# Market power in horizontal mergers: Evidence from wealth transfers between merging firms and their customers

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**Abstract**

Previous large sample studies of horizontal mergers observe that the average wealth effects to merging and related firms provide little or no evidence of market power. We argue that studying the relation between the wealth effects to merging firms and their corporate customers provides a more informative test of the presence of market power, a negative relation indicating the presence of market power. When we instrument the endogenous wealth effects due to merger announcements, we find that higher abnormal returns to merging firms systematically relate to lower abnormal returns to reliant downstream customers. Further analysis shows that this wealth transfer effect exists for deals in industries that face less foreign competition but not for deals in industries that face intense foreign competition. These results demonstrate the presence of market power (either pre-existing or merger-induced) in merging industries systematically affecting customer value.

JEL Classification: G340; K21.
Key words: merger and acquisition; market power; wealth transfer; efficiency; customers.

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## 1. Introduction

Finance researchers have disagreed with antitrust authorities for decades on the sources of gains to merging firms in horizontal mergers (e.g., Ellert, 1976; Eckbo and Wier, 1985; Eckbo, 1992). Large-sample studies of horizontal mergers based on stock market responses report no evidence of market power, which conflicts with the frequent concerns of antitrust authorities about the potential for horizontal mergers to harm consumers via market power. Previous empirical studies generally conclude that merging firms benefit from efficiency gains (Eckbo, 1983; Stillman, 1983; Fee and Thomas, 2004; Shahrur, 2005) or enhanced buying power against suppliers (Galbraith, 1952; Snyder, 1996; Fee and Thomas, 2004; Bhattacharyya and Nain, 2011) rather than from using market power to expropriate customers (Stigler, 1964).

To discriminate between market power and efficiency as sources of gains in horizontal mergers, empirical studies usually follow the methodology of Eckbo (1983) and Stillman (1983) and examine the average abnormal returns to corporate customers and suppliers of merging firms. Fee and Thomas (2004) point out that, since suppliers may be squeezed by downstream mergers due to either increased purchasing efficiency or monopsonistic collusion, identifying sources of gains based on supplier price reactions is ambiguous. The abnormal returns to corporate customers offer a clearer way to identify gains. Specifically, given that efficient upstream mergers reduce the marginal cost of production, which equals the product price in a competitive market, customers benefit from efficient upstream mergers if merging firms pass efficiency gains downstream. In contrast, if upstream firms use their market power to retain all efficiency gains, or a merger induces market power that allows upstream firms to extract anticompetitive rents (Stigler, 1964), customers have a zero or even a negative wealth effect at the deal announcement.

Since market power may coexist with efficiency gains, examining average customer abnormal returns to judge whether market power impacts customer wealth in a horizontal merger, as is in the previous literature, can be misleading. Horizontal mergers may confer market power and improve efficiency. Positive customer abnormal returns emerge when efficiency benefits passed to customers dominate their loss due to market power. Put differently, positive average customer abnormal returns do not guarantee the absence of market power. In contrast, the wealth transfer effect represented by a negative relation between merging firms' combined abnormal returns and customer abnormal returns offers an unambiguous approach to test for the presence of market power. To wit, fixing the levels of

efficiency gains and dead-weight loss due to market power, merging firms increase gains when greater market power in the merging industries allows them to withhold more efficiency gains or, worse, to extract anticompetitive rents at the expenses of customers. Since the aforementioned negative relation occurs in any deal where firms in the merging industry exercise their market power to expropriate customers, the extent of efficiency gains does not pre-empt the negative relation.[2]

We follow previous literature and examine cumulative abnormal returns (CARs) over a five day window (−2, 2) surrounding merger announcements to measure merger-induced wealth effects.[3] We examine reliant customers in particular (i.e., corporate customers in the downstream industry whose production depends on the merging industry's output more than any other downstream industry) to strengthen test power, as reliant customers are most dependent on the merging industry's outputs and are most likely to be expropriated by merging firms. We value-weight the CARs to the merging firms and label this the *Combined CAR*.

An important issue in testing the wealth transfer effect is the endogeneity of merging firms' abnormal returns. In particular, merging firms' and customer CARs are simultaneously determined. When a merged firm sets product price above the competitive level, downstream industries can respond by consolidating to increase their purchasing power (Galbraith, 1952). Anticipation of the countervailing response offsets the abnormal returns to merging firms due to market power. A Durbin and Wu–Hausman test shows that *Combined CAR* is indeed endogenous. To address this, we instrument *Combined CAR* using a set of instrumental variables (IVs) that directly affect *Combined CAR*, but affect the customer CAR only via *Combined CAR*. Our three instruments, namely hostile takeover, means of payment, and excess cash reserves, exploit findings from the literature on the determinants of merger value. Hostile takeovers are associated with removing inefficient target management and improving the combined firm's operations (Morck, Shleifer, and Vishny, 1988; Shivdasani, 1993; Schwert, 2000). A stock offer signals bidder overvaluation (Travlos, 1987; Shleifer and Vishny, 2003; Rhodes-Kropf, Robinson, and Viswanathan, 2005), high growth of financially constrained firms (Eckbo, Makaew, and Thorburn, 2014), or better business complementarity and lower information asymmetry (Eckbo, Makaew, and Thorburn, 2014), which in turn affect merging firms' abnormal returns. Excess cash reserves relate to managers' incentives

[2] By "expropriate", we mean that the merging industry either extracts anticompetitive rents at the expenses of customers or passes fewer efficiency gains to customers than they would in the absence of market power.

[3] Theory does not prescribe a specific window to measure announcement returns. We follow Walker (2000) and Shahrur (2005) and use a (−2, 2) window throughout. Our results hold with a (−1, 1) window.

to invest in value-destroying mergers (Jensen, 1986; Harford, 1999). We confirm that our instruments generate significant variation in abnormal returns to merging firms. They also satisfy the exclusion criterion both conceptually and according to our statistical tests.

Our sample consists of 494 horizontal mergers announced between 1984 and 2008 in non-financial and non-regulated industries. We use regressions to estimate the sensitivity of the customer CAR to *Combined CAR*, controlling for other factors that determine the customer CAR. The *Combined CAR* coefficient is insignificant in ordinary least squares (OLS) specifications. But when we instrument *Combined CAR* and use generalized method of moments (GMM) estimation to address heteroskedasticity in the second stage regression, we find that the customer CAR has a negative coefficient on *Combined CAR*, which implies the presence of market power. This negative coefficient is statistically significant and economically meaningful: customer abnormal returns decrease by 0.16% when the abnormal return to merging firms increases by 1%. In the absence of market power, efficiency gains are shared between customers and the merging industry at the new competitive equilibrium, which implies a positive relation between *Combined CAR* and customer CAR. This, however, should bias against finding a negative relation.

We further demonstrate that the wealth transfer to merging firms from their reliant customers is present in industries with low import ratios, but the direction of transfer reverses (i.e., we observe a positive relation) in industries facing high import pressure. The persistence of market power relies on barriers to entry. Foreign competition therefore performs a disciplinary role on market power that impacts merger outcomes by increasing supply elasticity (Katics and Petersen, 1994). When foreign competition is weak, the merging industry can expropriate customers, leading to a negative relation between the customer CAR and *Combined CAR*; when foreign competition is strong, merging firms are forced to pass at least some of their efficiency gains downstream, generating a positive relation.

Our study makes two main contributions. First, to our knowledge, this is the first large-sample study that provides systematic evidence of market power as a source of gains to merging firms in horizontal mergers.[4] Most large sample studies examine the average announcement wealth effects to merging firms and their rivals (e.g., Eckbo, 1983; Stillman, 1983; Eckbo and Wier, 1985) or to suppliers or customers along the supply chain (e.g., Fee and Thomas, 2004; Shahrur, 2005), and find no evidence of market power. Another stream of cross-sectional studies uses realized post-merger financial data (e.g., Healy, Palepu, and

[4] Given that efficiency and market power are not mutually exclusive as sources of gains to horizontal mergers, our results do not refute the findings of previous studies that efficiency is a key source.

Ruback, 1992) or survey forecasts (e.g., Devos, Kadapakkham, and Krishnamurthy, 2009), and also conclude that, on average, horizontal mergers result in efficiency gains. In contrast, we argue that market power and efficiency gains are not mutually exclusive. The average CAR merely captures the net wealth effect of a horizontal merger. The wealth transfer between the merging industries and their customers offers an unambiguous test for the presence of market power and a robust rejection of market power requires the wealth transfer relation to be positive as a necessary condition. We observe a negative relation between abnormal returns to merging firms and their customers, using an IV approach to address the endogeneity of merging firms' abnormal return. Our findings complement previous evidence of market power in the context of horizontal mergers based on clinical studies of particular cases or industries (e.g., Kim and Singal, 1993; Prager and Hannan, 1998). Our results support the view that market power influences the outcomes of horizontal mergers, a view that antitrust regulators frequently voice but academics largely reject. Observing a negative wealth transfer relation implies that market power is an important source of gains for merging firms even if mergers enhance efficiency on average. Put differently, market power allows a merging industry to retain more efficiency gains. The negative relation further suggests that market power is most likely in a deal where there is a large disparity between the wealth effect of merging firms and their customers.

Our study also contributes to methodology by highlighting the importance of the wealth transfer effect when detecting market power. We extend and complement the pioneering identification framework of Eckbo (1983) and Stillman (1983). We emphasize that the wealth transfer effect between merging firms and related firms, most notably reliant corporate customers, is a more informative test to detect the presence of market power. We show that merging firms' abnormal returns are endogenous and appropriate instrumentation is crucial. More broadly, our study adds to the literature on endogeneity in event studies. The literature addresses various sources of endogeneity in event studies.[5] Our research is the first to address the endogeneity of merging firm's abnormal returns when examining wealth transfers between related firms, and highlights both the need for further theoretical modelling of the equilibrium process of stock market prices conditional on anticipation of stakeholder reactions and the need for suitable instrumentation to address endogeneity.

We also demonstrate the importance of foreign competition in containing market power in domestic markets. We find that evidence of market power is most pronounced in industries

[5] See Li and Prabhala (2006) and Roberts and Whited (2012) for more research addressing endogeneity in corporate finance.

with low foreign competition. The important policy implication is that, to improve effectiveness, antitrust authorities should focus on domestic industries with weak foreign competition. Wherever possible, authorities should encourage free international trade to improve domestic industry efficiency and should curb protectionism. Our results also imply that current antitrust policies may have failed to fully deter or prevent anticompetitive mergers.

The rest of the paper continues as follows. Section 2 develops our testable hypotheses. Section 3 discusses the methodology. Section 4 describes the sample and construction of variables. Section 5 reports the empirical results. Section 6 summarises and concludes.

## 2. Literature review and hypothesis development

### *2.1 Market power in horizontal mergers*

Stigler (1964), in his landmark study, maintains that a horizontal merger reduces the number of firms in the merging industry, and facilitates industry-wide collusion by lowering monitoring costs.[6] By restricting supply, firms in merging industries set product price above marginal cost and earn monopoly rents at the expense of downstream firms.

With the exception of a few studies at the case or industry level, however, empirical evidence does not support the presence of market power in horizontal mergers. Further, most studies that find evidence of market power examine post-merger product price changes instead of wealth effects at the deal announcement. For example, Barton and Sherman (1984) trace product prices and profits after Xidex's acquisitions of two major competitors, Scott Graphics and Kalvar Corporation, in the duplicating microfilm industry. They find that prices and profits in each affected product line increased after the acquisition. Kim and Singal (1993) study post-merger price changes in the airline industry, and show that prices increased on routes served by the merging firms relative to prices on unaffected routes. Borenstein (1990) and Singal (1996) make similar observations. Industry-specific studies that find merger-induced anticompetitive product prices include Prager and Hannan (1998) and Focarelli and Panetta (2003) in the banking industry[7] and Ashenfelter and Hosken (2008) in consumer

[6] Other anticompetitive merger strategies include cross-subsidization (e.g., Chevalier, 2004), predatory pricing (e.g., Saloner, 1987), and pre-emption (e.g., Molnar, 2007). As these strategies do not necessarily apply to horizontal mergers, we focus on collusive monopoly.

[7] Prager and Hannan (1998) examine US bank mergers and report merger-induced decreases in deposit interest rates. Focarelli and Panetta (2003) find mixed evidence of bank mergers on prices, i.e., adverse price changes that harm consumers in the short run, and favourable price changes for consumers in the long run.

products.[8] The complexity and limited availability of detailed price data restricts such analyses to a small number of particular case and industry studies. Aktas, de Bodt, and Derbaix (2004) is the only study that we are aware of using stock market data that finds evidence of market power. Aktas et al. (2004) examine the announcement returns of firms in the car industry that are potentially subject to market power induced by horizontal mergers and conclude that their evidence is consistent with merging firms engaging in predatory pricing and abusing dominant positions. But they find no evidence of collusion.

*2.2 Efficiency gains from horizontal mergers*

Neoclassical theory suggests that firms merge horizontally to form new optimal firm boundaries in response to shocks from economic or trading environment changes, regulatory changes in particular industries, or technological transformations. By streamlining operations, replacing management, and realizing cost savings, merging firms can increase efficiency and realize synergistic gains (e.g., Jensen, 1993; Comment and Schwert, 1995; Maksimovic and Phillips, 2002; Lambrecht, 2004). Theories of merger waves also attribute their formation to the pursuit of increased efficiency in response to economic, regulatory and technological shocks (e.g., Mitchell and Mulherin, 1996; Harford, 2005; Ahern and Harford, 2014).

Empirical studies widely support the view that companies merge horizontally to pursue efficiency gains. Using event-study techniques, a strand of literature examines the average stock market reactions of merging and related firms at merger announcements, and concludes that horizontal mergers are efficient (e.g., Eckbo, 1983; Stillman, 1983; Eckbo and Wier, 1985; Eckbo, 1992; Fee and Thomas, 2004; Shahrur, 2005). Using plant-level data, Li (2013) demonstrates that acquirers increase the productivity of their targets through more efficient use of capital and labour. Maksimovic, Phillips, and Prabhala (2011) find that acquirers selectively retain plants acquired in mergers and restructure target companies to exploit their comparative advantage and increase productivity. Recent literature also identifies product differentiation and corporate innovation as specific sources of synergies and find they drive merger activities (e.g., Hoberg and Phillips, 2010; Bena and Li, 2014). In terms of the relative importance of the sources of efficiency gains, Devos, Kadapakkham, and Krishnamurthy (2009) use forecast data from the Value Line Investment Survey to decompose the sources of merger gains and observe that the bulk of gains come from operating synergies and a small portion from tax savings. Apart from these cross-sectional large-sample studies, industry-

[8] Ashenfelter and Hosken (2008) select five mergers in the consumer products industries that were most likely to result in anticompetitive price increases and find that four of these resulted in consumer price increases.

specific studies, e.g., Erel (2011) on the deregulated banking industry and Becher, Mulherin, and Walkling (2012) on electric utilities, support the view that horizontal mergers improve efficiency.

*2.3 Detecting market power*

Since market power is a company's ability to profit by raising product price above marginal cost, a direct way to detect market power is to examine the impact of horizontal mergers on product prices. However, data on product prices are difficult to obtain. Studies therefore largely follow the framework of Eckbo (1983) and Stillman (1983). Eckbo (1983) suggests that a convenient approach to detecting merger motives is to examine the wealth effect of merger announcements on merging and related firms. Eckbo (1983) points out several advantages of this approach. First, product prices may not capture merger-induced increases in non-price competition (e.g., quality or service improvements), and therefore do not necessarily capture the full effects of a merger. In contrast, in an efficient market, changes in stock prices reflect the overall wealth effects on firms. Second, the stock market reacts to merger announcement more quickly than do product market prices, reducing confounding effects from non-merger events. Third, the availability of stock price data enables large sample studies, unrestricted to particular cases or industries. Finally, as efficiency and market power have different wealth effects on related firms, we can distinguish the two effects by examining related firms' abnormal returns.

Eckbo (1983) and Stillman (1983) examine the abnormal returns to merging firms and rivals at two consecutive merger-related announcements, namely the merger proposal and a subsequent antitrust challenge. Both find no evidence of market power and question the validity of antitrust intervention. Specifically, Eckbo (1983) demonstrates that an antitrust challenge announcement does not reduce the share prices of rivals and Stillman (1983) reports that in nine out of eleven challenged horizontal mergers, rivals have insignificant abnormal returns at the proposal announcement and the antitrust challenge announcement. Other early studies testing average industry rivals' reactions (Eckbo, 1985, 1992; Eckbo and Wier, 1985; Song and Walkling, 2000) also report evidence that is largely consistent with the efficiency argument and against market power. Two later studies extend Eckbo and Stillman's framework to study firms along the supply chain. Fee and Thomas (2004) and Shahrur (2005) incorporate corporate customers and suppliers into the framework.[9] Fee and

[9] Bhattacharyya and Nain (2011) examine the effects of horizontal mergers on upstream suppliers, but they focus on the direct price effect rather than stock market reactions.

Thomas (2004) find insignificant announcement abnormal returns to actual customer companies and conclude that these customers do not suffer from market power. Shahrur (2005) finds that rivals and potential customer and supplier companies gain at merger announcements when the combined wealth effect for merging firms is positive, while they lose when the combined wealth effect for merging firms is negative, which is inconsistent with the presence of market power.

While previous large sample studies conclude that the abnormal returns to related companies are inconsistent with the presence of market power, emphasising average wealth effects identifies only net effects of mergers. In particular, as we have argued, a wealth transfer effect from corporate customers to merging firms is more relevant to testing the presence of market power and this effect is likely to be most pronounced for reliant customers. We therefore examine the relation between the abnormal returns to reliant customers and the abnormal returns to merging firms.

We also recognize that the degree of foreign competition in an industry is likely to affect this relation. Katics and Petersen (1994) find that rising import competition reduces price–cost margins in concentrated industries. Mitchell and Mulherin (1996) show that increased imports prompt domestic firms to merge to improve efficiency and lead to industrial merger waves. Shahrur (2005) demonstrates that foreign competition reduces merger gains to the target and bidder combined in concentrated industries. These observations suggest that foreign competition disciplines market power and it is more likely that domestic firms in industries with weak foreign competition gain more from market power. In contrast, firms in industries with intense foreign competition are more likely to merge for efficiency reasons; they are also more likely to be under greater pressure to pass efficiency gains to customers.

We hypothesize that the wealth effect of reliant corporate customers is negatively related to that of merging firms and this negative relation is stronger in low foreign competition industries.

H1: *The abnormal returns of reliant customers are negatively related to the abnormal returns of merging firms.*

H2: *The negative relation between the abnormal returns of reliant customers and of merging firms is more pronounced in industries with weak foreign competition.*

## 3. Methodology

### *3.1 The baseline model*

We examine the relation between the wealth effects to reliant corporate customers and merging firms by estimating the following baseline model, first using OLS,

$$Reliant\,customer\,CAR_j = \beta_0 + \beta_1 Combined\,CAR_j + \beta_2 X_j + \mu_j, \quad (1)$$

where *j* indexes deals, *Reliant customer CAR* and *Combined CAR* are the estimated abnormal returns to reliant customers and merging firms, and *X* is a vector of control variables. The vector *X* includes merging industry characteristics, i.e., foreign competition in the merging industry (*Foreign competition*) and its concentration structure measured by the sales-based Herfindahl–Hirschman Index (*HHI of merging ind.*); deal-specific characteristics, i.e., the merger-induced change in industry concentration (Δ*HHI of merging ind*), bidder size (*Ln Bidder size*), bidder profitability (*Bidder profitability*), and bidder growth prospects (*Bidder P/E*); reliant customer industry characteristics, i.e., the reliant customer industry's concentration structure (*Reliant customer concentration*), material purchase dependence level (*Reliant customer dependence*), and the logarithm of average firm size (*Ln Av customer size*); and other control variables, i.e., an antitrust legal environment dummy that equals one if the merger is initiated in Democratic administration years, and zero in Republican administration years (*Partisanship*). Table 1 defines all the variables.

We control for these variables because they may affect the wealth effect of reliant customers and in part are suggested by previous literature (e.g., Shahrur, 2005). Foreign competition increases supply elasticity and motivates domestic firms to reallocate resources to improve efficiency rather than maintain anticompetitive behaviour (Bernard, Jensen, and Schott, 2006; Tybout, 2003). Industry concentration may relate to the extent to which firms in an industry can achieve efficiency (Demsetz, 1973) or anticompetitive rents (Stigler, 1964). A horizontal merger's influence on downstream firms may depend on the merging industry's external and internal competitive environment. Therefore, we control for *Foreign competition* and *HHI of merging ind* to address this concern. Deal-specific characteristics such as the merger-induced change in industry concentration, and the bidder's competitive advantage and future growth opportunities relate to the merging firms' ability to squeeze or benefit downstream firms. Therefore, we include Δ*HHI of merging ind*, *Ln Bidder size*, *Bidder profitability*, and *Bidder P/E*. In addition, certain reliant customers' industry characteristics, such as industry concentration, procurement dependence on the merging industry, and industry firm size, are associated with the ability of the reliant customer industry to protect itself. We include *Reliant customer concentration*, *Reliant customer dependence*, and *Ln Av rel customer size* to control for these effects. Lastly, antitrust intensity and legal environment

differ across Republican and Democratic administrations, which may affect customers' expectations of the likelihood of antitrust intervention in a proposed deal.[10] We add the control variable *Partisanship* to address this concern.

The key explanatory variable in Eq. (1), *Combined CAR*, may be endogenous and correlated with $\mu$ due to the anticipation of downstream responses to upstream consolidation to countervail the effect of market power. OLS estimation may therefore be biased and inconsistent. To address this, we instrument *Combined CAR* with a vector, *Z*, that includes three variables, namely hostile takeover, means of payment, and excess cash reserves, which according to previous literature directly affect *Combined CAR* but only influence *Reliant customer CAR* via *Combined CAR*. The baseline IV model is,

$$Combined\ CAR_j = \pi_0 + \pi_1 X_j + \pi_2 Z_j + v_j \quad , \qquad (2)$$

$$Reliant\ customer\ CAR_j = \beta_0 + \beta_1 Combined\ CAR_j^* + \beta_2 X_j + \varepsilon_j \quad , \qquad (3)$$

where E($v$) = Cov($X$, $v$) = Cov($Z$, $v$) = 0 and $Z$ is the vector of instruments; $\varepsilon_j = \mu_j + \beta_1 v_j$, E($\varepsilon$) = Cov(*Combined CAR*$^*$, $\varepsilon$) = Cov($X$, $\varepsilon$) = 0, and *Combined CAR*$^*$ is the fitted value of *Combined CAR* from Eq. (2). We use GMM estimation in the second stage Eq. (3), since it generates efficient estimates in the presence of heteroskedasticity of unknown form (Baum, Schaffer, and Stillman, 2003).

*3.2 The extended IV model*

To investigate whether the relation between abnormal returns to merging firms and to customers varies according to the level of foreign competition in an industry, we include a *High foreign competition* dummy and the interaction term *Combined CAR* × *High foreign competition* as additional covariates. As the interaction of an endogeneous variable is also endogeneous, we instrument both *Combined CAR* and *Combined CAR* × *High foreign competition* and add to the vector *Z* interactions of its components with *High foreign competition* as instruments for *Combined CAR* and *Combined CAR* × *High foreign competition*, following Wooldridge (2002, p.234).

This gives the following model,

$$\begin{aligned} Combined\ CAR_j = \pi_0 + \pi_1 X_j + \pi_2 Z_j + \pi_3 Z \times High\ foreign\ competition_j \\ + \pi_4 High\ foreign\ competition_j + v_j \end{aligned} \quad , \qquad (4)$$

[10] Ghosal (2011) reports that Democrats initiated more civil cases than Republicans after the antitrust regime shift of U.S. antitrust enforcement in the mid-to-late 1970s.

$$Combined\ CAR \times High\ foreign\ competition_j = \lambda_0 + \lambda_1 X_j + \lambda_2 Z_j + \lambda_3 Z \times High\ foreign\ competition_j + \lambda_4 High\ foreign\ competition_j + \xi_j \quad , \tag{5}$$

$$Reliant\ customer\ CAR_j = \beta_0 + \beta_1 Combined\ CAR_j^* + \beta_2 \left( Combined\ CAR_j \times High\ foreign\ competition_j \right)^* + \beta_3 High\ foreign\ competition_j + \beta_4 X_j + \theta_j \quad , \tag{6}$$

where $\theta_j = \mu_j + \beta_1 v_j + \beta_2 \xi_j$.

## 4. Data and sample

### *4.1 Horizontal merger sample construction*

We extract all proposed mergers and acquisitions (completed and withdrawn) from the Securities Data Corporation (SDC) Mergers and Acquisitions (M&A) database, and apply the following screening criteria. First, we follow previous literature and require that a deal is one of the major types of acquisitions, namely mergers or acquisitions of majority interests as defined by SDC (i.e., the acquirer owns less than 50% of the target before the transaction and more than 50% of the target after). Second, both bidder and target are publicly listed firms and have data available from the Centre for Research in Security Prices (CRSP) to calculate abnormal returns surrounding the transaction announcement. Third, bidder and target have data available from Compustat at both the firm and segment levels, and they have at least one four-digit segment SIC code in common. Using segment four-digit SIC codes to define horizontal mergers is in line with previous research on horizontal mergers (e.g., Fee and Thomas, 2004).[11] Fourth, we exclude horizontal deals in financial and regulated industries (Compustat Segment SIC codes 6000–6999, 4000–4099, 4500–4599, and 4800–4999). Fifth, we require the deal value to be no less than $10 million. These criteria are largely consistent with Fee and Thomas (2004) and Shahrur (2005). Since the information from the SDC may not be reliable before 1984 (Chen, Harford, and Li, 2007), we restrict our sample to the period beginning January 1, 1984 and ending December 31, 2008.

The above procedure identifies a sample of 884 horizontal mergers. Next, we require data from the Bureau of Economic Analysis (BEA) Input–Output (IO) accounts to identify reliant customer industries and require stock price data to calculate reliant customer portfolio *CARs* for each horizontal merger. This reduces the sample to 679. We further require data

[11] If a bidder and target have more than one business segments in common, we count each pair of overlapping segments as a horizontal merger deal because each merging business segment has a distinct group of reliant customers. Using segment-level data to define horizontal mergers is more accurate than using firm-level data.

from the BEA Use table to calculate import ratios for each merging industry, reducing the sample to 577. Lastly, we require data available to calculate a bidder's excess cash reserve following Opler, Pinkowitz, Stulz, and Williamson (1999). This requirement reduces our final sample to 494. We use the 494 horizontal deals for our baseline analysis. Table 2 reports the distribution of horizontal mergers over the sample period. Panel A shows considerable variation in the annual frequency. Horizontal deals during 1997–1999 account for 29% of the baseline sample. The average ratio of target to bidder firm market values of equity is 36%, which is comparable to the 45% that Fee and Thomas (2004) report. The average market value of equity is $9,277 million for bidders and $915 million for targets. In panel B we aggregate deals into broad industries defined as in Fama and French (1997). The three Fama–French industries with the most merger activity over our sample period are business services, retail, and electronic equipment. Mergers in these three industries account for 57% of our sample. Panel C further describes deal characteristics. We manually check the "Annual Report to Congress Pursuant to Subsection (j) of the Clayton Act Hart-Scott-Rodino Antitrust Improvements Act of 1976" by the Department of Justice (DOJ) and the Federal Trade Commission (FTC) to decide whether or not a proposed merger is challenged. For our sample mergers during 1984–2008, we check the DOJ and FTC's joint annual reports for fiscal years 1984 (8th report) to 2009 (32nd report). We include the 2009 annual report because investigation decisions are sometimes documented in the year following the deal announcement.[12] About 7% of proposed mergers in our sample are challenged, which is close to the proportion of 7.04% that Fee and Thomas (2004) report. About 60% of deals use stock to finance the transaction, and the SDC record 5% of sample deals as hostile. In 6% of the deals bidders have toeholds in targets, and the average pre-offer ownership in the targets of these deals is 16%.

*4.2 Identification of corporate customers*

Following previous literature (e.g., Shahrur, 2005; Fan and Goyal, 2006; Bhattacharyya and Nain, 2011; Ahern, 2012; Ahern and Harford, 2014), we use the Use table from the Bureau of Economic Analysis (BEA) Benchmark Input–Output (IO) accounts to identify firms that operate along the merging firms' supply chains. The Use table gives estimates of the dollar value of an upstream industry's output used by a downstream industry as input, for every pair of downstream–upstream industries. A new version of the Use table has been

[12] There are 25 reports covering the 26-year period, 1984–2009. The 10th annual report covers 1986–1987. These reports are available on the FTC website, www.ftc.gov.

issued every five years since 1987.[13] Consistent with Shahrur (2005), when constructing customer portfolios, we consider only single-segment firms covered by CRSP and Compustat. This is for two reasons. First, diversified downstream customer firms may have segments that are affected by information from industries other than the merging industry. The restriction enables us to capture a cleaner merger effect on the downstream industry and increases test power. Second, this restriction ensures that the customer portfolio excludes firms with segments operating in the merging industry. Merger announcements may release information about the merging industry that affects all firms that operate in the industry (Song and Walkling, 2000). Including firms that operate in the merging industry in our customer portfolio mixes customer and rival effects.

We follow Shahrur (2005) in defining corporate customers and constructing customer portfolios. For each customer industry of a merging industry, we calculate a *Customer input coefficient* (*CIC*) as the merging industry's output value sold to the customer industry divided by the customer industry's total output value. To account for the negligible dependence of some customer industries on the merging industry, we require customers to operate in a downstream industry with a *CIC* no less than 1%.[14] To account for contemporaneous cross-correlation between individual customer returns, we construct a portfolio of customers for each deal. The 1% cut-off results in an average of 326 (median of 99) firms in the customer portfolios for our sample deals. As a greater reliance on input purchases from the merging industry implies that downstream firms are more affected by upstream consolidation, we define a corporate customer as reliant if it operates in the downstream industry with the highest *CIC*. This results in 21 (median of 6) firms in an average reliant customer portfolio.

By design, our identified customers are potential rather than actual. This follows Shahrur (2005) but differs from Fee and Thomas (2004), who identify current customers using actual product market relationships with merging firms. As current customers are not necessarily affected by a merger if their switching costs are low, we believe that examining the overall reaction from downstream firms that have potential product-market relationships with merging firms better captures the effects of horizontal mergers. More importantly, market power affects all firms in downstream industries, not only actual customers.

Since the SDC, Compustat and the Use tables adopt different industry classification systems, i.e., the SDC and Compustat use four-digit SIC codes, while the Use table uses six-digit IO codes, we match IO and SIC codes to identify product market relationships. For the

[13] The archives are available from http://www.bea.gov/industry/io_benchmark.htm.
[14] Shahrur (2005) and Kale and Shahrur (2007) also use this 1% threshold.

1982, 1987, and 1992 Use tables, following Shahrur (2005), we use the conversion tables of Fan and Lang (2000) to convert IO to SIC codes. We include an industry only if we can unambiguously match its SIC code to a unique IO code. But we allow an IO code to have more than one corresponding SIC code. For the 1997 and 2002 Use tables, since no direct IO–SIC mapping is available, we adopt the conversion strategy of Bhattacharyya and Nain (2011). First, we use the IO–North American Industrial Classification System (NAICS) conversion tables provided by the BEA to convert IO codes to NAICS codes.[15] Then we use correspondence tables provided by the U.S. Census Bureau to convert NAICS to SIC codes.[16] Finally, we match all 1982, 1987, 1992, 1997, and 2002 Use tables data to the horizontal merger sample using the SIC code of the overlapping segment from the Compustat segment tapes. Given that product market relations may change over time, we use the 1982, 1987, 1992, 1997 and 2002 Use tables for proposed deals announced during 1984–1986, 1987–1991, 1992–1996, 1997–2001, and 2002–2008 respectively.

*4.3 Measuring announcement period abnormal returns*

We use a standard event study methodology to estimate the wealth effects for merging firms and corporate customers. We calculate market-model-adjusted abnormal returns using, $AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$ where $R_{it}$ is firm *i*'s return on day *t*, $R_{mt}$ is the CRSP equal-weighted index return on day *t*, and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are parameter estimates. We estimate market model parameters over 250 trading days starting from day −300 before the announcement and require firms to have at least 100 daily returns available during the estimation period. Consistent with Bradley, Desai, and Kim (1988) and Fee and Thomas (2004), we estimate *Combined CAR* as a value-weighted portfolio of cumulative abnormal returns to the acquirer and target over a (−2, 2) window surrounding the merger announcement. The weights are the relative bidder and target pre-merger equity market values, excluding the value of any pre-merger holding (i.e., toehold) in the target by the bidder.

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[15] The IO–NAICS concordance for 1997 is available in Table A of the "Benchmark Input-Output Accounts of the United States, 1997", available at http://www.bea.gov/scb/pdf/2002/12December/1202I-OAccounts2.pdf. The IO–NAICS concordance for 2002 is available in Table A of the "U.S. Benchmark Input-Output Accounts, 2002", available at http://www.bea.gov/scb/pdf/2007/10%20October/1007_benchmark_io.pdf.Both concordance tables include an NAICS industry unambiguously matched to a unique IO code, allowing an IO code to have more than one corresponding NAICS code.

[16] The 1997 and 2002 NAICS–SIC concordance tables are available at http://www.census.gov/eos/www/naics/concordances/concordances.html. We allow multiple matches. For robustness, we also include only industries that have unique IO–NAICS matches and unique NAICS–SIC matches in order to retain a clean matching result for the 1997 and 2002 Use tables. The unique matching does not qualitatively change our conclusions. However, this restriction substantially reduces the number of up-downstream pairs identified for 1997 and 2002.

To measure downstream merger-induced wealth effects, we calculate equal- and value-weighted portfolio CARs to corporate customers for each merger in our sample. We report portfolio CARs with both weighting schemes in a univariate analysis (table 3). Our other reported results use equal-weighted portfolio CARs for consistency with previous literature (Eckbo, 1983; Song and Walkling, 2000; Fee and Thomas, 2004; Shahrur, 2005). The results persist with value-weighted customer portfolio CARs.

*4.4 Foreign competition and industry structure measures*

Consistent with Mitchell and Mulherin (1996) and Shahrur (2005), we measure foreign competition as the takeover industry's total imports divided by its total domestic supply. We retrieve import data and the data required for calculating domestic supply from the BEA Use tables in 1982, 1987, 1992, 1997, and 2002. Following Streitwieser (2010), we calculate domestic supply as the sum of commodity output net of imports, exports, change in private inventories, and sales of scrap and used goods. As the foreign competition environment of an industry changes over time, we match import data from the 1982, 1987, 1992, 1997 and 2002 Use tables to horizontal merger deals during 1984–1986, 1987–1991, 1992–1996, 1997–2001, and 2002–2008, respectively. We use the median value of the available foreign competition of the initial sample to classify merging industries into High and Low foreign competition industries.[17]

We use the sales-based HHI to measure the concentration of four-digit SIC industries. In the U.S., SFAS No. 14 requires firms to report sales and other operating and accounting data for each significant business segment that accounts for at least 10% of total revenues, profit, or assets. This segment level information enables us to measure industry concentration more accurately than using firm-level data. In line with Li (2010), from Compustat Segment tapes we retain firms' business segments with valid primary four-digit SIC codes (Item ssic1), and merge segments with identical four-digit SIC codes under the same firm into one and aggregate sales items accordingly. We calculate the HHI for merging industries (*HHI of merging ind*) and their reliant customer industries (*Reliant customer concentration*) using the adjusted Compustat Segment tapes. Following Fee and Thomas (2004) and Shahrur (2005), we measure merger-induced change in industry concentration as 2 × target market share × bidder market share in the year before the merger announcement, where the bidder and target

[17] Using imports divided by domestic supply plus imports as an alternative measure (Giroud and Mueller, 2010; Valva, 2012) leaves our conclusions intact.

market shares equal their sales in the merging industry divided by the aggregated segment sales of the merging industry calculated from the adjusted Compustat Segment tapes.

*4.5 Excess cash reserve measure*

One of our instrumental variables is the bidder's excess cash reserve ratio. We use *Excess cash reserve ratio* to measure a bidder's agency costs in the sense of Jensen (1986) and Harford (1999). Using excess rather than actual cash reserve considers a company's required cash reserve level, in line with previous literature (e.g., Opler, Pinkowitz, Stulz, and Willamson, 1999).In particular, we estimate a firm's required cash reserve ratio using a pooled time-series cross-sectional OLS regression with year dummies and calculate *Excess cash reserve ratio* as the difference between a firm's actual and required cash reserve ratio, where actual cash reserve ratio is the ratio of cash and short-term investment over total assets net of cash and short-term investment. Gao (2011) points out that the *Excess cash reserve ratio* reflects the ranking of bidders in terms of their costless access to cash.

## 5. Results

*5.1 Univariate analysis*

Table 3, panel A reports *CAR* (−2, 2) to merging firms and customers. On average, merging firms have significant positive abnormal returns of 1.72%. Bidders have a negative average abnormal return of −2.65%, while targets have a positive average abnormal return of 23.11%. These patterns are similar to the three-day abnormal returns that Fee and Thomas (2004) report for their horizontal merger sample during 1981–1997.

Our customer sample shows mixed results of proposed upstream consolidation, with a significantly positive average *CAR* of 0.16% for equal-weighted portfolios, but an insignificant *CAR* for value-weighted portfolios. Reliant customers have insignificant *CARs* for value- and equal-weighted portfolios. These results are in line with previous studies. Both Shahrur (2005) and Fee and Thomas (2004) find that on average customers are unaffected by upstream mergers, which is the main evidence against market power in the previous literature. The wealth effect patterns for the entire sample hold qualitatively in both the high- and low-foreign competition subsamples. The mean differences between the two subsamples are insignificant at conventional levels. To sum up, our univariate analysis of abnormal returns to merging and related firms in panel A yields evidence similar to previous studies, which provide no systematic evidence of market power.

Panel B further examines how *Reliant customer CAR* varies with *Combined CAR*, by examining sub-samples classified by *Combined CAR* quartiles. Abnormal returns to reliant customers are only significantly positive in the highest *Combined CAR* quartile when foreign competition is high, suggesting customers receive a positive net gain only when merger gains are high and the merging industry has weak market power to retain the gains due to foreign competition. In the other three quartiles, the point estimates of abnormal returns to reliant customers are negative, though insignificant.

As market power suggests a negative relation between the wealth effects to merging firms and customers, we conduct a multivariate analysis of the relation between the announcement abnormal returns of these two parties. Table 4 presents summary statistics of all the independent variables in our multivariate analysis. We winsorize all variables at the 1st and 99th percentiles to avoid distortion by outliers. Compared with merging industries facing greater foreign competition, merging industries with low foreign competition have lower pre-merger concentration but greater increases in their concentration, which indicates companies facing low foreign competition possibly have greater incentives to merge for market power. Bidders in low foreign competition industries are smaller on average. Meanwhile, their reliant customers are smaller, more concentrated and less dependent. Table 5 presents a correlation matrix for all the variables in the multivariate analysis. Most correlations are small and do not exceed 0.5 for variables in the baseline regressions, with two exceptions: (1) a correlation of 0.81 between *High foreign competition* and *Foreign competition*; (2) a correlation of 0.63 between *Combined CAR* and *Combined CAR* × *High foreign competition*. For (1), we use *Foreign competition* and *High foreign competition* in different models. For (2), the interaction term appears in the models by design.

*5.2 Baseline model comparison*

We estimate our baseline model, Eq. (1), using OLS and GMM–IV regressions. For each baseline model, we estimate three specifications. The first regresses *Reliant customer CAR* on *Combined CAR* and controls. The second adds industry effects, and the third further adds year effects while omitting *Partisanship* since it lacks variation within years. To facilitate comparison, we report OLS results in models (1)–(3) in table 6, panel A, and the results of GMM–IV in models (4)–(6); panel B reports the first-stage GMM–IV results and panel C reports diagnostic results relating to our GMM–IV estimates.

In panel A, the coefficient on *Combined CAR* is positive in all three OLS models, but is marginally significant only in model (1), which excludes year and industry effects. This result

is similar to that of Shahrur (2005).[18] This suggests an insignificant wealth transfer between merging firms and reliant customers. Combined with the positive average wealth effect to merging firms (table 3, panel A), the OLS result suggests that merging firms retain efficiency gains and there is no effect of market power.

We now turn to the GMM–IV estimation following Eqs. (2)–(4). The first-stage results in panel B show the determinants of *Combined CAR*. Here, model (4) excludes industry and year effects, while model (5) adds industry effects and model (6) further adds year effects and drops *Partisanship*. The negative coefficient on *Foreign competition* suggests that merging firms realize lower gains when they are in an industry with higher foreign competition pressure, consistent with foreign competition disciplining market power. The negative coefficient on *Ln Bidder size* is in line with the size effect of acquisition announcement returns (Moeller, Schlingemann, and Stulz, 2004). Models (4) and (5) show that mergers realize higher abnormal returns in Democratic than Republican administrations. The instruments, *Hostile takeover*, *Stock payment*, and *Excess cash reserve ratio*, are significantly associated with *Combined CAR* in all specifications, except for the coefficient on *Hostile takeover* of 0.028 ($t$ = 1.70) in model (6). The positive coefficient on *Hostile takeover* reflects the benefits of removing inefficient target management in hostile takeovers (Shivdasani, 1993; Schwert, 2000). The negative coefficients on *Stock payment* reflect the market reaction to an assortment of signals sent by stock offers, e.g., bidder market valuation (Travlos, 1987; Shleifer and Vishny, 2003; Rhodes-Kropf, Robinson, and Viswanathan, 2005), growth, business complementarity, and information asymmetry (Eckbo, Makaew, and Thorburn, 2014). The negative coefficient on Excess cash reserve ratio reflects agency cost concerns (Jensen, 1986).

Panel C presents test results for endogeneity, instrument validity, and instrument strength. We reject the null that *Combined CAR* is exogenous in all specifications. A Hansen *J*-test of over-identifying restrictions yields *p*-values of 0.94–0.98, which implies that we cannot reject the null hypothesis that our instruments are valid. Finally, we follow Baum, Schaffer, and Stillman (2007) and use the *Kleibergen-Paap rk Wald F-statistic* to test for weak identification.[19] In all specifications, this statistic exceeds 10.0, which is the rule-of-thumb critical value for weak identification not to be a problem (Staiger and Stock, 1997). The

[18] Shahrur (2005) uses weighted least squares and includes *Combined Wealth Effect* (equivalent to our *Combined CAR*) as a control variable. He reports an insignificant coefficient of 0.00 in table 8, model (2).

[19] We also report the *Cragg-Donald Wald F-statistic*, which assumes IID errors. This statistic facilitates a comparison between the biases of the GMM–IV and OLS estimators. In table 6 panel C, both statistics exceed the critical value of Stock and Yogo (2005) for a 10% maximal IV relative bias.

Angrist–Pischke multivariate *F*-test also rejects weak identification for *Combined CAR*. Overall, these results suggest that weak instruments do not affect our GMM–IV estimation.

Finally, we look at the key second-stage results of models (4)–(6) in panel A. Compared to the estimates of models (1)–(3), the relation between *Reliant customer CAR* and *Combined CAR* changes dramatically in these instrumented regressions. The coefficient on *Combined CAR* becomes consistently negative and is significant at 5% in all three models.[20] The coefficient on *Combined CAR* in model (4) is −0.168, which suggests that 16.8% of the increase in *Combined CAR* is due to net wealth transferred from customers to merging firms. These results persist qualitatively in model (5), which controls for industry effects, and in model (6), which controls for both industry and year effects. The GMM-IV results demonstrate that ignoring the endogeneity of *Combined CAR* dramatically biases the coefficient of *Combined CAR* upwards and even changes the sign of the relation between *Reliant customer CAR* and *Combined CAR*. This is consistent with OLS estimates ignoring, and GMM-IV correcting for, the market's anticipation of the countervailing responses of downstream firms to upstream mergers. The GMM-IV estimates provide clear evidence of a wealth transfer to merging firms from their corporate customers, demonstrating the presence of market power.

As a robustness check, replacing the equal-weighted *Reliant customer CAR* with a value-weighted *CAR* leaves our results unchanged.[21] We do not tabulate these results for brevity but they are available on request.

*5.3 Merger effects and foreign competition*

We further investigate whether the relation between the wealth effects of merging firms and their customers varies with foreign competition intensity. Table 7 reports the main results. Model (1) estimates the GMM–IV model of Eqs. (4)–(6) excluding industry and year effects, while model (2) adds industry effects and model (3) further adds year effects and drops *Partisanship.*

The three models consistently give a negative coefficient on *Combined CAR* of around −0.30 (significant at 5% or above), while the coefficient on the interaction term is around 0.50 (significant at 5% or above). Adding the coefficient on the interaction term to the coefficient on *Combined CAR* indicates that, for horizontal mergers in industries facing high

[20] All control variable coefficients are insignificant at conventional levels.

[21] We also re-estimate Eqs. (2)–(3) using the *CARs* of value-weighted portfolios of general customers and our results persist. When we use the *CARs* of equal-weighted portfolios of general customers the coefficient on *Combined CAR* is insignificant.

foreign competition, merging firms do not gain at the expense of reliant customers. An *F*-test shows that the sum of coefficients is significant in model (3) at 5%, but insignificant in models (1) and (2). Altogether, these results suggest that the negative wealth transfer effect comes from horizontal mergers in industries with low foreign competition; expropriation based on market power is present for horizontal mergers in industries with weak discipline from foreign competition. In contrast, strong foreign competition not only contains market power but also forces merging firms to share efficiency gains with their customers, implying a positive wealth transfer from the merging firms to costumers. Our findings highlight the importance of free trade in pre-empting social welfare losses due to anticompetitive activities.

For brevity, we do not report in detail the results of the first-stage regressions and endogeneity and instrument quality tests, but make two observations. First, the *Angrist-Pischke multivariate F-statistic* for weak identification of individual regressors rejects the null hypothesis that *Combined CAR* and *Combined CAR* × *High foreign competition* are weakly identified as stand-alone endogenous regressors (the exception is for *Combined CAR* × *High foreign competition* in model 2, where the *p-value* is 0.107); but the *Cragg-Donald Wald statistic* and the *Kleibergen-Paap rk Wald F-statistic* suggest they are not jointly identified. Second, to address the concern over the presence of weak instruments, we apply the Anderson-Rubin (1949) test, which is robust in the presence of weak identification (Baum, Schaffer, and Stillman, 2007). This test rejects the null that the endogenous variables are jointly insignificant and the orthogonality conditions are valid, indicating that we can still trust inferences from the GMM-IV estimation in the presence of weak identification.

## 6. Summary and concluding remarks

We provide large-sample evidence on market power using a sample of horizontal mergers announced during 1984–2008. Previous literature relies on the average wealth effect to merging and related firms and infers that horizontal mergers do not generate market power. We emphasise the importance of the wealth transfer in detecting market power. We show that the wealth effect of reliant customers is inversely related to that of merging firms, indicating a wealth transfer to merging firms from downstream corporate customers. Instrumenting the abnormal returns to merging firms is essential for identifying this relation since the abnormal returns of the combined firms is endogenous, reflecting the anticipation of downstream responses. In addition, we find that market power in the context of horizontal mergers varies with foreign competition intensity. The negative wealth transfer effect exists only for horizontal mergers in industries with low foreign competition. This confirms that foreign

competition disciplines market power and highlights the importance of free trade in enhancing efficiency and containing anticompetitive behaviour in the domestic market.

Our findings have two main implications. First, our identification framework complements that of Eckbo (1983) and Stillman (1983) by highlighting that wealth transfers between merging and related firms, most notably reliant corporate customers, offers a more informative test to detect the presence of market power. Second, our findings imply the necessity of further strengthening antitrust scrutiny, and support the promotion of free trade. We further suggest that, to improve antitrust effectiveness, antitrust resources should be directed at mergers in domestic industries with less foreign competition.

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**Table 1**
**Variable descriptions**

Definitions of variables. All variables are measured at the end of the fiscal year before the merger announcement, unless noted otherwise.

| Variable | Definition |
|---|---|
| *Bidder CAR* | Market model-adjusted return of the bidder firm over a (−2, 2) day window around the merger announcement. Day 0 is the announcement day. |
| *Bidder P/E* | The ratio of share price at the end of the fiscal year before the merger announcement to earnings per share. |
| *Bidder profitability* | The ratio of bidder's operating income before depreciation to its total assets. |
| *Challenged* | Equals one if a horizontal deal is challenged by the DOJ or the FTC and 0 otherwise. |
| *Combined CAR* | Value-weighted abnormal returns of merging firms. Abnormal returns are market-model-adjusted returns in a (−2, 2) day window around a merger announcement. |
| *Excess cash reserve ratio* | The difference between the bidder's actual cash reserve ratio and the required cash reserve ratio. The cash reserve ratio is cash and short-term investments over total assets net of cash and short-term investments. The required cash reserve ratio is estimated following Opler, Pinkowitz, Stulz, and Williamson (1999) and using a cross-sectional OLS regression for each of the Fama–French 12 industries in each year. |
| *Foreign competition* | Measured by the import ratio, i.e. the merging industry's total imports divided by its total domestic supply. Total domestic supply is commodity output adjusted by imports, exports, change in private inventories, and sales of scrap and used goods (Streitwieser, 2010). Raw data for imports and domestic supply construction is from the 1982, 1987, 1992, 1997, and 2002 Use tables of the BEA, available at http://www.bea.gov/industry/io_benchmark.htm. |
| *General customer CAR* | Market model-adjusted portfolio return of all general corporate customers in a (−2, 2) day window around a merger announcement. A general corporate customer is any Compustat single-segment firm in an industry whose production depends on the merging industry's output, with more than 1% of its required input sourced from the merging industry. The input purchase relation from upstream industries is derived from the 1982, 1987, 1992, 1997, and 2002 Use tables of the BEA, available at http://www.bea.gov/industry/io_benchmark.htm. We apply two weighting schemes, equal and value-weighted when constructing general customer CAR, and report both versions in univariate analysis. In multivariate analysis, we only report results based on the equal-weighted portfolio *CAR*; using value-weighted portfolio *CAR* does not alter our results and the results are available upon request. |
| *HHI of merging ind* | The sales-based Herfindahl–Hirschman index of the merging four-digit SIC industry, calculated from Compustat. |

**Table 1 (continued)**

| Variable | Definition |
|---|---|
| Δ*HHI of merging ind* | Equals 2 × percentage of bidder sales in the merging sector × percentage of target sales in the merging sector. |
| *High foreign competition* | Equals one if the merger is in an industry with an import ratio in the year before the merger announcement higher than the median import ratio of the merging industries during the sample years, and zero otherwise. |
| *Hostile takeover* | Equals one if the merger is hostile and zero otherwise. |
| *Ln Av rel customer size* | The logarithm of the average reliant customer's book value of assets in $millions. |
| *Ln Bidder size* | The logarithm of the bidder's book value of assets in $millions. |
| *Partisanship* | Equals one if the merger is initiated in Democratic administration years, i.e., 1993–2000 during the Clinton administration, and zero if the merger is initiated in Republican administration years. |
| *Payment including stock* | Equals one if there is any stock element in the payment of consideration and 0 otherwise. |
| *Reliant customer CAR* | Market model-adjusted portfolio return of reliant corporate customers in a (−2, 2) day window around a merger announcement. A customer firm is reliant if 1) it operates in the downstream industry with the greatest dependence on the merging industry's product as input and 2) it sources more than 1% of its input from the merging industry. The data on purchases from upstream industries is derived from the 1982, 1987, 1992, 1997, and 2002 Use tables of the BEA, available at http://www.bea.gov/industry/io_benchmark.htm. We apply two weighting schemes, equal- and value-weighted when constructing reliant customer CAR, and report both versions in univariate analysis. In multivariate analysis, we use the equal weighted portfolio CAR for main results and value weights as a robustness check. |
| *Reliant customer concentration* | The sales-based Herfindahl–Hirschman index of the four-digit SIC customer industry that is most dependent on the merging industry's output among all customer industries, calculated from Compustat segment data. |
| *Reliant customer dependence* | The ratio of the dollar amount of the merging industry's output sold to the most dependent customer industry divided by the total output of the customer industry. |
| *Stock payment* | Consideration paid in stock in decimals reported by SDC, calculated as value paid in stock divided by total value. |
| *Target CAR* | Market model-adjusted return of the target firm over a (−2, 2) day window around a merger announcement. |
| *Toehold* | Percentage of equity held by the bidder firm in the target firm prior to deal announcement. |

## Table 2
## Sample description

Distribution of horizontal mergers in nonfinancial and unregulated industries, 1984–2008. A horizontal merger is between two firms with at least one overlapping four-digit SIC business segment. Panel A reports the distribution by year. Industries in panel B are defined as in Fama–French (1997). Panel C reports the distribution by deal characteristics. We manually check the "Annual Report to Congress Pursuant to Subsection (j) of the Clayton Act Hart-Scott-Rodino Antitrust Improvements Act of 1976" issued by the Department of Justice (DOJ) and the Federal Trade Commission (FTC), to decide whether a proposed merger is challenged. Information regarding deal completion status, type of consideration, deal attitude, and toehold is from the SDC. MVE is market value of equity.

| Year | Deals | Percentage | Average bidder MVE ($ millions) | Average target MVE ($ millions) | Target MVE/ bidder MVE |
|---|---|---|---|---|---|
| *Panel A: Frequency of deals by year* | | | | | |
| 1984 | 6 | 1.21 | 4,869.17 | 2,636.51 | 0.48 |
| 1985 | 5 | 1.01 | 974.98 | 847.69 | 1.06 |
| 1986 | 11 | 2.23 | 1,495.80 | 435.90 | 0.25 |
| 1987 | 2 | 0.40 | 586.85 | 68.22 | 0.23 |
| 1988 | 10 | 2.02 | 2,008.19 | 307.27 | 0.12 |
| 1989 | 11 | 2.23 | 3,703.36 | 1,147.43 | 0.61 |
| 1990 | 7 | 1.42 | 3,765.93 | 159.54 | 0.31 |
| 1991 | 4 | 0.81 | 727.96 | 34.31 | 0.11 |
| 1992 | 2 | 0.40 | 691.22 | 45.67 | 0.07 |
| 1993 | 8 | 1.62 | 274.30 | 231.84 | 0.64 |
| 1994 | 13 | 2.63 | 3,364.05 | 238.90 | 0.20 |
| 1995 | 27 | 5.47 | 1,517.29 | 278.10 | 0.32 |
| 1996 | 31 | 6.28 | 4,204.42 | 692.56 | 0.36 |
| 1997 | 40 | 8.10 | 1,847.55 | 445.89 | 0.56 |
| 1998 | 54 | 10.93 | 5,155.78 | 606.38 | 0.32 |
| 1999 | 48 | 9.72 | 19,248.87 | 1,485.81 | 0.34 |
| 2000 | 28 | 5.67 | 17,327.26 | 1,201.25 | 0.31 |
| 2001 | 28 | 5.67 | 3,612.77 | 382.53 | 0.24 |
| 2002 | 10 | 2.02 | 37,680.58 | 4,577.48 | 0.21 |
| 2003 | 31 | 6.28 | 9,932.90 | 448.85 | 0.48 |
| 2004 | 27 | 5.47 | 2,928.36 | 934.81 | 0.43 |
| 2005 | 26 | 5.26 | 21,098.05 | 1,151.62 | 0.28 |
| 2006 | 22 | 4.45 | 21,215.71 | 2,103.44 | 0.28 |
| 2007 | 25 | 5.06 | 15,570.42 | 1,596.06 | 0.46 |
| 2008 | 18 | 3.64 | 10,630.26 | 476.10 | 0.21 |
| All deals | 494 | 100 | 9,276.72 | 914.64 | 0.36 |
| *Panel B: Frequency by Fama and French (1997) industries* | | | | | |
| Business services | 158 | 31.98 | 9,083.13 | 548.55 | 0.35 |
| Retail | 73 | 14.78 | 4,614.70 | 979.76 | 0.36 |
| Electronic equipment | 53 | 10.73 | 14,649.49 | 897.72 | 0.38 |
| Pharmaceutical products | 49 | 9.92 | 27,136.99 | 2,337.50 | 0.26 |
| Restaurants, hotels, motels | 33 | 6.68 | 1,047.25 | 469.71 | 0.51 |
| Other | 128 | 25.91 | 5,234.32 | 906.62 | 0.37 |
| *Panel C: Deal characteristics* | | | | | |
| Challenged | 35 | 7.09 | 2,5263.01 | 4,136.33 | 0.43 |
| Payment including stock | 295 | 59.72 | 7461.59 | 1,187.07 | 0.46 |
| Hostile | 23 | 4.66 | 1,4428.10 | 4,018.59 | 0.51 |
| Toehold | 30 | 6.07 | 4501.57 | 568.57 | 0.40 |

## Table 3
## Announcement abnormal returns

Panel A reports abnormal returns (%) to merging firms and their customers. Mean diff is the difference in mean abnormal returns between deals in low and high foreign competition industries. The *t*-statistics under Mean diff in parentheses are for a *t*-test of the equality of means. Panel B reports abnormal returns to merging firms and reliant customers by subsamples defined by *Combined CAR* quartiles. One *t*-test tests whether a sample mean differs significantly from zero. A median test tests whether a sample median differs significantly from zero. The one-way analysis of variance (ANOVA) tests for differences in the means among the samples. $^{*}$, $^{**}$, and $^{***}$ denote significance at 10%, 5%, and 1%. Table 1 defines all variables.

*Panel A: Announcement abnormal returns to merging firms, rivals, and customers*

| Firm Portfolio | Overall Sample | | *Low foreign competition industries* | | *High foreign competition industries* | | Mean diff (*t*-stat) |
|---|---|---|---|---|---|---|---|
| | *N* | Mean (%) (*t*-stat) | *N* | Mean (%) (*t*-stat) | *N* | Mean (%) (*t*-stat) | |
| ***Merging Firms*** | | | | | | | |
| *Combined CAR* | 494 | 1.717$^{***}$ (4.21) | 284 | 1.964$^{***}$ (3.59) | 210 | 1.384$^{***}$ (2.27) | 0.580 (0.70) |
| *Bidder CAR* | 494 | −2.649$^{***}$ (−6.30) | 284 | −2.032$^{***}$ (−3.73) | 210 | −3.483$^{***}$ (−5.30) | 1.451$^{*}$ (1.71) |
| *Target CAR* | 494 | 23.106$^{***}$ (18.81) | 284 | 22.693$^{***}$ (13.43) | 210 | 23.666$^{***}$ (13.36) | −0.973 (−0.39) |
| ***General customers*** | | | | | | | |
| *General customer CAR* (Equal weighted portfolio) | 494 | 0.161$^{**}$ (2.13) | 284 | 0.096 (1.15) | 210 | 0.249$^{*}$ (1.81) | −0.154 (−1.00) |
| *General customer CAR* (Value weighted portfolio) | 494 | −0.151 (−1.38) | 284 | −0.150 (−1.08) | 210 | −0.151 (−0.87) | 0.001 (0.01) |
| ***Reliant customers*** | | | | | | | |
| *Reliant customer CAR* (Equal weighted portfolio) | 494 | 0.048 (0.20) | 284 | −0.003 (−0.01) | 210 | 0.117 (0.36) | −0.119 (−0.25) |
| *Reliant customer CAR* (Value weighted portfolio) | 494 | −0.266 (−1.07) | 284 | −0.475 (−1.42) | 210 | 0.017 (0.05) | −0.493 (−0.98) |

## Table 3 (continued)

*Panel B: Abnormal returns to merging firms and reliant customers by Combined CAR quartiles*

| Firm Portfolio | Subsample by *Combined CAR quartiles* | | | | Mean diff. [*p*-value] |
|---|---|---|---|---|---|
| | Q1 (Low) | Q2 | Q3 | Q4 (High) | |
| **All sample deals** | | | | | |
| *Combined CAR* | | | | | |
| Mean | −0.092*** | −0.005*** | 0.037*** | 0.130*** | 579.58*** |
| (*t-stat*) | (−18.80) | (−4.17) | (30.36) | (22.96) | [0.00] |
| Median | −0.072*** | −0.002*** | 0.035*** | 0.108*** | |
| (*z-stat*) | (−9.66) | (−3.56) | (9.66) | (9.62) | |
| Std. Dev. | 0.055 | 0.013 | 0.013 | 0.063 | |
| Obs. | 124 | 123 | 124 | 123 | |
| *Reliant customer CAR* | | | | | |
| (Equal weighted portfolio) | | | | | |
| Mean | −0.005 | −0.005 | −0.001 | 0.012** | 2.76** |
| (*t-stat*) | (−1.14) | (−0.98) | (−0.14) | (2.42) | [0.04] |
| Median | −0.009* | −0.007 | −0.004 | 0.007* | |
| (*z-stat*) | (−1.91) | (−1.38) | (−0.42) | (1.85) | |
| Std. Dev. | 0.045 | 0.052 | 0.056 | 0.055 | |
| Obs. | 124 | 123 | 124 | 123 | |
| **Deals in low foreign competition industries** | | | | | |
| *Combined CAR* | | | | | |
| Mean | −0.090*** | −0.006*** | 0.037*** | 0.137*** | 352.74*** |
| (*t-stat*) | (−16.45) | (−3.29) | (24.18) | (16.91) | [0.00] |
| Median | −0.077*** | −0.007*** | 0.035*** | 0.112*** | |
| (*z-stat*) | (−7.32) | (−2.76) | (7.32) | (7.32) | |
| Std. Dev. | 0.046 | 0.015 | 0.013 | 0.068 | |
| Obs. | 71 | 71 | 71 | 71 | |
| *Reliant customer CAR* | | | | | |
| (Equal weighted portfolio) | | | | | |
| Mean | −0.004 | 0.004 | −0.009 | 0.009 | 1.41 |
| (*t-stat*) | (−0.72) | (0.68) | (−1.17) | (1.25) | [0.24] |
| Median | −0.008 | −0.001 | −0.008* | 0.007 | |
| (*z-stat*) | (−1.11) | (0.69) | (−1.83) | (0.89) | |
| Std. Dev. | 0.048 | 0.054 | 0.064 | 0.058 | |
| Obs. | 71 | 71 | 71 | 71 | |
| **Deals in high foreign competition industries** | | | | | |
| *Combined CAR* | | | | | |
| Mean | −0.095*** | −0.004*** | 0.036*** | 0.120*** | 225.17*** |
| (*t-stat*) | (−10.56) | (−2.70) | (18.22) | (16.25) | [0.00] |
| Median | −0.067*** | −0.002** | 0.035*** | 0.100*** | |
| (*z-stat*) | (−6.34) | (−2.37) | (6.33) | (6.28) | |
| Std. Dev. | 0.065 | 0.009 | 0.014 | 0.053 | |
| Obs. | 53 | 52 | 53 | 52 | |
| *Reliant customer CAR* | | | | | |
| (Equal weighted portfolio) | | | | | |
| Mean | −0.008 | −0.012 | 0.009 | 0.016** | 4.59*** |
| (*t-stat*) | (−1.58) | (−1.71) | (1.48) | (2.35) | [0.00] |
| Median | −0.009** | −0.013** | 0.009 | 0.005* | |
| (*z-stat*) | (−2.18) | (−2.50) | (1.53) | (1.76) | |
| Std. Dev. | 0.036 | 0.053 | 0.043 | 0.050 | |
| Obs. | 53 | 52 | 53 | 52 | |

**Table 4**
**Descriptive statistics**

Summary statistics for independent variables. A *t*-test (Ranksum test) tests mean (median) differences between low and high foreign competition industry deals. Table 1 defines all variables.

| Variable | Mean | Median | Std. Dev. | Obs. |
|---|---|---|---|---|
| *Foreign competition* | | | | |
| Overall | 0.085 | 0.002 | 0.121 | 494 |
| Low foreign competition industries (A) | 0.001 | 0.002 | 0.001 | 284 |
| High foreign competition industries (B) | 0.198 | 0.197 | 0.109 | 210 |
| *p*-value (A – B = 0) | 0.00 | 0.00 | | |
| *HHI of merging ind* | | | | |
| Overall | 0.122 | 0.085 | 0.096 | 494 |
| Low foreign competition industries (A) | 0.001 | 0.078 | 0.088 | 284 |
| High foreign competition industries (B) | 0.135 | 0.112 | 0.105 | 210 |
| *p*-value (A – B = 0) | 0.01 | 0.07 | | |
| Δ*HHI of merging ind* | | | | |
| Overall | 0.006 | 0.000 | 0.021 | 494 |
| Low foreign competition industries (A) | 0.007 | 0.000 | 0.027 | 284 |
| High foreign competition industries (B) | 0.003 | 0.000 | 0.010 | 210 |
| *p*-value (A – B = 0) | 0.03 | 0.66 | | |
| *Ln Bidder size* | | | | |
| Overall | 6.316 | 6.403 | 1.906 | 494 |
| Low foreign competition industries (A) | 6.149 | 6.106 | 1.815 | 284 |
| High foreign competition industries (B) | 6.541 | 6.681 | 2.005 | 210 |
| *p*-value (A – B = 0) | 0.02 | 0.01 | | |
| *Bidder profitability* | | | | |
| Overall | 0.128 | 0.139 | 0.138 | 494 |
| Low foreign competition industries (A) | 0.132 | 0.137 | 0.127 | 284 |
| High foreign competition industries (B) | 0.122 | 0.146 | 0.151 | 210 |
| *p*-value (A – B = 0) | 0.39 | 0.80 | | |
| *Bidder P/E* | | | | |
| Overall | 19.791 | 16.763 | 89.804 | 494 |
| Low foreign competition industries (A) | 15.362 | 17.548 | 88.191 | 284 |
| High foreign competition industries (B) | 25.779 | 15.561 | 91.811 | 210 |
| *p*-value (A – B = 0) | 0.20 | 0.68 | | |
| *Reliant customer concentration* | | | | |
| Overall | 0.353 | 0.250 | 0.346 | 494 |
| Low foreign competition industries (A) | 0.407 | 0.250 | 0.332 | 284 |
| High foreign competition industries (B) | 0.280 | 0.091 | 0.352 | 210 |
| *p*-value (A – B = 0) | 0.00 | 0.00 | | |
| *Reliant customer dependence* | | | | |
| Overall | 0.103 | 0.098 | 0.087 | 494 |
| Low foreign competition industries (A) | 0.082 | 0.098 | 0.052 | 284 |
| High foreign competition industries (B) | 0.130 | 0.116 | 0.112 | 210 |
| *p*-value (A – B = 0) | 0.00 | 0.00 | | |
| *Ln Av rel customer size* | | | | |
| Overall | 5.508 | 5.452 | 1.686 | 494 |
| Low foreign competition industries (A) | 5.136 | 5.238 | 1.403 | 284 |
| High foreign competition industries (B) | 6.011 | 6.045 | 1.897 | 210 |
| *p*-value (A – B = 0) | 0.00 | 0.00 | | |

**Table 4 (continued)**

| Variable | Mean | Median | Std. Dev. | Obs. |
|---|---|---|---|---|
| *Partisanship* | | | | |
| Overall | 0.504 | 1.000 | 0.500 | 494 |
| Low foreign competition industries (A) | 0.489 | 0.000 | 0.501 | 284 |
| High foreign competition industries (B) | 0.524 | 1.000 | 0.501 | 210 |
| *p*-value (A – B = 0) | 0.45 | 0.45 | | |
| *Hostile takeover* | | | | |
| Overall | 0.047 | 0.000 | 0.211 | 494 |
| Low foreign competition industries (A) | 0.053 | 0.000 | 0.224 | 284 |
| High foreign competition industries (B) | 0.038 | 0.000 | 0.192 | 210 |
| *p*-value (A – B = 0) | 0.44 | 0.44 | | |
| *Stock payment* | | | | |
| Overall | 0.504 | 0.520 | 0.456 | 494 |
| Low foreign competition industries (A) | 0.490 | 0.485 | 0.455 | 284 |
| High foreign competition industries (B) | 0.523 | 0.603 | 0.457 | 210 |
| *p*-value (A – B = 0) | 0.43 | 0.49 | | |
| *Excess cash reserve ratio* | | | | |
| Overall | −0.031 | −0.037 | 0.149 | 494 |
| Low foreign competition industries (A) | −0.024 | −0.035 | 0.146 | 284 |
| High foreign competition industries (B) | −0.041 | −0.041 | 0.153 | 210 |
| *p*-value (A – B = 0) | 0.22 | 0.24 | | |

**Table 5**
**Pearson correlation coefficients**

Correlation matrix for variables. Table 1 defines all variables.

| | *Combined CAR* | *Foreign comp* | *High foreign comp* | *Combined CAR × High foreign comp* | *HHI of merging ind* | *ΔHHI of merging ind* | *Ln Bidder size* | *Bidder profit* | *Bidder P/E* |
|---|---|---|---|---|---|---|---|---|---|
| *Reliant customer CAR* | 0.069 | −0.014 | 0.011 | 0.081 | 0.014 | −0.029 | −0.006 | 0.024 | 0.069 |
| *Combined CAR* | | −0.099 | −0.032 | 0.628 | 0.042 | 0.077 | −0.008 | 0.054 | 0.026 |
| *Foreign competition* | | | 0.808 | −0.019 | 0.013 | −0.124 | 0.060 | −0.072 | 0.012 |
| *High foreign competition* | | | | 0.118 | 0.114 | −0.098 | 0.102 | −0.039 | 0.057 |
| *Combined CAR × High foreign competition* | | | | | −0.002 | 0.019 | 0.039 | 0.103 | 0.040 |
| *HHI of merging ind* | | | | | | 0.483 | 0.014 | 0.001 | 0.076 |
| *ΔHHI of merging ind* | | | | | | | 0.142 | 0.051 | −0.001 |
| *Ln Bidder size* | | | | | | | | 0.280 | −0.043 |
| *Bidder profitability* | | | | | | | | | 0.093 |

**Table 5 (continued)**

| | *Reliant customer con.* | *Reliant customer dep* | *Ln Av rel cus size* | *Partisan* | *Hostile takeover* | *Stock payment* | *Excess cash re. ratio* | *Hostile takeover × High foreign comp* | *Stock payment × High foreign comp* | *Excess cash re. ratio × High foreign comp* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Reliant customer CAR* | 0.020 | 0.002 | −0.045 | 0.043 | −0.034 | 0.045 | 0.050 | 0.001 | −0.033 | 0.030 |
| *Combined CAR* | 0.062 | 0.012 | −0.043 | 0.098 | 0.097 | −0.178 | −0.120 | 0.085 | −0.117 | −0.031 |
| *Foreign competition* | −0.308 | 0.136 | 0.471 | −0.012 | −0.049 | 0.100 | −0.085 | 0.086 | 0.613 | −0.220 |
| *High foreign competition* | −0.181 | 0.276 | 0.257 | 0.034 | −0.035 | 0.036 | −0.054 | 0.149 | 0.656 | −0.198 |
| *Combined CAR × High foreign competition* | 0.127 | 0.120 | 0.008 | 0.088 | 0.080 | −0.125 | −0.046 | 0.157 | −0.072 | −0.082 |
| *HHI of merging ind* | 0.032 | −0.164 | −0.072 | 0.002 | 0.015 | −0.092 | −0.001 | 0.001 | 0.003 | 0.022 |
| *ΔHHI of merging ind* | 0.065 | −0.017 | −0.055 | −0.002 | 0.091 | −0.021 | 0.004 | 0.017 | −0.090 | 0.024 |
| *Ln Bidder size* | 0.008 | 0.235 | 0.097 | −0.142 | 0.095 | −0.324 | −0.171 | 0.092 | −0.098 | −0.129 |
| *Bidder profitability* | 0.078 | 0.019 | −0.066 | 0.101 | 0.052 | −0.192 | −0.110 | 0.026 | −0.114 | −0.089 |
| *Bidder P/E* | −0.053 | 0.036 | 0.032 | 0.085 | 0.030 | 0.006 | 0.043 | 0.035 | −0.009 | 0.037 |
| *Reliant customer concentration* | | 0.047 | −0.315 | −0.078 | 0.025 | −0.125 | −0.009 | 0.040 | −0.165 | 0.087 |
| *Reliant customer dependence* | | | −0.119 | −0.102 | 0.042 | −0.012 | 0.027 | 0.111 | 0.148 | −0.025 |
| *Ln Av rel customer size* | | | | −0.148 | −0.011 | 0.010 | −0.110 | 0.020 | 0.237 | −0.107 |
| *Partisanship* | | | | | −0.088 | 0.212 | 0.094 | −0.033 | 0.094 | 0.021 |
| *Hostile takeover* | | | | | | −0.170 | 0.078 | 0.581 | −0.095 | 0.025 |
| *Stock payment* | | | | | | | 0.134 | −0.100 | 0.516 | 0.039 |
| *Excess cash reserve ratio* | | | | | | | | 0.012 | 0.001 | 0.667 |
| *Hostile takeover × High foreign competition* | | | | | | | | | −0.024 | 0.000 |
| *Stock payment × High foreign competition* | | | | | | | | | | −0.077 |

**Table 6**
**OLS and GMM–IV estimates of baseline specifications**

This table reports the results of OLS and GMM–IV regressions of abnormal returns of reliant customers on the abnormal returns of merging firms. Panel A, models (1)–(3) report OLS estimates and models (4)–(6) report GMM–IV 2-step feasible efficient GMM estimates. Models (1) and (4) exclude industry and year effects. Models (2) and (5) control for industry effects, and models (3) and (6) further control for year effects while dropping *Partisanship*. In the GMM-IV regressions, *Combined CAR* is endogenous and *Hostile takeover*, *Stock payment*, and *Excess cash reserve ratio* are instruments. Panel B reports the first-stage OLS estimates of regressions of *Combined CAR* in models (4)–(6). Panel C presents results of tests of endogeneity, instrument validity, and instrument strength in models (4)–(6). We partial out industry dummies in model (5) and industry and year dummies in model (6) to make the covariance matrix of the remaining orthogonality conditions full rank and efficient GMM estimation feasible. Table 1 defines all variables. All variables are winsorized at the 1st and 99th percentiles. *t*-statistics (in parentheses) are adjusted for clustering of merger announcement years. *, **, and *** denote significance at 10%, 5%, and 1%.

*Panel A: OLS and 2-step feasible efficient GMM estimation*

| | Dependent Variable: *Reliant customer CAR* | | | | | |
|---|---|---|---|---|---|---|
| | OLS estimation | | | GMM estimation | | |
| Independent Variable | Model (1) | Model (2) | Model (3) | Model (4) | Model (5) | Model (6) |
| *Combined CAR* | 0.038* | 0.038 | 0.042 | −0.168** | −0.191** | −0.157** |
| | (1.73) | (1.57) | (1.58) | (−2.36) | (−2.40) | (−2.15) |
| *Foreign competition* | 0.005 | 0.040 | 0.040 | −0.013 | −0.004 | −0.003 |
| | (0.16) | (0.54) | (0.53) | (−0.51) | (−0.06) | (−0.04) |
| *HHI of merging ind* | 0.014 | 0.000 | −0.003 | 0.019 | −0.003 | −0.006 |
| | (0.72) | (0.01) | (−0.15) | (0.79) | (−0.11) | (−0.25) |
| Δ*HHI of merging ind* | −0.125 | −0.130 | −0.130 | −0.074 | −0.071 | −0.072 |
| | (−0.73) | (−0.70) | (−0.66) | (−0.48) | (−0.44) | (−0.43) |
| *Ln Bidder size* | 0.000 | 0.000 | 0.001 | −0.000 | 0.000 | 0.001 |
| | (0.15) | (0.22) | (0.50) | (−0.02) | (0.06) | (0.33) |
| *Bidder profitability* | 0.003 | 0.001 | 0.005 | 0.008 | 0.007 | 0.007 |
| | (0.17) | (0.05) | (0.30) | (0.43) | (0.40) | (0.43) |
| *Bidder P/E* ($\times 10^{-2}$) | 0.004 | 0.004 | 0.004 | 0.004 | 0.004* | 0.004* |
| | (1.27) | (1.41) | (1.45) | (1.39) | (1.71) | (1.79) |
| *Reliant customer concentration* | 0.002 | 0.001 | 0.001 | 0.005 | 0.000 | −0.003 |
| | (0.23) | (0.07) | (0.08) | (0.48) | (0.02) | (−0.23) |
| *Reliant customer dependence* | −0.003 | −0.083* | −0.065 | 0.007 | −0.084* | −0.069 |
| | (−0.12) | (−1.85) | (−1.35) | (0.29) | (−1.90) | (−1.42) |
| *Ln Av rel customer size* | −0.001 | −0.001 | −0.002 | −0.001 | −0.001 | −0.002 |
| | (−0.53) | (−0.55) | (−0.79) | (−0.30) | (−0.21) | (−0.67) |

**Table 6 (continued)**

| | Dependent Variable: *Reliant customer CAR* | | | | | |
|---|---|---|---|---|---|---|
| | OLS estimation | | | GMM estimation | | |
| Independent Variable | Model (1) | Model (2) | Model (3) | Model (4) | Model (5) | Model (6) |
| *Partisanship* | 0.003 | 0.001 | | 0.006 | 0.004 | |
| | (0.51) | (0.25) | | (1.30) | (0.89) | |
| *Industry effects* | N | Y | Y | N | Y | Y |
| *Year effects* | N | N | Y | N | N | Y |
| Obs. | 494 | 494 | 494 | 494 | 494 | 494 |
| $R^2$/Centered $R^2$ | 0.01 | 0.05 | 0.09 | −0.11 | −0.13 | −0.09 |

## Table 6 (continued)

*Panel B: First-stage regression*

| | Instrumented variable: *Combined CAR* | | |
|---|---|---|---|
| Independent Variable | Model (4) | Model (5) | Model (6) |
| *Foreign competition* | −0.069 | −0.171* | −0.177** |
| | (−1.69) | (−1.89) | (−2.19) |
| *HHI of merging ind* | 0.004 | −0.025 | −0.019 |
| | (0.10) | (−0.41) | (−0.29) |
| Δ*HHI of merging ind* | 0.298 | 0.335 | 0.335 |
| | (1.56) | (1.57) | (1.43) |
| *Ln Bidder size* | −0.005* | −0.006** | −0.006** |
| | (−1.92) | (−2.14) | (−2.06) |
| *Bidder profitability* | −0.001 | −0.006 | −0.020 |
| | (−0.04) | (−0.17) | (−0.64) |
| *Bidder P/E (×10$^{-2}$)* | 0.001 | 0.000 | −0.000 |
| | (0.24) | (0.05) | (−0.01) |
| *Reliant customer concentration* | 0.006 | −0.003 | −0.021* |
| | (0.47) | (−0.25) | (−1.71) |
| *Reliant customer dependence* | 0.072 | 0.020 | 0.013 |
| | (1.36) | (0.26) | (0.18) |
| *Ln Av rel customer size* | 0.002 | 0.003 | 0.001 |
| | (0.71) | (0.88) | (0.25) |
| *Partisanship* | 0.029*** | 0.020** | |
| | (3.07) | (2.13) | |
| *Hostile takeover* | 0.036** | 0.036** | 0.028 |
| | (2.43) | (2.47) | (1.70) |
| *Stock payment* | −0.039*** | −0.034*** | −0.042*** |
| | (−4.15) | (−3.52) | (−4.13) |
| *Excess cash reserve ratio* | −0.085** | −0.090*** | −0.083*** |
| | (−2.73) | (−3.44) | (−3.04) |
| Obs. | 494 | 494 | 494 |
| $R^2$ | 0.09 | 0.08 | 0.09 |

*Panel C: Tests of endogeneity, instrument validity, and instrument strength for GMM estimation*

| | GMM estimation | | |
|---|---|---|---|
| | Model (4) | Model (5) | Model (6) |
| Endogeneity test | | | |
| (H0: The specified endogenous regressors are exogenous.) | | | |
| Endogeneity test $\mathcal{X}^2$ [*p-value*] | 6.29** [0.01] | 6.61** [0.01] | 4.80** [0.03] |
| Overidentification test | | | |
| (H0: The instruments are valid, i.e., uncorrelated with the error term, and the excluded instruments are correctly excluded from the estimated equation.) | | | |
| *Hansen J-statistic* [*p-value*] | 0.05 [0.97] | 0.13 [0.94] | 0.04 [0.98] |
| Weak identification test | | | |
| (H0: The equation is weakly identified, i.e., excluded instruments are weakly correlated with the endogenous regressors.) | | | |
| *Cragg-Donald Wald – statistic* | 10.94 | 9.31 | 9.83 |
| *Kleibergen-Paap rk Wald F-statistic* | 15.06 | 10.67 | 13.42 |
| Stock-Yogo weak ID test critical values | 9.08 | 9.08 | 9.08 |
| (maximal IV relative bias) | (10%) | (10%) | (10%) |
| Weak identification test for individual endogenous regressor (*Combined CAR*) | | | |
| (H0: The endogenous regressor is weakly identified, i.e., excluded instruments are weakly correlated with the endogenous regressor.) | | | |
| *Angrist-Pischke multivariate F-statistic* [*p-value*] | 15.06*** [0.00] | 10.67*** [0.00] | 13.42*** [0.00] |

**Table 7**
**GMM IV estimates of customer *CAR* in industries with high and low foreign competition**

The table reports 2-step feasible efficient GMM results of GMM–IV regressions of abnormal returns of reliant corporate customers on the interaction of abnormal returns of the merging firms and a high foreign competition industry dummy. *Reliant customer CAR* is the dependent variable, and *Combined CAR* and *Combined CAR × High foreign competition* are endogenous. *Hostile takeover*, *Stock payment*, *Excess cash reserve ratio, Hostile takeover × High foreign competition, Stock payment × High foreign competition*, and *Excess cash reserve ratio × High foreign competition* are instruments. Model (1) excludes industry and year effects. Model (2) adds industry effects, and model (3) further adds year effects while dropping *Partisanship*. We conduct an *F-test* (H0: *Combined CAR + Combined CAR × High foreign competition* = 0) and report the *p*-value (in brackets). We partial out industry dummies in model (2) and industry and year dummies in model (3) to make the covariance matrix of the remaining orthogonality conditions full rank and efficient GMM estimation feasible. Table 1 defines all variables. All variables are winsorized at the 1st and 99th percentile. *t*-statistics (in parentheses) are adjusted for clustering at merger announcement years. *, **, and *** denote significance at 10%, 5%, and 1%.

| | Dependent Variable: *Reliant customer CAR* | | |
|---|---|---|---|
| Independent Variable | Model (1) | Model (2) | Model (3) |
| *Combined CAR* | −0.337*** | −0.326** | −0.292** |
| | (−2.63) | (−2.54) | (−2.37) |
| *Combined CAR × High foreign competition* | 0.505*** | 0.471** | 0.563** |
| | (3.15) | (2.08) | (2.52) |
| *High foreign competition* | −0.004 | −0.005 | −0.004 |
| | (−0.74) | (−0.42) | (−0.38) |
| *HHI of merging ind* | 0.029 | 0.014 | 0.022 |
| | (1.57) | (0.49) | (0.91) |
| *ΔHHI of merging ind* | −0.042 | −0.109 | −0.167 |
| | (−0.30) | (−0.74) | (−1.17) |
| *Ln Bidder size* | 0.000 | 0.000 | 0.001 |
| | (0.23) | (0.21) | (0.40) |
| *Bidder profitability* | 0.005 | −0.005 | 0.006 |
| | (0.23) | (−0.25) | (0.32) |
| *Bidder P/E (×10$^{-2}$)* | 0.002 | 0.003 | 0.003 |
| | (0.96) | (1.20) | (1.21) |
| *Reliant customer concentration* | −0.001 | −0.003 | −0.008 |
| | (−0.08) | (−0.33) | (−0.68) |
| *Reliant customer dependence* | −0.025 | −0.107** | −0.097** |
| | (−1.11) | (−2.16) | (−2.26) |
| *Ln Av rel customer size* | −0.002 | −0.000 | −0.003 |
| | (−0.59) | (−0.04) | (−0.90) |
| *Partisanship* | 0.006 | 0.005 | |
| | (1.34) | (1.10) | |
| *Industry effects* | N | Y | Y |
| *Year effects* | N | N | Y |
| Obs. | 494 | 494 | 494 |
| Centered $R^2$ | −0.22 | −0.20 | −0.18 |
| *F* test (*Combined CAR + Combined CAR × High foreign competition* = 0) | | | |
| [*p*-value] | [0.08]* | [0.30] | [0.04]** |