier 1 capital* is Tier 1 capital divided by market cap. *Exposure* is interest rate exposure divided by market cap. *Securities* is the quarterly average of securities, scaled by market cap. *Fed funds* is the quarterly average of federal funds, scaled by market cap. *Loans* is the quarterly average of loans, scaled by market cap. *Premise* is premises and fixed assets, scaled by market cap. *Prehedging income* is cash flow minus cash flow from derivatives, scaled by market cap. *Lagged return* is the percent return on the firm's stock minus the return on the value-weighted CRSP index during the quarter prior to the payout flexibility quarter. *Log market cap* is the natural log of share price times the number of shares outstanding. M/B is the market to book ratio. *Cash* is cash and cash equivalents, scaled by market cap. *Blockholder* equals one if the firm has at least one major blockholder, defined as a firm that has filed SEC form 13G within the past twelve months and is zero otherwise. Summary statistics presented in this table are for the sample of firm quarters with a nonmissing value for either payout flexibility or lagged payout flexibility.

main proxy for active risk management and is winsorized at the 1st and 99th percentiles to limit the influence of extreme values.[3,4]

Repurchases are the dollar value of treasury stock purchased, as reported in the bank holding company regulatory report, scaled by market cap. We control for firm risk, documented to affect dividend payments (Hoberg and

[3] Our results are robust to scaling interest rate hedging by reported interest rate exposure instead of market capitalization. In this specification, we exclude exposure as a control variable.

[4] A potential concern is that gross notional amount of derivatives may not correspond to a firm's hedging activity. Whereas Graham and Rogers (2002) discuss this concern and find the use of net versus gross notional amounts to be immaterial to their conclusions, we investigate whether this variable is a reasonable proxy for the extent of hedging. Following the notion that a more active hedging program would have a larger impact on firm income, we analyze the relationship between the gross notional amount of derivatives use for nontrading purposes and the impact of derivatives on income and find a positive and statistically significant relationship. Although derivative income includes the product of both trading and nontrading derivatives, our results still hold when we limit our sample to nontrading firms. For brevity, we do not tabulate these results, but they buttress our belief that gross notional amounts proxy for the level of hedging.

Prabhala 2009), with volatility, defined as the standard deviation of prehedged income scaled by market cap, measured over the prior twelve quarters. Capital structure also can influence repurchase decisions (Dittmar 2000); we control for this relationship with the inclusion of Tier 1 capital (scaled by market cap).[5] Finally, we control for the underlying interest rate exposure (using the one-year maturity gap following Flannery and James 1984), securities, federal funds, loans, fixed assets (premises), and prehedging income (cash flow minus cash flow from derivatives). All of these variables are obtained from the regulatory reports and are scaled by market capitalization.[6]

To remain in our sample, the company must have data from CRSP on dividend distributions and stock prices. Dividends are the dollar value of regular cash dividends (CRSP codes 1212, 1222, 1232, 1242, and 1252) distributed during the quarter, scaled by market cap. Total payout yield is the sum of dividends, repurchases, and special dividends (CRSP code 1272), scaled by market cap. Summary statistics suggest that bank holding companies have a quarterly total payout yield of 1.0% on average; dividends constitute approximately two-thirds of distributions to shareholders, and repurchases constitute the other third.

Payout flexibility for firm i in quarter t is defined initially as repurchases as a percent of total payout:

$$\text{Payout flexibility}_{i,t} = \frac{\text{Repurchases}_{i,t}}{\text{Total Payout}_{i,t}}. \tag{1}$$

There are 17,366 firm-quarter observations for which interest rate hedging and payout flexibility are available. Payout flexibility takes a value of zero (one) if all distributions to shareholders are in the form of dividends (repurchases). Firms with zero total payout will have a missing value for payout flexibility, but our results are robust to reclassifying these zero payout firms as having maximum payout flexibility (payout flexibility equal to one).

One potential concern with our quarterly payout flexibility measure is that its variation is driven by the variation in repurchases. We address this concern by calculating payout flexibility over two years, which captures aggregate repurchase and dividend activity within the firm, as well as two alternative quarterly measures of payout flexibility: repurchases divided by new payout (repurchases plus new dividends) and a flexibility indicator variable equal to one if the firm repurchases while decreasing its dividend. The substitution of payout flexibility and hedging continues to hold in all cases.

Payout policy is affected by management's view of whether the company's stock is undervalued (Stephens and Weisbach 1998; Grullon and Michaely 2004; Brav et al. 2005), which we proxy for using market to book (M/B) as

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5 For nonfinancial firms, we control for a firm's capital structure using leverage (total liabilities divided by total market capitalization) from Compustat.

6 Our results are robust to scaling by total assets instead of market capitalization.

well as the return of the company's stock during the prior quarter. Specifically, M/B is the market capitalization of the firm divided by the book value of the firm and lagged returns are calculated as the percent return on the firm's stock minus the return on the value-weighted CRSP index and measured during the quarter prior to the payout flexibility quarter.

We use data from Compustat to compute other control variables. We calculate firm size as the natural log of market capitalization. Cash (cash and short-term investments scaled by market capitalization) proxies for the need and/or ability to distribute funds to shareholders. Higher levels of cash are generally associated with more repurchases (Stephens and Weisbach 1998) and, in recent years, fewer dividends (Bates, Kahle, and Stulz 2009).

3. Empirical Support for the Joint Determination of Hedging and Payout

3.1 Do dividend decisions affect future hedging?

While it is commonly accepted that risk management enables dividend payments, we examine whether payout choices likewise can affect hedging decisions. To motivate our argument, we first examine how hedging and payout policies differ in firms with high versus low cash flow volatility. These results are presented in Panel A of Table 2. Our bank holding company data allow us to measure cash flow volatility absent the effects of hedging, and we define "high volatility" ("low volatility") bank holding companies as those with cash flow volatility above (below) the mean. High volatility firms have greater payout flexibility on average and are significantly more likely to hedge relative to low volatility firms. Given that the need for financial flexibility is likely greater for firms with volatile cash flows, these results suggest that both payout flexibility and hedging may help meet the need for financial flexibility in high cash flow volatility firms.

We then examine how prior dividend decisions can affect a firm's risk management response to a cash flow volatility shock. We define a cash flow volatility shock as either a 5% or 10% increase in prehedged cash flow volatility from one year ago (quarter $t-4$) to the current quarter (quarter t). We anticipate that dividend-paying firms will be more sensitive to increases in volatility and therefore will be more likely to respond to a shock with an increase in hedging. Our results, presented in Panel B of Table 2, confirm this prediction: when we segment our sample on the level of preshock dividend payments, we discover that, whereas all groups of firms increase financial hedging on average in response to a cash flow volatility shock, high dividend firms (those with dividend yields above the mean) increase hedging the most. For example, high dividend firms with a 5% shock increase interest rate hedging as a percentage of market cap by 7.6% (or 24.5% relative to their preshock hedging level of 31.0%), whereas low dividend firms increase hedging by only 3.1% (or 14.8% relative their preshock hedging level of 21%). This difference in hedging change is significantly different at the 5% level. Firms respond in a similar fashion

Table 2
Cash flow volatility, hedging, and payout flexibility

Panel A: Payout flexibility and hedging by level of cash flow volatility

	High volatility		Low volatility			
	N	Mean	N	Mean	Difference	*p*-Value
Payout flexibility	6,383	0.178	11,009	0.170	–0.008	0.037
Hedging dummy	7,749	0.365	12,783	0.277	–0.088	0.000

Panel B: Changes in hedging around cash flow volatility shocks

	High dividend firms		Low/no dividend firms			
	N	Mean	N	Mean	Difference	*p*-Value
5% shock	457	0.076	560	0.031	–0.046	0.026
10% shock	383	0.087	469	0.039	–0.048	0.038

This table presents univariate statistics and t-tests describing the relationship between cash flow volatility, hedging, and payout flexibility. *Volatility* is prehedged cash flow volatility, measured as the standard deviation of twelve prior quarters of income without the impact of derivatives. Panel A presents summary statistics on payout flexibility and hedging, segmented on the level of cash flow volatility for all firms. "High volatility" ("low volatility") implies cash flow volatility above (below) the median. *Payout flexibility* is defined as treasury stock purchases as a portion of total payout. *Hedging dummy* is an indicator equaling one if the dollar value spent on interest rate hedging is greater than zero. Panel B presents changes in interest rate hedging in response to cash flow volatility shocks. A firm has a volatility shock at time t if cash flow volatility is 5% or 10% higher than at time t-4 (the prior year-end). The change in hedging is measured over the next year (time t to t+4) as the change in the interest rate hedging scaled by market capitalization. We segment firms on dividend level, defined as high or low if a firm's annual total regular dividends (scaled by year-end market capitalization) are above or below the mean at time t-4.

to larger volatility shocks: high dividend firms with a 10% shock increase hedging by 8.7%, significantly greater than the 3.9% increase observed in low dividend firms with the same shock. We verify that these results are robust to defining high dividend firms as those with dividend yields above the median or 75th percentile. (See our Internet Appendix.) These results provide preliminary evidence that payout decisions and hedging choices are substitutes.

3.2 Are payout flexibility and financial derivatives jointly determined?

Our primary approach to establishing causality will rely on panel regressions with firm fixed effects and instrumental variables. However, these approaches still require there to be underlying variation in the net benefit of dividends that does not directly affect the net benefit of hedging and vice versa. Before presenting the large-sample results, we present a few motivating examples of how shocks to the costs of payout policy and discrete shifts in payout policy affect hedging and vice versa.

3.2.1 The relation between payout and hedging: Some motivating examples. Most of the theory does not directly address the trade-off between repurchases and dividends that we examine here. Rather, the models typically have a generic payout method or have dividends explicitly. The critical trade-off in the models is that higher dividends produce lower cash holdings on average and that cash policy is linked to hedging. Here, we focus on the inflexibility of dividends versus the flexibility of repurchases as part of cash management policy. The flexibility afforded by repurchases makes cash policy a more effective hedging mechanism. If increased payout flexibility changes the benefits of financial hedging, cash policy may be an effective substitute for hedging and simultaneously less hedging is necessary to maintain the firm's ability to pay dividends. Thus, when there is a shock to the relative costs of repurchases and dividends, a firm will shift the flexibility of its payout policy, affecting the relative efficiency of cash management versus hedging for risk management. More flexible payout policy will lead to less hedging. Similarly, when hedging becomes less expensive, the firm will rely less on cash policy for risk management, allowing it to have a less flexible cash policy due to higher dividends.

To start, we examine the state-by-state transition from Prudent Man to Prudent Investor legislation over the period of 1995 to 2004. Whereas Prudent Man guidelines focused on dividend payment as a yardstick of fiduciary prudence, Prudent Investor laws did not explicitly favor dividend payment. Hankins, Flannery, and Nimalendran (2008) estimate that the switch from Prudent Man to Prudent Investor "led institutions to shift 2% to 3% ($90 billion to $135 billion) of their stock portfolio values away from dividend payers." This legislative change creates time and location variation in the cost-benefit trade-off of dividends relative to stock repurchases. Moving to the more flexible Prudent Investor regime made dividends less beneficial (in terms of attracting institutional interest), and we expect to observe a decrease in dividends around the legislation.

Panel A of Table 3 presents the change in average dividends (scaled by market capitalization) from year 0 to year 1, where the switch from Prudent Man to Prudent Investor occurred in year 0. Following Black and Strahan (2002), we link firms to their state of incorporation, but Hankins, Flannery, and Nimalendran (2008) find similar results when they analyze the impact of Prudent Investor regulations using either the state of incorporation or headquarters. We find that firms incorporated in switching states decrease the level of dividend payment in the year following their state's end of Prudent Man laws, whereas firms incorporated in nonswitching states increase their dividends on average, and the difference in dividend change between firms in switching states and control firms is statistically significant. Further, we expect that decreases in dividends will be associated with decreases in hedging. We condition on firms with active hedging programs (those with nonzero interest rate hedging at the time of the end of Prudent Man), that is, firms that would be capable of decreasing their hedging.[7] Compared with firms incorporated in nonswitching states, firms significantly decrease their hedging activity after being covered by Prudent Investor laws. That is, with the switch to Prudent

[7] The number of active hedgers incorporated in a state that switched from Prudent Man to Prudent Investor is extremely low because Delaware, where many banks—especially larger and potentially more sophisticated banks that are likely to hedge—are incorporated, adopted fiduciary guidelines similar to the Prudent Investor regulations in 1985, which predates our sample window.

Table 3
Shocks to payout and hedging

Panel A: Change in the cost of dividends: Prudent Investor legislation

	Change from PM to PI		No PM change			
	N	Mean	N	Mean	Difference	p-Value
Δ Dividends (% market cap)	190	–0.010	3,838	0.016	–0.026	0.042
Δ Hedging, active hedgers	23	–0.042	1,173	0.060	–0.102	0.088

Panel B: Change in the cost of hedging: Extreme increases in firm size

	Large Δ TA		No large Δ TA			
	N	Mean	N	Mean	Difference	p-Value
Δ Hedging	361	0.094	3,699	0.025	0.070	0.000
Δ Hedging, active hedgers	280	0.076	1,008	0.033	0.043	0.043
Δ Dividends (% market cap)	361	0.028	3,667	0.013	0.015	0.083

Panel C: Dividend and hedging initiations

	N	Average treatment effect	p-Value
Δ Hedging around dividend initiations	60	0.0268	0.000
Δ Dividends (% market cap) around hedging initiations	246	0.0027	0.008
Δ Payout flexibility around hedging initiations	246	−0.0335	0.000

This table presents summary statistics on the change in the level of dividends and hedging around shocks to a firm's cost/benefit tradeoff to payout policy and risk management. Panel A examines the effect of the switch from Prudent Man (PM) to Prudent Investor (PI) legislation from year 0 to year 1, where the switch to Prudent Investor occurred in year 0. We compare changes in dividends and hedging for firms in switching states to changes in firms in states in which no switch in fiduciary law occurred. *Hedging* is the dollar value spent on interest rate hedging, scaled by market cap. *Dividends* is all cash dividends scaled by market cap. The change in hedging is presented for firms with active hedging programs (those with nonzero interest rate hedging at the time of the end of Prudent Man). Panel B examines changes in dividends and hedging for firms with and without a significant shock to total assets. Extreme size increases are defined as quarterly changes in total assets that exceed the 90th percentile. Panel C presents the average treatment effect for treated firms, that is, the average difference in the change in hedging for dividend initiators and the change in hedging for matched control firms, and the average difference in the change in dividends or payout flexibility for hedging initiators and the change in dividends or payout flexibility for matched control firms. Initiations occur in year 0, and we calculate changes from year 0 to 1. We define dividend initiations as instances where a firm paid no regular, cash dividend during the past year, but has at least one positive dividend payment in the current year. Hedging initiations are cases where a firm did not hedge over the past year, but hedged in the current year. We use propensity score matching to identify control firms.

Investor and its more flexible fiduciary guidelines, firms decrease their use of dividends as well as their use of hedging.[8]

While no similar policy change provides an equivalent natural shock for documenting intertemporal variations in hedging, we exploit an established discontinuity in hedging costs. Nance, Smith, and Smithson (1993), Brown (2001), and Mian (1996) discuss the high fixed costs of establishing a hedging program. Because of these costs, hedging programs are more prevalent in larger firms. We look at firms that experience a large increase in firm size (those in the largest 10% in terms of quarterly change in total assets). We assume that these observations represent either a merger or acquisition but also reflect a shift in the cost-benefit trade-off of derivatives use. A large shift in firm size makes hedging relatively less costly.

8 Though the fiduciary change is an exogenous shock to dividends, not necessarily repurchases, we also observe an increase in payout flexibility around the adoption of Prudent Investor fiduciary guidelines as expected.

Panel B of Table 3 presents the average change in interest rate hedging from year 0 to year 1, where the shock to firm size occurred in year 0. Indeed, firms experiencing a large change in total assets increase their use of derivatives significantly relative to other firms. We also document a corresponding increase in use of dividends during the year following these large increases in assets.[9] An alternative test would be to examine whether hedging changes following large decreases in firm size. However, large decreases in firm size are likely to be associated with distress and financial constraint and thus would bias the results.

In addition to these two shocks to the cost/benefit trade-off of paying dividends and hedging, there are time-varying elements that affect payout and hedging decisions. For example, the preference for dividends will vary with the changing tax preferences of institutional investors (Desai and Jin 2011) and policy changes, such as the 2003 cut in dividend taxation (Chetty and Saez 2006). Hedging costs and benefits may vary with interest rate volatility.

Finally, if hedging and payout flexibility are jointly determined, then we expect large shifts in payout to result in changes in hedging and vice versa. Dividend initiations represent significant commitments to disburse cash to shareholders and thus are deliberate decreases in payout flexibility. Similarly, initiating a hedging program is a costly endeavor. Based on the theory linking these policies and the hypothesis that hedging and payout flexibility are jointly determined—most likely in a way suggesting substitution—a decrease in the cost of hedging (or increase in the benefits of dividends, which may be signaling or otherwise) could lead the firm to initiate dividends and increase its hedging to offset the effect on cash policy. In the same way, a decrease in the cost of hedging would lead the firm to increase hedging, allowing it to rely less on cash for risk management, and subsequently increase dividends.

We define dividend initiations as instances in which a firm paid no regular, cash dividend during the past year but has at least one positive dividend payment in the current year. Hedging initiations are cases in which a firm did not hedge over the past year but hedged in the current year. Using our bank holding company sample, we identify 60 dividend initiations and 246 hedging program initiations during our sample period. Unlike our shocks, which present plausibly exogenous shifts in the cost/benefit trade-off of payout flexibility and hedging, dividend and hedging initiations are endogenously determined.

[9] We see no statistically significant change in the level of payout flexibility at the time of a shock to firm size. These results are not surprising in light of the relationship between share repurchases and M&A events. First, cash that is generally designated for a repurchase may be used for M&A activity instead; Brav et al. (2005) find that over 20% of firms claim that, of the funds that are used to repurchase shares, mergers or acquisitions are their most likely alternative use. Second, to the extent that stock-based M&As are correlated with stock price overvaluation and share repurchases are correlated with undervaluation, concurrent M&A and repurchase activity may be negatively correlated. Finally, SEC regulation of repurchase blackout periods may restrict firms from repurchasing around mergers or acquisitions. For these reasons, repurchase activity may be abnormally low the year of a merger or acquisition, confounding the effects of a merger-induced increase in hedging on payout flexibility.

Therefore, we use propensity score matching to identify control firms with similar characteristics and run our matching procedure on an annual basis to control for time trends in dividends and hedging behavior.[10] In the case of dividend initiations, we would ideally limit potential matches to firms that did not pay a dividend last year and that therefore could initiate a dividend. However, only 99 firms have years in which they could have initiated a dividend but did not, implying that we have few potential matches. Therefore, we use all firm/year observations for dividend initiations. In the case of hedging program initiations, we have enough firms each year that could initiate a hedging program to restrict potential matches to firms without hedging programs in the prior year.

Panel C of Table 3 presents the average treatment effect for treated firms, that is, the average difference in the change in hedging for dividend initiators and the change in hedging for matched control firms, and the average difference in the change in dividends or payout flexibility for hedging initiators and the change in dividends or payout flexibility for matched control firms. Initiations occur in year 0, and we calculate changes from year 0 to 1. Our results suggest that, relative to control firms, dividend initiations are followed by increased hedging and hedging initiations are followed by increased dividends and reduced payout flexibility. Overall, our motivating examples all provide consistent evidence supporting the substitution of payout flexibility and financial hedging.[11] One could be always concerned that there were simultaneous changes in the firms' risk exposures around the events we have identified here. One advantage of the data we will employ in the formal tests in the next section is that the Y9-C filings disclose the prehedged earnings, allowing us to control for the firms' prehedged raw risk exposure.

3.2.2 Regression analysis. To more formally examine how hedging relates to payout flexibility in a multivariate context, we model payout flexibility as a function of interest rate hedging and then examine whether causality runs in the other direction. All regressions include controls for risk management, payout policy, and firm characteristics. Given that taxes can affect the choice between dividends and share repurchases (Graham 2003), we include time dummies

10 Matching variables are the same as those used in Table 4 multivariate regressions, except they are measured annually. We also exclude total payout yield from the matching characteristics for hedging program initiations given that our variable of interest is change in payout.

11 In Table 3 we scale our variables of interest by market cap to focus on changes in dividend yield as outright dividend cuts are rare. We also calculate the changes in both dividends and hedging scaled by market cap at time $t=0$ so that any observed change can be attributed to our numerator. Fitting with the rarity of nominal dividend cuts, there is no significant decline in the within-firm level of dividends in Panel A. However, as expected, we observe a statistically significant drop in the level of hedging relative to unaffected observations. Paralleling our results in Panel B, firms experiencing an extreme increase in size increase both hedging and dividends, scaled by market cap at time $t=0$, relative to unaffected observations. Finally, consistent with our findings in Panel C, we observe statistically significant increases in hedging around dividend initiations and in dividends around hedging initiations.

Table 4
Payout flexibility and interest rate hedging

	Between estimation		Instrumental variables with firm fixed effects		Heckman IV with firm fixed effects	
Dependent variable	Payout flexibility (1)	Hedging (2)	Payout flexibility (3)	Hedging (4)	Payout flexibility (5)	Hedging (6)
Hedging	−0.074**		−0.259***		−0.269***	
	(−2.556)		(−2.717)		(−2.884)	
Payout flexibility		−0.205***		−4.418**		−2.465**
		(−3.140)		(−2.420)		(−2.392)
Volatility	−0.884	5.482***	1.118*	6.125*	1.609**	4.346*
	(−0.728)	(2.892)	(1.897)	(1.727)	(2.511)	(1.760)
Total payout yield	15.024***	4.040	6.513***	71.944**	−2.852***	40.884**
	(9.755)	(1.525)	(10.889)	(2.393)	(−2.754)	(2.406)
Exposure	−0.004	0.051***	0.003	0.014	0.010**	0.070***
	(−0.491)	(3.886)	(0.740)	(0.943)	(2.546)	(3.368)
Log market cap	0.014**	0.111***	0.028	0.172	0.011	0.402***
	(1.967)	(11.145)	(1.339)	(1.451)	(0.549)	(2.964)
Cash	0.132***	0.015	0.020	0.119	0.004	−0.112
	(2.852)	(0.206)	(1.288)	(0.831)	(0.266)	(−1.117)
M/B	0.172**	0.161	0.010	−0.230	−0.006	0.229
	(2.175)	(1.403)	(0.177)	(−0.699)	(−0.100)	(1.014)
Tier 1 capital	−0.066	−0.054	0.243***	0.446	0.243***	0.127
	(−0.640)	(−0.330)	(3.675)	(1.523)	(3.504)	(0.664)
Lagged return	−0.090	−0.279	−0.042***	−0.593**	0.101***	−0.385**
	(−0.598)	(−1.018)	(−2.841)	(−2.090)	(4.867)	(−2.253)
Securities	0.011	0.014	−0.019**	−0.040	−0.041***	0.005
	(1.021)	(0.918)	(−2.049)	(−1.082)	(−4.088)	(0.191)
Fed funds	−0.055	0.029	−0.027	−0.134	0.029	−0.066
	(−1.229)	(0.434)	(−0.918)	(−0.710)	(1.001)	(−0.510)
Loans	0.019**	0.038***	−0.011*	0.003	−0.001	0.035**
	(2.034)	(2.622)	(−1.899)	(0.108)	(−0.192)	(1.998)
Premise	−0.372**	−0.192	−0.151	−0.201	0.305**	0.377
	(−2.506)	(−0.857)	(−1.381)	(−0.425)	(2.553)	(1.102)
Prehedging income	−0.615***	1.644	−0.163	−0.769	0.038	−0.319
	(−2.774)	(1.364)	(−1.325)	(−1.067)	(0.276)	(−0.867)
Lambda				−0.395***	1.217***	
				(−9.861)	(3.140)	
Number of observations	12,652	12,658	12,628	12,402	12,628	12,402
Hansen J statistic	n/a	n/a	0.435	0.508	0.410	0.759
			$p = 0.509$	$p = 0.476$	$p = 0.522$	$p = 0.384$

This table presents regressions examining the relationship between payout flexibility and interest rate hedging. Models (1) and (2) are based on between estimations, Models (3) and (4) are within-firm instrumental variable regressions and Models (5) and (6) are Heckman selection models using instrumental variables and firm fixed effects. *Payout flexibility* is defined as treasury stock purchases as a portion of total payout. *Hedging* is the dollar value spent on interest rate hedging, scaled by market cap. Instrumental variables for interest rate hedging are firm-level *interest rate trading* (the dollar value spent on interest rate trading scaled by market cap) and *average hedging* (the yearly average *hedging* for firms in the same market cap quartile). The instrumental variables for payout flexibility are *average payout flexibility* (the yearly average payout flexibility for firms in the same market cap quartile) and *firm age* (the natural log of the age of the firm). *Lamba* is calculated for the Heckman selection models from a first-stage probit. All other explanatory variables are described in Table 1 and measured at the end of the prior quarter, unless otherwise noted. t-statistics are presented below coefficients in parentheses and ***, **, and * represent significance at the 1%, 5% and 10% levels. Year dummies are included in all analysis and firm fixed effects are included in Models (3)–(6). Standard errors are clustered at the firm level. Statistics and p-values for the Hansen J test, whose null hypothesis is that the instrumental variables are valid, are presented for instrumental variable regressions.

to absorb intertemporal variations in tax regimes and payout policy, such as investor demand for dividend-paying stocks (Baker and Wurgler 2004).[12]

Models (1) and (2) of Table 4 present the between-estimation for the panel—examining the cross-sectional relation between hedging and payout flexibility. There is a substitute relationship between hedging and payout flexibility: the coefficient associated with hedging is negative and statistically significant in the payout flexibility regression, and the payout flexibility coefficient is negative and significant in the hedging regression.

However, as there could be unmodeled firm characteristics that determine both hedging and payout flexibility, we rely on the fixed effects and instrumental variables to establish causality. We control for potential time-invariant firm-level omitted variables with firm fixed effects, which also ensure that our results capture the within-firm relationship between changes in hedging and changes in payout policy over time, rather than capturing covariation in hedging and payout policy across firms. In addition, if hedging decisions are made in consideration of past and current payout decisions, then hedging is endogenous. The same logic applies to payout flexibility in relation to hedging. We reject the null hypothesis that interest rate hedging and payout flexibility can be treated as exogenous: the associated chi-square test statistics equal 8.318 ($p=0.004$) for interest rate hedging and 11.250 ($p=0.001$) for payout flexibility.

We address these concerns with an instrumental variable (IV) approach with firm-level fixed effects in models (3) and (4). We consider two instruments for interest rate hedging, interest rate trading activity (scaled by market cap) within the firm and average hedging for peer firms (firms in the same size quartile during the same year), and two instruments for payout flexibility, firm age, and average payout flexibility for peer firms. Firm age, defined as the natural log of the number of years the firm has nonmissing fiscal year-end values of total assets and stock price, should be negatively correlated with payout flexibility because more mature firms are more likely to pay dividends. A valid instrument must be uncorrelated with the error terms in our model but correlated with interest rate hedging or payout flexibility. The Hansen test results indicate that our instruments pass the Hansen test of instrument validity.[13]

We identify a negative and significant relationship, which runs in both directions, between the level of interest rate hedging in bank holding companies and their payout flexibility. This negative relationship is consistent with hedging substituting for financial flexibility in payout policy. Payout flexibility is positively correlated with prior cash flow volatility, total payout yield, and Tier 1 capital but negatively related to recent stock returns, securities, and loans.

[12] We include year fixed effects to capture general time trends, but our results are robust to using quarterly fixed effects.

[13] First-stage results are available in an Internet Appendix, and the Hansen test is available using the "endog" option in Stata's "xtivreg2" command.

Interest rate hedging is positively correlated with prior cash flow volatility and total payout yield and negatively related to prior stock returns.

Before deciding upon the level of hedging or repurchases, a firm must first decide whether or not to initiate a hedging or repurchase program. The skewness of the distribution of hedging and repurchases implies that this selection issue is a potential concern. To address both selection and endogenous regressors, we estimate Heckman's lambda in a selection model and then include this lambda in the two-stage least squares IV equation.[14] We include firm fixed effects in the second stage and adjust our standard errors for potential clustering at the firm level. These results are presented in models (5) and (6). After controlling for selection, we continue to find strong empirical evidence of substitution.[15]

Our results based on cross-sectional estimation, a within-firm instrumental variables approach, and a Heckman instrumental variables model reject the assumption implicit in the extant literature that hedging and payout policy are related merely because hedging affects payout policy through its effect on cash flow volatility. Rather, causality clearly runs in both directions, providing evidence that firms substitute hedging and payout policy.

3.3 Alternative measures of payout flexibility

Thus far, we have focused on quarterly measures of hedging activity and payout flexibility. However, hedging and payout choice might be viewed as long-term decisions. Consider a firm with a low regular dividend and an occasional share repurchase paid during quarters with higher cash flows. A longer term measure is useful to capture the level of flexibility of this firm's payout policy. Therefore, we calculate an alternative payout flexibility measure for firm i in quarter t as the sum of repurchases over two years (eight quarters) divided by total payout over the same time window:

$$\text{Long-run Payout Flexibility}_{i,t} = \frac{\sum_{t=1}^{8} \text{Repurchases}_{i,t}}{\sum_{t=1}^{8} \text{Total Payout}_{i,t}}. \tag{2}$$

Explanatory variables are measured at the end of the prior year, and we collapse our data to avoid overlapping time periods. Consistent with our quarterly results, our long-run results in Table 5 support substitution. Our coefficients of interest continue to be negative in our between-estimation model, instrumental variables regressions, and Heckman selection model, though the payout flexibility coefficient fails to achieve statistical significance in the selection model.

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[14] See Wooldridge's (2002) *Econometric Analysis of Cross Section and Panel Data* (Section 17.4.2). Code for this methodology is provided on the UCLA Stata page related to the Wooldridge text book. We adapt this code with firm fixed effects in the second stage and adjust our standard errors for potential clustering at the firm level.

[15] We further explore the interaction between payout policy and risk management using a seemingly unrelated regression (SUR) framework. SUR incorporates the correlation of errors across the two equations. Coefficients on both payout flexibility and interest rate hedging are negative and statistically significant. These results are available in an Internet Appendix.

Table 5
Long-run payout flexibility and interest rate hedging

	Between estimation		Instrumental variables with firm fixed effects		Heckman IV with firm fixed effects	
Dependent variable	Payout flexibility (1)	Hedging (2)	Payout flexibility (3)	Hedging (4)	Payout flexibility (5)	Hedging (6)
Hedging	−0.097***		−0.228***		−0.218**	
	(−2.953)		(−2.734)		(−2.230)	
Payout flexibility		−0.196***		−3.329**		−1.747
		(−2.962)		(−2.332)		(−1.399)
Volatility	1.509	4.963**	4.211***	14.322**	0.280	1.306
	(0.880)	(2.060)	(11.271)	(2.282)	(0.364)	(0.420)
Total payout yield	4.170***	2.237***	0.122	0.370	0.615	5.771
	(8.002)	(2.843)	(1.404)	(0.927)	(0.678)	(1.331)
Exposure	0.008	0.037***	0.021	0.131	0.007	0.365**
	(0.848)	(2.703)	(0.679)	(1.195)	(0.231)	(1.978)
Log market cap	0.030***	0.131***	1.372*	4.372	0.003	0.074***
	(3.329)	(11.353)	(1.759)	(1.209)	(0.505)	(2.738)
Cash	−0.002	−0.077	0.001	0.002	−0.005	−0.540***
	(−0.042)	(−0.993)	(0.177)	(0.119)	(−0.103)	(−2.576)
M/B	0.237***	−0.006	0.046*	0.113	0.012	0.481
	(2.655)	(−0.045)	(1.668)	(0.984)	(0.160)	(1.385)
Tier 1 capital	0.038	0.273	−0.030	−0.065	0.118	0.224
	(0.306)	(1.585)	(−0.717)	(−0.472)	(1.480)	(0.954)
Lagged return	0.028	0.177*	−0.044	−0.217	−0.024	−0.190
	(0.430)	(1.925)	(−0.608)	(−0.714)	(−0.413)	(−1.280)
Securities	0.009	0.031*	−0.023	−0.032	−0.013	0.057
	(0.631)	(1.696)	(−1.327)	(−0.467)	(−0.868)	(1.477)
Fed funds	0.003	0.033	−0.011	0.003	−0.050	0.012
	(0.050)	(0.452)	(−0.209)	(0.015)	(−0.812)	(0.060)
Loans	0.009	0.022	0.005	0.004	0.007	0.070**
	(0.851)	(1.443)	(0.462)	(0.112)	(0.564)	(1.968)
Premise	−0.541***	−0.262	−0.163	−0.360	−0.159	−0.014
	(−3.094)	(−1.109)	(−0.982)	(−0.643)	(−0.680)	(−0.027)
Prehedging income	0.091	−4.274***	−0.129	−0.385	−0.237	−1.874
	(0.091)	(−3.045)	(−0.376)	(−0.332)	(−0.567)	(−1.636)
Lambda					−0.054	1.429***
					(−0.942)	(2.841)
Number of observations	1,553	1,556	1,458	1,461	1,442	1,417
Hansen J statistic	n/a	n/a	0.005	1.847	0.031	0.321
			$p = 0.941$	$p = 0.174$	$p = 0.860$	$p = 0.571$

This table presents regressions examining the relationship between payout flexibility and interest rate hedging over two years. Models (1) and (2) are based on between estimations, Models (3) and (4) are within-firm instrumental variable regressions and Models (5) and (6) are Heckman selection models using instrumental variables and firm fixed effects. *Payout flexibility* is defined as the sum of repurchases over nonoverlapping two-year periods divided by two-year total payout, and *hedging* is the two-year average of interest rate hedging, scaled by market cap. Instrumental variables for interest rate hedging are firm level *trading* (the dollar value spent on interest rate trading scaled by market cap) and *average hedging* (the two-year average dollar value of *hedging* for firms in the same market cap quartile). The instrumental variables for payout flexibility are *average payout flexibility* (the two-year average payout flexibility for firms in the same market cap quartile) and *firm age* (the natural log of the age of the firm). All other explanatory variables are measured at the end of the prior year and are described in Table 1. t-statistics are presented below coefficients in parentheses and ***, **, and * represent significance at the 1%, 5% and 10% levels. Year dummies are included in all analysis and firm fixed effects are included in Models (3)–(6). Standard errors are clustered at the firm level. Statistics and p-values for the Hansen J test, whose null hypothesis is that the instrumental variables are valid, are presented for instrumental variable regressions.

In addition to the measurement window, there are several potential concerns with our payout flexibility measure and controls. Table 6 presents our alternative measures of payout flexibility and additional controls using Heckman instrumental variable regressions with firm-level fixed effects. First, if dividends are stable, changes in repurchases drive the variation in payout flexibility. To address the concern that changes in payout flexibility are mainly due to variation in repurchase activity, we construct two alternative measures of payout flexibility specifically designed to capture choices in payout flexibility. In models (1) and (2) we define payout flexibility as repurchases divided by new payout (repurchase plus new dividends, where new dividends represent the dollar increase in dividends from last quarter to the current quarter):

$$\text{Alt. Payout Flexibility } 1_{i,t} = \frac{\text{Repurchases}_{i,t}}{\text{Repurchases}_{i,t} + \text{New Dividents}_{i,t}}. \tag{3}$$

If we assume that repurchases are fully flexible but that dividend levels are anchored on last quarter's level, then this measure captures repurchases as a percent of total new payout. In addition, models (3) and (4) are based on an indicator variable that equals one if the firm decreases its dividend by at least 1% while repurchasing:

$$\text{Alt. Payout Flexibility } 2_{i,t} = \begin{cases} 1, \text{ if Repurchases}_{i,t} > 0 \text{ and } \%\Delta \text{ Dividends}_{i,t} < -1\% \, . \\ 0, \text{ otherwise} \end{cases} \tag{4}$$

This measure of payout flexibility captures explicit—and arguably intentional—increases in payout flexibility and rules out the cash-constraint explanation for a dividend decrease because we observe positive repurchases. We continue to find results consistent with substitution using both alternative measures of payout flexibility.

In Models (5)–(8), we verify the robustness of our results to the presence of a major blockholder and to firm size because both could influence risk management and payout decisions. Blockholders are shareholders owning greater than 5% of the firm and have filed form 13G with the SEC. Our blockholder variable is a binary variable equal to one if the firm had a blockholder any time over the past twelve months.[16] Within-firm changes in the presence of a blockholder do not significantly impact payout flexibility or interest rate hedging, but interest rate hedging continues to be negatively and significantly related to repurchases as a percentage of total payout and vice versa. Further, we want to ensure that the negative relationship between payout flexibility and interest rate hedging is not driven solely by large firms. To alleviate this concern, we present our main results, excluding the top decile

[16] We thank Chris Clifford for all blockholder data used in this paper.

Table 6
Robustness to alternative measures of payout flexibility, blockholders, and firm size

	Repurchases/ (repurchases + new dividends)		1 if repurchases > 0 and dividend decrease ≥ 1%; otherwise, 0		Blockholder		Excluding large firms	
Dependent variable	Payout flexibility (1)	Hedging (2)	Payout flexibility (3)	Hedging (4)	Payout flexibility (5)	Hedging (6)	Payout flexibility (7)	Hedging (8)
Hedging	−0.367**		−0.064*		−0.269***		−0.306**	
	(−2.291)		(−1.812)		(−2.868)		(−2.260)	
Payout flexibility		−0.784***		−1.988***		−2.394**		−1.753*
		(−4.011)		(−2.855)		(−2.352)		(−1.884)
Blockholder					−0.002	0.099***		
					(−0.271)	(2.977)		
Table 4 controls	included	included	included	included	included	included	included	included
Number of observations	9,537	9,380	14,080	14,082	12,628	12,402	10,877	10,677
Hansen J statistic	0.347	0.011	0.627	0.097	0.415	0.777	0.967	0.325
	$p = 0.556$	$p = 0.917$	$p = 0.428$	$p = 0.755$	$p = 0.519$	$p = 0.378$	$p = 0.326$	$p = 0.566$
Instrumental variables	Hedging: Interest rate trading, average hedging Payout flexibility: Average payout flexibility, firm age							

This table presents within-firm quarterly Heckman instrumental variable regressions on the relationship between hedging and payout flexibility, with alternative measures of payout flexibility and with tests of robustness to the presence of a blockholder and to firm size. In Models (1) and (2) payout flexibility is repurchases as a portion of "new payout," where new payout is repurchases plus the dollar increase in dividends from last quarter to the current quarter. In Models (3) and (4) payout flexibility is an indicator variable equal to one if the firm repurchases, while decreasing their dividend by at least 1%. Models (5) and (6) include an indicator variable *Blockholder*, which equals one if the firm has at least one major blockholder. Models (7) and (8) exclude firms in the largest decile of market cap. The same control variables for Table 4 are included in all models. Explanatory variables are measured at the end of the prior quarter and are described in Table 1. t-statistics are presented below coefficients in parentheses and ***, **, and * represent significance at the 1%, 5%, and 10% levels. Year dummies and firm fixed effects are included in all analysis. Standard errors are clustered at the firm level. Statistics and p-values for the Hansen J test, whose null hypothesis is that the instrumental variables are valid, are presented for instrumental variable regressions.

of firms based on market cap. The negative relationship between hedging and payout flexibility continues to hold in both directions.

Finally, in our Internet Appendix, we present two additional robustness tests. First, we present seemingly unrelated regression (SUR) analysis to address potential correlation of the error terms and find evidence supporting substitution using both our quarterly and two-year measures. Second, we switch from payout flexibility to the level of either repurchases or dividends (scaled by market cap) to investigate whether changes in the flexibility ratio are driven solely by one factor. Using within-firm IV and Heckman selection IV analysis and removing total payout yield as an explanatory variable, we find that within-firm movements of both repurchases and dividends contribute to our result. As expected, repurchases are negatively correlated with hedging, whereas dividends are generally positively correlated with hedging. This implies that both components of payout are jointly determined with derivatives use and factor into a firm's financial flexibility decisions.

3.4 Is payout flexibility an operational hedge in nonfinancial firms?

Because our results suggest a strong negative relationship between hedging and payout flexibility in bank holding companies, we consider whether nonfinancial firms substitute between payout flexibility and financial hedging. Though detailed data on derivative use are unavailable for a large panel of nonfinancial firms, we are able to observe the quarterly gains and losses due to derivatives between 2004 and 2010 for all publicly traded firms.[17] Defining hedging firms as those with gains or losses due to derivatives, we explore whether nonfinancial firms show evidence of substituting payout flexibility and financial hedging. Analogous to our analysis on bank holding companies, payout flexibility is defined as repurchases divided by total payout. Repurchase data on nonfinancials are from Compustat: Repurchases represent total shares repurchased (Compustat data item CSHOPQ) times the average quarterly repurchase price (Compustat data item PRCRAQ). In Panel A of Table 7, nonhedging firms are those with exactly zero income from derivatives, whereas in Panel B nonhedging firms also include firms with missing values for derivative gains and losses. Using either definition, we identify a negative and significant relationship between hedging and payout flexibility. Repurchases represent 19.5% of total payout for hedgers but between 22.0% and 34.7% for nonhedgers, demonstrating that nonhedgers use a more flexible payout structure. These results provide preliminary evidence that our conclusions extend beyond financial firms.

Next, we evaluate nonfinancial firms in a multivariate context. Paralleling the empirical work presented for bank holding companies, Table 8 presents the quarterly results from OLS, IV, and Heckman IV. Firm fixed effects are omitted

17 Our results are robust to excluding the financial crisis (as per the analysis of financial firms).

Table 7
Nonfinancial firms

Panel A: Missing values excluded

	Payout flexibility (repurchases/total payout)		
	N	Mean	SD
Hedging	14,636	0.195	0.395
Nonhedging	18,695	0.347	0.475
Difference		−0.152	
p-Value		< 0.0001	

Panel B: Missing values treated as nonhedging

	Payout flexibility (repurchases/total payout)		
	N	Mean	SD
Hedging	14,636	0.195	0.395
Nonhedging	38,719	0.220	0.413
Difference		−0.024	
p-Value		< 0.0001	

This table presents summary statistics on the effect of hedging on payout flexibility for nonfinancial firms between 2004 and 2010. *Payout flexibility* is repurchases divided by total payout. Repurchases represent total shares repurchased (Compustat data item CSHOPQ) times the average quarterly repurchase price (Compustat data item PRCRAQ). Total payout represents the sum of regular cash dividends (CRSP codes 1212, 1222, 1232, 1242, and 1252), special dividends (CRSP code 1272), and repurchases. "Hedging" firms have a nonmissing, nonzero value for quarterly comprehensive income minus derivative gains or losses. In Panel A, "nonhedging" firms have exactly zero derivative gains or losses. In Panel B, nonhedging firms have a missing or zero value for derivative gains or losses.

from these regressions as there is limited within-firm variation in the binary hedging variable and the data are only available for a short time period, but we include industry (2-digit SIC code) fixed effects in the OLS regressions. We do not include industry fixed effects in the IV regressions because our instruments are based on industry means. We also omit the control variables specific to bank holding companies and add firm leverage (total liabilities divided by total market cap) as a control. Otherwise, the analysis is comparable to that of the financial firms.

Models (1) and (2) present the OLS regressions. We confirm that hedging is associated with less payout flexibility and that more payout flexibility reduces the likelihood of hedging. Quarterly hedging is associated with a 0.076 decrease in quarterly payout flexibility, an economically meaningful amount given that mean payout flexibility for this sample is 0.213. Causality also runs in the opposite direction: a one-standard-deviation increase in payout flexibility in nonfinancial firms decreases the probability of hedging in the next quarter by approximately 4%.

Models (3) and (4) present the basic IV models. Because nonfinancial firms, unlike bank holding companies, neither report nor frequently use derivatives for trading, we rely on one instrumental variable (the mean annual industry hedging behavior) for hedging in nonfinancial firms. Therefore, there is no Hansen J statistic because the equation is exactly identified. Our instruments for payout flexibility remain annual industry mean payout flexibility and firm age. We adjust firm age by the industry mean firm age, because a ten-year old

Table 8
Payout flexibility and hedging in nonfinancial firms

	OLS		Instrumental variable		Heckman selection instrumental variable
Dependent variable	Payout flexibility (1)	Hedging dummy (2)	Payout flexibility (3)	Hedging dummy (4)	Payout flexibility (5)
Hedging dummy	−0.076***		−3.639***		−0.301***
	(−11.556)		(−17.633)		(−16.648)
Payout flexibility		−0.088***		−0.215***	
		(−11.426)		(−14.226)	
Volatility	0.118***	0.062***	0.420***	0.103***	0.051***
	(12.233)	(6.235)	(9.633)	(9.728)	(4.176)
Total payout yield	−5.496***	−0.259	0.762	−0.065	−6.274***
	(−28.478)	(−1.424)	(0.840)	(−0.307)	(−30.588)
Log market cap	−0.033***	0.085***	0.339***	0.094***	−0.032***
	(−17.891)	(44.254)	(15.181)	(50.244)	(−10.403)
Cash	0.014***	0.014***	0.001	−0.001	0.003
	(5.147)	(5.163)	(0.103)	(−0.245)	(1.426)
M/B	0.028***	0.037***	0.096***	0.031***	0.016***
	(8.655)	(10.688)	(6.681)	(8.539)	(4.908)
Leverage	−0.024***	0.274***	0.175***	0.188***	0.009
	(−4.698)	(25.316)	(6.958)	(17.231)	(0.502)
Lagged return	0.018	−0.033**	−0.116**	−0.019	0.092***
	(1.330)	(−2.358)	(−2.038)	(−1.308)	(5.924)
Cash flow	−0.004	−0.007*	−0.033*	−0.004	−0.002
	(−0.948)	(−1.664)	(−1.783)	(−0.965)	(−0.513)
Lambda					−0.695***
					(−17.294)
Number of observations	19,674	19,767	19,661	19,767	20,037
Hansen J statistic			n/a	2.313	n/a
				$p = 0.128$	

This table presents OLS, IV, and Heckman IV regressions examining the relationship between quarterly payout flexibility and hedging activity in nonfinancial firms between 2004 and 2010. *Payout flexibility* is repurchases divided by total payout. Repurchases represent total shares repurchased (Compustat data item CSHOPQ) times the average quarterly repurchase price (Compustat data item PRCRAQ). Total payout represents the sum of regular cash dividends (CRSP codes 1212, 1222, 1232, 1242, and 1252), special dividends (CRSP code 1272), and repurchases. *Hedging dummy* equals one if the firm has nonzero quarterly derivative gains or losses and is zero if the firm has exactly zero derivative gains or losses. Our instrument for hedging is the industry average hedging (the mean value of *hedging dummy* for all firms with the same 2-digit SIC code). Our instruments for payout flexibility are industry adjusted firm age (the natural log of firm age minus the yearly mean log firm age for all firms with the same 2-digit SIC code) and average payout flexibility for firms in the same 2-digit SIC code. *Volatility* is cash flow volatility, defined as the standard deviation of the ratio of cash flow to market cap over the twelve prior quarters. *Total payout yield* is the sum of all cash dividends and repurchases divided by market cap. *Log market cap* is share price times the number of shares outstanding. *Cash* is cash and cash equivalents, scaled by market cap. M/B is the market to book ratio. *Leverage* is total liabilities divided by market cap. *Lagged return* is the percent return on the firm's stock minus the return on the value-weighted CRSP index during the quarter prior to the payout flexibility quarter. *Cash flow* is cash flow scaled by market cap. *Lamba* is calculated for the Heckman selection model from a first-stage probit. All explanatory variables are measured at the end of the prior quarter. t-statistics are presented below coefficients in parentheses and ***, **, and * represent significance at the 1%, 5%, and 10% levels. Statistics and p-values for the Hansen J test, whose null hypothesis is that the instrumental variables are valid, are presented for instrumental variable regressions.

technology firm, for example, is likely in a different stage of its life cycle than a ten-year old utility company. We document a strong negative relationship between the financial hedging and payout flexibility using quarterly payout flexibility. Model (5) presents the Heckman IV model, which is only useful in describing payout flexibility because our hedging proxy is an indicator variable. Again, we find that hedging and payout flexibility are negatively related. This

Table 9
Long-run payout flexibility and hedging in nonfinancial firms

	OLS		Instrumental variable		Heckman selection instrumental variable
Dependent variable	Payout flexibility (1)	Hedging dummy (2)	Payout flexibility (3)	Hedging dummy (4)	Payout flexibility (5)
Hedging dummy	−0.094***		−0.422***		−0.216***
	(−4.683)		(−8.028)		(−4.513)
Payout flexibility		−0.073***		−0.127***	
		(−4.243)		(−4.017)	
Volatility	0.079***	0.029**	0.112***	0.034***	−0.021
	(3.482)	(2.346)	(4.437)	(2.678)	(−0.754)
Total payout yield	−0.991***	−0.122	−0.980***	0.050	−3.559***
	(−12.259)	(−1.628)	(−11.188)	(0.627)	(−9.899)
Log market cap	−0.043***	0.082***	−0.008	0.088***	−0.007
	(−8.709)	(19.132)	(−1.103)	(20.735)	(−0.969)
Cash	0.099***	−0.007	0.077***	−0.042***	0.012*
	(7.275)	(−0.652)	(5.201)	(−4.029)	(1.697)
M/B	0.005	0.050***	−0.018	0.035***	−0.003
	(0.449)	(5.325)	(−1.469)	(3.614)	(−0.461)
Leverage	−0.091***	0.490***	−0.213***	0.336***	−0.296***
	(−2.592)	(14.313)	(−5.811)	(10.427)	(−6.673)
Lagged return	0.037	−0.010	0.079***	0.021	−0.029
	(1.340)	(−0.424)	(2.621)	(0.857)	(−0.624)
Cash flow	−0.015	−0.044**	−0.000	−0.042**	−0.051**
	(−0.672)	(−2.340)	(−0.004)	(−2.145)	(−2.082)
Lambda					0.926***
					(7.493)
Number of observations	3,073	3,056	3,073	3,055	1,895
Hansen J statistic			n/a	0.210	n/a
				$p = 0.646$	

This table presents OLS, IV, and Heckman IV regressions examining the relationship between long-run (two-year) payout flexibility and hedging activity in nonfinancial firms between 2004 and 2010. *Payout flexibility* is repurchases divided by total payout. Repurchases represent total shares repurchased (Compustat data item CSHOPQ) times the average quarterly repurchase price (Compustat data item PRCRAQ). Total payout represents the sum of regular cash dividends (CRSP codes 1212, 1222, 1232, 1242, and 1252), special dividends (CRSP code 1272), and repurchases. *Hedging dummy* equals one if the firm has nonzero derivative gains or losses and is zero if the firm has exactly zero derivative gains or losses. Our instrument for hedging is the two-year industry average hedging (the mean value of *hedging dummy* for all firms with the same 2-digit SIC code). Our instruments for payout flexibility are industry-adjusted firm age (the natural log of firm age minus the yearly mean log firm age for all firms with the same 2-digit SIC code) and average two-year payout flexibility for firms in the same 2-digit SIC code. *Volatility* is cash flow volatility, defined as the standard deviation of the ratio of cash flow to market cap over the twelve prior quarters. *Total payout yield* is the sum of all cash dividends and repurchases divided by market cap. *Log market cap* is share price times the number of shares outstanding. *Cash* is cash and cash equivalents, scaled by market cap. M/B is the market to book ratio. *Leverage* is total liabilities divided by market cap. *Lagged return* is the percent return on the firm's stock minus the return on the value-weighted CRSP index during the quarter prior to the payout flexibility quarter. *Cash flow* is cash flow scaled by market cap. *Lamba* is calculated for the Heckman selection model from a first-stage probit. All explanatory variables are measured at the end of the prior year. t-statistics are presented below coefficients in parentheses and ***, **, and * represent significance at the 1%, 5%, and 10% levels. Statistics and p-values for the Hansen J test, whose null hypothesis is that the instrumental variables are valid, are presented for instrumental variable regressions.

table suggests that, even after controlling for endogeneity, nonfinancial firms substitute financial hedging and financial flexibility in payout policy.[18]

We obtain similar results in Table 9 using two-year measures of hedging and payout flexibility. Using OLS, IV, and Heckman IV analysis, in both directions

[18] Our results are similar when we reclassify missing values of hedging as zero.

and with both hedging measures, we find that payout flexibility and hedging are negatively related. We verify that our results on nonfinancial firms are robust to SUR analysis, which includes industry (2-digit SIC code) fixed effects. Like our IV analysis, we find that hedging and payout flexibility are substitutes. These results are available in our Internet Appendix.

4. Conclusion

This paper examines the relationship between two determinants of financial flexibility—payout policy and risk management. Both in the cross-section and within-firms, we are able to reject the hypothesis that causality runs simply from hedging through cash flow volatility to payout policy and find instead that hedging substitutes for quarterly and long-run payout flexibility, defined as repurchases as a percent of total payout. These results are robust to controlling for endogeneity with instrumental variables, to using alternative measures of payout flexibility that capture variation in payout decisions, to controlling for other determinants of risk management and payout policy, including blockholder ownership and firm size, and to controlling for sample selection issues, that is, the choice to hedge or repurchase.

Although detailed hedging data are unavailable for nonfinancial firms, we analyze their decision to hedge and find that hedging firms have significantly less flexibility in their payout structure, consistent with hedging substituting for payout flexibility. Further, our results support the hypothesis that nonfinancial firms also substitute financial hedging and payout flexibility. Thus, our main results extend to nonfinancial firms.

In sum, our evidence suggests that both bank holding companies and nonfinancial firms recognize that payout policy and risk management both contribute to financial flexibility and are substitutes. Consequently, payout policy—and the broader issue of financial flexibility—can be fully understood only within the context of the firm's related hedging choices.

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