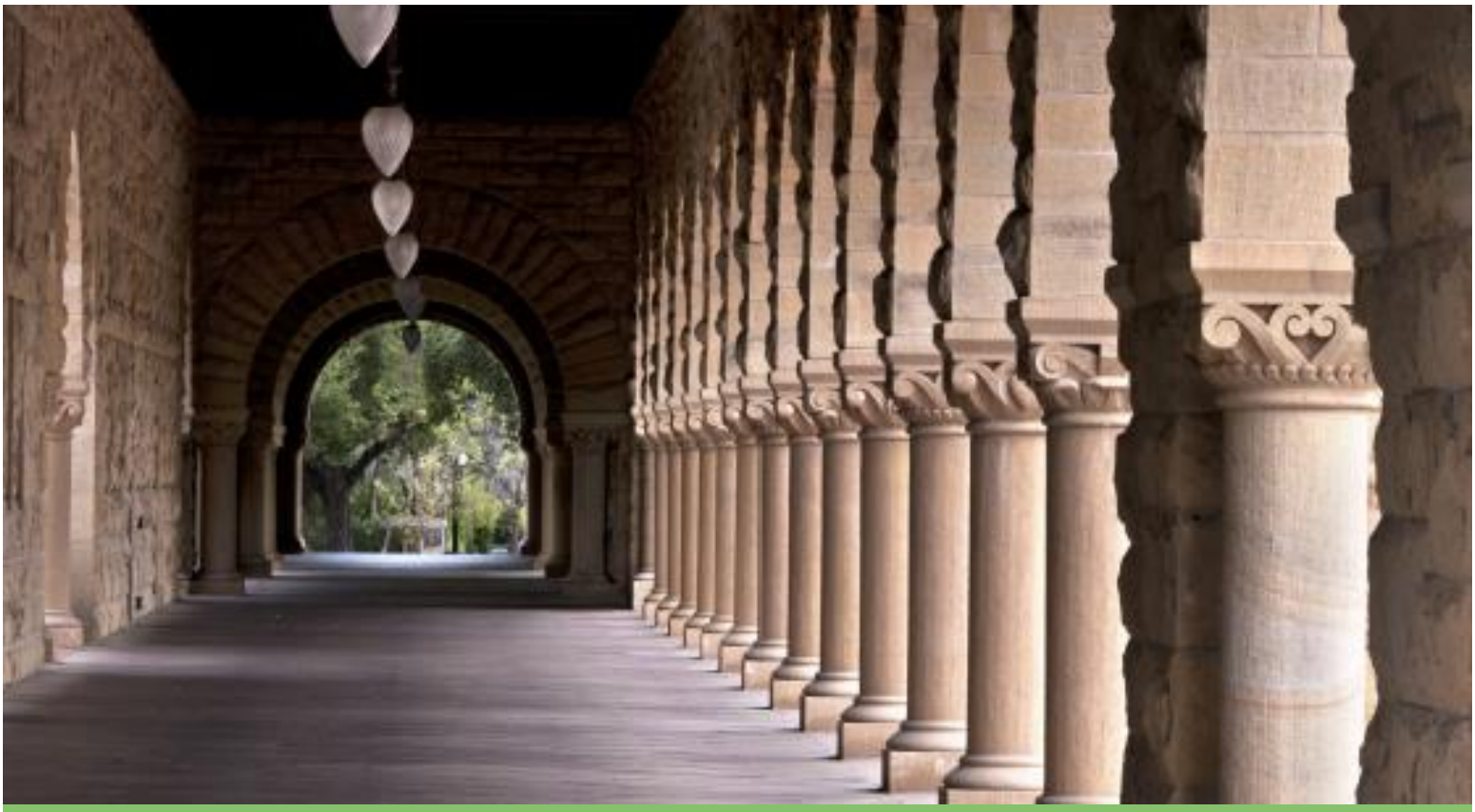
COMMITTEE ON CAPITAL MARKETS REGULATION

FINANCIAL TRANSACTION TAXES: AN ASSESSMENT OF THE EMPIRICAL LITERATURE



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The Committee on Capital Markets Regulation (the "Committee") is an independent 501(c)(3) research organization, financed by contributions from individuals, foundations, and corporations. The Committee's membership includes forty leaders drawn from the finance, business, law, accounting, and academic communities. The Committee Co-Chairs are R. Glenn Hubbard, Dean Emeritus of Columbia Business School, and John L. Thornton, Former Chairman of the Brookings Institution. The Committee's President is Hal S. Scott, Emeritus Nomura Professor of Inter- national Financial Systems at Harvard Law School and President of the Program on International Financial Systems. Founded in 2006, the Committee undertook its first major report at the request of the incoming U.S. Secretary of the Treasury, Henry M. Paulson. Over ten years later, the Committee's research continues to provide policymakers with an empirical and non-partisan foundation for public policy.

Financial Transaction Taxes: An Assessment of the Empirical Literature

Financial Transaction Taxes: An Assessment of the Empirical Literature[*]

In this report, the Committee on Capital Markets Regulation (the "**Committee**") reviews the existing academic and policy research on the projected tax revenue from a hypothetical U.S. Financial Transaction Tax ("**FTT**") and the empirical research on the historical impact of FTTs on financial markets and investors in the United States, Europe and Asia.

Our goal is to inform the active policy and academic debate on the merits of FTTs.[1] Although our research is comprehensive as to the recent academic and policy research in this space, we do not address all FTTs that are (or have been) in place as not all FTTs have been rigorously studied.

In Part I, we review eight tax revenue studies. FTT tax revenue is the FTT tax rate multiplied by the total taxable trading volume. Our review therefore focuses on how the tax revenue studies determine the total taxable trading volume. We find that the studies do not provide a well-substantiated basis for estimating the tax revenue that would be raised by a U.S. FTT as they fail to provide sufficient empirical support for their assumptions regarding the impact of an FTT on trading costs and taxable trading volumes.

In Part II, we review seventeen empirical studies of the impact of FTTs on markets and investors and find that FTTs across the globe have had a consistently negative impact on markets and investors by increasing trading costs through a reduction in trading volume and order book depth and a widening of bid-ask spreads. FTTs have also had a demonstrated negative impact on stock prices.

We therefore conclude that estimates of the tax revenue that would be raised by hypothetical U.S. FTTs are unreliable, whereas there would clearly be negative effects on U.S. markets and investors from an FTT. The empirical evidence therefore cautions against the future adoption of a U.S. FTT.

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[*] Committee member Benjamin Friedman dissents from this report.

[1] We also note that past research by the Committee has described the estimated cost to long-term investors from an FTT, available at: https://www.capmktsreg.org/wp-content/uploads/2019/09/Financial-Transaction-Taxes-Statement.pdf

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Part I: Review of Studies that Estimate Tax Revenue Raised by U.S. FTTs

It is important to estimate the projected amount of tax revenue raised by an FTT for two reasons. First, accurate projections of tax revenue allow governments to manage their budgets. Excessively optimistic forecasts of tax revenue could result in an unintended increase in deficit spending. Second, a projection of tax revenue is necessary to weigh the costs and benefits of an FTT.

The calculus for determining the tax revenue is relatively simple – FTT tax revenue is the FTT tax rate multiplied by the total taxable trading volume (in dollars). However, while the FTT tax rate (e.g. 0.1% or 0.5%) is a straight-forward input, the total taxable trading volume is not. That is because an FTT constitutes an additional trading cost that reduces taxable trading volumes. Therefore, estimates of the impact on taxable trading volumes from an FTT is of paramount significance to accurate tax revenue estimations.

In Part I, we consider eight recent studies that attempt to estimate the revenue potential for a hypothetical U.S. FTT. These studies are summarized in **Table 1**. Overall, two main conclusions emerge from our review. First, none of the studies provide a reliable basis for estimating potential tax revenue from a U.S. FTT since they fail to provide sufficient empirical support for their assumptions regarding the impact of an FTT on trading volumes. Second, the studies cannot be compared effectively to estimate a range of possible tax revenues from an FTT, since each study employs widely varying methodologies and FTTs that differ along multiple dimensions. For example, each of the studies make different assumptions regarding the impact of an FTT on trading volume, employ FTTs of different sizes (e.g 0.1% vs. 0.5%) and apply the FTT to different asset classes, such as equities, bonds and derivatives.

We therefore conclude that recent studies of the revenue potential for a hypothetical U.S. FTT do not provide a reliable estimate or range of estimates of the tax revenue that would be raised by a U.S. FTT.

Table 1: Key Assumptions and Revenue Estimates for U.S. FTTs

Study (Reverse Chronological Order)	FTT	Percent Decrease in Trading Volume	Elasticity of Trading Volume	Comparison to FTT in Foreign Jurisdiction	Estimated U.S. Tax Net Revenue
Weiss, Antonio, and Laura Kawano (2020), Hamilton Project	Start at 0.02% on equities, bonds, and derivatives; increase by 0.02% per year until reaching 0.1%	Not specified	-1, -1.25, and -1.5	N/A	Annual tax revenue of $41 billion (-1.50 elasticity), $50 billion (-1.25 elasticity), and $63 billion (-1.00 elasticity), as averaged over a ten-year horizon
Miller, Colin, and Anna Tyger (2020), Tax Foundation	0.5% tax on equities	N/A	N/A	Assume that the US FTT were to raise the same fraction of GDP as the existing FTT of the same size in the UK	$33 billion annually (likely gross revenue)
Angel, James (2019), Center for Capital Markets Competitiveness	0.5% on equities	N/A	N/A	Assume that the US FTT were to raise the same fraction of GDP as the existing FTT of the same size in the UK.	$36 billion annually (gross revenue)
Pekanov, Atanas, and Margit Schratzenstaller (2019), WIFO	0.1% for equities and bonds, and 0.01% for derivatives	15% decline for equities and bonds; decline for derivatives equals 90%, 70%, or 50%	-1.50, -1.00, and -0.50	N/A	$184.2 billion annually (-1.50 elasticity), $231.5 billion (-1.00 elasticity), and $280.4 billion (-0.50 elasticity)[2]
Congressional Budget Office (2018)	0.1% for equities, bonds with fixed maturities greater than 100 days, and derivatives	Not specified	Not specified	N/A	$78 billion in annual revenue averaged over a ten-year horizon

[2] Revenue estimates are for North America. Pekanov (2019) considers a global financial transaction tax.

Table 1: Key Assumptions and Revenue Estimates for U.S. FTTs (continued)

Study (Reverse Chronological Order)	FTT	Percent Decrease in Trading Volume	Elasticity of Trading Volume	Comparison to FTT in Foreign Jurisdiction	Estimated U.S. Tax Net Revenue
Pollin, Robert, et al. (2018), University of Massachusetts-Amherst and Loyola Marymount University	0.5% for equities, 0.1% for bonds, and 0.005% of the notional value of derivatives transactions	Assume that the tax causes a 50% decline in trading volume	N/A	N/A	$220 billion annual revenue
Bivens, Josh, and Hunter Blair (2016), Economic Policy Institute	0.5% on equities, bonds, 0.05% on foreign exchange and notional value of futures and swaps	N/A	-1.50, -1.25, -1.00, and -0.75	N/A	$38 billion annual tax revenue (-1.50 elasticity) to $104.6 billion (-0.75), depending on elasticity
Burman, Leonard, et al. (2016), Tax Policy Center (Urban Institute & Brookings Institution)	0.1% on equities, options, and bonds; 0.01% on futures, swaps, and foreign exchange	N/A	-1.50, -1.25, and -1.00	N/A	$27 billion in annual tax revenue (-1.50 elasticity) to $38 billion in annual tax revenue (-1.00 elasticity), averaged over a ten-year horizon

Trading volume assumptions lack support, undermining tax revenue estimates

The methodologies to estimate the tax revenue raised by a hypothetical U.S. FTT can generally be grouped into two categories. The first category, used in five studies, estimates the tax raised by an FTT based on trading volumes, generally derived from an "elasticity measure" that quantifies the link between an increase in trading costs (imposed by the FTT) and trading volume.[3] The second category, used in two studies, relies on comparisons to the U.K. (which has an FTT of 0.5% on equities transactions) to estimate U.S. tax revenue from a U.S. FTT.[4] Both methodologies present significant issues that we now consider.

Studies based on elasticity and trading volume

The elasticity of trading volume is defined as the percentage change in trading volume resulting from a given percentage change in trading costs. For example, suppose trading costs were to increase 10% due to a given FTT. An elasticity of -1.00 means that the 10 percent *increase* in trading costs would cause a 10 percent *decline* in trading volume. Similarly, an elasticity of -0.75 (or -1.25) means that the 10 percent increase in trading costs would cause a 7.5 percent (or 12.5 percent) decline in trading volumes. Therefore, in order to estimate the tax revenue raised by an FTT using the elasticity measure, there is a three-step process. First, determine the impact of an FTT on trading costs. Second, determine the elasticity, i.e. the relationship between trading costs and trading volumes. Third, apply the FTT tax rate to the projected trading volume.

Unfortunately, as to step one, the FTT revenue studies generally do not disclose their assumed increase in trading costs due to an FTT, nor do they disclose how the assumed increase in trading costs from an FTT are estimated. We therefore cannot judge whether the assumed impact of an FTT on trading costs by any of the five studies are reasonable. For example, the studies generally fail to clarify whether they include indirect trading cost increases that are due to the FTT, such as wider-bid ask spreads.

The second step is determining the elasticity of trading volume, i.e. the relationship between the assumed percentage increase in trading costs and the percentage decrease in trading volume. However, the studies do not attempt to estimate this relationship, instead they simply consider a range of potential elasticities to determine trading volumes. For example, Weiss and Kawano (2020) consider a range of elasticities of -1.00 (or -1.25 or -1.50) and Pekanov, Atanas, and Margit Schratzenstaller (2019) consider elasticities of -0.50, -1.00, and -1.50.

Certain studies note that their choice of elasticities are based on a corresponding empirical literature that estimates such elasticities for FTTs in other jurisdictions and markets. For example, Bivens and Blair (2016) references a range of estimated elasticities for FTTs in China in the early 2000s and the U.K in the 1980s. However, the studies do not provide any empirical support for why those historical ranges would be applicable to modern U.S. equity, bond, and derivatives markets. Indeed, there is reason to believe that the historical relationship between FTTs and trading

[3] *See¸e.g.* Weiss, Antonio, and Laura Kawano (2020); Pekanov, Atanas, and Margit Schratzenstaller (2019); Bivens, Josh, and Hunter Blair (2016); and Burman, Leonard, et al. (2016).
[4] See e.g. Miller, Colin, and Anna Tyger (2020); Angel (2019).

volumes is not applicable to modern U.S. markets as these past FTTs were applied to manual markets (with floor-based trading) that had much higher transaction costs than today's modern electronic markets. In general, when transaction costs are low, as they are today, then, for any given trading volume elasticity, a new FTT will result in a more significant increase in overall transaction costs and an even greater reduction in trading volume.[5] We are therefore unable to assess whether the elasticities and ranges of trading volume included in each of the studies that we review are appropriate.

As a result, the U.S. FTT studies based on elasticity do not provide a reliable basis for estimating potential tax revenue from a U.S. FTT since they fail to provide sufficient empirical support for their assumptions regarding the impact of an FTT on trading costs and ultimately on U.S. trading volumes.

Studies based on trading volume reductions in the U.K.

In the U.K. a stamp duty (akin to an FTT) of 0.5% on equities presently raises approximately $5 billion in tax revenue per year, which represents 0.17% of the $2.85 trillion in annual GDP in the U.K.[6] Miller, Colin (2020) and Angel (2019) assume that a similarly designed U.S. FTT of 0.5% would raise tax revenue equal to the same share of U.S. GDP that is presently raised by the U.K. stamp duty. A U.S. FTT of 0.5% would therefore raise 0.17% of U.S. GDP or approximately $35 billion in U.S. tax revenue per year.

However, Miller and Colin (2020) and Angel (2019) fail to make any predictions about how U.S. trading volumes would be affected by a U.S. FTT. Their assumption that a U.S. FTT would raise the same share of U.S. GDP as the U.K. stamp duty raises as a share of U.K. GDP is also not substantiated. Indeed, it is possible that market participants in the U.S. would find ways to avoid the 0.5% FTT on equities on a greater basis than traders do in the U.K., since a much larger amount of absolute tax savings could be achieved by doing so ($35 billion in the U.S. as compared to $5 billion in the U.K.). Such tax savings could be achieved through reduced trading volumes in cash equities and increased trading volume in equity derivatives. Another reason that avoidance in U.S. markets could be higher than in the U.K. is that U.S. markets have lower transaction costs than U.K. markets.[7] As noted earlier, all else equal, a higher percentage increase in transaction costs will result in a more significant decrease in trading volume. A 0.5% FTT would result in a higher percentage increase in transaction costs in the U.S. than it does in the U.K. and therefore likely have a more significant negative impact on trading volumes in the U.S. than it does in the U.K.

[5] Weiss and Kawano at 152.
[6] The U.K. stamp duty is levied on share transactions involving U.K.-incorporated companies. The stamp duty applies to overseas transactions that involve U.K.-incorporated companies, and it applies to parties regardless of whether or not they are residents in the U.K.
[7] Program on International Financial Systems, International Review of Equity Market Structure Regulation, Phase II Quantitative Analysis.

Studies employ varying methodologies that cannot be compared effectively

In addition to the underlying problems with FTT tax revenue studies, we note that differences between the methodologies and FTTs considered by these studies prevent a useful comparison among them. For example, two studies that employed differing methodologies (elasticity and trading volume vs. comparisons to the U.K.) to estimate revenue for a 0.1% FTT on equities transactions could be illustrative for policy purposes. However, the studies that we review not only employ varying methodologies, but also evaluate significantly different FTTs (e.g. 0.1% vs. 0.5%), so the comparisons are less informative. And the studies that we review also apply FTTs to different asset classes and therefore trading volumes. For example, although Pollin (2018) and Bivens (2016) both consider a U.S. FTT for equities of 0.5%, their tax revenue estimates are not comparable because Pollin's (2018) tax estimates also include an U.S. FTT of 0.1% for bonds whereas Bivens' (2016) instead includes a U.S. FTT of 0.05% on foreign exchange and derivatives transactions. Therefore, fundamental differences in the U.S. FTT revenue studies further limits our ability to compare these studies or derive potential ranges of tax revenue from a U.S. FTT.

Conclusion

In Part I, we reviewed the approach of eight recent studies that aim to estimate the tax revenue raised by a hypothetical U.S. FTT. We found that each of the existing FTT revenue studies do not provide a reliable basis to estimate the tax revenue that an FTT would raise as they do not provide sufficient empirical support for the trading volumes that would result from the imposition of an FTT. We are also unable to effectively compare the findings of each of these studies because, in addition to differences in methodology, the studies also consider different FTT rates and apply FTTs to different asset classes. In short, the existing empirical research does not provide a reliable range of tax revenue that would be raised by a hypothetical U.S. FTT.

Part II: Empirical Literature on the Impact of FTTs on Investors & Markets

Part II reviews the recent empirical academic literature assessing the impact of FTTs on markets and investors. Most of the 18 empirical pieces that we review in this part have the same structure: there is a change to a local FTT, and the study attempts to measure the consequences for trading volumes, stock prices, bid-ask spreads, volatility and price efficiency.

Part II organizes the empirical literature by geography. **Table 2** summarizes the applicable FTT for each jurisdiction and **Table 3** summarizes the key findings of each study. We then review U.S.-focused studies and then shift to Europe and Asia. There are substantially more European studies than U.S. or Asian studies, as several European countries have recently implemented FTTs. Much of the empirical literature focuses on equities, but we also address research examining other asset classes, such as futures and fixed income.

The empirical literature finds that the imposition of an FTT or an increase in a FTT is generally associated with reductions in trading volume, asset prices, order book depth, and price efficiency, and a widening of bid-ask spreads. Therefore, experience with an FTT clearly demonstrates negative effects on markets and investors.

Table 2: Overview of Select FTTs and Stamp Duties for Select Geographic Regions

Geographic Region	Date Implemented	Date Rescinded	Tax Rate	Caveats
United States (Federal) *Stock Transfer Excise Tax*	December 1914	January 1966	Varied over time (on September 20, 1941, equal to $0.06 per $100 par value for all shares selling above $20)	None
United States (New York State) *Securities Transaction Tax*	June 1905	October 1981	Varied over time (in July 1966, equal to $0.05 for all shares selling above $20)	None
United Kingdom *Stamp Duty*	1694	N/A	Varies over time. Tax rate currently equal to 0.5% on common stock and assets convertible to common stock; excludes bonds and certain derivatives	None
Italy *Financial Transaction Tax*	March 2013	N/A	Tax rate currently equal to 0.10% for exchange-traded shares, 0.20% for OTC shares, and 0.02% on high-frequency trades	Tax applies to Italian resident companies with a market capitalization of at least 500 million euros; exempt entities include market makers and pension funds
France *Financial Transaction Tax*	August 2012	N/A	Tax rate currently equal to 0.30% on equity and 0.01% on the amount of cancelled or modified orders exceeding a specified threshold for high-frequency traders	Tax applies to companies with registered offices in France and market capitalizations exceeding 1 billion euros; market makers are exempt

Table 2: Overview of Select FTTs and Stamp Duties for Select Geographic Regions (continued)

Geographic Region	Date Implemented	Date Rescinded	Tax Rate	Caveats
Sweden *Securities Transaction Tax*	January 1984	December 1991	In 1984, the tax was 1% on equity and equity-derivative transactions; in 1986, the tax was increased to 2%; in 1989, there was a 0.2 basis-point tax on bonds with short maturities	None
China *Stamp Duty*	July 1990	N/A	Varies over time. Current tax rate of 0.1% on equity transactions	Tax accrues to sellers
Taiwan *Futures Transaction Tax*	Not available	N/A	Tax rate on futures currently equal to 0.0000125% on 30-day interest rate futures contracts, 0.000125% on 10-year government bond futures, 0.002% on stock index futures contracts, 0.00025% on other futures contracts, and 0.1% on option contracts on futures	None
Japan *Securities Transaction Tax*	1953	April 1999	Tax rate varies over time (in April 1989, the tax rate was 0.3%)	Tax accrues to sellers

Table 3: Effect of a Higher FTT or Transaction Cost on Key Financial Variables

Journal Article	Geographic Region	Transaction Cost Change	Trading Volume	Bid-Ask Spread	Volatility	Asset Price	Price Efficiency	Order Book/ Quoted Depth
Pomeranets and Weaver (2018)	United States	Increase in FTT	Decrease	Increase	Increase	N/A	N/A	N/A
Jones and Seguin (1997)	United States	Increase in Commission	N/A	N/A	Increase	N/A	N/A	N/A
Saporta and Kan (1997)	United Kingdom	Announcement of Increase in stamp duty	N/A	N/A	No Change	Decrease	N/A	N/A
Bond et al. (2005)	United Kingdom	Announcement of Increase in stamp duty	N/A	N/A	N/A	Decrease	N/A	N/A
Hvozdyk and Rustanov (2016)	Italy	Introduction of FTT	N/A	Increase	No Change	N/A	N/A	N/A
Cappelletti et al. (2017)	Italy	Introduction of FTT	No Change	Increase	Increase	N/A	N/A	N/A
Gomber et al. (2016)	France	Introduction of FTT	Decrease	Increase	No Change	N/A	Decrease	Decrease
Eichfelder et al. (2017)	France	Introduction of FTT	Decrease	N/A	Decrease	Decrease	N/A	N/A
Colliard and Hoffmann (2017)	France	Introduction of FTT	Decrease	N/A	No Change	N/A	Decrease	Decrease
Meyer et al. (2015)	France	Introduction of FTT	Decrease	No Change	N/A	N/A	N/A	Decrease
Capelle-Blancard and Havrylchyk (2016)	France	Introduction of FTT	Decrease	N/A	N/A	N/A	N/A	N/A
Umlauf (1993)	Sweden	Introduction of/ Increase in FTT	N/A	N/A	N/A	Decrease	N/A	N/A
Campbell and Froot (1994)	Sweden	Introduction of/ Increase in FTT	Decrease	N/A	N/A	N/A	N/A	N/A
Baltagi et al. (2006)	China	Increase in stamp duty	Decrease	N/A	Increase	N/A	Decrease	N/A
Deng et al. (2018)	China	Increase in stamp duty	Decrease	N/A	Increase	N/A	N/A	N/A
Chou and Wang (2006)	Taiwan	Increase in futures transaction tax	Decrease	Increase	No Change	N/A	N/A	N/A
Liu (2007)	Japan	Increase in FTT	N/A	N/A	N/A	Decrease	Decrease	N/A

Empirical Studies

United States

The United States does not have a federal FTT. New York has a small security transaction tax on the books, which gets fully rebated to market participants and is therefore equivalent to having no FTT. There have been no changes to the New York FTT since October 1, 1981. As a result, the empirical literature studying U.S. FTTs is highly limited.

The most relevant study is by Pomeranets and Weaver (2018). They studied the effect of changes to the New York FTT and a federal security transaction tax (that was repealed in 1966) on volatility, bid-ask spreads, and traded volume. From 1932 to 1981, there were nine changes to the size of the New York FTT, and from 1932 to 1966, there were three changes to the size of the federal FTT. For example, in July 1966, there was a twenty-five percent increase to the New York FTT; for shares selling above $20, the per share tax increased from $0.04 to $0.05.

Pomeranets and Weaver (2018) considered all continuously traded NYSE and AMEX stocks for the period of one year before and one year after each tax change. Volatility was measured as the standard deviation of daily returns. Bid and ask data were not available for US stocks during the time period being studied, so the authors estimated bid-ask spreads via proxy. For a majority of the tax events studied, the authors found that an increase in the tax was associated with a statistically significant increase in individual stock volatilities. Also, for nearly every tax event under study, the authors found that an increase in the FTT was associated with an increase in the size of the bid-ask spread and a decrease in trading volume. For example, the twenty-five percent increase in the New York FTT in July 1966 generated a 16 percent reduction in average volume.

Jones and Seguin (1997) studied a U.S. law that adjusted a different type of securities transaction cost: commissions. Effective May 1, 1975, Section 6(e)(1) of the Securities Exchange Act eliminated fixed commissions. Fixed commissions were replaced with lower negotiated commissions for transactions on U.S. stock exchanges. Meanwhile, there was no change in commission structure for over-the-counter securities. The reduction in commission payments is analogous to a reduction in an FTT from the perspective of analyzing transaction costs. Reductions in total transaction costs ranged from 4 percent to 19.7 percent. The authors were interested in potential changes to volatility resulting from implementation of the law. They compared NYSE/AMEX securities to over-the-counter Nasdaq securities for the period of one year before to one year after May 1, 1975. The authors found that a reduction in transaction costs generated a statistically significant and economically important *decrease* in the volatility of NYSE/AMEX portfolios relative to the Nasdaq portfolios; the decline in volatility for the portfolio of large stocks was nearly 50 percent.

Europe

United Kingdom

The United Kingdom has had a stamp duty, akin to an FTT, since 1694. The rate of the stamp duty, payable on the purchase price of shares, has varied over time. For example, in May

1974, the rate increased from 1 percent to 2 percent; in April 1984, the rate decreased from 2 percent to 1 percent; and in October 1986, the rate decreased from 1 percent to 0.5 percent, remaining at 0.5 percent since. The tax is levied on share transactions involving UK-incorporated companies.[8] The tax applies to overseas transactions that involve UK-incorporated companies, and it applies to parties regardless of whether or not they are residents in the UK.

Saporta and Kan (1997) were interested in studying how the United Kingdom's stamp duty affected the level and volatility of equity prices. They compared the prices of London Stock Exchange-traded stocks with the prices of their corresponding American Depositary Receipts (ADRs). The UK-listed companies were subject to the stamp duty, while the US-listed ADRs were not. The authors examined how the announcement of a change in the stamp duty rate affected UK- and US-listed companies. They found that the announcement of a tax increase generated a reduction in share price and had no effect on volatility.

Bond et al. (2005) examined the effect of a reduced stamp duty on share prices. To discern this relationship, they studied changes in share prices surrounding four events: the announcements of stamp duty rate changes in 1984, 1986, and 1990, and the implementation of the 1986 stamp duty cut six months following its announcement. The authors considered event windows of one to five trading days following the date of each event. They found that the announcement of a reduction in the stamp duty rate increased the price of shares. In particular, it increased the price of shares for larger firms relative to the price of shares for smaller firms. Larger firms are on average more frequently traded than smaller firms, which means that the tax change had a bigger price impact on more frequently traded stocks. There was no such differential impact on prices following the implementation date, likely because all information had already been incorporated into share prices.

Italy

The Italian FTT was announced on December 29, 2012 and introduced on March 1, 2013. The Italian FTT taxes shares traded on an exchange and shares traded over-the-counter (OTC) that are issued by Italian resident companies with a market capitalization of at least 500 million euros. In 2013, exchange-traded shares were taxable at a rate of 0.12%, and OTC shares were taxable at a higher rate of 0.22%. In 2014, exchange-traded shares were taxable at a rate of 0.1%, and OTC shares were taxable at a rate of 0.2%. Certain market participants are exempt from the tax, including market makers, mutual funds, and pension funds.

Hvozdyk and Rustanov (2016) were interested in determining the effect of Italy's FTT on liquidity as measured by bid-ask spreads and volatility for on-exchange trading. The event study windows that they considered have a duration of two months before and after the announcement of the FTT and two months before and after the implementation of the FTT. The authors found a slight increase in liquidity after the tax announcement date and a substantial decrease in liquidity after the tax introduction date. Order flow likely increased following the tax announcement date as traders sought to execute stock transactions before the tax was actually implemented. There

[8] Technically, physical share transfers are subject to the Stamp Duty, and electronic share transfers are subject to the Stamp Duty Reserve Tax at the same rate.

were no significant changes in volatility following either the tax announcement date or the tax introduction date.

Cappelletti et al. (2017) also studied how the Italian FTT affected on-exchange equity trading. They examined the daily prices of Italian stocks from March 2012 to September 2013, that is, for a window equal to twelve months before and six months after the introduction of the FTT. Since the FTT only targets the shares of companies with market capitalizations above 500 million euros, the authors' empirical strategy involved comparing the effect of the FTT on stocks above the size threshold with stocks below the size threshold as a control. The authors found that the FTT introduced by Italy in March 2013 widened the bid-ask spreads for covered stocks and increased volatility, but it left on-exchange trading volumes substantially unaffected. According to the authors, with the tax rate on OTC transactions essentially double the tax rate on transactions taking place on exchanges, there was likely a shift in transactions from over-the-counter to on-exchange trading that kept the trading volume for on-exchange trading from decreasing.

France

The French FTT was introduced on August 1, 2012 and originally taxed equity securities at a rate of 0.2 percent on each trade if the equity is issued by companies with registered offices in France and market capitalizations exceeding 1 billion euros as of December 1 of the previous year. This rate was later increased to 0.3 percent on January 1, 2017. Market makers are exempt from the French FTT. The August 1, 2012 bill also separately taxes high-frequency trading strategies that involve the cancellation of orders within a half-second time period. Once the cancellation rate for a broker exceeds a specified threshold, then the FTT applies a tax rate of 0.01 percent to the value of cancelled or modified orders.

Gomber et al. (2016) studied the impact of the French FTT on price volatility, trading activity, and order book depth observed for stocks in the CAC40 traded on the Euronext Paris. The short-term, medium-term, and long-term event windows that the authors studied consist of 10 days, 2 months, and 6 months before and after the FTT implementation event. The authors found that market volatility remained unchanged in the short-, medium-, and long-term. Trade executions decreased on average by 15 percent within two months after implementation of the FTT. The number of shares traded, decreased on average by 19 percent over the same time period. There was also an immediate decline in order book depth following introduction of the FTT and a widening of bid-ask spreads. These findings peaked in the short term, but they still held over 6 months. Price efficiency across trading venues declined as prices were more likely to be different for the same stock being traded on multiple trading venues.

Eichfelder et al. (2017) examined announcement effects following passage of the French FTT on March 14, 2012, and they examined both short-run and long-run effects following implementation of the FTT on August 1, 2012. The pre-announcement period had a duration of either two months, four months, or eight months. The short-run implementation period extended from August 1, 2012 to August 31, 2012, and the long-run implementation period began on September 1, 2012 and extended for either two months, four months, or eight months. The authors expected there to be a positive volume effect during the announcement period as traders executed stock transactions before the tax came into effect. The authors also expected to find a negative

short-run volume effect after the implementation of the FTT. Analyzing the Euronext Paris, with the London Stock Exchange and the Frankfurt Stock Exchange as controls, the authors indeed found a positive announcement effect and a negative short-run effect for trading volume following implementation of the FTT. Moreover, the authors found a decrease in stock prices at the beginning of the announcement period likely driven by anticipation of the tax. The announcement of the tax increased anticipated transaction costs, which decreased willingness-to-pay for stock, and thereby decreased stock prices. The authors found an increase in intraday volatility during the announcement period, and a decrease in weekly and monthly volatilities following implementation of the FTT.

Colliard and Hoffmann (2017) studied the effect of the 2012 French FTT on trading activity, volatility, price efficiency, and liquidity. Their sample consisted of Euronext stocks registered in France, Luxembourg, and the Netherlands. The authors compared the affected French stocks to the unaffected non-French stocks. The authors examined a five-month sample period from June 2012 to October 2012. They found that trading volume for French stocks decreased about 10 percent in September and October 2012 and they also found a decrease in price efficiency for French stocks and quoted depth. The FTT did not have a statistically significant effect on intraday volatility.

Meyer et al. (2015) studied the effect of the 2012 French FTT on trading intensity and liquidity. The authors focused on the Euronext Paris market and Chi-X comparing the stocks traded in those markets to stocks traded on London Stock Exchange that are not subject to the tax. The observation period was from June 2012 to September 2012, that is, two months before and after the August 1, 2012 introduction of the French FTT. The authors found that average daily trading volume per stock declined by 17.6 percent on Euronext Paris and 26.1 percent on Chi-X after the French FTT went into effect. The number of trades declined by 19.2 percent on Euronext Paris and 14.0 percent on Chi-X. Order book volume also decreased following the introduction of the French FTT. However, there was no statistically significant change to spreads. The number of price updates decreased by about 15 percent on both Euronext Paris and Chi-X. A decrease in price updates can indicate that prices are less efficient and therefore investors that execute on the Euronext Paris and Chi-X are getting worse prices for their orders due to the introduction of the FTT.

Capelle-Blancard and Havrylchyk (2016) examined the effect of introducing the French FTT on liquidity and volatility in equity markets. They compared large French firms with market capitalizations in excess of 1 billion euros against smaller French firms that are not subject to the tax and against foreign firms listed on Euronext that are also not subject to the tax. The study period consisted of 6 months before and 6 months after the August 1, 2012 event date. The authors studied liquidity by looking at volume traded, the bid-ask spread, and turnover, among other measures. They found that the introduction of the FTT generated a reduction in market volume, a decrease in turnover of stocks, and an increase in the bid-ask spread. The authors found that the introduction of the FTT generated no significant effect on volatility.

Sweden

Sweden introduced a comparatively large 1-percent FTT on equity and equity-derivative transactions in 1984 that was increased to 2 percent in 1986. Note that the size of Sweden's 2-percent FTT for equities was 10 times the size of the French FTT and nearly twenty times the size of the Italian FTT for equities. In 1989, Sweden also levied a tax on fixed-income securities equal to 0.002 percent for bonds with short maturities. The FTT on bonds was discontinued on April 15, 1990, and the FTT on equity transactions was repealed on December 1, 1991.

Umlauf (1993) studied equity index returns for stocks listed on the Stockholm Stock Exchange during the period 1980 to 1987. Umlauf (1993) found that the index declined 2.2 percent on the day that the 1-percent transaction tax was announced, and it declined 0.8 percent on the day that the 2-percent transaction tax was announced. According to the author, it is likely that investors incorporated the possibility of the tax into equity prices prior to the actual announcement date, meaning that the overall decrease in the index was probably greater. Umlauf (1993) also found that volatility for Swedish stocks increased after the introduction of the 2-percent tax.

Campbell and Froot (1994) presented certain facts on the effect of the Swedish FTT on both trading volume and trading location for equity and fixed income transactions. Equity trading volume in Sweden in 1986 was SEK 142 billion, and for the years 1987 and 1988, it decreased to SEK 125 billion and SEK 115 billion. In 1988, only 27 percent of trading in Ericsson, Sweden's most actively traded company, occurred in Stockholm. In that same year, for twenty large Swedish companies, only an average of 61 percent of trading occurred in Stockholm. The FTT had a larger impact on local trading volume for fixed income securities than for equities. During the first week in which the tax on bonds was implemented, bond trading volume fell approximately 85 percent relative to its summer 1987 level. The trading volume of fixed income securities was likely more sensitive to the tax than the trading volume of equities because, for the former, there existed many readily available substitutes. For example, bonds could be substituted with Swedish debentures and variable rate notes that were not subject to the tax.

Asia

In this section, we review studies evaluating the stamp duty in China, futures transaction tax in Taiwan and FTT in Japan. As noted earlier, our report does not address all FTTs that are (or have been) in place, as the impact on markets of all FTTs have not been studied. We therefore do not address stamp duties or FTTs in place in South Korea or Thailand, for example.

China

On July 1, 1990, China introduced a stamp duty of 0.3 percent on the transfer of equities, and it was borne by both parties to the transaction. Over the time period 1996 to 2009, there were seven adjustments to the magnitude of the stamp duty. For example, on May 10, 1997, the stamp duty increased from 0.3 percent to 0.5 percent.

Baltagi et al. (2006) studied the effect of the Chinese stamp duty on trading volume, market return volatility, and market efficiency. The authors focused on shares traded on the Shanghai

Stock Exchange and the Shenzhen Stock Exchange. The time period that they considered was six months before and six months after the increase of the stamp duty on May 10, 1997. Following the tax rate increase, trading volumes decreased 25 to 36 percent, market return volatility increased, and the market became less efficient.

Deng et al. (2018) similarly studied the effect of the Chinese stamp duty on trading volume and price volatility. However, they pursued a different empirical strategy. They instead considered a sample of Chinese stocks that were simultaneously listed in mainland China (A shares) and Hong Kong (H shares). The A shares and H shares therefore had identical corporate fundamentals but different transaction costs, with the two markets segmented due to capital controls. The time period studied was from 1996 to 2009, during which time there were seven adjustments to the magnitude of the Chinese stamp duty. To conduct their analysis, the authors focused on one year before and one year after each Chinese tax event. Deng et al. found that there was a negative relationship between the size of the stamp duty and trading volume for both individual stocks and the overall portfolio. As for volatility, the authors found that in more recent years, price volatility increased with increases in the stamp duty.

Taiwan

In Taiwan, there is a securities transaction tax that applies to the sale of stocks, bonds, and certain other securities as well as a futures transaction tax that applies to futures transactions on the Taiwan Futures Exchange. On May 1, 2000, the futures transaction tax *decreased* from 0.05 percent to 0.025 percent.

Chou and Wang (2006) studied the effect of a change to the Taiwanese futures transaction tax on bid-ask spreads, daily trading volume, and intraday price volatility for the TAIEX (Taiwan Stock Exchange Capitalization Weighted Stock Index Futures) futures contract. The authors considered the period of one year before and one year after May 1, 2000. They found that a decrease in the futures transaction tax decreased the bid-ask spread and increased trading volume. There were no significant changes in price volatility following the change to the futures transaction tax. Ironically, the study found that tax revenues from the futures transaction tax actually increased after the size of the tax decreased due to the corresponding increase in trading volumes.

Japan

In 1989, Japan decreased its FTT on equities transactions from 0.55 percent to 0.3 percent; and in 1999, the FTT was repealed entirely.

Liu (2007) studied the effect of reducing the FTT on both prices and price efficiency for stocks traded on the Tokyo Stock Exchange (TSE). The author's sample period included two years before and two years after the tax decrease on April 1, 1989. The author compared unaffected Japanese ADRs with the affected underlying Japanese stocks. The author found that the reduction in the Japanese FTT had a statistically significant positive price impact on the affected Japanese stocks. The author also found that the decrease in the FTT triggered a statistically significant increase in price efficiency for affected Japanese portfolios.

Conclusion

In this report, we reviewed the existing academic and policy research on the projected tax revenue from a hypothetical U.S. FTT and the impact of FTTs and similar taxes on financial markets and investors. Our research allows us to weigh the costs and benefits of an FTT. The primary costs of an FTT include increased trading costs for investors and lower stock prices, whereas the primary benefit would be the increased government services and spending associated with higher tax revenues.

In Part I, we reviewed eight tax revenue studies. FTT tax revenue is the FTT tax rate multiplied by the total taxable trading volume. However, we found that the studies did not provide a well-substantiated basis for estimating the tax revenue raised by a U.S. FTT as they failed to provide sufficient empirical support for their assumptions regarding the impact of an FTT on taxable trading volumes. The studies also did not provide for a useful range of estimates as they considered hypothetical FTTs with varying tax rates and applied them to different asset classes.

In Part II, we reviewed seventeen empirical studies of the impact of FTTs on markets and investors in the United States, Europe and Asia. We found that FTTs across the globe have had a consistently negative impact on markets and investors by increasing trading costs through a reduction in trading volume, order book depth and a widening of bid-ask spreads. FTTs have also had a demonstrated negative impact on stock prices.

We therefore conclude that estimates of the tax revenue that would be raised by hypothetical U.S. FTTs are unreliable, whereas there would clearly be negative effects on markets and investors. The existing empirical evidence therefore does not favor the adoption of a U.S. FTT.

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