THE EFFECTS OF EXCHANGE RATE SHOCKS ON SECTORAL MERGERS AND ACQUISITIONS: EVIDENCE FROM TURKEY

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ABSTRACT

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The primary aim of this thesis is to examine the causal effects of the exchange rate shock in 2018 on sectoral mergers and acquisitions within Turkey. To achieve this, the study utilizes detailed, micro-level data-sets sourced from the Entrepreneur Information System (EIS). By capitalizing on the differences between import and export exposures across various sectors, this thesis shows that M&A ratio tends to decrease in sectors that are more exposed to the shock through export while M&A ratio increases more in sectors that are more exposed to the shock through import. Notably, these patterns are particularly prominent for small firms employing 10-50 employees. Furthermore, the study reveals a notable surge in M&A transactions and firm exits in 2018, coinciding with the significant depreciation of the Turkish lira. Additionally, the findings suggest that the acquired firms tend to exhibit higher productivity levels compared to the firms that exit the market, thereby implying an effective mechanism for mergers and acquisitions.

ÖZET

DÖVİZ KURU ŞOKLARININ SEKTÖREL BİRLEŞME VE SATIN ALMALAR ÜZERİNDEKİ ETKİLERİ: TÜRKİYE ÖRNEĞİ

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Anahtar Kelimeler: birleşme ve satın almalar, döviz kuru, ekonomik şoklar, firma hayatta kalması

Bu çalışmanın temel amacı, 2018 döviz kuru şokunun Türkiye'deki sektörel birleşme ve satın almalar üzerindeki nedensel etkisini analiz etmektir. Bunun için Girişimci Bilgi Sistemi'nden (GBS) elde edilen mikro düzeydeki idari veri setleri kullanılmıştır. Her bir sektörün ithalat ve ihracat seviyeleri arasındaki heterojenliği kullanan bu tez, birleşme ve satın almaların oranının ihracat yoluyla şoka daha fazla maruz kalan sektörlerde daha fazla azaldığını ve ithalat yoluyla şoka daha fazla maruz kalan sektörlerde daha fazla arttığını göstermektedir. Bu dinamikler, 10-50 çalışanı olan küçük ölçekli firmalar arasında daha belirgindir. Bu çalışma ayrıca, Türk lirasının keskin bir şekilde değer kaybettiği 2018 yılına denk gelen birleşme ve satın almaların ve ekonomiden çıkışların arttığını göstermektedir. Ayrıca bulgular, satın alınan firmaların verimliliğinin ekonomiden çıkan firmaların verimliliğini aştığını göstermekte ve bu da etkin bir birleşme ve satın alma mekanizmasına işaret etmektedir.

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To my parents

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1. INTRODUCTION

During the course of the year of 2018, upon receiving reports of impending sanctions by the United States, the Turkish lira experienced a significant depreciation in value, reaching its lowest point against the US dollar. Although Turkey has a special history of exchange rate shocks, this shock was quite severe, both in terms of volatility and magnitude. The Turkish Lira incurred a staggering loss of nearly 70% of its value against the US dollar within the initial nine months of the year. Subsequently, in response to the fluctuating exchange rates, the Central Bank of the Republic of Turkey raised the benchmark interest rate by 6.25 points in September. Following the implementation of the interest rate hike, exchange rate volatility was subsequently subdued, thereby leading to a marginal recovery of the Turkish Lira. Nevertheless, as the commencement of the new year ensued, the devaluation of the TL persisted at an elevated rate of 40%. While the depreciation of the Turkish Lira did exhibit some deceleration in the subsequent year, it nonetheless persisted at elevated levels beyond 2020. This is exemplified in Figure 1.1, which depicts the Turkish Lira's exchange rate against the US dollar during the period spanning from 2015 to 2019.

Figure 1.1 USD/TRY exchange rate

This thesis endeavors to analyze the ramifications of the exchange rate shock experienced in 2018 on industry-level mergers and acquisitions. In order to comprehensively identify mergers and acquisitions (M&A) transactions in Turkey, this study will leverage employee-employer matched datasets sourced from the Entrepreneur Information System. Additionally, to assess the extent of exchange rate exposure within sectors, firm-level balance sheet data and foreign trade data will be incorporated into the analysis. To investigate the causal effects of the exchange rate shock on the rate of M&As across sectors, this study will exploit the variation in sectoral exposure to the shock. The abrupt devaluation of the Turkish Lira (TL) by a significant margin of up to 40 percent will exert diverse impacts on firms across distinct sectors, depending their trade structure and whether they are predominantly engaged in imports or exports. Thus, given that the treatment effect differs based on the foreign trade composition of each industry, a valuable natural experiment arises for assessing the impact of the exchange rate shock. My findings indicate that a home currency depreciation resulting from an exchange rate shock increases the M&A ratio for industries that are more vulnerable to the shock through import. Conversely, the M&A ratio decreases for industries that are more susceptible to the shock through export. Notably, this study represents the first of its kind to

explore the relation between exchange rate shocks and industry-level M&A activity in Turkey. Furthermore, the present work distinguishes itself from existing studies that have primarily focused on publicly traded companies or publicly announced M&A transactions within the country. In contrast, this analysis endeavors to identify all M&A deals that transpired within Turkey from 2015 to 2019, regardless of whether they were publicly disclosed or not. As such, a noteworthy contribution of this thesis involves providing a comprehensive examination of M&A activity within Turkey for the very first time.

The M&A strategy, which has been a prevalent and widely studied phenomenon over an extended period of time, has attracted significant scholarly attention within the purview of numerous theoretical frameworks. The multifaceted nature of these frameworks enables a comprehensive understanding of the intricate dynamics at play in M&A activities. For instance, the share mis-valuation theory adopts an analytical approach that posits divergent valuations of the firm undergoing the transaction between the buyer and the seller. This theory highlights the variations in perceived worth and potential synergies, contributing to the negotiation and pricing complexities inherent in M&A deals. On the other hand, the managerial discretion theory adopts a behavioral perspective, delving into the psychological inclinations and aspirations of managers driving M&A decisions. By focusing on their eagerness to foster business growth and increase market presence, this theory sheds light on the strategic motivations underlying M&A endeavors.

The neoclassical theory offers a distinct lens through which to analyze M&A activities. According to this theory, M&A transactions are regarded as a rational and profit-driven process of asset transfer operating within the confines of an efficient market. The industry shocks hypothesis further corroborates this theory, positing that M&A transactions are concentrated within particular industries as a result of surplus liquid assets and distinct economic shocks. The existing literature presents multiple studies highlighting the close relationship between M&A transactions and economic shocks. Gort (1969) directs attention to significant variations in M&A activity across industries and ascribes these disparities to discrepancies in share valuations and shifts in individual expectations arising from economic shocks. These industry-based shocks identified by Gort may encompass innovation, anti-trust policies, deregulation, or fluctuations in input costs. Similarly, Harford (2005) underscores the significance of specific industry shocks, including regulatory, technological, and economic disruptions, in shaping merger waves. Jensen (1993) attributes the M&A activity during the 1970s and 1980s to excess capacity in industries affected by technological and supply shocks, while Mitchell and Mulherin (1996) argues that increased external competition was one of the factors driving the rise in M&A activity

in the 1980s.

Studies focusing on M&A transactions in Turkey, although they often include large or publicly traded firm groups in their samples, have demonstrated the significant influence of firms' financial conditions as a crucial factor. Erdogan (2012), employing a sample of the largest firms in Turkey, identifies 37 companies that were engaged in M&A activities between 2004 and 2010. The study reveals that a decrease in profit margin elevates the probability of being acquired, while excessive debt levels reduce the chances of becoming an acquisition target. Ucer (2009), examining M&A transactions involving publicly traded firms in Turkey, contends that acquired firms tend to be more extensive and lucrative than their acquisition targets, and posits that financial considerations might be the driving force behind these M&A deals.

Given that this thesis recognizes the exchange rate shock as a pivotal external economic shock with significant explanatory power for mergers and acquisitions, it is pertinent to provide a brief explanation of the importance of exchange rate movements for firms. From a firm-level perspective, exchange rate fluctuations can exert a substantial influence on a firm's profitability, competitive positioning, risk exposure and employment. These effects, whether stemming from cost or profit channels, can be particularly pronounced for firms engaged in international trade and vary significantly according to the degree of exposure to exports and imports.

Bernard and Jensen (2004) analyzed the manufacturing export boom in the U.S. between 1987 and 1992 and found that the dollar depreciation in the mid-1980s was a key contributor to the export boom. Similarly, Arslan and Van Wijnbergen (1993) focused on the Turkish export growth in the 1980s and found that real depreciation of the Turkish Lira was one of the main drivers of the export boom. Additionally, Dincer and Kandil (2011) argued that the export sector in Turkey is sensitive to exchange rate developments and that an expected appreciation of the exchange rate can reduce export growth due to a pessimistic outlook for competitiveness.

Following a depreciation shock to a domestic currency, firms with a greater dependence on imported goods are faced with a larger increase in their cost structures, resulting in a commensurate reduction in profit margins. Firms may endeavor to react to such declines in profitability through a range of strategic initiatives.

The literature suggests that firms have the option to mitigate currency risks through operational or financial hedging, including through the use of foreign debt, FX derivatives, production abroad, or passing on additional costs to customers depending on the level of exchange rate exposure (Bartram, Brown, and Minton (2010); Allayannis and Ofek (2001); Hagelin and Pramborg (2004)). In Turkey, exchange

rate risks have been found to be of great significance for corporate hedging behavior (Buyukkara et al. (2019)). However, research conducted by Ayturk, Gurbuz, and Yanik (2016) on 227 publicly traded non-financial firms in Turkey revealed that financial hedging activity is significantly lower compared to developed countries. It can be inferred that firms in Turkey are not well-protected against exchange rate risks, especially since hedging behavior is not common even among publicly traded firms. Exchange rate movements exert not only significant impacts on firms' sales, employment decisions, and performance but also can have vital implications for their long-term viability. Baggs, Beaulieu, and Fung (2009) employed micro-level data on the Canadian manufacturing sector between 1986 and 1997 to investigate the effects of exchange rate fluctuations on firms' probability of survival. Specifically, they focused on the 12-year period during which the Canadian dollar experienced six years of appreciation, followed by depreciation. Their results revealed that the appreciating Canadian dollar and the real effective exchange rate significantly reduced a firm's probability of survival, with more productive firms suffering less damage. These results are consistent with those of Head and Ries (1999), who found that a depreciating Canadian dollar led to increased scale and more plants, while an appreciation resulted in the opposite.

Firms that experience adverse exchange rate shocks may face considerable pressures in terms of their performance, profitability, and competitiveness, and in some cases, may be forced to exit. One strategy that firms may utilize to confront the challenges presented by adverse exchange rate shocks is to engage in mergers with other firms, in an effort to enhance competitiveness. Alternatively, if a merger is not feasible, firms may opt to sell themselves rather than close down altogether. Notably, empirical research has shown that major economic shocks often lead to a surge in takeover activity across entire economies or industries, as firms seek to address efficiency issues. [Shahrur (2005)] By merging with or acquiring other firms, companies may achieve increased market power, which can in turn provide them with greater leverage over their customers and suppliers. (Stigler (1964); Snyder (1996)).

2. DATA

The Entrepreneur Information System, established by the Ministry of Industry and Technology, is a comprehensive database that incorporates various micro-level datasets obtained from public institutions, including the Ministry of Trade, the Revenue Administration, and the Social Security Institution. The Ministry of Trade's administrative dataset, available from 2006 onwards, provides extensive balance sheet information for all firms operating in Turkey. Additionally, the system encompasses Firm Registry Data, facilitating the identification of firm-level characteristics such as the Nace Rev. 4 sector code, geographic location, and employee count. Importantly, all firms registered with the Ministry of Trade are required to report their import and export data to the Turkish Customs on a quarterly basis. The Customs data is also accessible within the Entrepreneur Information System, allowing integration with the aforementioned datasets through the unique firm identification. This integration enables comprehensive and interconnected analyses by leveraging the rich array of information available in the Entrepreneur Information System.

Customs data, which provides information on quarterly import and export volumes at the firm level, is converted into annual figures and merged with balance sheet data. This is done because total sales figures are only available on an annual basis. Subsequently, the resulting dataset is further augmented by matching with the Firm Registration data. This matching process allows for the identification of the specific sector to which each firm belongs using the NACE Rev.2 classification system. Finally, the data set is aggregated from the firm level to the sector level to obtain imports, exports and total sales, which are the sectoral trade variables that we will use to measure each sector's exchange rate exposure.

To calculate the sectoral M&A rate, the variable of interest, the types of firms are determined based on their status as entrants, incumbents, or exiters. To achieve this, firms that have missing or zero values for the number of employees or total sales in a specific year are excluded from the sample. Next, firms that are not observed in year t-1 but appear in the subsequent year are classified as entrants in year t.

Conversely, firms observed in year t but not in year t+1 are labeled as exiters in year t. This classification approach allows for the identification and tracking of the different types of firms within the dataset, enabling the calculation of the sectoral M&A rate accurately.

The social security administrative dataset of all employees obtained from the Social Security Institution contains detailed information such as the duration of employment, compensation, age, and gender of the workforce, which are available on a quarterly basis commencing from 2012. This dataset also includes the firm identity that the specific employee is working in the particular time period. The employee-employer matched nature of this dataset offers the advantage of tracking employee mobility across different firms and quarters. Initially, the dataset for each year is merged into a panel data format, combining the information across multiple years. Subsequently, employees who lack salary information for a specific year and quarter are excluded from the sample.

To determine the size of firms, the total number of employees in the quarter preceding the M&A transaction is considered. Given that the employee data from the Social Security Institution (SSI) is at an individual level, the dataset is transformed to the firm level by identifying the M&A firms and the timing of the transactions. Specifically, the number of employees with positive salaries is aggregated by quarter and firm, allowing for the classification of firms based on their size. The size categories are as follows: micro firms (1-9 employees), small firms (10-49 employees), medium firms (50-249 employees), and large firms (more than 250 employees). The resulting dataset is then merged with the Firm Registration data using the purchased firms' ID numbers, enabling the inclusion of sectoral and characteristic information.

Finally, the dataset obtained from the previous steps is merged with the firm balance sheet dataset. Similar to the determination of sectoral trade variables, no data cleaning is performed on the acquired firms based on their sales. This decision is primarily driven by the fact that balance sheet informations are reported at an annual level. Given that firms submit their annual balance sheet information at the end of the year, it is possible that a firm engaged in an M&A during the first quarter might not have reported the corresponding balance sheet information for that particular year. Thus, to maintain data integrity and consistency, the sales-related cleaning process is not applied for this stage.

It is important to acknowledge a possible limitation associated with the use of Social Security Institution (SSI) data. Specifically, the dataset omits information on individuals engaged in informal work, self-employed individuals, and public sector

employees, and thus, does not offer a comprehensive representation of the entire labor market. The lack of available data on self-employed and public sector employees does not pose a substantial issue for the analysis, as our primary focus is on private firms. However, the absence of information regarding informal workers could be perceived as a potential risk. To mitigate any potential impact on the results, we will introduce additional constraints on firm size. To illustrate the effectiveness of these additional restrictions, we will utilize the TurkStat Household Labor Force Survey (HLFS), which provides data on respondents' employment status, labor market situation, and relevant firm characteristics such as size, sector, and location.

3. MERGERS AND ACQUISITIONS IN TURKEY

Mergers and acquisitions (M&A) in Turkey are subject to notification to the Competition Authority if they affect competition conditions, take place in the high-tech sector, or exceed certain budget limits. The Competition Authority evaluates the agreement to determine whether it is permissible or not. If the agreement is deemed acceptable, the M&A transaction can proceed, and the agreements are made publicly available. Nonetheless, relying solely on the sample of firms disclosed by the Competition Authority for analysis can introduce biases in many ways such as firm size and industry.

To avoid such limitations, this study identifies mergers and acquisitions from employee-employer matched data, following a method similar to Lougui and Broström (2021). However, they limit their analysis to firms with more than 50 employees and define mergers and acquisitions if more than half of the workers moved to another firm. Since including only medium and large firms in the analysis could entail a significant loss of sample size, this study does not exclude small firms. Instead, it imposes more stringent requirements for firms involved in M&A deals.

As previously noted, our primary dataset does not capture certain employment categories. While the exclusion of public sector employees and self-employed individuals does not pose a threat to our analysis, the lack of information on informal workers may present a challenge. Under our definition, if a firm's employees in quarter t-1 are mostly informal and some of its formal employees transfer to another firm in quarter t, this transfer may be classified as an M&A. As a result, our definition may be biased toward firms with a high ratio of informal workers. To address this issue, we use the Household Labor Force Survey to construct an informality rate indicator. This indicator divides the total number of informal workers in each NACE rev. 2 sector and NUTS1 region by the total number of workers in the same region and sector. Table 1 provides the estimated informality rates in Turkey by firm size. Given that nearly half of the employees in micro-sized firms are estimated to be informal, we exclude such firms from our analysis. Additionally, we set the lower

limit transition rate required for an M&A deal to 90%.

Table 3.1 Informality rate by firm size

Year	Firm Size		
	Micro	Small	Medium
2015	0.429501	0.115522	0.029495
2016	0.432288	0.109533	0.030829
2017	0.433629	0.102013	0.027859
2018	0.432526	0.094719	0.029041
2019	0.437696	0.097868	0.025128

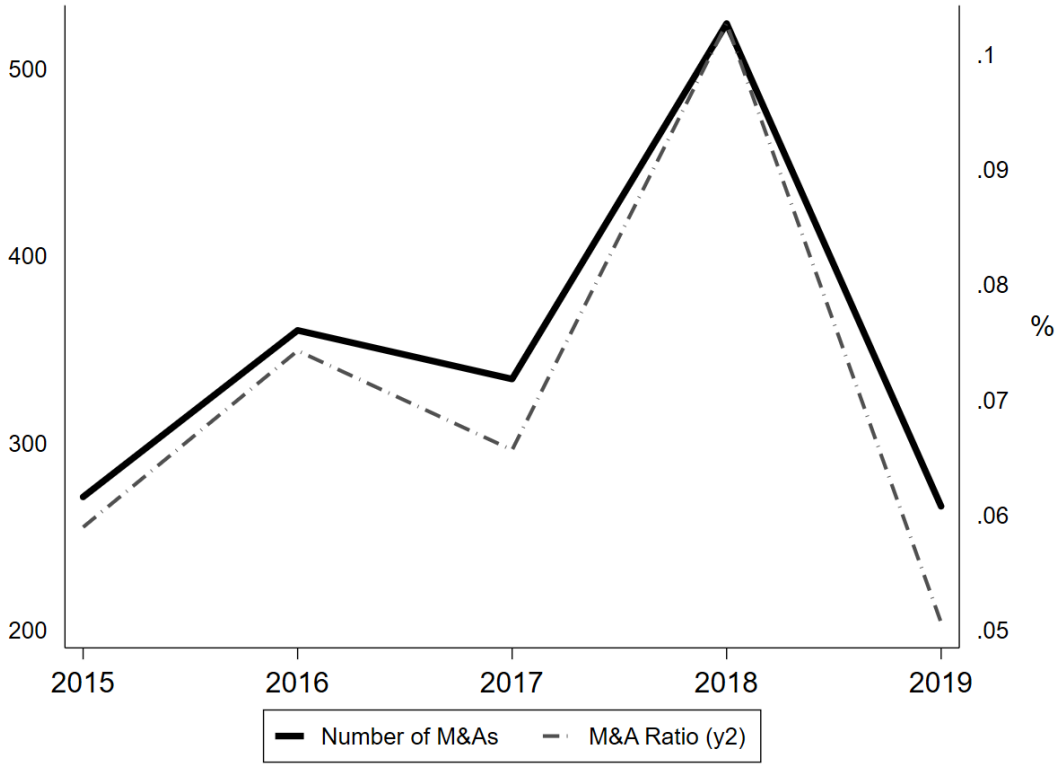
To preclude exceptional scenarios such as erroneous reporting and instances of firm closures and subsequent re-openings that may lead to a modification of the registration identification of a firm across quarters, and hence be misidentified as a merger or acquisition (M&A), we mandate the presence of the acquiring firm in the data from the preceding quarter (t-1). This stipulation precludes the identification of scenarios where two firms merge to create a distinct third entity. While such a condition might result in an underestimate of the total number of M&A transactions, we contend that it is a requisite measure to prevent inaccuracies, notably among smaller enterprises.

Recognizing that an acquired firm may persist with its operations after the consummation of a M&A deal to dispose of its inventories, we have introduced a requirement that mandates the exit of the acquired firm from the economy within three years of the acquisition date. Consequently, enterprises that remain operational beyond this time frame, despite over 90 percent of their workforce transferring to another entity, fail to meet the requisite qualifications for the M&A classification.

In summary, if over 90 percent of firm A's workforce in quarter t-1 commence employment with firm B during quarter t, we classify firm A as having been acquired by firm B. Within the scope of our analysis, we consider firms that merge with another enterprise under the latter's legal entity as acquired firms and refrain from distinguishing between mergers and acquisitions in this regard.

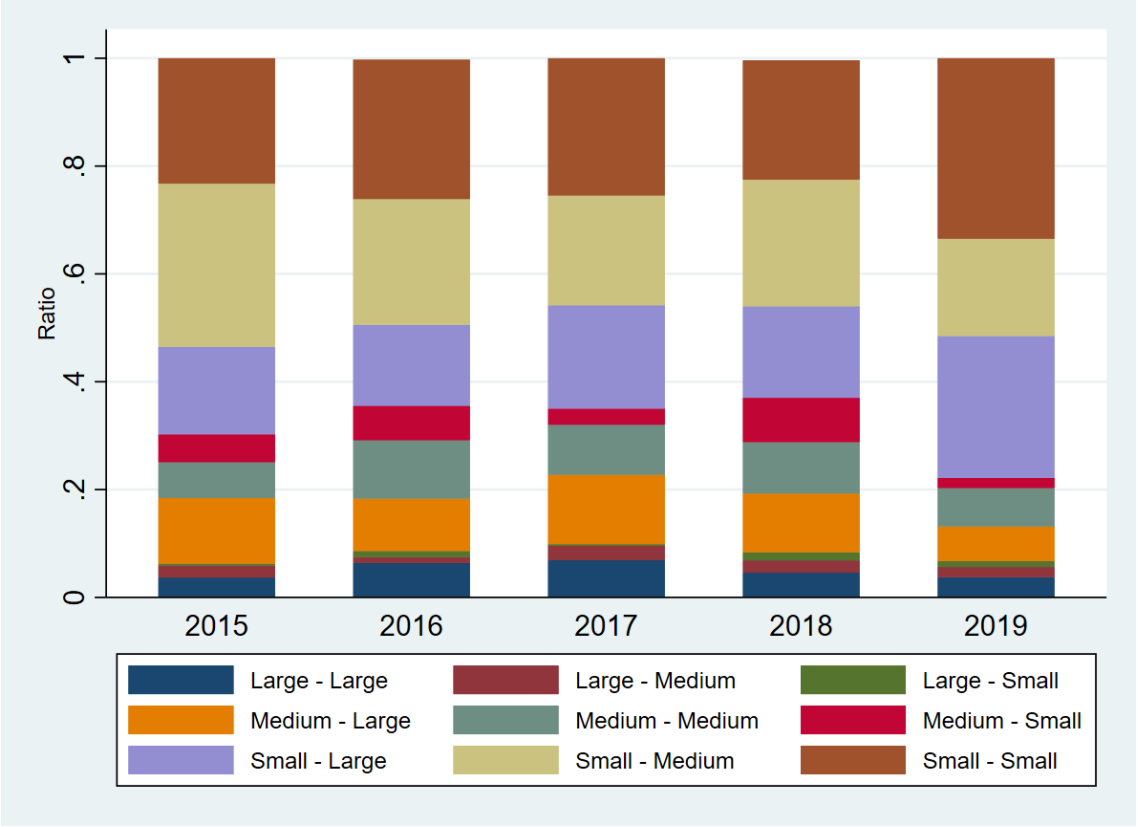
In order to investigate the impact of the exchange rate shock in 2018 on sectoral M&A activity, we focused our attention on the period spanning 2015 to 2019 and identified a total of 1755 unique instances of M&A transactions. As depicted in Figure 1.1, the overall number of M&A deals and the corresponding M&A ratio, computed by dividing the total number of M&A transactions by the total number of incumbent firms, witnessed a discernible upsurge in 2018, followed by a decline to pre-2018 levels in 2019.

Figure 3.1 Mergers and acquisitions in Turkey



The categorization of the 1755 M&A transactions according to firm size is provided in 3.2. It is evident that, in general, firms were acquired by entities larger than themselves in terms of size. Furthermore, in over half of the M&A transactions occurring in a given year, the acquired party consisted of small-sized firms. This proportion reached its highest level in 2019, reaching nearly 80 percent.

Figure 3.2 Mergers and acquisitions: size distribution



Moreover, A.1 provides a sectoral breakdown of M&A transactions, classifying firms into three primary sectors: services, manufacturing, and other. In majority of the instances, firms were acquired by other firms operating within the same sector, indicating a prevalence of intra-sectoral M&A transactions.

Table 3.2 separately presents the descriptive statistics for the acquired and acquirer firms by year. Consistent with theoretical predictions, the acquirer firms exhibit greater average size and productivity as compared to their acquired counterparts. Further, Table 3.3 provides an overview of the descriptive statistics concerning the acquirer and acquired firms based on the size of the latter. Irrespective of the size of the acquired firm, the average size and productivity of the acquirer firms is higher.

Table 3.2 Summary statistics - year

	Acquired Firm							Acquirer Firm						
	mean	N	sd	p25	p50	p75	p99	mean	N	sd	p25	p50	p75	p99
2015														
Employment	71.7	271	121.74	16	30	59	630	435.6	271	964.23	44	123	376	5016
Net Sales	22248.6	217	115062.5	672.1	1586.9	6233.6	503958.9	156321	215	602359.3	4957.2	18849.2	93335	1804157
Productivity	10.9	217	1.67	9.8	10.5	11.9	15.8	11.8	217	1.66	10.6	11.9	12.9	16.1
2016														
Employment	92.4	360	177.13	16	33	76	1033	504	360	1104.1	38.5	99	408.5	5559
Net Sales	18342.2	286	67240.92	666.1	1915.9	7791.2	543749	152492.7	281	706980.9	2911.9	16154.5	68010.5	2610726
Productivity	10.9	286	1.99	10	10.4	12	15.7	11.7	286	1.91	10.5	11.6	12.8	15
2017														
Employment	90.4	334	170.36	16	29	77	1033	784.9	334	2668.54	45	144	573	5588
Net Sales	32153.2	228	131542	1435.3	3541.4	15972.4	507236.3	164279.9	226	441740.9	5506.4	25784.2	84370.9	2111946
Productivity	11.5	228	1.74	10.4	11.4	12.7	14.8	12	228	1.42	10.8	12.1	13	15.2
2018														
Employment	103.2	524	259.25	16	32	88	919	590.5	524	1791.62	39	103	403.5	5893
Net Sales	75944.6	412	970184	823.8	2243.4	9480.1	436280	155649.9	394	423036.3	8628.1	36255.3	135200.3	1965117
Productivity	11	412	1.97	9.6	10.8	12.3	16	12.3	412	1.86	11.2	12.6	13.4	15.9
2019														
Employment	109.8	266	395.37	12	19	41	3735	945.1	266	3537.11	29	121.5	618	28185
Net Sales	40422.4	194	147073.2	963.9	4802.2	24755.8	1181715	381117.2	189	1599530	7659.2	29693.4	190843.8	12100000
Productivity	11.9	194	1.9	10.7	11.6	13.1	17.4	12.6	194	1.49	11.5	12.5	13.6	16
Total														
Employment	94.7	1755	240.86	15	29	72	1126	639.6	1755	2149.66	39	115	438	6020
Net Sales	42285.6	1337	547072.6	843.6	2462.3	10585.2	507236.3	189229.1	1305	793467.9	6275.7	25252.2	103048.3	2164628
Productivity	11.2	1337	1.91	10	10.9	12.4	15.8	12.1	1337	1.74	10.9	12.2	13.2	15.9

Table 3.3 Summary statistics - acquired firm size

	Acquired Firm							Acquirer Firm						
	mean	N	sd	p25	p50	p75	p99	mean	N	sd	p25	p50	p75	p99
Small														
Employment	21.9	1174	11	13	18	29	49	586.1	1174	2360.4	34	83.5	300	6376
Net Sales	35757	868	654922	578.5	1485.3	6548	278849.2	191396.4	843	905485.8	4754.1	20122.6	84927.1	2067353
Productivity	11.43	868	1.9	10.26	11.18	12.74	15.97	12.13	868	1.67	11.09	12.23	13.16	16
Medium														
Employment	111.6	438	53.1	66	94.5	150	240	579.3	438	1142	57	184	578	6020
Net Sales	40577.2	354	246640.8	1600.6	3735.4	16254.5	565914.9	168321.8	347	568535.2	7827.5	27689.6	129270.5	2851126
Productivity	10.83	354	1.95	9.8	10.47	11.83	15.79	11.87	354	1.98	10.67	11.66	13.10	15.95
Large														
Employment	640.7	143	601.6	342	452	632	3784	1263	143	2572.4	136	500	1408	10179
Net Sales	96821.5	115	231690.5	5631.6	14275.8	67063.9	1181715	236427	115	401503.2	18638.6	76960.5	226815.9	1967039
Productivity	10.61	115	1.49	9.47	10.29	11.75	14.38	12.17	115	1.49	11	12.18	13.19	15.21

4. EMPIRICAL STRATEGY

Our principal focus is to investigate the causal influence of an exchange rate shock on the M&A activity at the industry level. To quantify the exposure to exchange rate shock, we distinguish between two distinct channels: import and export. To ascertain the level of exposure, we estimate the intensities of imports and exports at the NACE-2 two-digit level.

Prior research reveals that exchange rate movements tend to have a greater impact on firms engaged in international trade. Tao (2000) conducted an empirical investigation encompassing stock return data, as well as records of foreign sales and foreign assets, pertaining to 80 U.S. manufacturing companies during the period spanning from 1988 to 1993. The study provided evidence that a decline in the value of a currency leads to increased profitability for firms, with the extent of this effect being directly correlated to the proportion of foreign sales in relation to total sales. The magnitude and direction of the influence exerted by exchange rate shocks may vary depending on whether firms are oriented towards export or import activities. For instance, Nucci and Pozzolo (2010) discovered that Italian manufacturing firms exhibit contrasting employment patterns in response to exchange rate depreciation, with expansion or contraction contingent upon the level of exposure. Furthermore, these effects are more pronounced among firms characterized by a higher proportion of foreign sales in total revenue and a larger share of imported goods in total costs. This differentiation can be attributed not only to the foreign trade composition of individual firms but also to the overall industry composition. In fact, Dominguez and Tesar (2006) established a noteworthy association between the composition of international trade at the industry level and the level of exchange rate risk experienced by individual firms. Taken together, these studies offer substantial support for our conceptualization of exchange rate exposure, underscoring the validity of using import and export intensities as a reliable indicator for assessing the extent of the exposure.

Given that the shock occurred in 2018, we rely on the net sales, import and export

figures from 2017. To be precise, the import and export intensities are constructed as:

$$Exposure_i^m = \sum_j \frac{Import_{i,j,2017}}{NetSales_{i,j,2017}} \tag{4.1}$$

$$Exposure_i^x = \sum_j \frac{Export_{i,j,2017}}{NetSales_{i,j,2017}} \tag{4.2}$$

where we aggregate amount of export, import, and net sales of each firm j at the industry i level. Table A.1 in the appendix presents the import and export intensities of each sector based on the Nace Rev. 2 classifications.

Based on the nature and extent of their exposure to exchange rates, industries are likely to display diverse reactions to the shock. Our approach capitalizes on this heterogeneity, as we compare the pre- and post-2018 M&A ratios across industries with varying levels of import and export exposure.

The regression specification is as follows:

$$M\&A_{i,t} = \beta_1 Exposure_i^m \times Shock_t + \beta_2 Exposure_i^x \times Shock_t + \gamma_i + \delta_t + \upsilon_{i,t} \tag{4.3}$$

where $M\&A_{i,t}$ is the ratio of total number of mergers and acquisitions to the incumbent firms in industry i in year t, γ_i are industry level fixed effects, δ_t are year fixed effects. $Exposure_i^{import}$ and $Exposure_i^{export}$ are industry level exposure variables as defined in equation (4.1) and (4.2). $Shock_t$ is a dummy variable for 2018 exchange rate shock and takes a value of zero for pre-2018 and one for the years 2018 and 2019. The standard errors are clustered at industry level.

5. EMPIRICAL RESULTS

Table 5.1 presents the findings on the impact of exchange rate fluctuations on industry-level mergers and acquisitions (M&As) with varying degrees of exposure. Time and industry fixed effects are included in all regressions. The baseline results are displayed in Column 1, which incorporates all acquired firms in the sample. In Column 2, Equation 4.3 is estimated solely for small-sized acquired firms, and industries that do not exhibit M&A activity for such firms are excluded. Similarly, Column 3 and Column 4 detail the results for medium-sized and large acquired firms, respectively, utilizing the same approach. We also classify industries into three principal sectors, namely manufacturing, services, and other. Columns 5, 6, and 7 showcase the outcomes for these sectors, with Equation 4.3 once more being estimated within each sector. We do not balance the dataset on purpose since the number of observations we have is not large and we exploit industry-level variation, balancing the dataset costs too much of a variation and leads imprecise results.

Our findings suggest that when an exchange rate shock depreciating to the home currency hits, M&A ratio tends to decrease in sectors that are more exposed to shock through exports. We believe main mechanism behind this result is the created favorable environment for these sectors due to the trade channel. However, we see a statistically significant increase in M&A ratio in more import intensive sectors. Since devaluation of TL, increases the import costs, firms in more import-intensive sectors may face more intense competitive and profitability pressures. Moreover, the sum of β_1 and β_2 in Equation 4.3 gives us the total effect of trade balance for sectors. As the import exposure dominates the export exposure, we can infer that M&A ratio increases in sectors with larger trade deficits.

Column 3 reveals that the previously mentioned dynamics are more pronounced among small-sized firms. This can be attributed to the fact that such firms have limited hedging ability, less diversified business plans, and less robust financial structures compared to their larger counterparts, rendering them more vulnerable to exchange rate shocks. This assertion aligns with Dominguez and Tesar (2006) finding

of a strong correlation between firm size and exchange rate risk. One possible explanation for the absence of statistically significant findings regarding medium and large firm sizes could be attributed to their more enhanced access to bank credit compared to small-sized firms and/or greater capacity to protect themselves from adverse outcomes. Our analysis demonstrates statistically significant results for import exposure in the services sector and export exposure in the manufacturing sector. Nonetheless, our argument is seemingly contradicted by the observed increase in M&A ratio in manufacturing sectors that are more export-intensive. We, however, do not believe this poses a serious threat to our analysis, given that the result is only statistically significant at the 10 percent level and may be driven by the low number of observations we have. Nevertheless, there may be another underlying mechanism in the manufacturing sector in which M&A activity is shaped by the expectations of future profitability. For instance, if economic agents expect depreciation to persist in the future, and the shock is deemed permanent, the present undervaluation of firms in these sectors may prompt them to act accordingly. However, the obtained result for the manufacturing sector in this study is imprecise rather than supportive of either of the two potential mechanisms.

Table 5.1 The effect of exchange rate shock on industry level mergers and acquisitions

	Acquired Firms						
		Size			Sector		
	All Firms	Small	Medium	Large	Services	Manufacturing	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
post x export exposure	-0.0183**	-0.0234***	0.0023	0.0107	-0.0024	0.0121*	-0.0306
	(0.0085)	(0.0057)	(0.0027)	(0.0132)	(0.0312)	(0.0061)	(0.0296)
post x import exposure	0.0261***	0.0307***	0.0070	-0.0026	0.0308***	-0.0100	0.0162
	(0.0070)	(0.0026)	(0.0084)	(0.0024)	(0.0053)	(0.0067)	(0.0309)
Observations	270	248	132	54	160	87	23
R-squared	0.714	0.775	0.648	0.713	0.720	0.696	0.853
Year FE	+	+	+	+	+	+	+
Nace FE	+	+	+	+	+	+	+

6. POLICY IMPLICATIONS

In the event of an unexpected exchange rate shock, firms are impacted through their cost and profit channels. Under the new conditions, some firms may benefit from a favorable environment that enables them to increase their market share, enhance profitability, or lower input costs. However, others may face a bleak outlook that includes a scenario in which they eventually exit the economy because they fail to manage risks related to competition, input costs and sales.

In this context, it is crucial to inquire about the decisions made by individual firms following the occurrence of an economic shock. This significance stems from the possibility that, subsequent to the occurrence of a shock, proficient and highly value-added firms may choose to exit the economy while inefficient firms manage to sustain their engagement in economic activities. This particular scenario can be perceived as inefficient in the broader context of the economy. Consequently, when assessing the effects of an economic shock on mergers and acquisitions, it becomes imperative to examine the firms involved in M&A transactions from the perspective outlined above.

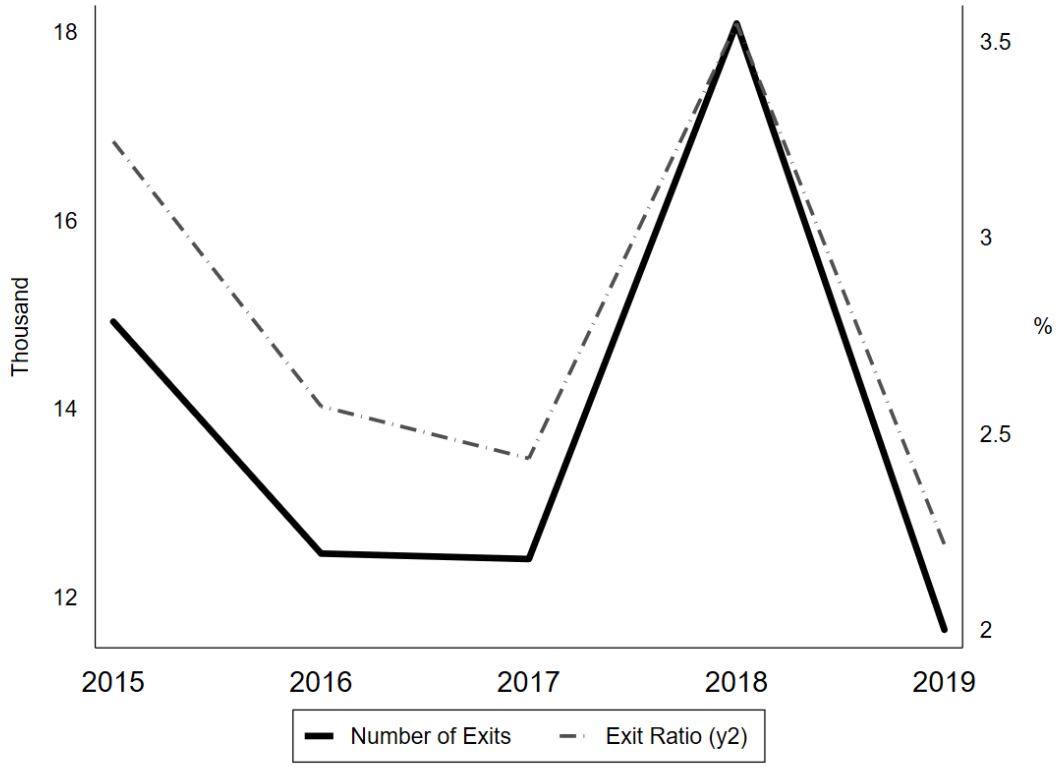
In the literature, it is common to encounter divergent findings regarding the success of mergers and acquisitions. Typically, this assessment is conducted through the examination of stock returns for publicly traded companies. In certain instances, the returns for the acquiring firm may exhibit slight positivity, insignificance or even negativity, despite observing positive returns for the acquired firm following the M&A. However, the analysis presented in this study will primarily focus on the survival of firms after the shock and subsequently evaluate the efficiency of these firms, rather than providing an assessment of the success of the M&A transaction.

6.1 Firm Survival

The study conducted by Karamollaoğlu and Yazgan (2014) specifically examine the correlation between exchange rate fluctuations and firm survival in Turkey during the period from 2002 to 2009. They utilize firm-level data pertaining to the manufacturing industry. The findings indicate that currency appreciation negatively affects the probability of firm survival. Additionally, it is observed that more productive firms exhibit higher probabilities of survival compared to less productive firms.

Although no previous studies have explored the impacts of the 2018 exchange rate shock on firm survival, it is worthwhile to present some descriptive statistics. To calculate the firm exit rate, we distinguish between entrant, incumbent, and exiter firms using balance sheet data at the firm-level. This distinction is necessary since the shock may result in fewer firms entering the economy, leading to an upward bias in the exit rate. To mitigate the impact of entry rate fluctuations on our analysis, we measure the exit rate by dividing the number of exiter firms by the number of incumbent firms. We exclude micro-sized firms to ensure consistency with our analysis of mergers and acquisitions. Figure 6.1 displays the exit rate from the formal economy. As illustrated in the figure, both the total number of exiter firms and their ratio to incumbent firms increased in 2018, mirroring the trend observed in the M&A changes over the years.

Figure 6.1 Firm exit rate in Turkey



6.2 Firm productivity

Our empirical findings indicate that both mergers and acquisitions (M&As) and exits from the economy increased in 2018, coinciding with a sharp depreciation of the Turkish lira. To further elaborate on this, we present Figure 6.2, which displays the labor productivity levels for acquired, acquirer, and exiter firms.

Figure 6.2 Labor productivity

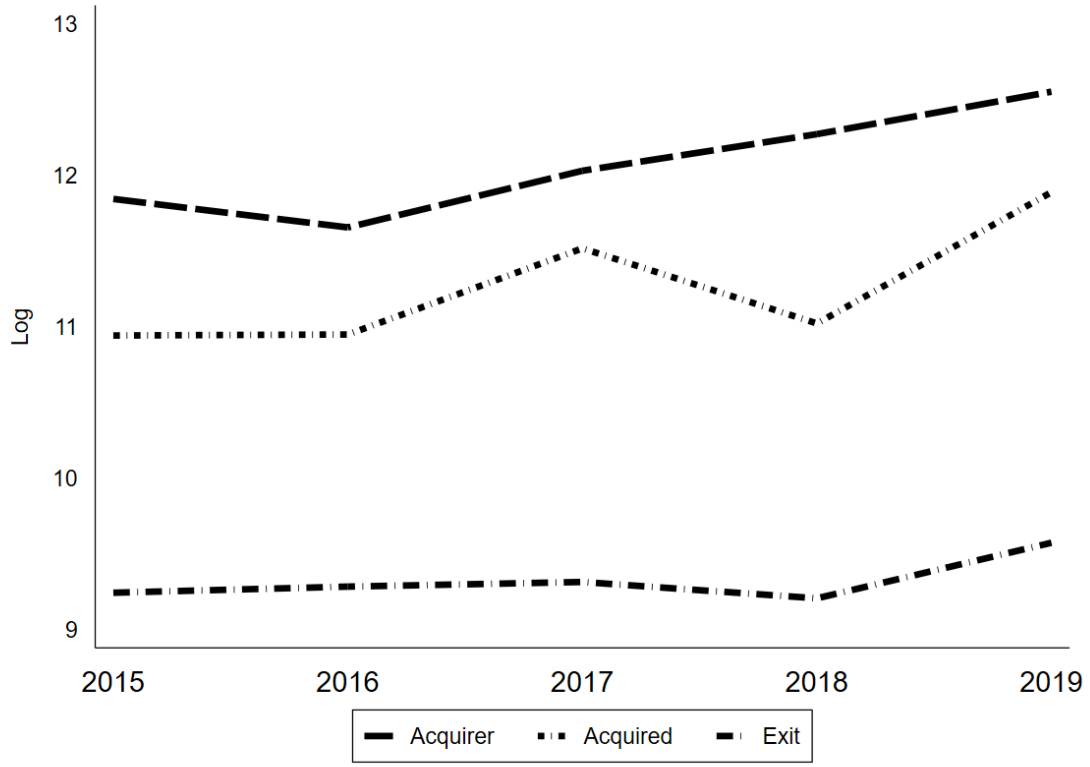


Figure 6.2 reveals that acquiring firms exhibit the highest level of labor productivity. It is noteworthy that the productivity of acquired firms surpasses that of firms exiting the economy. This observation suggests that acquiring firms may demonstrate a preference for acquiring or merging with high-productivity firms, or the acquired firms may possess superior strategies or business acumen compared to the exiting firms. However, apart from the internal dynamics and strategic decisions of the firms, it is crucial for efficient firms to sustain their operations instead of ceasing operations in response to an economic shock.

Hence, instead of allowing productive firms to exit the economy in response to exogenous shocks, it may be more efficient to facilitate M&As. Consequently, encouraging M&As and simplifying the operational requirements involved would yield benefits for all parties involved, as well as for the economy at large. Naturally, it is imperative to exercise restraint and take appropriate measures when sectoral competition may be impacted, and market conditions may be compromised. With regard to small-sized firms, mergers or acquisitions are unlikely to have an adverse effect on the level of competition in the market, except in high-tech sectors where the Turkish Competition Authority already imposes certain regulatory and oversight measures.

7. CONCLUSION

Drawing attention to the significant devaluation of the Turkish lira in 2018, this study utilizes micro-level data obtained from the Entrepreneur Information System (EIS) to examine the causal impact of exchange rate shocks on sector-specific merger and acquisition rates within Turkey. Distinguishing itself from prior research on M&A in Turkey, which typically focuses on publicly announced M&A transactions or uses data only on publicly listed firms, this study introduces a novel approach by harnessing detailed M&A information obtained from employee-employer matched dataset, following a similar methodology employed by Lougui and Broström (2021). Specifically, it investigates an unexplored research question concerning the repercussions of a depreciating economic shock on sectoral M&A activity. By employing employee-employer matched data, the study identifies 1755 M&A transactions occurring between the years 2015 and 2019, and proceeds to conduct an empirical analysis that capitalizes on the heterogeneity in sectoral exchange rate exposure. The findings of this investigation indicate that relatively more import-intensive sectors experienced an increase in M&A activity as a consequence of the 2018 shock, while relatively more export-intensive sectors exhibited a contrasting effect. Moreover, the impact was more pronounced among small firms employing between 10 and 49 employees. Conversely, no statistically significant outcomes were observed for other firm size categories. The mechanisms potentially driving these effects may lie within the domains of profit and cost channels. Following currency depreciation, costs may escalate for firms operating in import-oriented sectors, whereas profitability may rise for firms oriented towards exports. As discussed in the existing literature, through the pursuit of M&A strategies, firms effectively adapt to market changes, secure a competitive edge, and leverage strategic advantages that can contribute to their success. Through a descriptive analysis of the parties involved in M&A transactions, it is revealed that acquiring firms tend to possess a higher average employee count and demonstrate greater labor productivity. Additionally, the majority of M&A transactions involve small firms (with 10-49 employees) on the acquired side. In addition to these findings, the study briefly investigates firms that exited the economy in

2018, evaluating the labor productivity of acquired, acquirer, and exited firms. The results indicate that acquiring firms exhibit the highest productivity levels, while acquired firms display greater productivity on average compared to exiting firms. As a policy implication, it can be argued that M&A strategies enable the selection of efficient target firms or protect firms from being forced out of the economy. In light of these observations, it underscores the significance of examining the effects of M&A on overall welfare during periods of economic shocks, with a view to preventing the exit of efficient firms from the economy and implementing suitable policy provisions or regulations.

BIBLIOGRAPHY

Allayannis, George, and Eli Ofek. 2001. "Exchange Rate Exposure, Hedging, and the Use of Foreign Currency Derivatives." *Journal of International Money and Finance* 20: 273–296.

Arslan, Ismail, and Sweder Van Wijnbergen. 1993. "Export Incentives, Exchange Rate Policy and Export Growth in Turkey." *Review of Economics and Statistics* 75(1): 128–133.

Ayturk, Yusuf, Ali Osman Gurbuz, and Seda Yanik. 2016. "Corporate derivatives use and firm value: Evidence from Turkey." *Borsa Istanbul Review* 16(2): 108–120.

Baggs, Jennifer, Eugene Beaulieu, and Loretta Fung. 2009. "Firm Survival, Performance, and the Exchange Rate." *Canadian Journal of Economics* 42: 393–421.

Bartram, Sohnke M., Gregory W. Brown, and Bernadette A. Minton. 2010. "Resolving the exposure puzzle: The many facets of exchange rate exposure." *Journal of Financial Economics* 95(2): 148–173.

Bernard, Andrew B., and J. Bradford Jensen. 2004. "Entry, Expansion, and Intensity in the US Export Boom, 1987-1992." *Review of International Economics* 12(4): 662–675.

Buyukkara, Gokhan, Mehmet Baha Karan, Hasan Temiz, and Yildiray Yildiz. 2019. "Exchange Rate Risk and Corporate Hedging: Evidence from Turkey." *Emerging Markets Finance and Trade* 55(8): 1737–1753.

Dincer, Nergiz, and Magda Kandil. 2011. "The effects of exchange rate fluctuations on exports: a sectoral analysis for Turkey." *The Journal of International Trade and Economic Development* 20(6): 809–837.

Dominguez, Kathryn, and Linda Tesar. 2006. "Exchange rate exposure." *Journal of International Economics* 68: 188–218.

Erdogan, Aydın İlker. 2012. "The Determinants of Mergers and Acquisitions: Evidence from Turkey." *International Journal of Economics and Finance* 4: 72–7.

Gort, Michael. 1969. "An Economic Disturbance Theory of Mergers." *Quarterly Journal of Economics* 83(3): 624–642.

Hagelin, Niclas, and Bengt Pramborg. 2004. "Hedging foreign exchange exposure: Risk reduction from transaction and translation hedging." *Journal of International Financial Management amp; Accounting* 15: 1–20.

Harford, Jarrad. 2005. "What drives merger waves?" *Journal of Financial Economics* 77: 529–560.

Head, Keith, and John Ries. 1999. "Rationalization effects of tariff reductions." *Journal of International Economics* 47: 295–320.

Karamollaoğlu, Nazım, and M. Erdem Yazgan. 2014. "Firm Exit and Exchange Rates: An Examination with Turkish Firm-Level Data." *TÜSİAD Economic Research Forum Working Paper Series* (1411).

Lougui, Monia, and Anders Broström. 2021. "New firm formation in the wake of mergers and acquisitions: An exploration of push and pull factors." *Journal of Evolutionary Economics* 31: 65–89.

Mitchell, Mark, and J. Harold Mulherin. 1996. "The impact of industry shocks on takeover and restructuring activity." *Journal of Financial Economics* 41(2): 193–229.

Nucci, Francesco, and Alberto F. Pozzolo. 2010. "The Exchange Rate, Employment and Hours: What Firm-Level Data Say." *Journal of International Economics* 82(2): 112–123.

Shahrur, Husayn. 2005. "Industry Structure and Horizontal Takeovers: Analysis of Wealth Effects on Rivals, Suppliers, and Corporate Customers." *Journal of Financial Economics* 76: 61–98.

Snyder, Christopher M. 1996. "A dynamic theory of countervailing power." *Rand Journal of Economics* 27: 747–769.

Stigler, George J. 1964. "A theory of oligopoly." *The Journal of Political Economy* 72: 44–61.

Ucer, Suleyman. 2009. Determinants and characteristics of Mamp;As, and target firm performance: Evidence from Turkey PhD thesis Boğaziçi University.

APPENDIX A

In this appendix, I report sectoral distributions of M&A transactions and sectoral trade intensities that have been used to measure exchange rate exposure.

Figure A.1 Mergers and acquisitions: Sectoral distribution

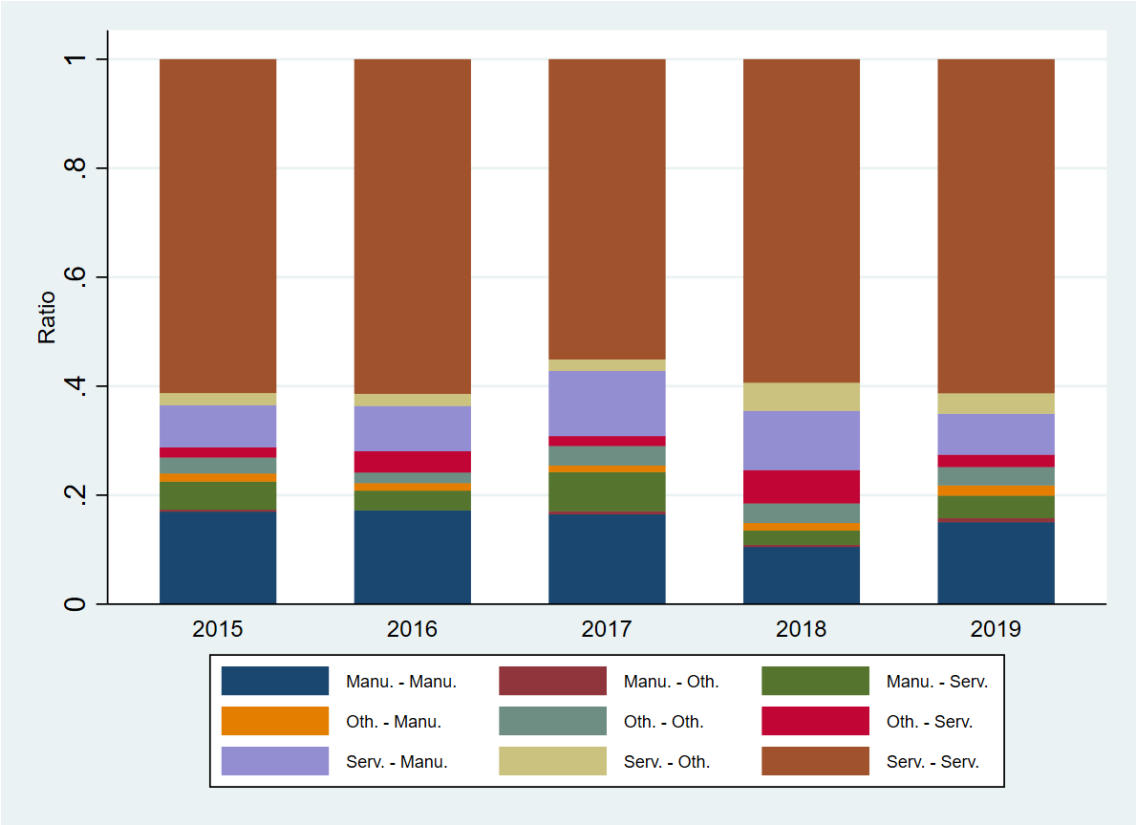


Table A.1 Sectoral import and export intensities

Nace Rev. 2 Classification Codes	Import Intensity (%)	Export Intensity (%)	Nace Rev. 2 Classification Codes	Import Intensity (%)	Export Intensity (%)
01	4.3	5.56	22	9.36	5.95
02	7	5.18	23	3.54	2.78
03	1.52	8.06	24	11.89	4.89
05	2.23	0.02	25	5.8	5.69
06	0.8	0.49	26	16.23	2.74
07	6.5	3.47	27	12.23	7.36
08	2.42	8.4	28	10.06	7.15
09	13.44	5.72	29	15.73	14.07
10	4.73	4.42	30	11.66	12.31
11	6.01	0.99	31	1.4	3.59
12	21.36	9.36	32	9.9	11.02
13	7.08	4.41	33	15.5	10.95
14	2.99	7.42	35	4.74	0.29
15	3.72	3.65	36	4.85	0.6
16	9.31	3.25	37	1.64	1.42
17	9.78	4.25	38	6.82	1.84
18	4.82	2.4	39	2.79	0.13
19	1.58	0.03	41	1.21	1.27
20	12.24	4.58	42	3.77	1.05
21	18.17	3.15	43	5.88	1.95

Nace Rev. 2 Classification Codes	Import Intensity (%)	Export Intensity (%)
45	14.03	2.38
46	6.9	5.31
47	5.17	1.28
49	0.65	0.96
50	5.23	2.25
51	8.18	4.67
52	1.55	0.78
53	0.54	0.4
55	0.87	0.44
56	1.51	2.54
58	3.76	0.21
59	0.75	0.74
60	0.04	0.01
61	1.44	0.08
63	1.49	0.23
68	3.64	0.5
69	0.57	0.26
70	3.09	2.36
71	6.87	2.59
72	7.26	1.3

Nace Rev. 2 Classification Codes	Import Intensity (%)	Export Intensity (%)
73	2.01	0.32
74	7.66	4.75
75	3.92	0.18
77	1.08	0.26
78	0.92	0.4
79	0.96	0.42
80	2.93	0.3
81	1.92	1.29
82	1.56	0.74
85	0.33	0.19
86	0.79	0.31
87	1.1	0
88	5.75	1.72
90	4.06	2.99
91	3.13	3.82
92	0.04	0.03
93	1.07	1.72
94	4.83	0.11
95	4.73	0.99
96	3.64	1.53