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Product Market Competition and the Value of Corporate Cash:

Evidence from Trade Liberalization

Authors' List

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Product Market Competition and the Value of Corporate Cash:

Evidence from Trade Liberalization[*]

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Abstract

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1. Introduction

It is widely recognized that important corporate decisions are fundamentally affected by competition in product markets. In particular, finance scholars have shown that the nature of product market competition influences firms' financing and investment choices and, therefore, their cash flows (e.g. Haushalter et al., 2007; Xu, 2012). Hou and Robinson (2006) and Hoberg and Phillips (2010) further document a significant effect of competition on the riskiness and market valuation of these cash flows. To date, however, relatively little is known how competition affects the market valuation of important corporate policies, such as cash management. This is a surprising gap in the literature given a tremendous increase in cash holdings of firms in the U.S. over the last three decades and the massive value gains or losses to investors that can result from firm cash management choices (e.g. Bates et al., 2009). Over that same period, firms have experienced a significant increase in the intensity of competition due to globalization of business activity, reductions in trade barriers, and technological progress. Therefore, it is important to understand the effect of increased competition on the contribution of cash holdings to firm value. The goal of this study is to examine whether and how *changes* in the intensity of competition faced by firms affects the value of their cash holdings.

To understand why changes in competition may impact the value of cash holdings, I turn to theories of predation and agency conflicts for insight into the link between competition and the use of cash (which ultimately determines its value). Predation-based theories stress the strategic role that cash reserves play in ensuring a firm's ability to successfully compete in product markets. For instance, Bolton and Scharfstein's (1990) and Froot et al. (1993) show that cash reserves and equivalents are an important source of flexibility in product markets because liquid assets allow firms to quickly counter possible predatory actions on the part of their rivals and thus preserve firms' valuable investment

opportunities. The predation view thus implies that a rise in competitive pressure will enhance the value of additional cash holdings that could be used to fund activities that mitigate product market threats.

In contrast, the agency-based theories suggest that stockpiles of cash can exacerbate agency conflicts at the firm by providing self-interested managers with discretionary funds to undertake suboptimal investment (e.g. Jensen 1986). Dittmar and Mahrt-Smith (2007) show that investors indeed discount the value of cash reserves in firms run by potentially entrenched managers. Economists have long argued that the competitive pressure from product markets serves as a powerful tool to mitigate agency problems. Tougher competition enforces discipline on managers to reduce inefficiency, or else be driven out of business. The agency-based view thus implies that a rise in competition will increase the value of corporate cash by reducing the agency problem of cash holdings.

In sum, while the exact mechanisms are different, both theories predict a positive relation between the degree of competition and the value of cash. To establish a convincing link between competition and the value of cash, however, a researcher needs to deal with the fact that many commonly used proxies for competition, such as industry-level concentration ratios or profit margins, are difficult to interpret due to the endogeneity of industry structure to firms' chosen financial and investment policies (Schmalensee 1989).

I attempt to deal with this endogeneity problem by using the Canada-United States Free Trade Agreement (FTA) as a source of an exogenous change in firms' product market conditions. The FTA came into effect in 1989 and involved substantial reductions in tariffs and other trade barriers between the two countries, and thus significantly reduced entry barriers into a large number of industries. As discussed by Trefler (2004), the FTA represents a clearly defined trade policy experiment which was exogenous to individual companies and was not driven by changes in economic climate or political environment. As a result, this

trade agreement plausibly represents a substantial exogenous shock to firms' competitive environment and allows me to assess the *causal* impact of increased competition on the value of cash. I further exploit the cross-sectional differences in the impact of the competitive shock across firms based on their exposure to trade with Canada. Specifically, my empirical analysis isolates the effect of the trade agreement by studying its *differential* impact on the value of cash across firms, based on the degree to which firms were protected by tariffs on Canadian imports prior to the agreement. The identifying assumption of this empirical strategy is that firms experiencing larger import tariff reductions as the result of the FTA (and thus greater decline in entry barriers into their industries) should be exposed to a greater increase in foreign competition.

Using a large panel data that spans the period from 1984 to 1995, I conduct difference-in-differences tests, in which I compare the market valuation of cash reserves before and after the trade liberalization (first difference) for firms experiencing relatively large versus small tariff cuts (second difference). I find a significant value impact of an increase in competition due to a decline in tariffs. Following the trade liberalization, the value of an additional $1 of cash increases by approximately $0.31 more for firms experiencing large tariff cuts relative to the value of cash for firms experiencing small tariff cuts. This effect is estimated controlling for all other factors that may affect the marginal value of cash as well as industry and year fixed effects that account for permanent unobserved industry heterogeneity and changes in economic conditions. To reduce concerns about reverse causality, I trace out the timing of the effect of the trade liberalization and show that its effect manifests only two years after the passage of the agreement.

It is important to note that the FTA eliminated U.S. tariffs on Canadian imports as well as Canadian tariffs on U.S. exports and thus increased growth opportunities for U.S. firms. I examine the effects of increased growth opportunities and find that the reductions in

Canadian tariffs have no significant effects on the marginal value of cash. Overall, the results point to the positive and *causal* effect of increased foreign competition due to the FTA-mandated import reductions on the value of firms' cash reserves.

After documenting the average impact of an increase in foreign competition on the value of cash, I next analyze which competing economic mechanisms might explain the findings. As discussed above, the predation view suggests that a rise in competitive pressure will increase the value of corporate liquidity through an increase in the predatory threats. In contrast, the agency view suggests that an increase in competition will increase the value of cash by forcing entrenched managers to reduce inefficient use of cash.

To determine the relative merits of these competing explanations, I test whether the effect of the FTA tariff reductions varies systematically with the firms' exposure to predation risk and the severity of agency problems. I find that the FTA tariff reductions have stronger impact on the value of cash for firms facing greater predation risk, as measured by two proxies for the interdependence of their growth opportunities with industry rivals. In contrast, the impact of increased competition on the value of cash does not systematically differ between firms with more and less severe potential agency problems, as measured by the level of institutional ownership.

To corroborate these results, I also look at changes in corporate spending on investment before and after the trade liberalization. The predation and agency hypotheses imply that an increase in competitive pressure will potentially have two opposing effects on the use of cash reserves to fund investment. One possibility is that firms increase their investment spending in an attempt to counter increased predatory threats from foreign rivals. Alternatively, if competitive pressure enforces discipline on managers, firms may cut wasteful spending when faced with growing competition. I find that, following the trade

liberalization, firms with larger tariff reductions and with more cash reserves tend to increase spending on discretionary investment, primarily acquisitions.

Taken together, the evidence is most consistent with the predation threat hypothesis: cash reserves become more valuable for the firms experiencing a greater increase in competitive pressure because the market anticipates a more prominent role for the use of cash to fund activities that mitigate increased predatory threats.

2.   Theoretical background and related empirical studies

This section starts by describing predation risk-based and agency-based theories that explain why changes in firms' product market conditions may affect the value of their cash holdings. I then discuss the empirical implications and related empirical studies.

2.1 Increase in competition, threat of predation, and value of cash

A number of theoretical studies argue that a stockpile of cash confers important strategic advantages to firms in competitive product markets and thus increases shareholders' wealth. In particular, Telser (1966) initially proposed and Bolton and Scharfstein (1990) formalized an argument that a firm's ability to compete successfully against its product markets rivals depends on the level of internal liquidity. Bolton and Scharfstein suggest that firms with "deep pockets" or large cash holdings can use cash to fund aggressive "predatory" actions against their rivals, such as cutting prices, opening new facilities, and even acquiring rivals at fire-sale prices.

Froot, Scharfstein, and Stein (1993) further propose that predation risk and thus the competitive advantage of cash largely depend on the nature of competitive interactions within an industry. They suggest that having additional cash is more valuable when product market rivals compete in strategic substitutes and thus have a high degree of interdependence in their investment opportunities. If a firm is not able to finance its valuable investment opportunities,

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it risks losing these opportunities and market share to rivals. Collectively, these theoretical models suggest that having additional internal funds, which allow a firm to invest in activities that protect the firm against the threat of predatory actions or help deter entry of new rivals, serve shareholders' interests.

2.2 Increased in competition, managerial agency problems, and value of cash

The alternative argument linking changes in competition and the value of cash emphasizes the disciplinary role of competition in mitigating managerial slack, such as inefficient use of cash reserves. A prevalent view among researchers and practitioners is that large cash reserves aggravate the agency conflicts between managers and shareholders. Easterbrook (1984) suggests that cash reserves allow managers to avoid the scrutiny and monitoring of outside investors. Jensen (1986) argues that self-interested managers would spend excess cash holdings on projects that benefit them rather than shareholders. Consistent with the idea that agency conflicts influence the value of cash, Dittmar and Mahrt-Smith (2007) and Masulis et al. (2009) find that investors place a much lower value on cash holdings in firms with weaker corporate governance structures, as indicated by the preponderance of antitakeover provisions and greater control rights-cash flow rights divergence. Harford et al. (2008) further show that firms with more entrenched managers tend to spend cash on value-reducing projects.

Economists have long argued that tough competition in the product market can be an even more effective force for mitigating managerial agency problems than internal corporate governance structures. Alchian (1950) and Hart (1983) argue that competitive pressures in the product market force firms to minimize costs and increase operating efficiency, and drive inefficiently run firms out of the market. Shleifer and Vishny (1997) note that, "product market competition is probably the most powerful force towards economic efficiency in the

world." The agency view thus suggests that more intense competition can increase the value of cash to shareholders by forcing managers to use cash more efficiently and thus reducing agency costs associated with cash holdings.

2.3 Empirical implications

The discussion above highlights several empirical implications. First, both theories imply that a decline in entry barriers and subsequent increase in competition will raise the value of corporate cash on average. However, the predation threat and agency hypotheses rely on different mechanisms and thus have distinct cross-sectional implications. Under the predation threat hypothesis, when competition intensifies, additional cash reserves will become more valuable primarily for firms that face a greater threat of predation. In contrast, the agency hypothesis predicts that, in response to increased competition, the value of cash will increase primarily for firms where managers are more entrenched.

2.4 Contribution and related empirical studies

This paper contributes to the literature by identifying an important channel through which changes in product market competition affect shareholder wealth-the market valuation of cash reserves. This study goes beyond simply establishing an association between static proxies for competition and market valuation and instead documents a causal effect of an increase in competitive pressure in the product markets. Consequently, this paper advances our understanding of the precise links between competition and the value implications of corporate policies.

These findings add to a growing body of evidence showing a link between product market competition and shareholder wealth. Hou and Robinson (2006) and Hoberg and Phillips (2010) show that competition systematically affects average stock returns. Gaspar

and Massa (2006) and Irvine and Pontiff (2009) provide evidence that increased competition over the past few decades contributed to increased volatility of firms' cash flows and stock returns. Giroud and Mueller (2011) find that the positive link between good internal governance and stock returns exists only in noncompetitive industries.

The findings in this paper also add to the growing literature which studies the determinants of the market valuation of corporate cash resources. Prior studies mostly focused on firm characteristics to explain cross-sectional variation in the value of cash, such as financial constraints (Faulkender and Wang 2006), managerial agency conflicts (Dittmar and Mahrt-Smith, 2007; Masulis, Wang, and Xie, 2009), labor unions (Klasa et al., 2009), country-level investor protection (Pinkowitz et al., 2006), and managerial compensation incentives (Liu and Mauer, 2011). In contrast, this is the first study that demonstrates an important role of product market competition in determining the value of corporate cash.

Finally, this paper is related to the literature on the effects of firms' chosen cash positions on product market outcomes. Haushalter, Klasa, and Maxwell (2007) show that firms' cash holding and hedging policies are closely related to the industry structure and the extent of the interdependence of their investment opportunities with rival firms. Consistent with the predation models, the authors show that larger cash reserves allow firms to support their investment spending at times when their rivals are forced to cut their investment spending. Frezard (2010) examines the effects of cash holdings on firm performance in product markets and finds that firms with larger cash reserves tend to experience higher sales growth and operating performance than their industry counterparts. Using large industry-level import tariff cuts to measure changes in competition, Fresard confirms that firms with larger cash holdings achieve higher industry-adjusted sales growth when foreign competition intensifies. Relative to this literature, the primary focus of my paper as well as its incremental contribution is to identify a causal impact of increased competition due to an

exogenous fall in trade barriers on the market value of corporate liquidity. It is worth stressing that the value that the market places on the corporate cash is ultimately determined by how the market expects the cash to be utilized. Hence, studying changes in the value that investors attach to the cash holdings of firms allows me to capture the market's comprehensive estimate of how the value and implied use of the cash change following a shock to firms' competitive environment. In addition, the methodology used in this study to determine the market value of cash accounts for the potential shifts in the risk related factors due to unexpected changes in competition.

3. Identification and empirical strategy

3.1 The 1989 Canada-U.S. Free Trade Agreement

A major obstacle hindering most empirical studies of the effect of competition on corporate policies and their value implications is the endogeneity of common competition measures. For example, Demsetz (1973) notes that a concentration index for a particular industry, a commonly used proxy for competition, may be the consequence of the efficiency of firms in that industry rather than the measure of competitive pressures.

To identify the causal effect of competition on the value of the cash reserves of firms, I thus need to identify a setting, that from any individual firm's perspective, represents an exogenous, unanticipated and material shock to the degree of product market competition. To this end, I identify a quasi-natural experiment that affects competition through its effect on imports tariffs and other trade barriers. Import tariffs represent an important mechanism that countries use to protect domestic producers from foreign competition. The quasi-natural experiment in this paper exploits the elimination of all tariffs and other trade barriers between Canada and U.S. across a large number of industries. The tariff reductions were the result of

the Canada–U.S. Free Trade Agreement (FTA), which was signed in 1988 and went into effect in January 1989. Trefler (2004), Guadalupe and Wulf (2010), Romalis (2007), Bernard et al. (2011), among others, used this event to identify exogenous changes in product market competition. These papers discuss in detail the validity of this quasi-natural experiment for the identification of the causal effects of increased competition. I will be briefly discuss describe the trade agreement but I refer the interested reader to Trefler (2004) and Guadalupe and Wulf (2010) for discussion of the political and economic context in which the agreement was passed. Trefler (2004) points out that the FTA represented a clearly defined change in bilateral trade relations and that the trade reform was not accompanied by other economic or political reforms in the two countries. Trefler notes that the FTA was not implemented as a response to changes in macroeconomic conditions in the U.S. or Canada or as a result of pressure from any individual firm. Since major Canadian political parties opposed to the agreement, the eventual implementation of the FTA was highly uncertain and unanticipated. Only a narrow victory of the Conservative Party of Canada in the November 1988 general elections assured the passage of the FTA. Guadalupe and Wulf (2010) further argue that relative to an alternative strategy that relies on large import tariff cuts, the FTA more cleanly identifies truly exogenous variation in competition. In contrast, the timing and magnitude of import tariff cuts can capture endogenous choices of firms that may lobby governments for protection from foreign competition.

To demonstrate that the FTA represented a substantial shock to the competitive environment of U.S. firms, Figure 1 plots the percentage annual changes in the value of import shipments from Canada to the U.S. from 1986 to 1995. The trade data come from the Center for International Data at UC Davis. To illustrate the importance of changes to entry barriers into an industry due to a decline in tariffs, I divide industries into three groups based on the pre-1989 tariff levels that shielded these industries from Canadian imports. The pre-

FTA tariffs and thus post-FTA tariff reductions at the four-digit SIC industry level ranged from zero to 36 percent. Industries with the pre-FTA import tariffs above the 67th percentile of the tariffs distribution (roughly 5%) are denoted as the high tariff and industries with tariffs below the 33rd percentile (roughly 2%) are denoted as the low tariff industries. The industries in the medium tercile are the medium tariff industries. As a whole, the volume of Canadian imports to U.S. almost doubled between 1986 and 1995. Figure 1 further shows that the greater the industry-level pre-FTA tariff (and thus greater the tariff cuts mandated by the FTA) the faster the imports from Canada grew. Specifically, in industries that prior to the FTA were protected by tariffs in excess of 5%, the volume of Canadian imports has risen by about 300% from its 1986 level to 1995. In comparison, industries with import tariffs below 2% experienced a 122% increase in the volume of Canadian imports.

The results in Figure 1 thus indicate that the removal of trade barriers has substantially increased the presence of Canadian products, especially in industries with relatively high tariffs on Canadian imports before 1989. Romalis (2007) reports similar findings. Such a dramatic increase in the market penetration of Canadian products was likely to intensify competitive pressure on U.S. firms in part because Canadian firms tend to specialize in the same products and have skills similar to those of U.S. firms. I thus conclude that the decline in imports tariff mandated by the FTA represented economically meaningful competitive shocks for a large number of U.S. firms.

3.2 Empirical strategy and main regression

The empirical strategy of this study uses a differences-in-differences method, in which I compare the value that the market places on the cash holdings of firms in the years before and after the FTA implementation (first difference) for firms experiencing greater versus-lesser increase in the competitive pressure due to the trade liberalization. While the

FTA has affected a large number of U.S. industries, my empirical analysis follows Guadalupe and Wulf (2010) and Bernard et al. (2011) and attempts to isolate the impact of the trade liberalization by examining its *differential* impact on the value of cash across firms according to the level of tariffs that shielded these firms from Canadian imports before 1989. The identifying assumption central to this empirical strategy is that the FTA resulted in a greater increase in competitive pressure for firms in industries with high pre-FTA Canadian tariffs relative to firms in industries with low tariffs. Findings in Figure 1 as well as evidence in Trefler (2004) and Guadalupe and Wulf (2010), support this identification assumption.

To identify the firms' differential exposure to the competitive shock, I create a dummy variable ("High Tariff") that equals one if the firm experienced tariff reductions following the FTA in excess of 5 percent, which roughly corresponds to the 67th percentile of the tariffs distribution, and zero otherwise. I use a dummy variable instead of continuous measure to allow for more intuitive economic interpretation of the estimated coefficients. In addition, the binary variable should mitigate any measurement problems associated with the measurement of tariffs as effective rates (computed from trade data) instead of statutory rates. It is also necessary to point out that while all tariffs on imports from Canada were scheduled to go to zero after 1989 and some tariff reductions took effect in 1989, other tariffs s were phased out over the ten year period. To avoid the fact that the tariff phase-out schedule could be endogenous, I follow Guadalupe and Wulf (2010) and treat all industries equally by exploiting only their pre-1989 level of tariffs. Since all tariffs were eliminated due to the agreement, the level of tariffs before the agreement represents the actual tariff reduction experienced by firms following the FTA.

My primary regression model builds on the widely-used methodology developed by Faulkender and Wang (2006), which examines an association between a (unexpected) change in cash holdings and a (unexpected) change in the market value of equity over the fiscal year.

The change in market value of equity is measured by the risk-adjusted equity return during fiscal year. The risk-adjusted return is the raw stock return minus the return on one of the 25 Fama and French (1993) size and book-to-market portfolio to which a firm belongs at the beginning of fiscal year

The following equation describes the differences-in-differences regression:

$$r_{i,t} - R_{i,t}^B = a + \gamma_1 \frac{\Delta Cash_{i,t}}{MV_{i,t-1}} + \gamma_2 postFTA * \frac{\Delta Cash_{i,t}}{MV_{i,t-1}} + \gamma_3 postFTA * HighTariff_i * \frac{\Delta Cash_{i,t}}{MV_{i,t-1}} +$$
$$+ \gamma_4 HighTariff_i * \frac{\Delta Cash_{i,t}}{MV_{i,t-1}} + \gamma_5 \frac{\Delta E_{i,t}}{MV_{i,t-1}} + \gamma_6 \frac{\Delta NA_{i,t}}{MV_{i,t-1}} + \gamma_7 \frac{\Delta RD_{i,t}}{MV_{i,t-1}} + \gamma_8 \frac{\Delta I_{i,t}}{MV_{i,t-1}} + \gamma_9 \frac{\Delta D_{i,t}}{MV_{i,t-1}} + \quad \textbf{(1)}$$
$$\gamma_{10} \frac{Cash_{i,t-1}}{MV_{i,t-1}} + \gamma_{11} \frac{NF_{i,t}}{MV_{i,t-1}} + \gamma_{12} L_{it} + \gamma_{13} \frac{Cash_{i,t}}{MV_{i,t-1}} \frac{\Delta Cash_{i,t-1}}{MV_{i,t-1}} + \gamma_{14} L_{it} \frac{\Delta Cash_{i,t}}{MV_{i,t-1}} + d_t + \eta_t + + e_{ij,t}$$

The dependent variable is the risk-adjusted stock return. For the independent variables, $\Delta Xi,t$ indicates a change in variable X for firm i over the fiscal year t. $\Delta Cash$ is a firm's unexpected change in cash and marketable securities over the fiscal year, where the firm's cash position at the year-beginning serves as its expected value at the end of the year. All independent variables, except for leverage and competition, are scaled by $MV_{i,t-1}$, a firm i's market value of equity at the end of the fiscal year t-1. Therefore, the slope on $\Delta Cash$ captures the dollar change in the market value of equity of a firm for a one dollar change in its cash balance. *PostFTA* is a dummy variable that equals 1 for observations in the post-1989 period, and 0 otherwise. *HighTariff_i* is a dummy variable that equals 1 if a firm is experiencing the FTA-mandated tariff reductions in excess of 5% (67th percentile of the tariffs distribution), and zero otherwise. Other independent variables include: earnings before extraordinary items (*E*), change in noncash assets (*NA*), research and development expense (*RD*) (set equal to zero if missing), interest expense (*I*), common dividends (*D*), Leverage measured as long-term debt plus short-term debt divided by the market value of assets at time t (*L*), and net new finance measured as total equity issuance minus repurchases plus debt issuance minus debt redemption (*NF*).

All regressions include year fixed effects (d_t) to control for common macroeconomic shocks and firms' main four-digit SIC industry fixed effects (η_t) to account for industry-specific time-invariant factors that could be correlated with both the tariffs and firms' financing policies. It is important to note that all regressions in this paper use changes (or first-differences) in variables, which largely remove time-invariant firm-specific heterogeneities (Imbens and Wooldridge, 2009).

The estimated standard errors in all specifications are corrected for heteroskedasticity and clustering at the firms' main four-digit SIC industry level. Given that the source of variation in competition (tariffs) is measured at the industry level, clustering at the industry level accounts for potential correlations in unobserved factors that affect all firms in a given industry (see Bertrand, Duflo, and Mullainathan, 2004). Importantly, clustering at the industry-level also corrects for potential correlations of error terms within a firm and thus more general than clustering at the firm-level.

The main variable of interest is the change in cash position by itself and its two interactions with the indicator variables for firms experiencing high vs. low tariff reductions. The coefficient on *ΔCash* PostFTA*HighTariff* measures the change in the marginal value of cash following the trade liberalization for the firms experiencing relatively large tariff cuts (in excess of 5%) relative to the firms experiencing small or no tariff cuts for which the post-FTA change in the value of cash is captured by the slope on *ΔCash*PostFTA*.

4.   **Data and Summary Statistics**

Tariff Data. I extract data on the volume of imported and exported goods and services and collected import duties aggregated at the four-digit SIC industry level from the Center for International Data at the University of California Davis (available on http://www.internationaldata.org). For each industry, I compute the effective pre-FTA tariff

rates on imports from Canada as total duties collected by the U.S. Customs divided by the

total value of imports from Canada between 1986 and 1988. The average pre-FTA U.S. tariff

rate on Canadian imports across all industries was 4.4% and the median was 3.3%. In some

specifications, I also use Canadian tariffs on U.S. exports obtained from Trefler (2004).

Firm-level sample. Appendix A provides definitions of all variables used in the

paper. The firm-level accounting and stock return data come from Compustat and the Center

for Research in Security Prices (CRSP). The sample spans the period from 1983 to 1995 and

consists of all U.S.-based publicly traded non-financial and non-utility firms operating in

industries with available tariff data. The usable sample starts in 1984 because the valuation

regression uses yearly changes in variables. Since my empirical analysis exploits the

differential exposure of firms to the level of tariffs on Canadian imports prior to the FTA, my

sample is further restricted to firms that are present in Compustat before 1989 to avoid

change in sample composition. Firm-year observations are required to have non-missing data

for book assets, sales, cash, and common shareholders' equity, as well as valid stock returns

for an entire fiscal year. I further remove firm-years for which cash holdings exceed the value

of total book assets or asset growth exceeds 200%.

Since many firms operate in more than one segment, each firm's exposure to the trade

liberalization is measured as the sales-weighted average of the Canadian tariffs across the

four-digit SIC industries in which the firm was active in 1988. Data on segment sales and the

segment's primary four-digit SIC codes are obtained from the Compustat Segments database.

Clarke (1989) and Kahle and Walkling (1997) point out that some of the four-digit SIC

industry classifications used by Compustat may not accurately identify meaningful product

markets. Following these researchers, I retain only firms whose main segment's (in terms of

sales) four-digit SIC industry code is assigned to well-defined product markets and exclude

firms whose main segment's SIC code ends with zero or nine. The final sample consists of 1,041firms with 12,514 firm-year observations.

Table 1 describes the key variables used in this study. All variables are converted to real values in 1990 dollars using the consumer price index and all ratio variables are winsorized at the 1 and 99 percentiles, to reduce the impact of outliers. The median raw and abnormal stock return is 4% and −8.1%. The average changes in cash and earnings are slightly positive, suggesting that firms' cash holdings and operating performance tend to increase over time. On average, cash and debt represent 15.6% and 24.3% of the firms' market capitalization. The average institutional ownership is 27% and its median is 22.5%.

5.   Results

5.1 The main result

Table 2 reports results of the valuation model described in Equation (1). Column 1 replicates Faulkender and Wang's (2006) original results to confirm the association between cash holdings and firm value for my sample firms. The results show that the estimated coefficients on all variables are very similar to those reported by Faulkender and Wang. To get a better understanding of economic magnitudes, throughout the paper I estimate the total dollar change in the market value of equity as a result of one dollar change in cash balance for the mean firm. So, the coefficient estimates in Column 1 imply that a $1 of extra cash is worth $1.329 to shareholders in the mean firm that has no cash and no debt at the beginning of the fiscal year. However, the mean firm in the sample has cash holdings equivalent to 15.6% of the market value of equity at the beginning of the fiscal year and the leverage ratio of 24.3%. A correct measure of the value effect of a one-dollar increase in cash holdings, therefore, requires incorporation of the two additional coefficients on the interactions of the change in cash with cash balance and leverage multiplied by the sample means of these

variables. Hence, a one-dollar increase in cash increases shareholder wealth in the mean firm by $0.97 (=$1.388 - $0.877*0.156-$1.129*0.243). In comparison, Faulkender and Wang (2006) estimate that the marginal value of cash in their sample is $0.94.

In the remaining columns of the table, I augment the specification in Model 1 by including the two key interaction terms: *ΔCash*PostFTA*HighTariff* and *ΔCash*PostFTA,* which capture the incremental impact of the trade liberalization on the marginal value of an extra $1 of cash for the firms that experience relatively large and small tariff reductions on Canadian imports following the trade reform.

Column 2 starts the analysis of the effect of competition on the marginal value of cash by suppressing interactions of the change in cash with the lagged level of cash and with leverage. This allows us to

The findings in these models indicate that equity investors indeed place a different value on liquidity for the firms experiencing relatively large FTA-tariff reductions and thus most affected by the trade liberalization. The coefficient on *ΔCash*PostFTA*HighTariff* in Column 2 is positive $0.338 and significant at better than the 3% level. For firms experiencing small tariff reductions mandated by the FTA, the trade liberalization increases the value of an additional dollar of cash by only $0.04. Furthermore, when I add industry fixed effects in Column 3, the coefficient on the interaction of the change in cash with the post-FTA dummy becomes insignificant. In contrast, the inclusion of industry fixed effects has very little influence on the impact of the trade liberalization on the marginal value of cash for those firms that experience a large fall in tariffs: the respective coefficient declines only slightly from $0.388 to $0.312 and remains significant.

This evidence thus indicates that the market significantly increases the marginal value of cash for firms experiencing a substantial increase in foreign competitive pressure due to a

large decline in tariffs relative to firms that experience a small increase in foreign competition. The impact of deep cuts in tariffs on the marginal value of cash is not only statistically significant but economically sizable as well. Using the results in Column 3, we observe that, following the trade liberalization, a $1 of extra cash is worth $0.31 more for the firms experiencing above 5% tariff reductions relative to the firms experiencing below 5% tariff reductions. This represents almost a 33 percentage point increase in the marginal value of cash for the mean firm due to an exogenous shock to its competitive landscape.

Since the FTA eliminated both import and export tariffs between U.S. and Canada, the trade liberalization potentially enhanced export opportunities to Canada for some U.S. firms. To separate effects of market expansion opportunities from the increase in competitive pressure in domestic markets, Column 4 includes an additional interaction term of the change in cash with the post-FTA indicator variable and the dummy variable indicating for firms that faced Canadian tariffs on U.S. exports in excess of 5% before the FTA, *ΔCash*PostFTA*High Export Tariff*. The high import tariff dummy is computed in an analogous way to the high import tariff dummy. The results in Column 4 show that a large fall in Canadian export tariffs does not influence the market valuation of cash. The addition of the firms' exposure to high export tariffs does not affect my earlier inferences about the effect of the large import tariff reductions on the value of cash. Thus, investors appear to revise their valuation of the cash reserves mainly in response to an increase in foreign competition due to a decline in import tariffs rather than an increase in potential market expansion opportunities.

Next, I address issues of reverse causality. As was discussed before, reverse causality issues appear to be minimal in this analysis since the passage of the trade agreement was relatively unexpected and not driven by macroeconomic shocks. Nevertheless, I examine reverse causality in Column 5 by tracing out the timing of the effect of the trade liberalization

on the value of cash. I follow Bertrand and Mullainathan (2003) and decompose the *PostFTA* dummy into three separate dummies: (i) *Before-FTA* [1987-88] is a dummy for observations in years 1987 and 1988, which captures any effects from two years before to one year before the trade liberalization; (ii) *FTA*[1989-90] is a dummy for observations in years 1989 and 1990, which captures the effect in the year FTA was passed and the year after; and (iii) *After FTA* [>1990] is a dummy for observations after 1990, which captures the effect two years after the implementation of the FTA. I then interact these three dummy variables with the change in cash variable and the dummy for large import tariff reductions. If the coefficient on the interaction of *Before-FTA* [1987-88] with the change in cash and large tariff reduction dummy is positive and significant, that may indicate potential reverse causality.

The results in Column 5 show that the coefficient estimates on the *ΔCash* Before-FTA*[1987-88]**High Tariff* and *ΔCash* FTA*[1989-09]**High Tariff* variables are not statistically significant. In contrast, the coefficient estimate on *ΔCash*After FTA* [>1990]** High Tariff* is highly statistically significant and even larger in magnitude than the estimate on *ΔCash*PostFTA*High Tariff* in Columns 2 and 3. This finding is consistent with a causal interpretation of the main result: investors place a higher value on internal liquidity for firms facing increased competitive pressure due to a large decline in tariffs on Canadian imports.

In the remainder of the section, I examine the robustness of the results to an alternative valuation regression developed by Fama and French (1998) and modified by Dittmar and Mahrt-Smith (2007) and Bates et al. (2009). The Fama and French valuation methodology allows me to examine how the increase in competitive pressure affects the contribution of a firm's cash reserves to its market-to-book ratio. The Fama and French valuation methodology is described in Appendix B.

Table 3 produces estimates of the Fama and French valuation regression. The results in Table 3 are entirely consistent with those in Table 2 and suggest that, following the trade

liberalization, the contribution of cash holdings to firm value increases more for the firms that experience large tariff changes than for those firms that experience small tariff changes as the result of the FTA. For example, the Model 3 with industry fixed effects shows that the coefficient on the triple interaction of the post-FTA dummy with the high import tariff dummy and the level of cash balance variable is positive 1.212 and statistically significant at better than the 5% level. This again indicates that the contribution of cash holdings to firm value increases when firms' product markets faced increased competition due to a large decline in tariffs. Column 4 of the table confirms that the findings are robust to the inclusion of reductions in Canadian export tariffs and Column 5 confirms the dynamic effects of the trade liberalization on the association between cash holdings and firm value.

The main conclusion from Tables 2 and 3 is that, following the removal of trade barriers between Canada and U.S., investors place a higher value on the cash holdings of firms most likely to be affected by the trade liberalization (i.e. firms in industries protected by high U.S. tariffs on Canadian imports prior to 1989). To provide further insights into the effects of the trade liberalization, next section examines the specific economic mechanisms through which increased foreign competition might impact the value of cash.

5.2 Why does competition increase the value of cash?

The documented positive impact of an increase in competitive pressure due to the tariff reductions on the value of cash of firms is consistent with both the predation threat and agency explanations. However, the predation threat and agency hypotheses suggest that an increase in competitive pressure impacts the value of cash through two distinct mechanisms. According to the predation hypothesis, a shock to firms' competitive environment raises the value of their liquidity because firms need additional liquid assets to finance activities that mitigate increased threat of predation. Under this hypothesis, I would thus expect to find a

stronger relation between the FTA-mandated tariff reductions and the value of cash among firms most exposed to predation risk. In contrast, the agency hypothesis suggests that an increase in competition raises the value of cash by acting as a disciplinary mechanism that forces managers to improve efficiency in utilizing cash resources. Under the agency hypothesis, the competitive shock from a fall in tariffs will have a larger impact on the value of cash for firms where managerial agency problems are likely to be more severe. To determine the relative merits of these two explanations, the next analyses examine whether the effect of the foreign competition shock varies systematically across firms that differ along various dimensions that proxy for predation threat and agency problem.

5.2.1   Test of predation threat hypothesis

Froot et al. (1993) propose that a firm's exposure to the threat of predatory actions is largely determined by the degree of the interdependence of its investment opportunities with product market rivals. I follow Haushalter et al. (2007) and measure the degree of the interdependence of a firm's investment opportunities using two different proxy variables. The first proxy is the absolute value of the deviation of a firm's capital-to-labor ratio from the median ratio in its industry, measured in 1988. Smaller values of the capital-to-labor ratio deviation indicate that a firm uses production technology that is more similar to the rest of the industry and thus faces a greater risk of losing investment opportunities to rivals. The second proxy is the correlation of a firm's monthly stock returns with respect to an equally-weighted industry return index (at two-digit SIC level) measured over the three year period prior to the FTA. The higher value of the correlation indicates that a firm's growth opportunities co-vary more with those of their industry rivals.

Table 4 presents estimates of Eq. (1) separately for firms exposed to high and low threat of predation. Firms are assigned to a high (low) predation threat group if their capital-

to-labor ratio falls in the lower (upper) third or their stock return correlation falls in the upper (lower) third of the distribution for these measures. The predation hypothesis predicts that the coefficient on *ΔCash*PostFTA*High Tariff* is larger for firms facing greater predation risk.

The evidence in Table 4 is consistent with a magnifying effect of the predation threat on the change in the marginal value of cash for firms experiencing a greater increase in foreign competition due to large tariff cuts. Across both proxies for predation risk, I find that the coefficients on *ΔCash*PostFTA*High Tariff* are positive and statistically significant for firms in the high predation risk group. In stark contrast, the increase in foreign competition due to a fall in tariffs does not affect the marginal value of cash for firms facing lower threat of predation. The difference between the coefficients across the high and low predation risk groups is significant at better than the 5% level[1]. Notably, the trade liberalization does not affect the value of cash for firms experiencing relatively small tariff reductions regardless of their exposure to predation risk (slope on *ΔCash*PostFTA*). Hence, the regression estimates suggest that, following the liberalization, a one-dollar increase in cash increases shareholder value by an additional $1.24 for the firms experiencing relatively large tariff cuts *and* facing greater predation risk. These results are consistent with the implications of predation theories: when competition in the product markets intensifies, liquidity becomes more valuable for those firms that are most exposed to the threat of predation by rival firms.

5.2.2 Test of agency hypothesis

I measure the extent of agency problems at the firm using the percentage of shares held by institutional investors. The anti-takeover index developed Gompers et al. (2003), a commonly used measure of managerial entrenchment, is not available during my sample

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[1] I assess the significance of the difference in the coefficients between the two regressions using a stacked regression framework. Specifically, I create a dummy variable for high predation risk and interact it with every independent variable.

period. Institutional ownership variable can capture the quality of corporate governance because, as pointed out by Shleifer and Vishny (1986), institutional investors have strong incentives to monitor and discipline the management. A larger institutional investor ownership hence indicates more monitoring and thus potentially lower managerial agency problem at the firm. Unreported analysis that uses institutional blockholder ownership as an alternative measure of institutional monitoring produces qualitatively similar results. The data on institutional holdings come from the 1988 SEC 13f filings recorded in the Thompson Reuters database[2].

Table 5 reports the estimates from Eq. (1) separately for firms sorted into high and low institutional ownership terciles. The agency hypothesis predicts that an increase in foreign competition due to the FTA tariff reductions will have a greater impact on the value of cash for firms with more entrenched managers (i.e. firms with low institutional ownership). A key result in the first two columns of the table is that the main variable of interest- *ΔCash*PostFTA*High Tariff*- yields larger coefficients in the top institutional ownership tercile than in the bottom one. This result is, therefore, inconsistent with the agency hypothesis. A formal test of differences in estimates, however, indicates that the top ownership tercile coefficient is not significantly different from the bottom tercile coefficient at conventional levels.

I next explicitly test the relative importance of predation threat and agency costs-related heterogeneity in the impact of the FTA-mandated tariff cuts. To do this, Model 3 of Table 5 nests the predation threat and agency models into one specification by augmenting Eq. (1) with two additional interaction of *ΔCash*PostFTA*High Tariff* with the relatively high predation risk dummy (as measured by the labor-cost variable) and the low institutional

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[2] All institutional investors with more than $100 million in equity assets under management are required to file a Form 13f with the SEC on a quarterly basis.

ownership dummy. Given that the specification conditions on the level of predation risk and agency problem at the firm, the coefficient on *ΔCash*PostFTA*High Tariff* captures the effect of large tariff reductions on the value of a $1 of extra cash for firms facing relatively low threat of predation *and* that have relatively high institutional ownership.

The results in Column 3 of table 5 highlight a strong predation risk-related heterogeneity in the impact of the FTA tariff reductions on the value of cash. The *ΔCash*PostFTA*High Tariff*High Predation* variable yields positive and statistically significant coefficient, suggesting that an extra dollar of cash becomes more valuable for firms experiencing large tariff cuts *when* those firms face a greater threat of predation. In contrast, the results do not support the agency hypothesis since the coefficient on *ΔCash*PostFTA*High Tariff*Low Ownership* is negative (while the agency argument predicts it to be positive) and only marginally significant.

To summarize, the main conclusion from Tables 4 and 5 is that the increase in the marginal value of cash for firms experiencing large tariff reductions on Canadian imports is mostly concentrated among firms that face a greater threat of predation. This evidence is consistent with a predation risk story and suggests that the market impounds an expected increase in the threat of predation following the reductions in trade barriers into its valuation of corporate cash holdings.

5.2.3   Additional analysis: Changes in the use of cash

Since the value of firms' cash reserves is ultimately determined by how the market expects that cash to be used, changes in the value of cash should be reflected in the *ex-post* firm spending behavior. While it is beyond the scope of the paper to try to fully identify all possible changes in firm spending, in this section I look at changes in one potential use of

cash: investment expenditures. I focus on investment response to a rise in competition because it is one potential dimension along which the predictions of the agency and predation threat hypotheses clearly differ. The predation hypothesis predicts that a firm may respond to a rise in competition by increasing spending on certain types of investment that can help the firm to mitigate increased predatory threats. In contrast, the agency hypothesis predicts a decline in investment spending in response to increased competition since competitive pressure can enforce discipline on managers and reduce their spending on wasteful projects.

As in the prior analyses, my primary identification strategy focuses on the differential post-FTA changes in investment expenditures across firms with high vs low levels of Canadian tariffs prior to 1989. Changes in investment are measured as changes in capital expenditures, research and development (R&D), and acquisition spending as well as the sum of all these investments. I estimate the following augmented version of the standard investment-q regression specification:

$$\Delta \text{Investment}_{it} = a + \gamma_1 postFTA * HighTarif_i + \gamma_2 postFTA * HighTariff_i * \text{Cash}_{i,t-1}$$
$$+ \gamma_4 postFTA * C\text{ash}_{i,t-1} + \gamma_5 \text{Cash}_{i,t-1} + \gamma_6 Q_{i,t-1} + \gamma_7 \text{Controls}_{i,t-1} + d_t + \eta_t + + e_{ij,t}$$

$$(2)$$

where i indexes the firm, j indexes the firm's main industry, and t is a year index. The dependent variable is year-to-year change in capital expenditures, research and development (R&D), acquisitions, and the sum of these investments all scaled by beginning-of-year total assets. I use the Compustat data to compute changes in capital and R&D expenditures (where available) and the merger and acquisitions data from Thomson Financial to compute changes in acquisition spending. The key variable of interest is the firm's beginning-of-year cash balance (scaled by total assets) and its interaction with the firm's sensitivity to the level of FTA-mandated tariff reductions. Control variables include Tobin's Q (market to book assets) as a measure of growth opportunities, cash flow to total assets, size of firm's book assets, book leverage, a dividend dummy indicating firms paying common dividend as well as the

industry and year fixed effects. Because the contemporaneous levels of both investment and cash holdings can be simultaneously determined, I use changes in investment instead of levels and employ one-year lagged values of cash holdings and other independent variables.

The results of this analysis are presented in Table 6. As expected, the Tobin's Q, cash flow and cash holdings (by itself) variables yield positive and significant coefficients in the capital and R&D expenditures specifications. This indicates that firms with better growth opportunities and greater internal liquidity tend to spend more on new capital investment and R&D projects. The coefficient on the interaction of cash holdings with the post-FTA dummy is not significant in any equations, indicating that firms that experience small changes in tariffs do not increase the use of cash for investment purposes. In contrast, the coefficient on *Cash*PostFTA*High Tariff* is a positive and statistically significant in the change in acquisition spending (Column 3) and the total investment spending specifications (Column 4). This indicates that, following the trade liberalization, firms experiencing a greater increase in competitive pressure (i.e. large tariff cuts) are more likely to spend their cash reserves on new investment, primarily on acquisitions.

This finding this suggests that the trade liberalization affects the use of cash by the firms most affected by the fall in trade barriers in a way that is consistent with the predation threat hypothesis. Following the shock to trade, firms that experience a greater rise in competitive pressure tend to increase their spending on acquisitions and other investments, presumably in order to mitigate increased predatory threats.

6. Conclusions

Using the 1989 Canada–United States Free Trade Agreement as a source of exogenous variation in product market conditions, I establish a causal effect between increased foreign competition and the value that shareholders place on the cash holdings of firms. I find that following the shock to firms' competitive environment, the market value of cash increases

significantly for firms most affected by the decline in entry barriers into their product markets (measured by the level of tariff cuts on Canadian imports). I further find that the increased competitive pressure has a stronger impact on the marginal value of cash for the firms facing greater risk of losing investment opportunities to competitors. This evidence is consistent with the predation threat hypothesis that an increase in competition enhances the value of having more liquidity by raising the threat of predation. However, I find no support for the agency hypothesis that increasing competition enhances the value of cash by mitigating the managerial agency problem associated with cash holdings.

Taken together, the results in this paper suggest that the intensity of competition plays an economically important and *causal* role in determining the value of cash to firms and their shareholders. Some readers may still be concerned whether my inferences about the effects of increased competition could be extrapolated beyond quasi-natural experiment setting used in this paper. In the earlier working paper, which is available on the author's SSRN website, I use a large panel of Compustat firms and find that commonly used proxies for greater competition are positively associated with the value of corporate cash.

Although this study focuses only on the causal impact of changes in competition on the market value of cash, competition is likely to influence investors' valuation of other firm polices and assets as well. I look forward to future research on these and other related issues.

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Appendix A: Variables Definition

Name of Variables	Description (Compustat data names in parentheses)

Valuation regression variables

Assets	Book assets (*at*)
Cash	Cash and short-term investments (*che*)
Earnings	Earnings before Extraordinary Items (*ib+xint+txdi+itci*)
Market value of equity	Stock price (*prcc_f*)*Shares outstanding (*csho*)
Market to book	Book assets (*at*) + market value of common equity (prcc_f*csho) – book value common equity (ceq)- deferred taxes (txdb))/ (book assets (*at*)
Net Assets	Book assets (*at*) - cash and short-term investment (*che*).
R&D Expenses	Research and Development (*xrd*)
Interest	Interest Expenses (*xint*)
Dividends	Common Dividends (*dvc*)
Market leverage	(debt in current liabilities (dlc) + long-term debt (dltt))/(market value of equity+ dlc+ dltt)
Net new finance	sales of common and preferred stock – stock repurchases +issuance of long-term debt-long-term debt reduction (*sstk-prstkc+dltis-dltr*)
Risk-adjusted return	Stock return over the fiscal year (from CRSP) minus Fama and French size and book-to-market matched portfolio return

Trade and other measures

Tariffs on Canadian imports	Duties collected by the U.S. customs divided by total customs value of imports from Canada at the four-digit SIC industry level over the 3-year period between 1986 and 1988. Trade data is from Center for International Data at the University of California Davis.
High tariff	Binary variable indicating that a firm is experiencing a fall in tariff on Canadian imports in excess of 5 percent (67the percentile of tariffs distribution) following the FTA implementation in 1989. For each firm, the tariff reduction is computed as the sales-weighted average across all is business segments that a firm was active in 1988. Segment data is from Compustat Segments.
Capital-labor ratio	Gross PPE (*ppegt*) divided by number of employees (*emp*)
Correlation with industry returns	the correlation coefficient between the firm's monthly stock returns and average industry returns after controlling for the market returns for the period between 1986 and 1988
Institutional Ownership	percentage of firm's share held by institutional investors as reported in Thomson-Reuters Institutional Holdings Database

Appendix B: Market-to-book valuation methodology

The following equation describes the valuation methodology developed by Fama and French (1998) and modified by Dittmar and Mahrt-Smith (2007) and Bates, Kahle and Stulz (2009).

$$\frac{Market\text{Value}_{i,t}}{A_{i,t}} = a + b_1 \frac{L2Cash}{A_{i,t}} + b_2 Competition_{i,t} + b_3 Competition_{i,t} * \frac{L2Cash}{A_{i,t}}$$

$$+ b_4 \frac{Earnings_{i,t}}{A_{i,t}} + b_5 \frac{L2Earnings}{A_{i,t-1}} + b_6 \frac{F2Earnings_{i,t+2}}{A_{i,t}} + b_7 \frac{L2Net\,Assets_{i,t}}{A_{i,t-}} + b_8 \frac{F2Net\,Assets}{A_{i,t}}$$

$$+ b_9 \frac{RD_{i,t}}{A_{i,t}} + b_{10} \frac{L2R\,\&\,D}{A_{i,t}} + b_{11} \frac{F2R\,\&\,D}{A_{i,t}} + b_{12} \frac{Interest\,Expenses_{i,t}}{A_{i,t-}} + b_{13} \frac{L2Interest\,Expenses}{A_{i,t}}$$

$$+ b_{14} \frac{F2Interest\,Expenses}{A_{i,t}} + b_{15} \frac{Dividends_{i,t}}{A_{i,t}} + b_{16} \frac{L2Dividends}{A_{i,t}} + b_{17} \frac{F2Dividends}{A_{i,t}}$$

$$+ b_{18} \frac{F2Market\text{Value}}{A_{i,t}} + Industry\,\text{Dummies} + Year\,\text{Dummies} + \varepsilon_{i,t}$$

where L2 stands for the two-year change in the level of the variable from year $t - 2$ to year t, and F2 for the two-year change in the level of the variable from year t to year $t+ 2$. Market Value is the market value of equity plus total liabilities at time t. A is total book assets; Net assets is total book assets minus cash.

Table 1
Summary Statistics

This table reports summary statistics for the sample, which consists of nonfinancial and nonutility firm-years from 1984 to 1995. Changes are measured as the value of the variable is at the end of fiscal year minus its value at the beginning of fiscal year. See Appendix A for detailed variable definitions.

Variable	Mean	Median	Standard Deviation	25th Percentile	75th Percentile
Return	0.128	0.039	0.566	-0.214	0.324
Risk-adjusted return	-0.002	-0.082	0.534	-0.318	0.175
Change in cash /ME	0.003	-0.001	0.128	-0.035	0.031
Change in earnings/ME	0.015	0.006	0.21	-0.039	0.047
Change in noncash assets /ME	-0.02	0.015	0.384	-0.095	0.11
Change in R&D /ME	0	0	0.021	0	0.004
Change in interest expense /ME	-0.002	0	0.025	-0.004	0.004
Change in common dividends/ME	0	0	0.007	0	0
Lagged Cash/ME	0.156	0.086	0.207	0.031	0.194
Market Leverage	0.242	0.191	0.22	0.048	0.383
New finance/ME	0.021	0	0.194	-0.033	0.053
Tariffs on Canadian imports	0.027	0.023	0.031	0.004	0.04
Market-to-book assets	1.359	0.995	1.107	0.739	1.515
Cash/Assets	0.133	0.069	0.163	0.02	0.185
Capital exp./Assets	0.003	0.001	0.056	-0.016	0.02
Labor-capital ratio	0.121	0.066	0.157	0.025	0.145
Stock correlation with industry index	1.003	0.913	1.571	0.314	1.652
Blockholder Ownership	0.272	0.236	0.209	0.082	0.448
Pension Fund Ownership	0.01	0.002	0.015	0.001	0.013
No of observations	12,680				
Firms	1,033				

Table 2
The impact of *the 1989 Canada-U.S. FTA tariff cuts* on the value of cash holdings using Faulkender and Wang's (2006) return regressions
This table presents coefficient estimates from a difference-in-differences regression of changes in firm value on changes in cash holdings and other variables. The sample period is between 1984 and 1995. The dependent variable is the size and book-to-market adjusted excess stock return for a firm over the fiscal year. ΔXt is notation for the one-year change in the independent variables. All the independent variables, except leverage, are scaled by the lagged market value of equity. See Appendix A for detailed variable definitions. The regressions include year and firm fixed effects. Standard errors in brackets below coefficients are computed adjusting for heteroskedasticity and within-firm error term clustering. Superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
ΔCash	1.638***	0.867***	1.529***	1.525***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔCash*PostFTA*High Import Tariff		0.555**	0.559**	0.579**
		[0.042]	[0.03]	[0.029]
ΔCash* PostFTA		0.233**	0.151	0.171
		[0.045]	[0.160]	[0.138]
ΔCash* High Import Tariff		0.003	-0.002	-0.002
		[0.970]	[0.984]	[0.982]
PostFTA*High Import Tariff		-0.003	-0.003	0.006
		[0.932]	[0.938]	[0.852]
ΔCash*PostFTA*High Export Tariff				-0.125
				[0.464]
PostFTA*High Export Tariff				-0.053**
				[0.020]
PostFTA years indicator		0.034	0.026	0.039
		[0.146]	[0.273]	[0.114]
ΔEarnings	0.495***	0.503***	0.496***	0.496***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔNet assets	0.146***	0.138***	0.144***	0.143***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔR&D	1.147***	1.215***	1.172***	1.174***
	[0.001]	[0.000]	[0.000]	[0.000]
ΔInterest	-1.276***	-1.332***	-1.293***	-1.309***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔDividends	0.674	0.937	0.703	0.687
	[0.377]	[0.216]	[0.357]	[0.369]
Lagged Cash	0.844***	0.918***	0.842***	0.838***
	[0.000]	[0.000]	[0.000]	[0.000]
Market leverage	-1.191***	-1.195***	-1.190***	-1.186***
	[0.000]	[0.000]	[0.000]	[0.000]
Net Financing	0.080**	0.101**	0.083**	0.083**
	[0.048]	[0.014]	[0.041]	[0.041]
ΔCash *lagged cash	-0.703***		-0.694***	-0.706***
	[0.001]		[0.002]	[0.001]
ΔCash *leverage	-1.513***		-1.493***	-1.471***
	[0.000]		[0.000]	[0.000]
Constant	0.076***	0.069***	0.076***	0.074***

	[0.000]	[0.000]	[0.000]	[0.000]
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	12669	12504	12504	12504
R-squared	0.404	0.397	0.404	0.405

Table 3
The impact of *the FTA tariff cuts* on the value of cash: Dynamics
This table presents coefficient estimates from a difference-in-differences regression of changes in firm value on changes in cash holdings and other variables. The sample period is between 1984 and 1995. The dependent variable is the size and book-to-market adjusted excess stock return for a firm over the fiscal year. ΔXt is notation for the one-year change in the independent variables. See Appendix A for detailed variable definitions. The regressions include year and firm fixed effects. Standard errors in brackets below coefficients are computed adjusting for heteroskedasticity and within-firm error term clustering. Superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)
ΔCash	1.518***
	[0.000]
ΔCash*Before-FTA $^{1987-88}$*High Import Tariff	-0.013
	[0.826]
ΔCash*FTA$^{1989-90}$*High Import Tariff	0
	[0.560]
ΔCash*FTA$^{>1990}$*High Import Tariff	0.801**
	[0.010]
ΔCash*PostFTA	0.148
	[0.156]
ΔEarnings	0.496***
	[0.000]
ΔNet assets	0.144***
	[0.000]
ΔR&D	1.189***
	[0.000]
ΔInterest	-1.281***
	[0.000]
ΔDividends	0.706
	[0.355]
Lagged Cash	0.840***
	[0.000]
Market leverage	-1.190***
	[0.000]
Net Financing	0.082**
	[0.042]
ΔCash *lagged cash	-0.686***
	[0.002]
ΔCash *leverage	-1.479***
	[0.000]
Constant	0.076***
	[0.000]
Year fixed effects	Yes
Firm fixed effects	Yes
Observations	12504
R-squared	0.404

Table 4

The impact of *the FTA tariff cuts* on the value of cash for firms facing high vs low predatory threats.

This table presents coefficient estimates from a difference-in-differences regression of changes in firm value on changes in cash holdings and other variables. The sample period is between 1984 and 1995. The dependent variable is the size and book-to-market adjusted excess stock return for a firm over the fiscal year. ΔX_t is notation for the one-year change in the independent variables. See Appendix A for detailed variable definitions. The regressions are estimated separately for firms facing high and low exposure to the threat of predation. The threat of predation for each firm is measured based on: (i) the absolute value of the deviation of a firm's capital-to-labor ratio from the median ratio in its industry and (ii) correlation of a firm's monthly stock returns with respect to an equally-weighted industry return index. The regressions include year and firm fixed effects. Standard errors in brackets below coefficients are computed adjusting for heteroskedasticity and within-firm error clustering. Superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Threat of Predation measured as			
	Absolute value of capital to-labor ratio		Correlation of firm returns with industry returns	
	High threat	Low threat	High threat	Low threat
ΔCash*PostFTA*High Import Tariff	1.733***	0.803	0.614*	-0.583
	[0.000]	[0.125]	[0.084]	[0.218]
p-value of difference	[0.09]		[0.055]	
ΔCash*PostFTA	0.166	-0.218	0.089	0.048
	[0.394]	[0.291]	[0.608]	[0.826]
p-value of difference	[0.121]		[0.875]	
ΔCash	1.507***	1.190***	1.860***	1.396***
	[0.000]	[0.000]	[0.000]	[0.000]
p-value of difference	[0.335]		[0.344]	
ΔEarnings	0.526***	0.568***	0.540***	0.601***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔNet assets	0.166***	0.065	0.163***	0.127***
	[0.001]	[0.169]	[0.001]	[0.009]
ΔR&D	0.974	1.457**	1.163**	2.048***
	[0.148]	[0.027]	[0.021]	[0.000]
ΔInterest	-1.061*	-1.640***	-1.512**	-0.664
	[0.056]	[0.009]	[0.010]	[0.289]
ΔDividends	0.002	1.605	0.002	0.786
	[0.999]	[0.281]	[0.999]	[0.535]
Lagged Cash	0.887***	0.620***	0.955***	0.704***
	[0.000]	[0.000]	[0.000]	[0.000]
Market leverage	-1.195***	-1.114***	-1.210***	-1.238***
	[0.000]	[0.000]	[0.000]	[0.000]
Net Financing	0.026	0.152*	0.019	0.095
	[0.745]	[0.067]	[0.828]	[0.233]
ΔCash *lagged cash	-0.405	-0.575	-0.761*	-0.674*
	[0.287]	[0.168]	[0.071]	[0.059]

�ΔCash *leverage	-1.753***	-0.731	-1.787***	-1.315***
	[0.000]	[0.177]	[0.000]	[0.001]
Constant	0.075**	0.103***	0.019	0.096***
	[0.019]	[0.004]	[0.571]	[0.006]
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	2612	2910	3351	2910
R-squared	0.385	0.347	0.404	0.345

Table 5
The impact of *the FTA tariff cuts* on the value of cash for firms with strong vs weak governance.

This table presents coefficient estimates from a difference-in-differences regression of changes in firm value on changes in cash holdings and other variables. The sample period is between 1984 and 1995. The dependent variable is the size and book-to-market adjusted excess stock return for a firm over the fiscal year. ΔXt is notation for the one-year change in the independent variables. See Appendix A for detailed variable definitions. The regressions are estimated separately for firms with strong vs weak governance, measured using the level of block institutional ownership and public pension fund ownership. Standard errors in brackets below coefficients are computed adjusting for heteroskedasticity and within-firm error clustering. The regressions include year and firm fixed effects. Superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Governance measured as			
	Blockholder Ownership		Pension Fund Ownership	
	High	Low	High	Low
ΔCash*PostFTA*High Import Tariff	0.065	0.597*	0.329	0.694*
	[0.892]	[0.080]	[0.388]	[0.089]
p-value of difference	[0.423]		[0.543]	
ΔCash*PostFTA	0.26	-0.124	0.08	-0.175
	[0.217]	[0.412]	[0.557]	[0.352]
p-value of difference	[0.150]		[0.267]	
ΔCash	1.215***	1.640***	1.445***	1.460***
	[0.000]	[0.000]	[0.000]	[0.000]
p-value of difference	[0.174]		[0.460]	
ΔEarnings	0.587***	0.412***	0.562***	0.404***
	[0.000]	[0.000]	[0.000]	[0.000]
ΔNet assets	0.113*	0.161***	0.144***	0.143***
	[0.053]	[0.000]	[0.000]	[0.002]
ΔR&D	1.553***	0.744	0.855*	1.080*
	[0.004]	[0.150]	[0.055]	[0.058]
ΔInterest	-1.121*	-1.528***	-1.651***	-1.112**
	[0.056]	[0.000]	[0.000]	[0.038]
ΔDividends	1.432	0.968	-0.084	4.091***
	[0.361]	[0.365]	[0.929]	[0.001]
Lagged Cash	0.742***	0.810***	0.693***	0.907***
	[0.000]	[0.000]	[0.000]	[0.000]
Market leverage	-0.957***	-1.280***	-0.992***	-1.450***
	[0.000]	[0.000]	[0.000]	[0.000]
Net Financing	0.08	0.016	0.055	0.049
	[0.320]	[0.789]	[0.289]	[0.547]
ΔCash *lagged cash	-0.24	-0.827***	-0.540*	-0.559
	[0.589]	[0.005]	[0.094]	[0.105]
ΔCash *leverage	-1.469***	-1.380***	-1.739***	-1.048***
	[0.003]	[0.000]	[0.000]	[0.007]
Constant	0.019	0.140***	0.092***	0.065*

	[0.517]	[0.000]	[0.000]	[0.099]
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	3161	5523	7351	3173
R-squared	0.333	0.387	0.366	0.396

Table 6

The impact of *the FTA tariff cuts* on the use of cash for investment

This table presents coefficient estimates from a difference-in-differences regression of changes in firms' investment on lagged cash holdings, market-to-book assets, cash flow and other variables. The sample period is between 1984 and 1995. The dependent variables are the change in capital expenditures, R&D and advertising expenditures (for firms with available R&D and advertising expenditures), and acquisitions, all scaled by lagged total assets. See Appendix A for detailed variable definitions. Standard errors in brackets below coefficients are computed adjusting for heteroskedasticity and within-industry error clustering. The regressions include year and firms' main four-digit SIC industry fixed effects. Superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Changes in spending on			
	Capital expend	ΔR&D expend.	ΔAdverti sement	Δ Acquis itions
Cash*PostFTA*High Import Tariff	0.019*	0.022*	-0.003	0.004
	[0.057]	[0.055]	[0.721]	[0.781]
Cash*PostFTA	-0.004	0.001	0.007	0.003
	[0.540]	[0.926]	[0.142]	[0.496]
PostFTA*High Import Tariff	-0.002	-0.003	-0.001	-0.006**
	[0.527]	[0.251]	[0.513]	[0.011]
Cash*High Import Tariff	-0.007	-0.003	-0.001	0.001
	[0.238]	[0.315]	[0.292]	[0.234]
PostFTA	-0.012*	-0.004**	0	-0.001
	[0.053]	[0.029]	[0.839]	[0.588]
Cash/Assets$_{t=-2}$	0.001	0.009**	-0.002	-0.009**
	[0.872]	[0.025]	[0.373]	[0.021]
Market-to-book assets $_{t=-2}$	0	0.002***	0	0.001
	[0.871]	[0.007]	[0.580]	[0.103]
Operating Cash flow $_{t=-2}$	0.011**	0.049***	0.005	-0.003
	[0.031]	[0.000]	[0.172]	[0.663]
Log book assets $_{t=-2}$	-0.001**	0	0	0
	[0.014]	[0.964]	[0.248]	[0.108]
Dividend Indicator $_{t=-2}$	0.004***	-0.001*	0.003**	-0.001
	[0.000]	[0.094]	[0.018]	[0.287]
Debt/assets $_{t=-2}$	-0.003	0.004*	-0.006***	-0.003
	[0.405]	[0.057]	[0.009]	[0.238]
Constant	0.018***	0.001	0.004***	0
	[0.000]	[0.744]	[0.001]	[0.830]
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	9860	6318	3229	9864
R-squared	0.026	0.082	0.116	0.006

Table 7: Competition and the value of cash: large sample analysis

This table presents coefficient estimates from a regression of changes in firm value on changes in cash holdings and other variables. The sample period is between 1976 and 2005 in Column (1) and between 1997 and 2007 in Column (2). The dependent variable is the size and book-to-market adjusted excess stock return for a firm over the fiscal year. ΔX_t is notation for the one-year change in the independent variables. See Appendix A for detailed variable definitions. The regressions include year fixed effects. Standard errors in brackets below coefficients are computed adjusting for heteroskedasticity and within-firm error term clustering. Superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

	(1)	(2)
ΔCash	2.480***	1.398***
	[0.000]	[0.000]
Log(Herfindahl-Hirschman Index)*ΔCash	-0.157***	
	[0.003]	
Log(Herfindahl-Hirschman index)	0.050***	
	[0.000]	
Log(Product fluidity)*ΔCash		0.237***
		[0.001]
Log(Product fluidity)		-0.018***
		[0.003]
ΔEarnings	0.559***	0.572***
	[0.000]	[0.000]
ΔNet assets	0.242***	0.291***
	[0.000]	[0.000]
ΔR&D	1.107***	1.106***
	[0.000]	[0.000]
ΔInterest	-2.005***	-2.166***
	[0.000]	[0.000]
ΔDividends	3.526***	3.278***
	[0.000]	[0.000]
Lagged Cash	0.223***	0.239***
	[0.000]	[0.000]
Market leverage	-0.411***	-0.396***
	[0.000]	[0.000]
Net Financing	-0.065***	-0.210***
	[0.000]	[0.000]
ΔCash *lagged cash	-0.799***	-1.196***
	[0.000]	[0.000]
ΔCash *leverage	-1.338***	-1.401***
	[0.000]	[0.000]
Constant	-0.292***	0.038***
	[0.000]	[0.002]
Year Fixed Effects	Yes	Yes
Observations	76207	32113
R-squared	0.205	0.196