The Value of Offshore Secrets – Evidence from the Panama Papers

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Abstract

We use the data leak of the Panama Papers on April 3, 2016 to study whether and how the use of secret offshore vehicles affects firm value around the world. The data provide insights into the operations of more than 214,000 offshore vehicles incorporated in tax havens by Panama-based law firm Mossack Fonseca. We find that the data leak erases US$135 billion in market capitalization among 397 public firms that we trace as users of offshore vehicles exposed in the Panama Papers. Firm value declines only when offshore activities are previously secret. In addition, we show that the leak reduces the net benefits of using secret offshore vehicles to violate anti-bribery regulations and evade taxes. Taken together, firms use secret offshore vehicles for value-enhancing but potentially illegal activities that go beyond tax avoidance. Offshore intermediaries facilitate such activities.

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In considerable depth, prior research has analyzed how and why firms around the world use *observable* offshore vehicles to avoid taxes. In comparison, the use of *secret* offshore vehicles has undergone limited analysis. Anecdotally, corporations have used secret offshore structures to finance corruption and evade taxes. While such activities are by-and-large illegal and costly to society, they oftentimes provide valuable business opportunities. [1]

The goal of this paper is to provide large-scale evidence that firms use *secret* offshore vehicles to circumvent regulations—to the benefit of their shareholders. Providing such evidence is challenging because secret offshore activities are inherently unobservable. We tackle this observability problem by exploiting the largest offshore data leak to date in an event study.

On April 3, 2016, news sources around the world started reporting about a data leak of confidential documents concerning the business activities of Mossack Fonseca, a Panama-based law firm and provider of corporate services. These so-called Panama Papers comprise 11.5 million documents and provide insights into the operations of over 214,000 shell companies, incorporated in tax havens around the world over the past 45 years. In the wake of the data leak, thousands of news stories from over 100 media organizations with access to the Panama Papers data highlighted that the use of offshore vehicles goes well beyond tax avoidance.[2]

Judging from news stories following the Panama Papers data leak, the most popular uses of secret offshore vehicles among publicly traded firms are the financing of corruption as well as

[1] Corruption, for instance, is estimated to cost $2.6 trillion or 5% of global GDP per year (2001-2002 survey data, World Bank Institute) and reduces investment and growth (Mauro 1995). Note though that corruption can also grease the wheels, e.g. when used to circumvent high tariffs (Dutt and Traca 2010). Shleifer and Vishny (1993), Bardhan (1997), and Svensson (2005) provide reviews of the corruption literature. On the firm side, bribe payments have been shown to create shareholder value (e.g., Cheung, Rau, and Stouraitis 2012, Karpoff, Lee, and Martin 2015, and Zeume 2016).

[2] See, e.g., 'The Panama Papers: how the world's rich and famous hide their money offshore', April 3, 2016, The Guardian (retrieved April 14, 2016). The term "Panama Papers" appeared in 1,972 global news stories on April 3, in 9,967 global news stories on April 4, and in 8,856 global news stories on April 5 (Factiva).

tax evasion.[3] Two examples illustrate this: Siemens, a German conglomerate, used offshore vehicles, some of them operated by Mossack Fonesca, to run slush accounts that were used to bribe government officials in South and Latin America. Saipem, an Italian energy firm, used shell companies incorporated by Mossack Fonseca to tunnel $275mn in bribes to win more than $10bn in contracts to build oil and gas pipelines in North Africa.[4] Besides these cases of violations of anti-bribery regulations, the leaked data have prompted a surge in tax evasion investigations.[5]

In theory, the unexpected data leak might negatively affect firm value if it reduces future benefits from bribe payments or tax evasion. Similarly, the leak might be associated with costly regulatory fines for past violations of anti-bribery regulations or tax evasion. Lastly, firm value could also decrease if firms experienced reputational losses from the data leak. However, the leak might also increase firm value. For instance, if offshore structures were used to tunnel resources out of the firm at the expense of shareholders, the transparency brought about by the leak might reduce such costly activities (e.g., Desai, Dyck, and Zingales 2007).

We base our empirical analysis on a unique database of publicly traded firms that we connect to the Panama Papers. Specifically, starting with 23,540 publicly traded firms from 73 countries, with a total of 530,393 subsidiaries across 211 sovereign and non-sovereign territories, we match subsidiaries, directors, and directors of subsidiaries of public firms to the leaked data.

[3] Outside the scope of our paper, the Panama Papers also contain data on the use of offshore vehicles by individuals and legal entities other than publicly traded firms (such as private firms and governing bodies). Additional uses by these other parties include fraud, evasion of sanctions, and money laundering.

[4] Details about Siemens are reported by Sueddeutsche Zeitung (see e.g. panamapapers.sueddeutsche.de/articles/570e7bb4a1bb8d3c3495bb08), details about Saipem are reported by ICIJ (see e.g. panamapapers.icij.org/20160725-natural-resource-africa-offshore.html). Other prominent examples include BP (The Guardian, theguardian.com/news/2016/may/10/bp-hired-firm-linked-to-bribery-scandal-panama-papers-reveal) and Alcoa (CBC, cbc.ca/news/business/panama-papers-victor-dahdaleh-alcoa-bribery-case-1.3598527).

[5] Multiple authorities have launched civil and criminal tax evasion investigations in relation to the leaked data. As of October 2016, authorities include those in the U.S., Australia, Canada, Denmark, France, Germany, India, Israel, Malta, Norway, Pakistan, Singapore, Spain, Sri Lanka, Sweden, and Thailand.

Our matching process, which we describe in detail below, succeeds in tracing 397 public firms as users of offshore vehicles incorporated by Mossack Fonseca. These firms are spread across the globe and operate in a wide range of industries. The firms tend to be large, have more international operations and are more exposed to perceptively corrupt countries, particularly to countries where high-ranked government officials were implicated by name in the leaked data.

Our empirical analysis shows that firms connected to the Panama Papers experience significantly negative returns around event dates associated with the data leak. In economic terms, the data leak wiped out a total of US$135 billion in market capitalization among firms with exposure to the revelations of the Panama Papers.[6] This reflects a drop in firm value of 0.7 percent relative to same-country and same-industry firms without such exposure. Our results are robust to alternative event windows, alternative risk adjustments, and to matched sample analysis.

Most but not all offshore activities that came to light through the Panama Papers are unobservable prior to the leak. We therefore investigate whether our main effect—the drop in value of firms with exposure to the Panama Papers—is driven by previously observable or secret offshore activities. We find that firms are adversely affected only when their offshore activities are likely to have been entirely secret prior to the leak; firms whose offshore activities were likely observable are not significantly affected. We also show that our effect is distinct from a negative market reaction around the data leak for firms that have tax haven subsidiaries. Taken together, these results indicate that the negative market response for firms with exposure to the Panama Papers stems at least in part from the revelation of firms' use of secret offshore vehicles.

[6] For this calculation, we multiply each firm's market valuation at the end of 2015 by its cumulative abnormal return during our event windows. We obtain quantitatively similar results when we instead multiply firms' market value at the end of 2015 by the average percentage drop in firm value net of country and industry fixed effects.

We further assess whether the negative market impact is more pronounced among firms for whom stronger enforcement in response to their exposed offshore activities is plausibly expected. We expect particularly strong impact on firms that are subject to U.S. enforcement, and find indeed that the negative market reaction is larger for offshore vehicle users that are U.S.-based, non U.S.-based but have U.S. subsidiaries, and non U.S.-based but have sponsored ADRs outstanding. All three characteristics expose firms to potential U.S. enforcement actions.

Next, we explore the causes of the negative market response. First, we consider the corruption channel previously described. Firms may use secret offshore vehicles to finance bribe payments in order to win contracts tendered by corruptible government agents, and thereby create firm value (Beck and Maher 1986, 1989). The revelations of the leak may result in regulatory fines for past violations of anti-bribery regulation, and the increased threat of discovery of secret offshore vehicles may encourage corporations to stop using secret vehicles for the purpose of paying bribes. We find that firms exposed to the data leak are more negatively affected when they are also exposed to perceptively corrupt countries, and to countries where country leaders are identified as users of secret offshore vehicles in the leaked data. For instance, around the data leak, firms with exposure to the leaked data and with a subsidiary in one of ten countries where country leaders were implicated by name are 0.9% more negatively affected than other firms with exposure to the leaked data. This effect is similar in magnitude among firms exposed to the most perceptively corrupt countries.

Second, we examine the potential role of taxes. Tax aggressive firms may use secret offshore vehicles to evade taxes, and thereby create firm value. The revelations of the data leak may lead to regulatory punishment for past tax-related actions as well as discourage future aggressive use of offshore vehicles. We measure tax aggressiveness by the difference between

statutory and effective tax rates. Due to the breadth of our sample—over 23,000 firms headquartered in 73 countries—this metric is necessarily general, and likely to capture both tax avoidance and tax evasion. The surge in tax evasion investigations in relation to the leaked data mentioned earlier is suggestive evidence that the leaked data reveals instances of tax evasion rather than merely instances of legal tax avoidance.[7] We find that tax aggressive firms connected to the Panama Papers are significantly more negatively affected by the leak. These results complement a large and growing literature in accounting and finance that has focused on the use of tax havens to circumvent tax regulation.[8]

Third, we consider whether firms incur reputational losses due to the data leak. Given the intense news coverage the leak received, revealing a firm's use of secret offshore vehicles for illegal or at least perceptively unethical purposes might create reputational losses—more so for firms with good reputation. We measure firm reputation using a range of corporate social responsibility ratings, and find evidence that high reputation firms are significantly more negatively affected when implicated by the leaked data. Thus, investors appear to price reputational losses due to the data leak. In economic terms, for firms exposed by the Panama Papers, a one standard deviation increase in reputation is associated with losing 1% more in firm value.

Taken together, our preferred interpretation of the drop in firm value of implicated firms is that activities such as bribery and tax evasion create shareholder value prior to the Panama Papers data leak. The revelations of the Panama Papers destroy some of that value, and also result in

[7] We use the term tax evasion broadly, to include the whole spectrum of actions aimed at reducing taxes, ranging from less aggressive and more likely legal tax avoidance to more aggressive and more likely illegal tax evasion. As Hanlon and Heitzman (2010) note, the degree of legality of tax transactions is often determined after the fact.

[8] See, for instance, Graham and Tucker (2006) on the use of tax shelters as a substitute for debt and Desai, Foley, and Hines (2004) on economic effects of tax havens. Despite their use for tax avoidance, tax havens are costly when managers use excessive cash parked in tax havens to finance inefficient acquisitions (Hanlon, Lester, and Verdi 2015).

reputational losses. As previously stated, the sources of value destruction could be two-fold: expected future cash flows from financing corruption and tax evasion may be lower, or regulatory fines may result from such activities in the past. While we cannot distinguish these two empirically, the average firm loses $340mn in value ($135bn/397 firms), which by magnitude seems unlikely to be explained purely by fines.[9]

We consider three alternative interpretations for the negative market response by firms with exposure to the Panama Papers. First, offshore structures may have been used not in the interest of shareholders but to tunnel resources out of the firm. Consistent with this, a small number of news stories have reported cases where Mossack Fonesca vehicles were used for tunneling. However, if the leak primarily uncovers and reduces such value destroying activity, on net firms exposed to the leak should be positively affected, counter to our finding.

Second, the firms we identify as users of offshore vehicles run by Mossack Fonseca may be fundamentally different from other firms, and may experience negative returns for reasons unrelated to the leaked data. Consistent with this argument, firms exposed to the Panama Papers are larger and more likely to have activities in more corrupt countries. Yet we find that all of our results are robust to matching firms on observable characteristics.

A final alternative interpretation is that, following the data leak, firms' exposure to tax havens as a risk factor becomes more salient for outside investors. Thus, investors may apply a larger premium for exposure to tax havens in general, rather than discount firms' specific use of secret offshore vehicles. While we find support for an offshore discount following the leak, this

[9] The leak might alternatively increase firms' discount rate if, subsequent to the leak, firms' cash flows co-move more with the market. If offshore vehicles facilitate tax evasion and the leak reduces tax evasion activities, this is unlikely since a reduction in tax evasion likely reduces cash flows in good times and has no effect on cash flows in bad times. Consistent with this, we do not find evidence of significant changes in equity betas before and after the leak for firms with Panama Papers exposure.

effect is separate from our baseline results: Firms that have publicly observable subsidiaries in the Mossack Fonseca tax havens but do *not* use secret offshore vehicles, are less adversely affected than firms that are directly implicated by the leaked data.

Our estimate of the economic magnitude of the effect of secret offshore activities on firm value is likely conservative. The market reaction we observe is a net effect, as the leak may have positive implications for governance and transparency at least for some firms. Moreover, firms can circumvent the leak's implications by switching to other offshore service providers or constructing ever more elaborate legal structures.

Methodologically, our paper builds off a fast-growing literature that uses shocks to the transparency of tax haven activities to understand the use of offshore subsidiaries and their impact on firm value. The passage of TIEAs—which allow tax authorities to exchange information relevant in tax investigations—has been used to document that tax havens are used for round-trip tax evasion (Hanlon, Maydew and Thornock 2015) and that corporations use tax haven subsidiaries to expropriate minority shareholders (Bennedsen and Zeume 2016).[10]

Taken together, the contribution of this paper lies in providing novel large-scale evidence on the use of secret offshore vehicles. Our paper also highlights the role played by offshore intermediaries—such as Mossack Fonseca—in facilitating illegal activities. The vast market for offshore intermediation and firms' willingness to pay for intermediaries' services may be explained by the finding that such activities create shareholder value when undetected.

[10] Relatedly, Johannesen and Zucman (2014) show that bank deposits respond to the passage of TIEAs, while Slemrod (1985) considers individual tax evasion.

1. The Panama Papers Data Leak, Methodology, and Data

1.1 The Panama Papers Data Leak

On Sunday, April 3, 2016, news sources around the world started reporting about a data leak of confidential documents concerning the business activities of Mossack Fonseca, a Panama-based law firm and provider of corporate services. Among the earliest news stories were those concerning specific firms, country leaders, and other individuals. The leaked data overall comprised an unprecedented 2.6 terabytes of data, or 11.5 million confidential documents. The documents provided insights into the uses of more than 214,000 shell companies in tax havens around the world over the past 45 years. Of the 214,000 companies that appear in Mossack Fonseca's files, 90 percent were incorporated in just four tax havens - the British Virgin Islands (BVI) (114,000 firms), Panama (48,000), the Bahamas (16,000), and the Seychelles (15,000). The remaining firms were incorporated in Niue (9,600), Samoa (5,300), British Anguilla (3,200), Nevada (1,300), Hong Kong (450), the U.K. (150), and a few other countries.

Figure 1 presents the time line of the leak. Following April 3, we identify two additional dates relevant for our analysis, and we describe each in turn. On Tuesday, April 26, the International Consortium of Investigative Journalists (ICIJ) announced that a searchable database of the leaked data would be made public. On Monday, May 9, 2016, this searchable database was made available through ICIJ's website. The database contains information on all entities incorporated by Mossack Fonseca, as well as relationship information between entities, and individuals such as shareholders and directors attached to the entities. As we explain in detail below, we use these data to trace how specific companies and individuals are connected to entities, individuals, and intermediaries in the leaked Mossack Fonseca files, and thus uncover users of offshore vehicles around the world.

1.2 Methodology

One approach to studying the value created by corporate offshore activities is to collect data from reports about detected tax haven activity. However, there are few detected cases and firms implicated by such cases may differ from firms whose secret offshore activities remain undetected along dimensions that correlate with the value they create. To alleviate these concerns, we employ event study techniques to study the market response of firms connected to the Panama Paper data leak around the announcement of the leak.

In the first part of the analysis, we analyze the market response of firms exposed to the data leak around dates relevant to the data leak. Specifically, we run the following regression:

$$CAR_i = \alpha + \beta_1 PanamaPapersExposure_i + \gamma' \mathbf{X_i} + \varepsilon_i, \qquad (1)$$

where CAR_i denotes the cumulative return of firm *i* around event days relevant to the revelation of the Mossack Fonseca documents, $PanamaPapersExposure_i$ indicates whether (1) or not (0) our data identify firms as users of offshore vehicles exposed in the Panama Papers, and $\mathbf{X_i}$ is a vector of controls measured before April 2016, including country and industry fixed effects. The coefficient of interest $ß_1$ captures whether exposure to the leaked documents impacts firm value.

In the second part of the analysis, we augment equation (1) by firm characteristics in order to test whether certain types of activities are priced. We run the following regression:

$$CAR_i = \alpha + \beta_1 PanamaPapersExposure_i + \beta_2 FC_i + \beta_3 PanamaPapersExposure_i \times FC_i + \gamma' \mathbf{X_i} + \varepsilon_i, \qquad (2)$$

where FC_i is a firm characteristic of interest measured before April 2016. Of particular interest is $ß_3$, which indicates whether firms exposed to the leak are differentially affected when they have

specific characteristics. Equations (1) and (2) use two-way clusters (country and industry).[11]

1.3 Data and Variable Construction

Our sample combines data from several sources. We trace connections to the Panama Papers data leak using the data made available by the ICIJ, as well as from subsidiary and director data of all publicly listed firms in Bureau van Dijk's Orbis database as of 2015. Accounting and market data are obtained from Datastream/Worldscope and Orbis. Appendix 1 provides a complete list of variable definitions.

1.3.1 Exposure to the Panama Papers

The data contained in the leak of the Panama Papers are unique with respect to the opportunity they provide to identify users of secret offshore vehicles. We make use of multiple relational data sets made available by the ICIJ on 9th May 2016, in particular, an "entities" data set containing information on companies, trusts, or funds created in offshore jurisdictions by Mossack Fonseca, an "officers" data set, with data on individuals who play a role in the aforementioned entities, and an "intermediaries" data set, with data on middlemen, such as law firms or accountants, who facilitate the creation and operation of offshore entities for their clients. Using Orbis data, we connect these three ICIJ data sets to publicly listed firms in three ways: to a public firm's subsidiaries, to a public firm's directors, and to the directors of a public firm's subsidiaries.

[11] We consider alternative clustering dimensions and obtained similar results. Generally, two-way clustering produces the most conservative standard errors.

We use fuzzy string matching algorithms to match the names of directors and subsidiaries in the (publicly available) Orbis database to potentially corresponding data in the three Mossack Fonseca data bases. We restrict the algorithms in requiring that names in Orbis and in the leaked data are associated with the same headquarter/home country, while allowing for minor variations in the spelling of names across data sources.[12] Specifically, we proceed in two steps, dealing with Orbis subsidiary names and Orbis officer names separately. First, we match the Orbis subsidiaries of publicly listed firms to the Mossack Fonseca data using the subsidiary name and location. Second, we match directors of publicly listed firms from Orbis to the Mossack Fonseca data using the director name and country as identifying information. We repeat the matching of director names for directors of subsidiaries of publicly listed firms. After limiting ourselves to data with available address information, this match starts out with 212,845 entities, 144,791 officers, and 12,599 intermediaries from ICIJ's databases and on 913,819 subsidiaries as well as 1,879,048 directors from Orbis.

Next, we aggregate any matches between publicly available data and the leaked data at the firm level to obtain our first key variable of interest. *Has Panama Papers Exposure* indicates whether (1) or not (0) *any* entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm, a director of a firm, or a director of a firm's subsidiary. In additional tests, we disaggregate *Has Panama Papers Exposure* into *Exposure of Observable Activities* and *Exposure of Secret Activities*. The former requires being connected to an entity listed in the leaked Mossack Fonseca documents; such links are potentially observable because Orbis will associate them with a tax haven headquarter or home country. The latter

[12] To illustrate two such fuzzy algorithm matches, we associate the firm "Sun Hung Kai Properties limited" (Orbis) with "Sun Hungkai Properties limited" (Mossack Fonseca), based in China in both data sets, and officer "Christina Drousiotou" (Orbis) with " Christina Droussiotou" (Mossack Fonseca), based in Cyprus in both data sets.

measure, *Exposure of Secret Activities*, requires being connected to an intermediary or person in the leaked data.

To ensure that we do not falsely classify firms as being connected to the leaked documents, we verify matches manually. The number of implicated firms captured by our match is likely a conservative estimate of the true number of implicated firms due to different spelling and naming conventions in the ICIJ and Orbis databases. As far as firms not identified due to different naming conventions are not substantially different from firms identified by our matching strategy, this likely biases our analysis against finding an effect because firms that are exposed by the Panama Papers but unidentified by us will form part of the control group.[13]

1.3.2 Measures of firm value

We measure the impact of the data leak on firm value using daily returns for [-1;3] event windows around the three event days of the leak. For Sunday, April 3, a non-trading day, we move the event date to the next trading day, Monday, April 4. We obtain daily stock prices from Datastream and apply standard data filters of dropping penny stocks (prices below US$0.10), stocks not actively traded (no price changes between March 31, 2016 and April 6, 2016), and firms with assets below US$5mn. We winsorize returns at the 1 and 99 percentiles to remove outliers. Besides using raw returns, we calculate 1-factor alphas, i.e. stock returns in excess of market returns after controlling for firms' exposure to the market index. Alphas are obtained from a 1-

[13] Some countries, such as South Korea, are underpresented among users of offshore vehicles. To alleviate the concern that our algorithms may fail to detect matches in specific geographies, for example due to inconsistent transcription of non-ASCII characters, we confirm that such countries are not only underrepresented among matches between publicly available data and leaked data, but are also underrepresented in the leaked data themsleves. This suggests that firms from such countries did not use Mossack Fonseca services in the first place (but might use other non-compromised secret intermediaries). To illustrate, for South Korea we find only 181 instances of South Korean connections in the leaked data, compared to 1,681 publicly listed firms, none of which overlap. In comparison, for the U.K. we find 15,900 instances of connections in the leaked data, compared to 1,079 publicly listed U.K. firms, of which 124 firms overlap as users of Mossack Fonseca offshore vehicles.

factor model estimated over March 4, 2015 to March 3, 2016. We require stocks to have at least 100 non-missing return observations during that period. Local market indices and risk-free rates are not available for all of the 73 countries in our sample. We therefore obtain stock prices in USD and use the U.S. market index (CRSP Value-Weighted Return) and U.S. T-Bill as market index and risk-free rate, respectively. Our results are robust to using local indices and local risk-free rates where available.

1.3.3 Other Firm Characteristics

Finally, we construct several variables to capture firms' exposure to corruption and their tax aggressiveness. All variables are measured before April 2016 to ensure that they are not affected by the Panama Papers data leak.

Has Political 1St Layer Exposure is a Dummy variable equal to one if a firm has at least one subsidiary in any of the countries where country leaders were implicated by name in the Panama Papers. We use subsidiary data from Orbis (2015) and news stories from early April 2016 to identify these countries: Argentina, Georgia, Iceland, Iraq, Jordan, Qatar, Saudi Arabia, Sudan, the United Arab Emirates, and the Ukraine. Initial news stories focused primarily on the use of offshore vehicles by government leaders in these 10 countries. As of 21 April 2016, the list of potentially implicated individuals had grown to include politicians and other individuals from at least 40 countries, with many further additions since then.[14]

To capture the idea that politicians from many more countries were likely to be implicated by the leak and that politicians from countries perceived to be more corrupt are more likely

[14] Additional countries include Armenia, Australia, Azerbaijan, Bangladesh, Brazil, Canada, Chile, China, Colombia, Cyprus, Egypt, France, Hong Kong, India, Indonesia, Israel, Italy, Malta, Mexico, New Zealand, Norway, Pakistan, Russia, Singapore, Spain, Sweden, Switzerland, Thailand, Tunisia, the U.K., and the U.S.

implicated, we construct *Corruption Exposure*, a dummy variable that is equal to one if a firm is exposed to the most perceptively corrupt tercile of countries using Transparency International's Corruption Perception Index.

Tax Aggressiveness is the statutory tax rate at the country level less a firm's effective tax rate where the effective tax rate is defined as tax expense over EBIT. A variation of this measure sets *Tax Aggressiveness* to zero when the value would otherwise be negative, e.g. because a firm received a tax credit or paid more taxes than justified by the statutory tax rate. As noted in the introduction, this metric is necessarily general, and likely to capture both tax avoidance and tax evasion. The measure on its own may capture country- or industry-level tax law particularities. We alleviate such concerns by controlling for country and industry fixed effects.

Further variables of interest include firms size (total assets), the number of domestic and foreign subsidiaries of each firm, as well data on ADRs from BNY Mellon and measures of firm reputation, which we proxy using corporate social responsibility metrics from the Bloomberg ESG database. Appendix 1 provides detailed variable definitions.

2. Descriptive statistics

Table 1 provides summary statistics for firms with and without exposure to the Panama Papers data leak. Panel A of Table 1 shows the number of firms connected to the leak by entity, person, or intermediary. 397 firms, or 1.7% of our sample, are connected to the Panama Papers data leak in some way.

-- -- Table 1 about here -- --

We then further disaggregate this connection measure. 89 firms (0.4% of the sample) are

connected through the entities datae, 296 firms (1.3% of the sample) are connected through the data on individuals, and 86 firms (0.4%) are connected through the data on intermediaries. Some firms are exposed to the leaked data through a combination of these individual files.

Panel B of Table 1 shows a breakdown by country of firms exposed to the Panama Papers, with countries sorted in declining order by fraction of firms exposed. There is substantial variation across countries, with Hong Kong (almost one in four firms) and the U.K. (one in nine firms) leading the table; the U.S ranks around the middle, with roughly 2 percent of firms using offshore vehicles through Mossack Fonseca. Among large economies, we do not find any exposure to the leak in Brazil and South Korea, and only a single firm in Japan. We selectively double-check our name matching procedure to ensure that this is not driven by different spelling conventions across data sets. Even though we cannot rule out that we miss connections of some firms to the leaked data, such bias will only work against finding results.[15] Additionally, some of the countries for which no firms have any Panama Papers exposure by our measure show up very rarely in the Mossack Fonseca documents. This suggests that firms from these countries rarely used Mossack Fonseca.

Appendix 2 additionally shows results by Fama-French industry. The use of offshore vehicles is particularly pervasive in Trading, Mining, Restaurants and Hotels, Aircraft Manufacturing, and Real Estate, yet the use of offshore vehicles extends across virtually all

[15] Note that even the leaked internal data of Mossack Fonseca, that are virtually perfectly suited for identifying the true owners and uses of secret offshore vehicles, do not always allow identifing ultimate beneficial owners. For example, offshore vehicles can use nominee *directors*, i.e. individuals that stand in for the true owners but exercise no real power over the firm since they have separately pre-agreed to act upon instruction of another party, and nominee *shareholders*, i.e. individuals or companies that stand in for the true shareholders but have no real power, since they have separately pre-agreed to transfer ownership to another party. A package of nominee directors and nominee shareholders, combined with a third party, such as a private bank, handling all interactions with Mossack Fonseca, may hide the identity of the beneficial owner even from Mossack Fonseca itself, and therefore never appear in its internal data.

industries. Only five out of the 47 populated Fama-French industries in our sample are free of offshore vehicle users in the leaked data.

In Table 2, we examine the characteristics of firms with and without a link to the Panama Papers data leak. Firms connected to the data leak have more subsidiaries, and more of these are foreign subsidiaries, both in absolute and relative terms. Consistent with this, firms connected to the leak are also substantially larger; total assets average $91.6 billion, compared to $5.4 billion for firms without a connection.[16] We control for size throughout our analysis and also repeat our analysis using matched samples.[17]

-- -- Table 2 about here -- --

Firms connected to the leak are also more exposed to perceptively corrupt countries on average and are more likely to have subsidiaries in countries whose politicians were implicated by the data leak. Moreover, while not different in terms of tax aggressiveness, such firms are more likely to be cross-listed and have better corporate social responsibility performance on average.

3. Market Response to the Panama Papers Data Leak

In this section, we analyze the market response to the Panama Paper data leak. We measure firm value by cumulative raw and abnormal returns around the three event dates described in Section 1.1.

[16] A smilar picture emerges when we consider market cap; prior to the leak, firms with exposure to the Panama Papers data leak have a market value of $15.5bn on average, while firms without such exposure have a market value of $2.1bn on average. Market value averages are smaller than total assets since the sample contains financial firms.
[17] The results of this univariate split are confirmed when we run multivariate probit regressions in which we control for industry fixed effects, country fixed effects, and size.

3.1 Firms Connected to the Panama Papers Data Leak

Table 3 shows regressions of our dependent variables on firms' exposure to the Panama papers and controls. The dependent variables are *Cumulative raw returns* and *Cumulative abnormal returns* around three event dates, shown in Figure 1. The control variable of interest is *Has Panama Papers Exposure,* a dummy variable equal to one if a firm is connected to the data leak. All specifications include country and industry (Fama-French 49) fixed effects.

--- Table 3 about here ---

Our analysis reveals that firms connected to the Panama Papers data leak have negative cumulative raw returns during the event window. Raw returns are 1.6 percent lower for such firms than for same-country, same-industry firms without a connection to the data leak (Column (1)). Firms with Panama Papers exposure are larger and size may be priced significantly during the event period for other reasons. Controlling for size reduces the coefficient to 1.0 percent, but does not affect statistical significance (Column (2)).

Further, firms with Panama Papers exposure tend to have higher market risk, and high-beta firms may have lower returns during the event period for other reasons. We therefore use *Cumulative abnormal returns* (alphas) as our dependent variable in Columns (3) and (4), and continue to find that firms with exposure to the leaked data are significantly negatively affected. The economic magnitude is reduced to 0.8 and 0.7 percent, respectively, and we conservatively treat the lowest estimate of abnormal performance, 0.7 percent, as our baseline estimate.

Overall, these results indicate that firms connected to Mossack Fonseca were adversely affected by the revelations of the Panama Papers. Next, we discuss a range of extensions and robustness tests.

3.2 Secret and Observable Offshore Activities

Most but not all offshore activities that came to light through the revelations of the Panama Papers were unobservable prior to the leak. We therefore further investigate whether our main effect—the drop in value of firms with exposure to the Panama Papers—is driven by observable or secret offshore activities.

For these tests, reported in Table 4, we distinguish how firms are connected to offshore vehicles. We capture whether the offshore activities revealed by the leak are likely to have been entirely secret prior to the leak, or whether outside investors plausibly could have infered the existence of these activities from data that is publicily available *prior* to the leak. Specifically, we distinguish between firms linked only to the ICIJ entity or intermediary data base (*Exposure of Secret Activities*), firms linked only to the ICIJ entity data base (*Exposure of Observable Activities*), and firms linked to both (*Both Types of Exposure*).

--- Table 4 about here ---

As the results show, the value loss is driven by the revelation of previously secret activities. Using the full specification, firms whose previously secret activities are revealed by the leak lose 0.9% in firm value, while previously observable activities do not contribute (Column (4)).

3.3 Exposure to Tax Havens

Around the data leak, exposure to tax havens as a risk factor may have become more salient for outside investors. Thus, firms with any exposure to tax havens may be adversely affected around the leak because investors factor in a larger premium for offshore risk. In Table 5, we show that while there is such a general negative market reaction by firms with tax haven exposure, the negative market impact on firms with Panama Papers exposure is statistically and economically distinct from this general market reaction.

--- Table 5 about here ---

Specifically, we create four portfolios among our 23,540 sample firms: (i) firms with Panama Papers exposure but no actual subsidiaries in any of the TOP4 Tax Havens most frequenly used by Mossack Fonseca (Panama, British Virgin Islands, Bahamas, Seychelles), (ii) firms that have such TOP4 Tax Haven subsaridies but no exposure to the Panama Papers, (iii) firms that have both TOP4 Tax Haven subsidiaries and exposure to the Panama Papers, and (iv) the vast majority of firms that have neither. All coefficients have negative signs, but only the Panama Papers exposure coefficient is statistically significant. The coefficient for firms with Panama Papers Exposure and TOP4 Tax Haven Exposure is larger but not statistically significant. Overall, this is consistent with investors discounting tax haven exposure around the leak, specifically exposure to tax havens heavily used by the firm at the center of the leak, but discounting firms with exposure to the specific revelations by the data leak even more.

3.4 Enforcement

We next examine a setting where the negative market impact of exposure to the Panama Papers is plausibly enhanced in our sample. We expect a particularly strong negative impact on

firms with characteristics that subject them to U.S. laws and institutions, particularly the far-reaching investor protection laws, such as the Foreign Corrupt Practices Act and the Sarbanes Oxley Act.

In Table 6, we interact firms' Panama Papers exposure with three firm characteristics that expose firms to potential U.S. enforcement actions: whether firms are cross-listed in the U.S., whether firms have U.S. subsidiaries, and whether firms are U.S.-based. For cross-listings, which subject firms to U.S. regulation (see Coffee 1999, 2002, Stulz 1999, and related evidence e.g. by Doidge 2004, Doidge, Karolyi and Stulz 2004, 2010, and Lel and Miller 2008), we further split ADRs into those that are unsponsored and hence subject to less stringent regulatory requirements on average and those that are sponsored and hence subject to more stringent requirements.

--- Table 6 about here ---

As the results show, the negative market reaction is larger for offshore vehicle users that are cross-listed with sponsored ADRs, that have U.S. subsidiaries, and that are themselves U.S. based, while there is no incremental effect for firms with unsponsored ADRs.[18] Investors therefore discount firms with Panama Papers exposure more if firms face potential U.S. regulatory enforcement actions.

3.5 Robustness

[18] In line with prior work, we run additional tests where we further distinguish sponsored OTC-traded (Level I) from sponsored exchange-traded (Level II/III) ADRs. As expected, economically, the effect is strongest among firms with exposure to the leaked data and exchange-traded sponsored ADRs. However, the number of firms with both exposure to the Panama Papers and Level II/III ADRs is too small to allow for meaningful statistical tests.

We perform a number of robustness tests in Table 7. First, in Panel A, we decompose the cumulative abnormal returns in response to the data leak into the market response on the three specific event dates around which information relevant to the leak is released; we refer to these dates as Day 1, Day 2, and Day 3. The results, shown in Columns (1) to (3), reveal a negative market reaction on all three days. The second day, on which the ICIJ announced the future publication of a database of the leaked documents, has the economically largest negative return of 0.4 percent. This could be related to selling by investors with some knowledge of the previously secret offshore activities of the firms in question, or to outside investors correctly assessing the probabilities of specific firms being exposed in the ICIJ database 2 weeks later.

--- Table 7 about here ---

Second, in Columns (4) and (5), rather than cumulating returns over days [-1;3] around relevant event dates, our results similarly hold when cumulating over days [-2;2] and [0;4]. Thus, the negative market response documented above is not driven by abnormal trading prior to the leak. In fact, the stock market response is concentrated around days [0;2]. Third, in Panel B, we consider several alternative risk adjustments to the abnormal returns we obtain, as well as several ways of matching firms exposed to the Panama Papers to otherwise comparable firms. Our baseline result is robust to these alternative specifications.

4. Cross-sectional Variation in the Market Reaction to the Data Leak

We have so far established that firms exposed to the Panama Papers experience significantly negative returns around the data leak. There are at least three possible channels that may explain this result. First, the data leak might negatively affect firm value if it diminishes the

net benefits of bribery. Second, the unexpected data leak might reduce the net benefits of tax aggressiveness. Finally, firms might suffer reputational losses from the data leak. We consider these explanations in turn.

4.1 Financing corruption

Secret offshore vehicles may have been used to finance corruption, as was revealed by various news stories illuminating links between firms, governments, and middlemen in the Panama Papers documents. As noted in the introduction, if corporations did indeed use offshore vehicles to finance corruption, and if such activities created shareholder value, firms exposed to the leaked data and exposed to perceptively corrupt countries should have a more negative share price response because they are less able to secretly transfer funds to foreign politicians or because they may face regulatory fines for violating bribery regulations. In Table 8, we examine this idea further. The table shows regressions of *Cumulative abnormal returns* around three event dates on firms' exposure to corruption.

-- Table 8 about here --

Among firms with exposure to the Panama Papers, having a subsidiary in a country whose government officials were implicated by the data leak is associated with 1.0% more negative abnormal returns (Column (1)). In order to alleviate concerns that this effect is merely driven by negative news for any firm exposed to countries whose government officials were implicated by the data leak, we augment the specification to all our sample firms. Indeed, firms with exposure to

such countries and exposure to the Panama Papers are still statistically and economically more negatively affected (Columns (2)-(3)).

Next, we move to an alternative measure of exposure to perceptively corrupt countries (Columns (4)-(6)). Notably, firms with exposure to the leaked data and exposure to the most perceptively corrupt countries are again more negatively affected. Specifically, being exposed to perceptively corrupt countries and the leaked data is associated with a 0.9% more negative share price response.

These results are in line with the notion that investors believe that the data leak reduces firms' ability to win contracts in perceptively corrupt countries, or with regulatory fines for past violations of anti-bribery regulations.

4.2 Tax aggressiveness

If tax avoidance and evasion create shareholder value—or if past tax evasion is expected to result in regulatory fines—tax aggressive firms with Panama Papers exposure should experience more negative returns around events related to the data leak. Table 9 shows regressions of *Cumulative abnormal returns* around three event dates on firms' exposure to the Panama papers and controls, most importantly measures of tax aggressiveness.

--- Table 9 about here ---

In Columns (1)-(3), the tax aggressiveness measure of interest is *Tax Aggressiveness Unadjusted*, the statutory tax rate at the country level less a firm's effective tax rate (missing for firms with negative EBIT). We start by examining whether this variable on its own explains returns in the subset of firms with Panama Papers exposure. Indeed, firms that are more tax aggressive

have significantly more negative returns around days associated with the data leak (Column (1)). Next, in order to alleviate concerns that all tax aggressive firms are adversely affected around relevant event dates for reasons unrelated to exposure to the Panama Papers, we repeat our analysis for the full sample and confirm that tax aggressive firms only have significantly negative returns when they are also exposed to the Panama Papers.

In Columns (4)-(6), we extend this analysis to an alternative tax aggressiveness measure, *Tax Aggressiveness Floor*. The previous measure may be negative, e.g. because firms obtained a tax credit or because firms paid higher taxes than the statutory tax rate. We replace negative values by zero and reconfirm our previous results. Economically, a one standard deviation increase in tax aggressiveness is associated with a 0.7% (=14.9%*4.498%) more negative firm value response (Column (4)), and this effect is similar in magnitude among firms exposed to the Panama Papers in the full sample of firms (Columns (5)-(6)).

These results suggest that investors believe that firms will have reduced ability to (aggressively) avoid or even evade taxes in the future, but also with regulatory fines for past violations of tax regulations.

4.3 Reputation

Finally, we consider whether firms incur reputational losses due to the data leak. Revealing a firm's use of secret offshore vehicles for illegal or at least perceptively unethical purposes might potentially result in significant reputational losses—particularly given the intense critical/negative global news coverage the Panama Papers received. One example how the relevation of tax dodging can affect cash flows is provided by the customer boycott of Starbucks U.K. when it was revealed

in 2012 that the company had paid taxes only in one year since beginning its U.K. operations in 1998.

Measuring firm reputation is challenging for a cross-country sample. We use firm-level corporate social responsibility performance metrics from the Bloomberg ESG database as a proxy for reputation. The underlying notion is that CSR investments enhance how investors, employees and other stakeholders perceive firms: CSR is associated with corporate "goodness" (see, for instance, Hong and Kacperczyk 2009, Cheng, Hong and Shue 2016, Dyck, Lins, Roth and Wagner 2016, Ferrell, Liang and Renneboog, 2016, Hong and Liskovich 2016, and Lins, Servaes and Tamayo 2017). Reputational losses have been shown to be a significant driver of the negative market response around revelation and punishment for major financial misconduct (e.g., Karpoff, Lee and Martin 2008) but not so much around other revelations such as environmental violations (Karpoff, Lott, and Wehrly 2005).

Bloomberg, one of the main CSR firm-level data providers, covers around 11,000 listed firms worldwide, of which roughly 3,500 have ESG scores and 2,700 overlap with our sample. Our tests on reputation only use firms with available CSR data and may not be representative of the full sample (for instance, firms with CSR data tend to be larger). We use an aggregate measure of overall CSR performance provided by Bloomberg (*Overall ESG Score*) as well as its subscores—*Environmental*, *Social*, and *Governance* performance—to proxy for firm reputation, and, as in our previous tests, interact these measures with our indicator variable for whether we identify firms as users of offshore vehicles in the Panama Papers (Table 10).

--- Table 10 about here ---

We find that high reputation firms are significantly more negatively affected when implicated by the leaked data. Thus, investors appear to associate the data leak with reputational

losses. Economically, using the aggregate CSR measure in column (3), firms with one standard deviation higher reputation lose 1%(=0.47*2.10%) more in value if they are exposed to the Panama Papers.

Taken together, the results of this section suggest that investors believe that the data leak reduces firms' ability to win contracts in perceptively corrupt countries and that firms will have reduced ability to (aggressively) avoid or even evade taxes in the future. Alternatively, regulatory fines for past tax evasion and past violations of anti-bribery regulations may explain some of the negative response. Some of the drop in firm value is also explained by reputational losses.

5. Conclusion

We use the data leak of the Panama Papers on April 3, 2016 to study whether and how the corporate use of secret offshore vehicles affects valuation around the world. Using event study techniques, we find that the data leak erased US$135 billion in market capitalization among 397 firms with direct exposure to the revelations of the Panama Papers, reflecting 0.7 percent of their market value. Firm value declines only when offshore activities are previously secret. Moreover, firms with exposure to perceptively corrupt countries and tax aggressive firms are more adversely affected, and so are firms with high reputation.

Taken together, we conclude that secret offshore activities created value, e.g. through facilitating corporate bribe payments and tax evasion. The revelations of the Panama Papers destroy some of that value through reducing firms' ability to avoid taxes and finance corruption, or increasing regulatory fines for past tax evasion and violations of anti-corruption regulations. Besides providing novel large-scale evidence on the use of secret offshore vehicles, our paper also

highlights the role played by offshore intermediaries—such as Mossack Fonseca—in facilitating illegal activities under the veil of offshore secrecy. We leave the analysis of real responses by firms connected to the data leak to future research.

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Table 1

Summary Statistics

This table shows summary statistics of firms with and without exposure to the Panama Papers data leak. Panel A shows the number of firms connected to the leak by legal entity, person, and intermediary. Details on the procedure to establish these connections can be found in Appendix 1. Panel B shows number and fraction of firms connected to the leak by country for countries with at least 50 firms; countries with fewer than 50 firms are aggregated to *Rest of the World*. All variables are defined in Appendix 1.

Panel A: Firms with Exposure to the Panama Papers Data Leak

Firm is connected to offshore vehicle via	N Firms	N Firms w/exposure	% w/exposure
…a legal entity (shell)	23,540	89	0.38%
…a person	23,540	296	1.26%
…an intermediary	23,540	86	0.37%
…any of the three	23,540	397	1.69%

Panel B: Firms with Exposure to the Panama Papers Data Leak by Country

Country	*N* Firms	*N* Panama Papers Exposure	Percent Panama Papers Exposure	Avg. *N* Subs.	Country	*N* Firms	*N* Panama Papers Exposure	Percent Panama Papers Exposure	Avg. *N* Subs.
Hong Kong	161	37	23.0	46	Turkey	279	1	0.4	8
U.K.	1,080	124	11.5	40	Poland	352	1	0.3	9
Russia	100	5	5.0	33	Japan	3,442	1	0.0	16
Belgium	108	5	4.6	36	Argentina	63	0	0.0	7
Austria	66	3	4.6	77	Brazil	251	0	0.0	11
Italy	216	7	3.2	37	Bulgaria	83	0	0.0	9
France	551	17	3.1	49	Chile	111	0	0.0	14
Australia	587	15	2.6	28	Croatia	71	0	0.0	10
Greece	81	2	2.5	18	Egypt	89	0	0.0	11
Germany	493	12	2.4	61	Finland	115	0	0.0	35
Spain	124	3	2.4	86	Indonesia	56	0	0.0	11
Singapore	305	7	2.3	18	Korea	1,681	0	0.0	4
Philippines	90	2	2.2	7	Kuwait	73	0	0.0	13
U.S.	3,506	75	2.1	50	New Zealand	90	0	0.0	15
Netherlands	107	2	1.9	62	Pakistan	129	0	0.0	2
Israel	326	6	1.8	13	Peru	91	0	0.0	3
Norway	127	2	1.6	23	Romania	55	0	0.0	9
Sweden	257	4	1.6	22	South Africa	179	0	0.0	25
Canada	696	9	1.3	12	Sri Lanka	117	0	0.0	8
China	2,269	28	1.2	11	Switzerland	210	0	0.0	39
Mexico	109	1	0.9	20	Thailand	206	0	0.0	9
Denmark	111	1	0.9	27	Vietnam	385	0	0.0	1
Malaysia	602	4	0.7	14	Rest of world	637	10	1.6	18
Taiwan	1,120	7	0.6	7					
India	1,583	6	0.4	7	**Total**	**23,540**	**397**	**1.7**	**23**

Table 2

Univariate Analysis

This table shows characteristics of firms with and without exposure to the Panama Papers data leak. The column labeled *Difference* captures the difference in means between the two groups. All variables are defined in Appendix 1. All continuous variables are winsorized at the 1% and 99% levels. *,**, and *** indicate statistical significance at a 10%, 5%, and 1% level, respectively.

Sample	Firms with Panama Papers Exposure		Firms without Panama Papers Exposure		*Diff*
	N Firms	Avg	*N* Firms	Avg	
Total assets ($mn)	397	91,642	23,143	5,421	-86,200***
N subsidiaries	397	155	23,143	20.3	-134.7***
Has foreign subsidiary (1/0)	397	0.914	23,143	0.439	-0.475***
Perc. foreign subsidiaries	397	0.478	23,143	0.204	-0.274***
N foreign subsidiaries	397	16.9	23,143	2.9	-14.0***
Has sponsored ADR (1/0)	397	0.191	23,143	0.037	0.155***
Has unsponsored ADR (1/0)	397	0.164	23,143	0.049	0.115***
Has U.S. subsidiary (1/0)	397	0.413	23,143	0.176	-0.23.7***
Is U.S. firm (1/0)	397	0.189	23,143	0.148	-0.041**
Political 1st Layer Exposure (1/0)	397	0.320	23,143	0.060	-0.259***
Corruption Exposure (1/0)	396	0.449	23,083	0.146	-0.304***
Tax Aggressiveness 1	306	0.155	15,220	0.151	-0.004
Tax Aggressiveness 2	306	0.179	15,220	0.176	-0.003
ESG Score	168	35.1	2,528	25.4	-9.7***
Environmental score	148	29.2	1,877	19.5	-9.7***
Social score	162	35.7	2,299	28.7	-7.0***
Governance score	168	56.6	2,528	49.1	-7.5***

Table 3
Abnormal Returns of Firms Exposed to the Panama Papers Data Leak

This table analyzes returns of publicly listed firms around the Panama Papers data leak. The dependent variable is *Cumulative raw return* in Columns (1) and (2) and *Cumulative abnormal return* in Columns (3) and (4). Returns are cumulated over days around three dates related to the data leak. These three dates are described in Figure 1 and the event window is [-1;3] with respect to each date. *Has Panama Papers Exposure* is a dummy that takes the value of 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, and 0 otherwise. *Size* is the natural logarithm of a firm's assets in $000s. Appendix 1 provides detailed variable definitions. All continuous variables are winsorized at the 1% and 99% levels. Country and industry fixed effects (Fama–French 49) are included as indicated. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent variable	Raw Returns	Raw Returns	Alpha	Alpha
Has Panama Papers Exposure	-1.601***	-0.999***	-0.820*	-0.694***
	(-2.89)	(-2.58)	(-1.95)	(-2.62)
Size		-0.263***		-0.055
		(-3.23)		(-0.56)
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	23,540	23,540	23,540	23,540
Adj. R2	0.167	0.170	0.094	0.094

Table 4
Secret and Observable Offshore Activities

This table analyzes returns of publicly listed firms around the Panama Papers data leak. The dependent variable is *Cumulative raw return* in Columns (1) and (2) and *Cumulative abnormal return* in Columns (3) and (4) as defined in Table 3. *Exposure of Secret Activity* is a dummy variable that takes a value of 1 if a person or an intermediary listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, but if no entity in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary. *Exposure of Observable Activity* is a dummy variable that takes a value of 1 if an entity in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, but if no person and no intermediary in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary. *Both Types of Exposure* is a dummy variable that takes a value of 1 if both (i) an entity and (ii) a person or an intermediary in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary. Appendix 1 provides detailed variable definitions. All continuous variables are winsorized at the 1% and 99% levels. Country and industry fixed effects (Fama–French 49) as well as a control for size are included as indicated. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent variable	Raw Return	Raw Returns	Alpha	Alpha
Exposure of Observable Activity	-0.005	0.465	0.399	0.496
	(-0.01)	(0.76)	(0.61)	(0.73)
Exposure of Secret Activity	-1.937***	-1.322***	-1.068**	-0.941***
	(-3.52)	(-3.62)	(-2.42)	(-3.63)
Both Types of Exposure	-1.244	-0.528	-0.641	-0.493
	(-1.03)	(-0.53)	(-0.92)	(-0.90)
Size		-0.262***		-0.054
		(-3.23)		(-0.56)
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	23,540	23,540	23,540	23,540
Adj. R2	0.167	0.170	0.094	0.094

Table 5
Exposure to the Panama Papers Data Leak and Other Tax Haven Exposure

This table analyzes returns of publicly listed firms around the Panama Papers data leak. The dependent variable is *Cumulative raw return* in Columns (1) and (2) and *Cumulative abnormal return* in Columns (3) and (4) as defined in Table 3. *Has Panama Papers Exposure* is a dummy that takes the value of 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, and 0 otherwise. *TOP4 Tax Haven Exposure* is a dummy variable equal to 1 if a firm has at least one subsidiary in any of the four main tax havens used by Mossack Fonseca (Panama, British Virgin Islands, Bahamas, Seychelles). *Has Panama Papers but no TOP4 Tax Haven Exposure* is a dummy variable equal to 1 if a firm has exposure to the Panama Papers as defined in Table 1 Panel A (any of the three) but no exposure to a TOP4 haven. *Has no Panama Papers but TOP4 Tax Haven Exposure* is a dummy variable equal to 1 if a firm has no exposure to the Panama Papers as defined in Table 1 Panel A (any of the three) but exposure to a TOP4 haven. *Has both Panama Papers and TOP4 Tax Haven Exposure* is a dummy variable equal to 1 if a firm has both (i) exposure to the Panama Papers as defined in Table 1 Panel A (any of the three) and (ii) exposure to a TOP4 haven. Appendix 1 provides detailed variable definitions. All continuous variables are winsorized at the 1% and 99% levels. Country and industry fixed effects (Fama–French 49) as well as a control for size are included as indicated. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent variable	Raw Returns	Raw Returns	Alpha	Alpha
Has Panama Papers Exposure	-1.055***		-0.728***	
	(-2.64)		(-2.69)	
Has Panama Papers but no TOP4 Tax Haven Exposure		-0.964***		-0.616***
		(-3.35)		(-2.59)
Has no Panama Papers but TOP4 Tax Haven Exposure	-0.403	-0.407	-0.243	-0.248
	(-1.50)	(-1.50)	(-1.08)	(-1.10)
Has both Panama Papers and TOP4 Tax Haven Exposure		-1.246		-0.963
		(-1.27)		(-1.27)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
N	23,540	23,540	23,540	23,540
Adj. R2	0.170	0.170	0.094	0.094

Table 6
Panama Papers Exposure and Enforcement

This table analyzes returns of publicly listed firms around the Panama Papers data leak. The dependent variable is *Cumulative abnormal return* as defined in Table 3. *Has Panama Papers Exposure* is a dummy that takes the value of 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, and 0 otherwise. *Has Sponsored ADR* is a dummy variable equal to 1 if a firm is not headquartered in the U.S. and has a sponsored ADR (Level II or III) in 2015. *Has Unsponsored ADR* is a dummy variable equal to 1 if a firm is not headquartered in the U.S. and has an unsponsored or Level I ADR in 2015. *Has U.S. Subsidiary* is a dummy variable equal to 1 if a firm is not headquartered in the U.S. and has a U.S. subsidiary in 2015. *Is U.S. Firm* is a dummy variable equal to 1 for firms headquartered in the U.S.. *Has PPE + Interaction = 0* is a p-value for a test whether the sum of the Panama Papers Exposure coefficient and the respective interaction terms is zero. All continuous variables are winsorized at the 1% and 99% levels. Country and industry fixed effects (Fama–French 49) as well as a control for size are included as indicated. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Alpha	Alpha	Alpha	Alpha	Alpha
Has Panama Papers Exposure (PPE)	-0.503*	-0.751**	-0.076	-0.764**	0.200
	(-1.82)	(-2.57)	(-0.23)	(-2.56)	(0.39)
Has Sponsored ADR	-0.614***				-0.627**
	(-3.10)				(-2.50)
Has Unsponsored ADR		-0.395			-0.441
		(-1.13)			(-1.16)
Has U.S. Subsidiary			-0.404***		-0.338***
			(-3.73)		(-2.74)
Is U.S. Firm				-1.514**	-1.528***
				(-2.44)	(-19.58)
Has PPE x Has Sponsored ADR	-0.819**				-0.582
	(-1.98)				(-0.78)
Has PPE x Has Unsponsored ADR		0.344			0.339
		(0.73)			(0.64)
Has PPE x Has U.S. Subsidiary			-1.420**		-1.530***
			(-2.46)		(-2.72)
Has PPE x Is U.S. Firm				0.350	-0.724
				(1.06)	(-1.24)
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
N	23,540	23,540	23,540	23,540	23,540
Adj. R2	0.094	0.094	0.094	0.094	0.095
Has PPE + Interaction = 0 (p-value)	0.001	0.363	0.001	0.053	0.001

Table 7
Robustness

This table provides a breakdown of individual events associated with the data leak and alternative event windows in Panel A, and a range of robustness tests in Panel B. In Panel A, Cumulative Abnormal Returns are measured over each individual event day (Columns (1)-(3)) and for all three event days but using a [0;4] event window around each event date (Column (4)) as well as a [-2;2] event window around each event date (Column (5)). In Panel B, Column (1) provides robustness tests for the main specification (Table 3 Panel (4)). In Column (1), all controls other than *Has Panama Papers Exposure* are omitted. In Columns (2) and (3), alpha is constructed using 3- and 5-factor models based on U.S. factor-mimicking portfolios (from Kenneth French's Data Library). The next two Columns restrict the sample to firms with exposure to the Panama Papers and firms matched by country and size (Column (4)) and additionally by industry (Column (5)). Firms are matched without replacement. Appendix 1 provides detailed variable definitions. All continuous variables are winsorized at the 1% and 99% levels. Country and industry fixed effects (Fama–French 49) as well as a size control are included as indicated. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Market Response by Individual Event Day

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Alpha	Alpha	Alpha	Alpha	Alpha
Event days	Day 1	Day 2	Day 3	Days 1-3, Alternative event window [0;4]	Days 1-3, Alternative event window [-2;2]
Has Panama Papers Exposure	-0.156	-0.408*	-0.142	-0.740**	-0.578**
	(-0.87)	(-1.66)	(-1.16)	(-2.27)	(-2.40)
Controls	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	23,540	23,091	22,980	23,540	23,522
Adj. R2	0.086	0.050	0.140	0.060	0.052

Panel B: Robustness

	(1)	(2)	(3)	(4)	(5)
Dependent var.	1-Factor Alpha	3-Factor Alpha	5-Factor Alpha	1-Factor Alpha	1-Factor Alpha
Sample	All	All	All	Matched by Country and Size	Matched by Country, Industry, Size
Has PPE	-1.247**	-0.932***	-1.105***	-0.642**	-0.610***
	(-2.01)	(-3.00)	(-3.31)	(-2.33)	(-3.02)
Controls	N	Yes	Yes	Yes	Yes
Country FE	N	Yes	Yes	N	N
Industry FE	N	Yes	Yes	N	N
N	23,540	23,540	23,540	754	734
Adj. R2	0.000	0.175	0.151	0.014	0.024

Table 8
Panama Papers Exposure and Financing Corruption

This table analyzes returns of publicly listed firms around the Panama Papers data leak controlling for firms' exposure to perceptively corrupt countries. The dependent variables are *Cumulative abnormal returns* around three event days associated with the leaked Mossack Fonseca documents. *Has Panama Papers Exposure* (*PPE*) is a dummy that takes the value of 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary. In Columns (1)-(3), the measure of interest is *Political 1st Layer Exposure*, a Dummy variable equal to one if a firm has at least one subsidiary in any of the countries whose presidents or major officials were implicated by the Panama Papers (Argentina, Georgia, Iceland, Iraq, Jordan, Qatar, Saudi Arabia, Sudan, United Arab Emirates, Ukraine). In Columns (4)-(6), the measure of interest is Corruption exposure, measured by a Dummy variable that is equal to one if a firm is exposed to the most perceptively corrupt tercile of countries using Transparency International's Corruption Perception Index. Controls include size and fixed effects as indicated. Appendix 1 provides detailed variable definitions. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Corruption Variable	Political 1st Layer Exposure			Corruption Exposure (most corrupt tercile)		
Has PPE		-0.371	-0.384*		-0.134	-0.213
		(-1.64)	(-1.69)		(-0.62)	(-0.92)
Corruption Variable	-0.958**		-0.121	-0.497		-0.454**
	(-2.07)		(-0.63)	(-1.16)		(-2.39)
Interaction		-0.998**	-0.893**		-1.252***	-0.881**
		(-2.41)	(-2.36)		(-3.18)	(-2.30)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
N	397	23,540	23,540	396	23,479	23,479
Adj. R2	0.184	0.094	0.094	0.181	0.094	0.094

Table 9
Panama Papers Exposure and Tax Aggressiveness

This table analyzes returns of publicly listed firms around the Panama Papers data leak controlling for firms' tax aggressiveness. The dependent variables are *Cumulative abnormal returns* around three event days associated with the leaked Mossack Fonseca documents. The sample consists of all publicly listed firms with non-missing daily returns in the 5 days surrounding at least one of the three event dates. *Has Panama Papers Exposure* (*PPE*) is a dummy that takes the value of 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary. In Columns (1)-(3), the tax aggressiveness measure of interest is *Tax Aggressiveness Unadj*, the statutory tax rate at the country level less a firm's effective tax rate (missing for firms with negative EBIT). In Columns (4)-(6), the tax aggressiveness measure of interest is the same as before but set to zero when the measure is negative, e.g. because firms obtained a tax credit or because firms paid higher taxes than the statutory tax rate. Controls include size and fixed effects as indicated. Appendix 1 provides detailed variable definitions. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Tax Variable	Tax Aggressiveness Unadj.			Tax Aggressiveness Floor		
Has *PPE*		-0.067	-0.024		0.291	0.246
		(-0.17)	(-0.06)		(0.68)	(0.57)
Tax Variable	-3.921**		0.308	-4.498*		-0.312
	(-2.59)		(0.75)	(-1.71)		(-0.46)
Interaction		-2.791**	-3.073**		-4.417***	-4.154**
		(-2.32)	(-2.44)		(-3.07)	(-2.56)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
N	306	15,526	15,526	306	15,526	15,526
Adj. R2	0.176	0.110	0.110	0.176	0.110	0.110

Table 10
Panama Papers Exposure and Reputation

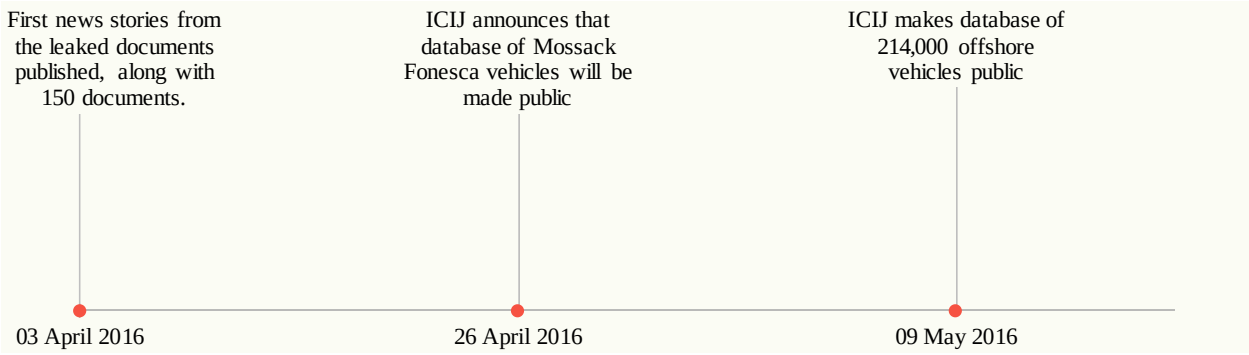
This table analyzes returns of publicly listed firms around the data leak controlling for firms' reputation. The dependent variable is *Cumulative abnormal returns* around three event days associated with the leaked Mossack Fonseca documents. The sample consists of all publicly listed firms with non-missing daily returns in the 5 days surrounding at least one of the three event dates. *Has Panama Papers Exposure* (*PPE*) is a dummy that takes the value of 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary. Overall ESG is the natural logarithm of one plus a firm's overall Environmental, Social, and Governance score in 2015 taken from Bloomberg. Environmental, Social, and Governance are the respective natural logarithms of one plus a firm's envornmental, social, and governance score taken from Bloomberg. Controls include size and fixed effects as indicated. Appendix 1 provides detailed variable definitions. Logarithms of ESG scores were demeaned for better legibility. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at country and industry level (2-way cluster). *t*-statistics are given in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
ESG Variable		Overall ESG Score		Environmental	Social	Governance
Has *PPE*		-0.547	-0.562	-1.217**	-0.861**	-0.085
		(-0.88)	(-0.90)	(-2.38)	(-2.17)	(-0.14)
ESG Variable	-1.067		-0.187	-0.331*	-0.164	1.279**
	(-0.60)		(-0.48)	(-1.80)	(-0.94)	(2.36)
Interaction		-2.213**	-2.103**	-0.572	-1.564***	-8.848***
		(-2.46)	(-2.07)	(-0.86)	(-5.56)	(-4.37)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
N	168	2,696	2,696	2,025	2,461	2,696
Adj. R2	0.233	0.105	0.104	0.107	0.106	0.106

Figure 1

Timeline of the Panama Papers data leak

This figure shows the relevant event dates associated with the Panama Papers data leak.



Appendix 1: Data Appendix

All continuous variables are winsorized at the 1% and 99% levels.

Description	Description (detailed)	Source
Alpha [a;b]	Cumulative daily abnormal returns in % from closing on day *a*-1 to closing of day *b* relative to some event date. Daily abnormal returns are obtained from parameters of a one-factor model estimated over days [−294; −41] relative to event dates. *Excess return on the market* is the return of the local index in USD over and above the U.S. risk-free rate.	Datastream
Cumulative raw returns [a;b]	Cumulative daily stock returns in % from closing on day *a*-1 to closing of day *b* relative to some event date.	Datastream
Has Panama Papers Exposure	A dummy variable equal to 1 if any entity, intermediary, or person listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, and 0 otherwise. Persons are matched using exact home country matches and fuzzy name matches. Entities and intermediaries are matched using exact incorporation country matches and fuzzy name matches. All fuzzy matches are hand-checked.	ICIJ, Orbis
Exposure of Observable Activity	A dummy variable equal to 1 if an entity in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, but if no person and no intermediary in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary.	ICIJ, Orbis
Exposure of Secret Activity	A dummy variable equal to 1 if a person or an intermediary listed in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary, but if no entity in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary.	ICIJ, Orbis
Both Types of Exposure	A dummy variable equal to 1 if both (i) an entity and (ii) a person or an intermediary in the leaked Mossack Fonseca documents is connected to a subsidiary of a firm in our sample, a director of a firm in our sample, or a director of a sample firm's subsidiary.	ICIJ, Orbis
Has TOP4 Haven Exposure	A dummy variable equal to 1 if a firm has at least one subsidiary in any of the four main tax havens used by Mossack Fonseca (Panama, British Virgin Islands, Bahamas, Seychelles).	Orbis
Has Sponsored ADR	A dummy variable equal to 1 if a firm is not headquartered in the U.S. and has a sponsored ADR in 2015.	BNY Mellon
Has Unsponsored ADR	A dummy variable equal to 1 if a firm is not headquartered in the U.S. and has an unsponsored ADR in 2015.	BNY Mellon
Has U.S. Subsidiary	A dummy variable equal to 1 if a firm is not headquartered in the U.S. and has a U.S. subsidiary in 2015.	Orbis
Is U.S. Firm	A dummy variable equal to 1 if a firm is headquartered in the U.S..	Orbis
Political 1st Layer Exposure	A dummy variable equal to 1 if a firm has at least one subsidiary in any of the countries whose presidents or major officials were implicated by the Panama Papers (Argentina, Georgia, Iceland, Iraq, Jordan, Qatar, Saudi Arabia, Sudan, United Arab Emirates, Ukraine).	Orbis
Exposure to Most Corrupt Tercile	A dummy variable that is equal to one if a firm is exposed to the most perceptively corrupt tercile of countries using Transparency International's Corruption Perception Index.	Orbis, Transparency International
Tax Aggressiveness Unadj.	The statutory tax rate at the country level less a firm's effective tax rate. The effective tax rate is defined as tax over EBIT. Observations with negative EBIT are denoted as missing.	KPMG, Orbis
Tax Aggressiveness Floor	As *Tax Aggressiveness Unadj* but set to zero when the measure is negative, e.g. because firms obtained a tax credit or because firms paid higher taxes than the statutory tax rate.	KPMG, Orbis
Overall ESG Score	Log(1+Overall environmental, social and governance score), in 2015	Bloomberg ESG database
Environmental	Log(1+Overall environmental score), in 2015	Bloomberg ESG database

Social	Log(1+Overall social score), in 2015	Bloomberg ESG database
Governance	Log(1+Overall governance score), in 2015	Bloomberg ESG database
Total Assets	Total assets. Regressions use the natural logarithm.	Datastream
Number of subsidiaries	Number of domestic and foreign subsidiaries.	
Has foreign subsidiary	Dummy variable equal to 1 if a firm has at least one subsidiary outside of its parent headquarter country.	Orbis
% Foreign Subsidiaries	Fraction of a firm's subsidiaries headquartered outside of its parent headquarter country.	Orbis
Number of Foreign Countries	Number of foreign countries in which firm has subsidiaries.	Orbis

Appendix 2: Firms Connected to the Panama Papers Data Leak by Industry

Industry	*N* Firms	*N* Panama Papers	Percent Panama Papers	Avg. *N* Subs.	Industry	*N* Firms	*N* Panama Papers	Percent Panama Papers	Avg. *N* Subs.
Trading	881	58	6.6	24	Wholesale	674	9	1.3	21
Mining	188	7	3.7	22	Automobiles and Trucks	307	4	1.3	31
Restaraunts Hotels	303	11	3.6	30	Construction Materials	625	8	1.3	19
Aircraft	56	2	3.6	52	Msrmt/Ctrl Equipment	159	2	1.3	33
Real Estate	795	27	3.4	45	Shipping Containers	88	1	1.1	16
Construction	499	13	2.6	37	Beer & Liquor	179	2	1.1	26
Apparel	192	5	2.6	26	other	7,432	83	1.1	17
Retail	620	16	2.6	33	Food Products	508	5	1	21
Insurance	39	1	2.6	81	Agriculture	220	2	0.9	15
Entertainment	163	4	2.5	25	Consumer Goods	365	3	0.8	23
Transportation	536	13	2.4	30	Printing and Publishing	127	1	0.8	27
Machinery	713	16	2.2	21	Chemicals	633	4	0.6	20
Banking	224	5	2.2	30	Computers	167	1	0.6	14
Recreation	91	2	2.2	13	Rubber and Plastic Products	200	1	0.5	13
Petroleum Gas	461	10	2.2	28	Pharmaceutical Products	634	3	0.5	17
Precious Metals	149	3	2	11	Electrical Equipment	498	2	0.4	18
Personal Services	156	3	1.9	25	Textiles	293	1	0.3	7
Coal	53	1	1.9	22	Defense	8	0	0	23
Business Services	1,708	32	1.9	23	Fabricated Products	67	0	0	7
Steel Works	417	7	1.7	17	Healthcare	153	0	0	67
Utilities	476	8	1.7	37	Shipbuilding, Railroad	51	0	0	28
Electronic Equipment	553	9	1.6	16	Tobacco Products	24	0	0	38
Medical Equipment	203	3	1.5	23					
Communication	433	6	1.4	29					
Business Supplies	219	3	1.4	22	**Total**	**23,540**	**397**	**1.7**	**23**