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A step change in tax transparency?

An event study on how the automatic exchange of information did not affect Swiss banks

Tim B.M. Stolper*

December 10, 2017

Abstract

For decades the Swiss banking secrecy has made it a criminal act for banks in Switzerland to reveal information about their customers' identities. As of 2018, Switzerland will exchange banking information on foreign bank customers with the respective home countries on an automatic basis. This event study estimates the abnormal returns in the stock prices of Swiss banks around important milestones toward the automatic exchange of information. There is no evidence of significant or sizeable decreases in the market value of Swiss banks due to the new tax transparency. The minimum detectable effect sizes are moderate and suggest a high statistical power. The null results stand in reasonable contrast to a significant increase in the level of tax compliance among the owners of Swiss bank accounts.

Keywords: automatic exchange of information, banking secrecy, tax evasion

JEL codes: G21, G28, H26, K34

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1 Introduction

The wealth management business in tax havens is currently experiencing fundamental change. For decades strict banking secrecyes have concealed who owns the offshore wealth in tax havens and what income they derive from it. This environment has given rise to flourishing banking industries attracting many international customers, of whom many are believed to evade taxation in their home countries. As of 2018, more than one hundred countries have committed to exchanging financial account information for tax purposes on an automatic basis, including many of the countries that were previously renowned for their banking secrecyes.¹

The country which is possibly best known for its banking secrecy, and which is the world market leader for offshore wealth management, is Switzerland. It entrenched its banking secrecy into law in 1934, making it a criminal act to reveal the identity of a bank customer. Information on financial accounts and their owners could only be obtained with the subpoena by a Swiss judge in cases of severe criminal acts. Tax evasion, simply through the non-reporting of taxable income, is considered merely a misdemeanor, and not a criminal offense. Zucman (2013, 2014) estimates that 8% of the global financial wealth of households is held in tax havens, about one third thereof or, equivalently by the end of 2013, US \$2.4 trillion in Switzerland.² He also estimates that 80% of the European-owned wealth in Switzerland goes untaxed.³

On 6 May 2014, Switzerland joined the declaration on the automatic exchange of information in tax matters (AEOI) by the Organisation for Economic Co-operation and Development (OECD) (2014) and committed to the implementation of the information exchange by 2018.⁴ According to the AEOI, countries will obtain information from their financial institutions on financial accounts held by foreign investors and will automatically exchange that information with the investors' participating home countries. In order to prevent taxpayers from bypassing the new information exchange, the reporting standard was designed with a particularly wide scope – the information to be exchanged includes broad types of investment income, account balances, and sales proceeds from financial assets; the financial institutions required to report include banks, custodians, and certain investment vehicles; and the accounts to be reported include not only accounts held

¹For a list of all jurisdictions that have committed to implementing the automatic exchange of financial account information (AEOI), see <http://www.oecd.org/tax/transparency/AEOI-commitments.pdf> (last accessed on 15 February 2017).

²Zucman's estimates are smaller than other, non-academic estimates. In an industry survey, The Boston Consulting Group (BCG) (2014, p. 9f) estimates the global offshore wealth by private individuals at US \$8.9 trillion by the end of 2013, of which US \$2.3 trillion were held in Switzerland.

³A report by the US Senate (2014, p.61) estimates that, until 2008, between 85 and 95% of the US-linked accounts with Credit Suisse in Switzerland had been undeclared to US authorities.

⁴Note that Switzerland participates in the international exchange of financial account information on request since 2009, as studied in by Johannesen and Zucman (2014). Furthermore, financial account information is provided on an automatic basis to the US pursuant to the Foreign Account Tax Compliance Act (FATCA) as amended in 2010. Nevertheless, the offshore wealth in Switzerland is close to an all-time-high (Zucman 2014, pp.140f).

by individuals but also accounts held by entities, such as trusts and foundations. The reporting standard also requires to look through passive entities so as to identify the ultimate owner in control of an account. The OECD calls the implementation of the AEOI as the new global standard “another step change in international tax transparency” (OECD 2013). On the contrary, Knobel (2015) points out significant loopholes in the reporting standard. Most prominently, he reports that tax evaders can circumvent the new information exchange by acquiring sham residency certificates or by setting up a cleverly designed trust structure in the US.

This study provides the first empirical evidence on the impact of the automatic information exchange on the extent of offshore tax evasion in Swiss banks. Providing compelling evidence comes with two major challenges. First, the extent of offshore tax evasion is inherently difficult to observe.⁵ Second, the time span between Switzerland’s agreement to the new transparency and the first time the country will collect information on foreign account owners includes 2.5 years. It is therefore not clear when exactly banks and their customers would react to the new legal environment. This study applies a standard *event study* approach to analyze how the stock prices of banks in Switzerland reacted to news concerning the AEOI. This approach has two major advantages. First, stock prices are publicly available. Second, they capture the net present value of a firm’s expected future profits. In an efficient market, any new information that interferes with a firm’s future profitability will be immediately reflected in the stock price (Fama, 1991). If financial markets expect the AEOI to contract the market for evasion-related banking services, this will also most likely reduce the future earnings of Swiss banks and should be reflected by a decrease in their stock prices within a few trading days after it became more likely that Switzerland would participate in the AEOI.

The events that made the participation of Switzerland in the AEOI more likely were identified by systematically screening all front pages of *Neue Zürcher Zeitung* (NZZ), a leading newspaper in Switzerland. Any event that is important enough to affect the stock prices of Swiss banks is expected to appear on the front pages of Swiss newspapers. For the period January 2013 to October 2016, the screening identified 44 articles on the front pages of NZZ mentioning the AEOI. The main focus of the study is 6 May 2014, when Switzerland joined the OECD declaration committing to implement the AEOI by 2018. The following day, the NZZ headline declared “farewell to banking secrecy.” Furthermore, the analysis addresses important events prior to that date which may have signaled the increasing political pressure on Switzerland and the country’s changing attitude toward the AEOI. It also addresses an important event after that date which substantiated the actual implementation of the information exchange. Finally, the study provides an aggregated analysis of all 44 front page articles referring the AEOI.

⁵Slemrod (2016, pp.11f) reviews recent work on tax compliance and enforcement, and notes that almost all empirical analyses on tax evasion rely on indirect measures of evasion.

Of course, not every bank in Switzerland engages in and benefits from the tax evasion of its foreign customers. The analysis therefore considers a sample of banks that were identified by the US Department of Justice (DoJ) for having assisted US customers with offshore tax evasion. The first bank that faced criminal investigations in the US for its involvement in offshore tax evasion schemes was UBS in 2008. In the subsequent years, another 15 Swiss banks were subjected to criminal proceedings by the US. Ultimately, the US DoJ announced the *Swiss Bank Program*, in which banks could resolve their potential criminal liability if they fully disclosed their US cross-border activities and paid appropriate penalties. This program was used by a further 80 Swiss banks. By the time of writing, the vast majority of legal proceedings has been settled and produced penalties in the amount of US \$5.65 billion.⁶ After restricting the attention to listed banks with regular stock returns, the estimating sample for 6 May 2016 includes 37 banks with a known link to the offshore tax evasion business. The sample varies slightly over time because the ownership structures of banks sometimes change.

The event study specification regresses the return of the portfolio of Swiss banks on a major European stock market index and dummies indicating the days around important events concerning the AEOI. The European stock market index controls for normal or expected returns due to variations in the general market conditions. The main variables of interest are the dummies, which measure the daily abnormal returns in the stock prices of Swiss banks. By studying the return series of one portfolio instead of many individual stock return series, the analysis accounts for any cross-sectional correlation between the banks' stock returns. Moreover, the dummies are specified so as to account for any intertemporal correlation in the estimated abnormal returns.

The results suggest that Switzerland's commitment to implementing the AEOI was followed by a modest negative return in the stock prices of Swiss banks, which was limited to a small number of banks. The cumulative abnormal return over four days was as small as -0.2% for the entire sample of Swiss banks and -0.7% for those Swiss banks that were subject to individual investigations in the US. Both estimates are statistically not different from zero for conventional significance levels. That is although the standard errors are moderately sized and the resulting minimum detectable effect sizes are well below the estimates of a similar event study on data leaks from banks in tax havens (Johannessen and Stolper 2017). This suggests that the null results are not a consequence of low statistical power, but rather that they are caused by a lack of effect. The null results are also robust for further selected events that might have affected the financial market expectations. Finally, of the total of 44 NZZ front page articles with a reference to the AEOI, only two were followed by a sizeable abnormal drop in the stock prices of Swiss banks. However, the exact timing and the close similarity with the abnormal performance of the *Swiss Market Index*, a major index for the entire Swiss stock market,

⁶For more information on the legal proceedings, see <https://www.justice.gov/tax/offshore-compliance-initiative>, and for more information on the Swiss Bank Program, see <https://www.justice.gov/tax/swiss-bank-program> (last accessed on 15 February 2017).

suggest that the stock price drops might have been driven by factors other than the new tax transparency.

These findings are suggestive that financial markets expected the AEoI to have no sizeable impact on the future profits of Swiss banks. This does not necessarily imply that the AEoI had no effect on offshore tax evasion. Previously tax non-compliant customers may become compliant and still keep their assets with banks in Switzerland. However, I am not aware of any evidence suggesting that funds in Swiss banks have been disclosed to foreign tax authorities in a similar amount like the offshore wealth in Switzerland that was estimated to go untaxed by the end of 2013 – around US \$2 trillion. It seems also unlikely that the entire undeclared offshore wealth in Swiss banks becomes tax compliant and remains in Switzerland. A more plausible explanation seems to be that the market for evasion-related banking services remained unaffected, and that the AEoI might not have increased the level of tax compliance among the owners of Swiss bank accounts.

To my knowledge, this study is the first to provide empirical evidence on the effect of the automatic exchange of information on offshore tax evasion. It contributes to the literature assessing previous policy initiatives in this field. Johannesen and Zucman (2014), for example, address the information exchange on request, which was implemented as the new global standard in 2009. They find that, rather than repatriating funds, tax evaders relocate their offshore wealth to less compliant tax havens in an attempt to circumvent the new information exchange. Johannesen (2014) identifies similar relocation patterns in response to the European Savings Directive. The directive was implemented in 2005 and included an anonymous withholding tax on interest income from countries with banking secrecy. The Savings Directive has also been studied by Hemmelgarn and Nicodeme (2009) and Klautke and Weichenrieder (2010) with no evidence on an increase in the level of tax compliance. Langenmayr (2015) shows that programs with reduced penalties for tax evaders who voluntarily disclose their offshore assets increase the extent of evasion, but also increase tax revenues net of administrative costs by tax authorities. Finally, in a similar event study to this one, Johannesen and Stolper (2017) provide evidence that the acquisition of stolen customer files from banks in tax havens by authorities in high-tax countries did reduce the hidden wealth in Switzerland.

Furthermore, as an empirical evaluation of a policy initiative, this study is closely related to the theoretical literature on how policy initiatives should be designed to effectively reduce offshore tax evasion. Elsayyad and Konrad (2012) argue for a simultaneous approach against all tax havens rather than addressing one haven after the other. In a sequential approach, the fewer active tax havens there are, the more market power they concentrate. The last tax havens are therefore very profitable and resilient against political pressure from the international community. Konrad and Stolper (2016) identify strategic complementarities in the compliance decisions of a haven country and many individual tax evaders. Whether or not the fight against tax havens will be successful is therefore determined in a many-player coordination game. Their analysis highlights a

trade-off between the fight against tax havens and high tax rates or, similarly, low penalties for revealed tax evasion. Finally, Dharmapala (2016) argues that an information exchange regime can increase evasion by increasing the costs of tax compliance.

2 Background and data

2.1 Important milestones toward the AEoI

The study tracks the development from Switzerland’s banking secrecy to the new global standard of tax transparency as captured on the front pages of the leading Swiss newspaper *Neue Zürcher Zeitung* (NZZ).⁷ The underlying reasoning is to use the front page of NZZ as a proxy for important events in and concerning Switzerland. As the banking secrecy was long considered to be part of Switzerland’s national identity and as an automatic exchange of information (AEoI) stands in strong conflict with it, any important step toward the new information exchange is expected to show up on the front pages of Swiss newspapers. To identify such events, all NZZ front pages between January 2013 and November 2016 were systematically screened for references to the AEoI. The screening included a keyword search for “steuer” (tax), “info” (information), “daten” (data), and “bank” (bank), and manually reading all headlines on the front pages. The article of every potential hit was then checked for a reference to the AEoI. Each article was also searched for an indication of when the event under consideration took place. If an article did not mention the time of event, it was assumed that it had taken place one calendar day prior to the article’s date of publication.⁸ This approach identified 44 front page articles that refer to the AEoI.

Most prominently, NZZ headline read “farewell to banking secrecy” after, on 6 May 2014, Switzerland joined the OECD declaration on the automatic exchange of information in tax matters. In the declaration, all 35 OECD member countries along with 13 non-member countries committed to implementing the AEoI (OECD, 2014). Because this declaration was Switzerland’s first official confirmation that it would comply with the new global standard of tax transparency and because NZZ called it the end of the Swiss banking secrecy on its next day’s front page, this date is the main focus of the analysis.

Furthermore, it is conceivable that major events prior to Switzerland’s commitment might have indicated the rising international pressure on Switzerland and the country’s changing attitude toward the AEoI, and made stock markets anticipate the political deci-

⁷This is neither to assume that traders who drive market prices read NZZ nor that they read only the front page.

⁸As newspapers merely mention the time of day when events take place, it was assumed that the events happened before the stock exchanges in Switzerland closed. If an event actually took place after stock markets had closed, the event’s impact on the banks’ stock prices is measured with a delay of one day.

sion later on. Similarly, the commitment does not yet ensure the actual implementation of the information exchange. Stock markets might still have been in doubt as to whether or not Switzerland will live up to its promise. The analysis therefore addresses further selected events which might have been particularly important for the market expectations regarding the future of the Swiss banking secrecy. The selected events are listed in Table 1.

Events #1–#5 account for the potential anticipation effects on stock markets. Luxembourg and Austria are the two countries in the EU that used to have banking secrets similar to the one in Switzerland. Their agreements to the AEOI created the necessary unanimity to adjust EU regulations and induced the EU to increase political pressure on nearby third countries, such as Switzerland, to also join the new information exchange. Also, when the information exchange on request was implemented as the new global standard in 2009, Luxembourg, Austria, and Switzerland aligned their strategies and announced their cooperation on the very same day. The decision of one of the countries to cooperate might therefore have been interpreted as a signal about the bargaining power of the two other countries. Moreover, the first endorsement of the AEOI as the expected global standard by the G20 countries might have signaled a new international consensus on the future of tax transparency. Switzerland’s willingness to contribute to the development of the AEOI standard as well as to negotiate on the AEOI with the EU might have indicated a change in the country’s strategy regarding the new information exchange. Event #6 concerns Switzerland’s commitment to the AEOI and is the main focus of the analysis. Ultimately, Event #7 concerns the treaty signature for the AEOI between Switzerland and the EU. Because most of the offshore wealth in Switzerland is owned by Europeans (Zucman 2013, pp. 1,332ff), the exchange of information with the EU substantiates Switzerland’s willingness to cooperate.

Finally, the study also includes an aggregated analysis of all front page articles with a reference to the AEOI. This ensures that the selection of events above does not disregard an important milestone in Switzerland’s transition to the new tax transparency.

2.2 Swiss banks benefiting from offshore tax evasion

Of course, not every Swiss bank is involved in offshore tax evasion schemes, and including banks that derive no earnings from the evasion business would bias the estimation results toward zero. In order to limit the focus on affected banks, the analysis considers a sample of banks that were identified by the US Department of Justice (DoJ) for having assisted US clients with offshore tax evasion.

The first bank that was identified in 2008 is UBS. When the former customer Igor Olenicoff was sentenced for evading taxes offshore, he blamed his evasion on bad financial advice from, among others, his UBS banker Bradley Birkenfeld. The bank employee,

Table 1: Important milestones toward the AEoI

Event number	Date of event	Date of front page article	Event	Acronym
#1	10 apr 2013	11 apr 2013	Luxembourg announced the implementation of the AEoI with the EU as of 2015	LUX
#2	-	22 apr 2013	G20 countries endorsed the AEoI as the expected new standard	G20
#3	26 apr 2013	29 apr 2013	Austria announced the approval of the AEoI with the EU	AUT
#4	-	15 jun 2013	Switzerland decided to contribute to the OECD developing a new global standard but not to offer the AEoI to the EU	OECD
#5	18 dec 2013	19 dec 2013	Switzerland passed a mandate for negotiations on the AEoI with the EU	EU I
#6	6 may 2014	7 may 2014	Farewell to banking secrecy: Switzerland joined the OECD declaration and committed to the implementation of the AEoI	Main
#7	27 may 2015	28 may 2015	Switzerland signed the treaty concerning the AEoI with the EU	EU II

Note: The table provides information on all events that are considered important milestones in the development from Switzerland's banking secrecy to the automatic exchange of financial account information (AEoI). The date of event is the date mentioned in the article, the storylines are the author's own summaries and translations from German, and the acronyms are used for cross-referencing in Table 4.

when charged with conspiracy to defraud the US of tax payments, cooperated with the US authorities and pointed them toward systematic tax evasion practices of UBS. The following legal proceedings against the bank for conspiracy to evade taxes resulted in a settlement including not only a penalty of US \$780 million but also an extensive exchange of information on 4,450 US customers, including where customers transferred their money to if they had closed the account in the recent years before the settlement.⁹

Potentially due to the resulting information from the UBS case, the US authorities investigated another 15 Swiss banks on similar charges throughout the following years.¹⁰ At the time of writing, six of these cases had been settled with combined penalties of US \$4.29 billion, seven are still pending, and three of the investigated banks have ceased their operations.¹¹ Finally, in August 2013 and in consultation with the Swiss government, the US DoJ announced the *Swiss Bank Program*, which allowed Swiss banks not already under investigation to resolve potential criminal liabilities from their US cross-border business. A participation in the program required, among others, complete disclosure of a bank's cross-border activities, cooperation with future information requests, and the payment of appropriate penalties. The last banks in the Swiss Bank Program entered non-prosecution agreements with the US DoJ in January 2016. In total, the program has produced non-prosecution agreements for a further 80 Swiss banks and has resulted in payments of more than US \$1.36 billion in penalties.¹²

The identification of Swiss banks by the US DoJ comes with two advantages. First, it yields a sample of banks that are known to derive earnings from the offshore tax evasion of their customers. If the automatic information exchange contracts the market for evasion-related banking services in Switzerland, the future profits and so also the stock prices of these banks can be expected to decline.¹³ Second, the identification allows for heterogeneity analyses in the cross-section of Swiss banks and thereby for inference on the subsample of banks that are likely to be most strongly involved in the business with

⁹For more information on the settlement between the US DoJ and UBS, see <https://www.justice.gov/opa/pr/ubs-enters-deferred-prosecution-agreement> (last accessed on 15 February 2017).

¹⁰To the knowledge of the author, there is no official list of all 16 banks under investigation, but they are mentioned in numerous news articles. One article that lists all the banks can be found on the Swiss public service news and information platform Swissinfo, see http://www.swissinfo.ch/eng/credit-suisse-fallout_remaining-hit-list-banks-sweat-over-us-verdicts/38637818 (last accessed on 15 February 2017).

¹¹The three banks that have gone out of business are Wegelin, Neue Zürcher Bank, and Bank Frey. For more information on the legal proceedings of the US DoJ against offshore tax evaders and the financial institutions assisting them, see <https://www.justice.gov/tax/offshore-compliance-initiative> (last accessed on 15 February 2017).

¹²For more information on the Swiss Bank Program, see <https://www.justice.gov/tax/swiss-bank-program> (last accessed on 15 February 2017).

¹³The prevalence of tax evaders with accounts in Swiss banks might have declined in response to the American and other enforcement initiatives, but they are unlikely to have vanished completely by May 2014, which is the period of main interest in this study shortly after the Swiss Bank Program was announced. Furthermore, the enforcement initiatives by the US targeted US tax evaders and are likely to have mainly reduced their occurrence in Swiss banks. The AEOI targets tax evaders from almost all other countries.

the offshore secrecy. For example, it is possible to distinguish the banks as to the size of the penalty they paid in the US, and as to whether they were investigated individually or entered the group resolution program.

Because event studies rely on stock returns, the estimating sample disregards all banks that are not listed on a stock exchange. Banks can either be listed themselves or have a listed parent entity – for example, the Swiss bank *HSBC Private Bank*, as identified by the US DoJ, is a subsidiary of the listed, UK-based company *HSBC Holdings PLC*.¹⁴ This approach yields 44 entities that are a Swiss bank or own subsidiaries that are Swiss banks for some period between 2012 and 2016. For simplicity, these companies are referred to as *Swiss banks* throughout the paper, while strictly speaking they also include non-Swiss companies and other companies than banks. Two of these companies are excluded from the estimating sample because they are classified neither as a bank nor as a financial services provider according to the Industry Classification Benchmark (ICB). A change in the Swiss banking secrecy is therefore not expected to have a strong impact on their stock prices.¹⁵ This yields an estimating sample of 42 Swiss banks, which are listed in Table A in the Appendix.

2.3 Stock market data

All stock market information was downloaded from Bloomberg for the period 1 January 2012 to 31 October 2016. It includes daily stock and index prices as well as banks' industry classification. As most banks under consideration are listed in Switzerland and their stock prices are denoted in Swiss francs, all prices were downloaded as denoted in Swiss francs to alleviate exchange rate effects.

The simple stock return $sreturn_{n,t}$ for bank n on trading day t is derived from the bank's daily total return index, which accounts for all stock earnings including capital gains and dividend payments. It is calculated as

$$sreturn_{n,t} = \frac{p_{n,t} - p_{n,t-\tau}}{p_{n,t-\tau}}, \quad (1)$$

where $p_{n,t}$ denotes the total return index of bank n on trading day t , and $t - \tau$ denotes the latest Swiss trading day with a total return index observation for bank n prior to day t . All observations from non-trading days in Switzerland are excluded to rule out a small subset of banks, which are listed outside of Switzerland, from dominating the analysis

¹⁴The current parent entities of Swiss banks are identified in Bloomberg, and any changes to the parent-subsidiary links are identified in an extensive online research using the banks' own homepages, Wikipedia, and <http://www.schweizer-banken.info/> (last accessed on 15 February 2017). In case of multiple listed parent entities on different hierarchy levels, the lowest ranked listed parent entity was chosen in order to include as few unaffected entities as possible.

¹⁵Here, Assicurazioni Generali SpA, an insurance company, and Italmobiliare SpA, a construction and materials company, are excluded from the estimating sample.

Table 2: Summary statistics on stock market returns

	Mean	Standard deviation	Minimum	Maximum
Individual banks	0.0	1.8	-11.5	11.0
Portfolio of banks	0.0	0.9	-7.6	3.0
Stoxx Europe 600	0.0	1.2	-11.7	4.3

Note: The table provides summary statistics for the stock market returns (in percent) of the 42 Swiss banks in the estimating sample and of a major European stock market index. All statistics are for the period between 1 January 2012 and 31 October 2016. The first line refers to the stock returns of individual sample banks; the second line to the portfolio return computed as the average of individual bank returns; the third line to the stock market index *Stoxx Europe 600*.

on such days.¹⁶ For example, three banks investigated in the US for their involvement in offshore tax evasion are listed in Israel, where stocks are typically traded from Sunday through Thursday. Again, for the sake of simplicity, this paper refers to trading days, while strictly speaking it considers only trading days in Switzerland.

Furthermore, to ensure that stale stocks which are rarely traded do not bias the estimates toward zero, a bank's return observations are excluded from the analysis during times when the bank's end-of-day stock price remained constant or was missing for at least five consecutive trading days. Also, to reduce the impact of outliers, stock returns are winsorized at the top and bottom $1/1,000^{th}$ of returns.¹⁷ Table 2 provides summary statistics of the resulting stock market returns. Across all Swiss banks, the daily stock returns varied between -11.5% and 11.0%, with a mean of 0.0% and a standard deviation of 1.8%. Table 2 also includes the statistics for an equally weighted portfolio of the Swiss banks and a major index for the European stock market, the *Stoxx Europe 600*.¹⁸

3 Event study methodology

The effect of the AEOI on the Swiss banks is inferred using a standard event study specification.¹⁹ It elicits how the stock prices of Swiss banks responded to important events which made it more likely that Switzerland would exchange information for tax purposes on an automatic basis. The analysis proceeds in three steps.

¹⁶Trading days in Switzerland are defined as days when the *Swiss Market Index* was traded. They typically include weekdays from Monday through Friday except bank holidays.

¹⁷For an event study with similar adjustments of the stock returns, see, e.g., Della Vigna and La Ferrara (2010).

¹⁸Precisely speaking, the portfolio in Table 2 is an unbalanced portfolio that reflects the time-varying parent-subsidiary links. In contrast, the event study specification considers an event-specific balanced portfolio. Furthermore, the index return is calculated similarly to the stock returns, ignoring observations from non-trading days in Switzerland.

¹⁹An introduction to the methodology of event studies can be found, e.g., in the textbook by Campbell et al. (1997) and the handbook article by Kothari and Warner (2007).

The first step determines an event-specific sample and observation period for each event under consideration. The sample includes all Swiss banks identified by the US DoJ and listed in Table 3.A, which are Swiss banks themselves or own subsidiaries which are Swiss banks for the entire week after the event under consideration, which is when the effect of main interest is estimated. Furthermore, the sample requires the banks to have at least one return observation during that week. The observation period includes five stock market closures before and after the event, which constitutes the event window, and 250 trading days prior to the event window, which constitutes the estimation window and depicts roughly one calendar year. The period of main interest are the days after an event, but the event window also includes some days prior to the event to identify potential anticipation effects. Each event-specific observation period thus includes 260 trading days $t \in \{-254; 5\}$, and $t = 1$ marks the respective event date. The number of banks included in each sample varies slightly across events as parent-subsidiary links sometimes change, and it is included in the regression tables.

The second step compiles the sample banks into a daily rebalanced, equally-weighted portfolio. By studying the return series of one portfolio instead of many stock return series of individual banks, the analysis does not require the stock returns of individual banks to be independent. Rather it takes into account any cross-sectional correlation between them. This step is particularly important because many unaccounted sources for variation in the stock prices, such as changes in the general market conditions in Switzerland, might affect many sample banks similarly and may induce a correlation in the banks' stock returns. The equal weighting of the banks and the daily rebalancing of the portfolio gives each bank in the sample an equal emphasize when eliciting the effect size. Note that the simple portfolio return on a given day t is thereby just the average of the individual stock returns of all sample banks on that day $\frac{1}{N} \sum_{n=1}^N sreturn_{n,t}$, where $n \in \{1, \dots, N\}$ is the set of banks included in the event-specific sample with a return observation on day t . Moreover, to permit for the aggregation of returns over multiple days, the portfolio return $preturn_t$ for day t is calculated as the continuously compounded return and is given by

$$preturn_t = \ln \left(1 + \frac{1}{N} \sum_{n=1}^N sreturn_{n,t} \right). \quad (2)$$

The third step regresses the portfolio return on the return of major index for the European stock market and dummy variables for each day in the event window. The main interest concerns the cumulative abnormal return CAR of the portfolio in the event window, which is defined as the sum of the daily abnormal portfolio returns AR_t such

that

$$CAR_T = \sum_{t=1}^T AR_t \quad \text{for } 1 \leq T \leq 5 \quad (3)$$

$$CAR_T = \sum_{t=0}^T AR_t \quad \text{for } -4 \leq T \leq 0. \quad (4)$$

In order to directly estimate $CARs$ and their correct standard errors, which account for any intertemporal correlation in the estimated abnormal returns, the dummies in the event window are specified according to Salinger (1992). The dummy specification uses the fact that the abnormal return on the event day AR_1 is also the cumulative abnormal return on that day $CAR_1 = AR_1$, and that the abnormal returns on subsequent days AR_t for $t > 1$ can be written as the difference of two cumulative abnormal returns $AR_t = CAR_t - CAR_{t-1}$. A similar logic applies to the (cumulative) abnormal returns in the event window prior to the event. The resulting regression equations are

$$preturn_t = \alpha + \beta mreturn_t + \varepsilon_t \quad \text{for } t \leq -5 \quad (5)$$

$$preturn_1 = \alpha + \beta mreturn_1 + CAR_1 + \varepsilon_1 \quad \text{for } t = 1 \quad (6)$$

$$preturn_t = \alpha + \beta mreturn_t + CAR_t - CAR_{t-1} + \varepsilon_t \quad \text{for } t \geq 2, \quad (7)$$

where $mreturn_t$ is the continuously compounded return of the Stoxx Europe 600 on day t and CAR_v , for $1 \leq v \leq 5$, are coefficients of dummy variables that are equal to 1 for $t = v$, equal to -1 for $t = v + 1$, and zero otherwise.²⁰ For $-4 \leq t \leq 0$ the regression equations are similar to the equations for $1 \leq t \leq 5$ with CAR_{-w} , for $1 \leq w \leq 5$, as coefficients of dummy variables that are equal to 1 for $t = 1 - w$, equal to -1 for $t = -w$, and zero otherwise.²¹

The coefficient β reflects the correlation of the portfolio return with the return of the Stoxx Europe 600. So $\alpha + \beta mreturn_t$ captures the expected or normal portfolio return conditional on the European market return on that day and in the absence of any particular event affecting Swiss banks. The abnormal return is the actual portfolio return minus its expected or normal return if there had not been an event. Finally, the coefficients CAR_T capture the portfolio's cumulative abnormal return during the event window.

²⁰The Stoxx Europe 600 was chosen to control for general market conditions because almost all sample banks are headquartered in Europe and because, in regressions not reported in this dissertation, it explained more of the variation of the portfolio return than the major European blue chip index Stoxx Europe 50. It also qualifies as a control as changes in the Swiss banking secrecy are unlikely to affect the entire European market. This seems less clear for indices of the Swiss market – for example, UBS and Credit Suisse alone account for around 10% of the Swiss Market Index. (See the factsheet for the Swiss Market Index-family, available at https://www.six-swiss-exchange.com/indices/data_centre/shares/smi_en.html, last accessed on 15 February 2017).

²¹Note that CAR_5 is equal to 1 for $t = 5$ and zero otherwise, as $t = 6$ is not included in the observation period. Similarly CAR_{-5} is defined to be equal to 1 for $t = -4$ and zero otherwise.

4 Results

4.1 Switzerland’s commitment to the AEOI

The main event under consideration took place on 6 May 2014, when Switzerland joined the declaration of the OECD Council Meeting, in which all 34 OECD member countries along with 13 non-member countries committed to the implementation of the AEOI. NZZ reported about the event as the “farewell to banking secrecy.”

Figure 1 illustrates the cumulative abnormal return of Swiss banks immediately before and after Switzerland’s commitment. In the week after the declaration, the stock prices of Swiss banks experienced a persistently negative yet very small cumulative abnormal return of between -0.1 and -0.2%. The cumulative abnormal return in the week before the commitment was not persistently positive or negative and accumulative to +0.1%, which does not suggest a significant anticipation effect. Neither the cumulative abnormal return before nor after the commitment are statistically significantly different from zero.

In order to investigate whether the sample of Swiss banks may be too broad and include too many banks for which the banking secrecy is not important enough such that changes thereof would move their stock prices, the same event study specification is performed on two sample splits. The aim is to explore whether or not there exists a subsample of banks that experienced a sizeable and significant decrease in their market values after Switzerland committed to the AEOI.

The first sample split distinguishes the nine banks that were subjected to criminal investigations by US authorities and the 28 banks that voluntarily disclosed their US cross-border activities in the course of the Swiss Bank Program. It is plausible to assume that the US authorities selected Swiss banks for investigation based on *ex ante* information about the banks’ involvement in offshore tax evasion schemes. If financial market participants had similar information, a contraction in the market for evasion-related banking services should affect the stock prices of the banks that were investigated more strongly than those that entered the self-disclosure program.

The second sample split distinguishes the banks according to the penalties that they ultimately paid in the US. The size of the penalty can be expected to reflect a bank’s criminal exposure from assisting US customers in tax fraud and can therefore serve as an *ex post* measure of a bank’s involvement in offshore tax evasion. Again, a contraction in the market for evasion-related banking services can be expected to affect banks with higher penalties more strongly than banks with smaller penalties.²² Note that both measures for the banks’ exposure to offshore tax evasion are closely related as the penalties

²²The results are qualitatively similar if the sample is split according to the banks’ penalties relative to a measure of their size, such as total assets or market capitalization.

Figure 1: Cumulative abnormal return of Swiss banks around Switzerland's commitment to the AEoI

Note: The figure illustrates the results from the event study specification applied to the event of main interest, Switzerland's commitment to the automatic exchange of financial account information (AEoI) at the OECD Ministerial Council Meeting on 6 May 2014. The line shows the estimates of the cumulative abnormal return. The gray bars indicate 95% confidence intervals of the estimates accounting for cross-sectional and intertemporal correlation in the abnormal returns.

which were paid by the banks under investigation were typically higher than the penalties paid by the banks that participated in the resolution program.²³

Table 3 provides the results from the event study on Switzerland’s commitment to the AEoI for different subsamples of Swiss banks. The results for the entire sample of Swiss banks are shown in Column (1) for ease of comparison. With regard to the first sample split, Column (2) shows the results for the Swiss banks under investigations in the US, and Column (3) for the banks that participated in the Swiss Bank Program. The investigated banks experienced a stronger cumulative abnormal decrease in their stock prices of up to -0.7% over four days after the commitment, and which were persistently negative. The banks in the Swiss Bank Program experienced cumulative abnormal variations in their stock prices between -0.2 and +0.1%. A similar pattern exists for the second sample split as reported in Columns (4)–(5). Stock prices of banks that paid a penalty weakly above the sample median responded more strongly with a persistently negative cumulative abnormal return of up to -0.6% over four days after the commitment, while stock prices of banks that paid a penalty below the sample median responded with a cumulative abnormal return of between -0.2 and +0.2%. Still, for all subgroups and the entire week after Switzerland committed to the AEoI, cumulative abnormal returns were statistically not significantly different from zero.

The results suggest that the modest abnormal return of the portfolio of all Swiss banks after Switzerland’s commitment to the AEoI was driven by those banks that are most strongly involved in the offshore tax evasion business. However, even for those banks, independent of how they were defined, the cumulative abnormal return was small and statistically not significantly different from zero.

In order to distinguish between a lack of effect and a lack of statistical power, the remainder of this section computes and discusses the minimum detectable effect sizes (*MDE*) for the cumulative abnormal return over four days, which is when the estimates are the largest. For a statistical power of 80% and a significance level of 5%, the *MDE* is given by

$$MDE = - (t_{(1-0.8)} + t_{0.05/2}) \cdot SE \left(\widehat{CAR}_4 \right), \quad (8)$$

where t is obtained from a standard t -distribution and $SE \left(\widehat{CAR}_4 \right)$ is the standard error of the cumulative abnormal return coefficient. With $t_{0.2} = 0.84$ and $t_{0.025} = 1.97$, the expression simplifies to

$$MDE = -2.81 \cdot SE \left(\widehat{CAR}_4 \right). \quad (9)$$

The minimum effects that would have been detected at a 5% significance level with a probability of 80% are therefore -1.7% for the entire sample of Swiss banks and -3.1% for the Swiss banks under investigation.

²³See Table A in the Appendix for information on all the Swiss banks in the estimating sample and the penalties they paid.

Table 3: Regression results for Switzerland's commitment to the AEoI

	All (1)	Criminal investigation (2)	Swiss Bank Program (3)	High penalty (4)	Low penalty (5)
CAR 1	-0.1 (0.3)	-0.0 (0.5)	-0.2 (0.3)	-0.4 (0.4)	0.1 (0.4)
CAR 2	-0.2 (0.4)	-0.5 (0.8)	-0.1 (0.5)	-0.1 (0.6)	-0.2 (0.5)
CAR 3	-0.1 (0.5)	-0.7 (0.9)	0.1 (0.6)	-0.2 (0.7)	0.1 (0.6)
CAR 4	-0.2 (0.6)	-0.7 (1.1)	-0.1 (0.6)	-0.6 (0.8)	0.2 (0.7)
CAR 5	-0.2 (0.7)	-0.4 (1.2)	-0.1 (0.7)	-0.6 (0.9)	0.2 (0.8)
Stoxx Europe 600	68.1*** (2.1)	87.7*** (3.7)	62.1*** (2.2)	85.6*** (2.9)	43.9*** (2.5)
Constant	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Observations	260	260	260	260	260
R-squared	0.8	0.7	0.8	0.8	0.6
Banks in sample	37	9	28	17	16

Note: The table shows the results (in percent) from the event study specification applied to Switzerland's commitment to implement the automatic exchange of financial account information (AEoI) at the OECD Ministerial Council Meeting on 6 May 2014. Column (1) refers to all Swiss banks; (2) to Swiss banks that were subjected to criminal investigations in the US for their role in offshore tax evasion; and (3) to Swiss banks that have admitted to criminal tax-related offences under the Swiss Bank Program. Column (4) includes only the Swiss banks that have paid penalties weakly above the sample median; (5) includes only the Swiss banks that have paid penalties below the sample median. All regressions include a set of event time dummies as described in the main text. Standard errors are provided in parentheses and take account for cross-sectional and intertemporal correlation in the abnormal returns. *** Significant at the 1% level.

For comparison, in a similar event study, Johannesen and Stolper (2017) assess the abnormal stock price performance of Swiss banks after former employees of banks in tax havens leaked information on the owners of secret offshore accounts to foreign tax authorities or public media. Four days after the first data leak of this kind, they estimate abnormal drops in the stock prices of Swiss banks of -2.2% for the entire sample of Swiss banks, and -6.1% for the Swiss banks under investigation in the US. Both estimates are well above the *MDE* of this study.²⁴ Rather than a lack of statistical power, the moderately sized standard errors and the resulting minimum detectable effect sizes indicate that financial markets expected Switzerland’s commitment to the AEoI to have no sizeable impact on the future profits of Swiss banks.

4.2 Further selected milestones toward the AEoI

One criticism on the analysis above is that the OECD declaration, including Switzerland’s commitment to the new standard of tax transparency, might not have been the one single event indicating that Switzerland would participate in the AEoI. This section therefore addresses further important milestones toward the new tax transparency standard.

Table 4 provides estimates from the same event study specification applied to further events that are selection in Section 2.1 and listed in Table 1. To account for indications of the increasing international pressure on Switzerland and the country’s changing attitude prior to the OECD declaration, the following events are considered: 10 April 2013, when Luxembourg announced the implementation of the AEoI with the EU by 2015 (Column 1); 21 April 2013, when for the first time the G20 finance ministers and central bank governors endorsed the AEoI as the expected new global standard (Column 2); 28 April 2013, when Austria announced its approval of the AEoI with the EU (Column 3); 14 June 2013, when Switzerland announced its willingness to contribute to the development of, but not to participate in, the AEoI (Column 4); and 18 December 2013, when Switzerland passed a mandate for negotiations on the AEoI with the EU (Column 5). For ease of comparison, Column (6) provides the results for 6 May 2014, the date of main interest discussed previously, when Switzerland joined the OECD declaration committing to the AEoI. Moreover, to account for doubts as to whether or not Switzerland would live up to its commitment, Column (7) refers to 27 May 2015, when Switzerland signed the AEoI treaty with the EU, which substantiated its willingness to cooperate.

²⁴The results of Johannesen and Stolper (2017) shall serve as an example of how the stock prices of Swiss banks can react to important events concerning the Swiss banking secrecy. Note, however, that the effects in both setups may differ for several reasons. On the one hand, for example, a data leak is arguably more surprising than a political decision, and may therefore cause stronger stock price reactions. On the other hand, data leaks typically affected between some hundreds and several thousands of bank customers from one financial institution, whereas the AEoI is designed to systematically reveal foreign account holders and should therefore be expected to cause a stronger increase in the level of tax compliance.

Table 4: Regression results for further important milestones toward the AEoI

	LUX	G20	AUT	OECD	EU I	Main	EU II
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CAR 1	0.2 (0.5)	-0.2 (0.5)	0.3 (0.5)	0.1 (0.5)	-0.0 (0.4)	-0.1 (0.3)	-0.2 (0.3)
CAR 2	-0.1 (0.7)	-0.6 (0.7)	0.7 (0.7)	0.0 (0.6)	-0.4 (0.5)	-0.2 (0.4)	-0.1 (0.5)
CAR 3	0.3 (0.8)	-0.5 (0.8)	1.5* (0.8)	0.0 (0.8)	0.1 (0.6)	-0.1 (0.5)	0.3 (0.6)
CAR 4	0.6 (1.0)	-0.6 (1.0)	1.8* (1.0)	-0.3 (0.9)	0.3 (0.7)	-0.2 (0.6)	0.5 (0.7)
CAR 5	1.2 (1.1)	-0.3 (1.1)	1.6 (1.1)	-0.2 (1.0)	-0.1 (0.8)	-0.2 (0.7)	1.0 (0.8)
Stoxx Europe 600	71.7*** (3.2)	72.0*** (3.2)	71.4*** (3.2)	72.7*** (3.0)	68.3*** (2.4)	68.1*** (2.1)	56.7*** (1.7)
Constant	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Observations	260	260	260	260	260	260	260
R-squared	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Banks in sample	36	36	36	36	36	37	37

Note: The table shows the results (in percent) from the event study specification applied to important milestones toward the automatic exchange of financial account information (AEoI) that are considered particularly important. Column (1) concerns when Luxembourg announced the implementation of the AEoI with the EU; (2) when the G20 countries endorsed the AEoI as the expected new global standard; (3) when Austria announced the implementation of the AEoI with the EU; (4) when Switzerland announced it would contribute to developing the new standard for the AEoI; (5) when Switzerland agreed to negotiate on the AEoI with the EU; (6) when Switzerland committed to implementing the AEoI; and (7) when Switzerland signed a treaty with the EU for the AEoI. Standard errors are provided in parentheses and take account for cross-sectional and intertemporal correlation in the abnormal returns.

*** Significant at the 1% level and * significant at the 10% level.

The results show that the stocks prices of Swiss banks generally experienced small abnormal returns in the days following the selected events. The largest cumulative abnormal return in absolute terms and the only one that was temporarily statistically significant at the 10% level occurred after Austria committed to the AEoI, and was positive. The largest negative cumulative abnormal returns occurred two and four days after the G20 countries endorsed the AEoI, and were as small as -0.6%. While some events were followed by persistently negative or positive cumulative abnormal returns, over all selected events, cumulative abnormal returns were neither systematically positive or negative. The results do not suggest that any of the selected events had a sizeable or significant impact on the stock prices of Swiss banks.

4.3 An aggregated analysis of all front page articles

Finally, to validate that there was no other event that caused a strong and negative cumulative abnormal return in the stock prices of Swiss banks and to justify the event selection above, this section provides an aggregated analysis on (almost) every trading day.

First, the analysis identifies all three-day windows between January 2013 and October 2016 with *no* event concerning the AEoI as reflected on the front page of NZZ. This yields a set of 845 three-day event windows which reflect normal times without important news relating to the AEoI. The analysis then applies the previous event study specification to estimate the cumulative abnormal return for each of these three-day windows. Figure 2a illustrates the cumulative distribution function of the resulting estimates.

Second, the analysis estimates the three-day cumulative abnormal returns after each of the 44 NZZ front page articles mentioning the AEoI. This yields estimates for the effect of every event concerning the AEoI that was important enough to be reported on the front page of NZZ. The cumulative distribution function of the resulting estimates is illustrated in Figure 2b.

Cumulative abnormal returns during normal times in the absence of important news regarding the AEoI, as illustrated in Figure 2a, appear to be distributed similarly to a normal distribution with a mean close to zero. This suggests that the underlying event study specification works well to account for normal returns, and that the parametric tests above are meaningful.

Cumulative abnormal returns after events concerning the AEoI were reported on the front page of NZZ, as illustrated in Figure 2b, seem to be distributed similarly. Most cumulative abnormal returns lie between -0.6 and +0.6%. Only two negative cumulative abnormal returns stand out: -3.0% upon 14 January 2015, and -1.0% upon 14 November 2013.

Figure 2: Distributions of three-day cumulative abnormal returns after and in the absence of important news concerning the AEoI

(a) Three-day cumulative abnormal returns when the AEoI was not mentioned on the front page of NZZ

(b) Three-day cumulative abnormal returns after the AEoI was mentioned on the front page of NZZ

Note: The figures illustrate the distributions of the cumulative abnormal returns of Swiss banks for (almost) all three-day windows between January 2013 and October 2016 depending on whether or not the automatic exchange of financial account information (AEoI) was mentioned on the front page of Neue Zürcher Zeitung (NZZ). Figure (a) refers to all three-day windows with no reference to the AEoI, and (b) to all three-day windows after the AEoI was mentioned on the front page of NZZ.

The remainder of this section addresses these two dates and applies the event study specification to both dates individually. The results are illustrated in Figure 3. The figures depict the estimated cumulative abnormal returns in the stock prices of Swiss banks as well as of the Swiss Market Index (SMI), a major index for the broad Swiss stock market, around the two dates. As the event study specification controls for general market conditions on the European level, the abnormal performance of the SMI indicates changes of the conditions in the entire Swiss market relative to the European market. If the abnormal drops in the stock prices of Swiss banks are indeed caused by the events concerning the AEoI, this should have no strong effects on the entire Swiss market and the abnormal returns of the SMI should be close to zero.

Figure 3a illustrates the cumulative abnormal returns around 14 January 2015, when the Swiss government submitted the draft law for the AEoI into the consultation process. By coincidence, just one day later, the Swiss National Bank abandoned the exchange rate cap of a minimum of 1.20 Swiss francs per euro. The strong abnormal drop in the stock prices of Swiss banks of -3.0% occurred swiftly within two days, but started only one day after the Swiss government submitted the draft law into consultation. The SMI experienced a comparable drop of -2.3% at the very same time. The exact timing of the stock price drop and its similarity to the abnormal performance of the SMI suggest that the drop was caused by some event which happened one day after the submission of the draft law and had implications for the entire Swiss market – potentially the new exchange rate regime by the Swiss National Bank.

Figure 3b illustrates the cumulative abnormal returns around 14 November 2013, when Liechtenstein committed to the AEoI. In contrast to Austria and Luxembourg, Liechtenstein is not a member country of the EU. Its commitment therefore had no implications for the EU decision-making process and, in turn, for the Swiss banking secrecy. In the week after Liechtenstein’s commitment, the stock prices of Swiss banks experienced a gradual abnormal decline of around -0.3% per day, which very closely resembles the abnormal performance of the SMI. Moreover, the abnormal decline in both return series seemingly started at least two days prior to Liechtenstein’s commitment. Again, the timing of the stock price decline and its similarity with the abnormal performance of the SMI suggest that the decline was driven by unfavorable general market conditions in Switzerland rather than the new tax transparency.²⁵

5 Concluding remarks

Switzerland has undergone a radical change with regard to its banking secrecy. For decades, the Swiss banking secrecy was commonly considered a reliable protection against

²⁵ While I was not able to identify an obvious source for the stock price decline, a cumulative abnormal return of -1.0% over four trading days does not seem to be very uncommon with around 8% of the cumulative abnormal returns during normal times being smaller (see Tabel 2a).

Figure 3: Most negative cumulative abnormal returns of Swiss banks after important news concerning the AEoI

(a) Cumulative abnormal returns around 14 January 2015

(b) Cumulative abnormal returns around 14 November 2013

Note: The figures illustrate the cumulative abnormal returns of Swiss banks and the Swiss Market Index, a major index for the Swiss stock market, around important news concerning the automatic exchange of financial account information (AEoI) upon which Swiss banks experienced strong abnormal drops in their stock prices. Figure (a) refers to 14 January 2015, when the Swiss government submitted the AEoI draft law into the consultation process and, by coincidence, one day before the Swiss National Bank unpegged the Swiss franc from the fixed exchange rate to the euro; and (b) refers to 14 November 2013, when Liechtenstein committed to the AEoI.

investigations by foreign tax authorities. This environment has attracted large amounts of international wealth into Swiss banks. Zucman (2014, Table S.1) puts the foreign-owned wealth in Switzerland by the end of 2013 at US \$2.4 trillion. Although the level of tax compliance among the owners of Swiss bank accounts has recently increased, it remains low at around 20%. Swiss banks still profit from the service and transaction fees from managing that wealth. As of 2018, Switzerland will participate in the international exchange of financial account information for tax purposes on an automatic basis.

This study examines how the new information exchange affected the stock prices of Swiss banks as an indicator of the banks' future profitability. It documents a modest negative effect which was limited to a small number of banks and is statistically not significantly different from zero. The minimum detectable effect sizes in this study are moderately sized and well below the estimated effects in a similar event study on data leaks from banks in tax havens (Johannesen and Stolper 2017). This suggests that the null results are not a consequence of low statistical power, but rather that financial markets expected the new tax transparency to have no sizeable impact on the future profits of Swiss banks.

While it is possible that previously tax non-compliant accounts will now become compliant and remain with banks in Switzerland, it seems unlikely that a significant increase in the level of tax compliance among the customers of Swiss banks will have no effect on the banks' future earnings. A more plausible explanation for the results seems to be that the new tax transparency might not have significantly increased the level of tax compliance among the owners of Swiss bank accounts. In fact, media articles are already reporting on loopholes in the new information exchange, which are said to attract large amounts of capital and allow tax evaders to keep their assets with Swiss banks and still remain anonymous to the tax authorities in their home countries.²⁶

²⁶One such loophole that is said to attract large amounts of capital is described in "Financial transparency: The biggest loophole of all," *The Economist*, 20 February 2016.

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Appendix

Table A: Swiss banks in the estimating sample

Name of listed Swiss bank or its listed parent	Source	Penalty (US \$ million)	Market		Start of holding period	End of holding period	Country	Sector
			capitalization (US \$ million)	capitalization (US \$ million)				
Credit Suisse Group	Criminal investigation	2,600.0	43,734	-	-	-	CH	Banks
UBS Group	Criminal investigation	780.0	70,142	-	-	-	CH	Banks
Julius Baer Group	Criminal investigation	547.0	9,172	-	-	-	CH	Banks
Bank Leumi Le-Israel	Criminal investigation	270.0	5,072	-	-	-	IL	Banks
Liechtensteinische Landesbank	Criminal investigation	23.8	1,287	-	-	-	LI	Banks
HSBC Holdings	Criminal investigation	pending	171,194	-	-	-	UK	Banks
Bank Hapoalim	Criminal investigation	pending	6,565	-	-	-	IL	Banks
Mizrahi Tefahot Bank	Criminal investigation	pending	2,709	-	-	-	IL	Banks
Basler Kantonalbank	Criminal investigation	pending	2,243	-	-	-	CH	Banks
BTG Pactual Group	Swiss Bank Program	211.0	11,213	14 jul 2014	22 feb 2016	-	BR	Financ svcs
Credit Agricole	Swiss Bank Program	99.2	34,260	-	-	-	FR	Banks
Bank J Safra Sarasin	Swiss Bank Program	85.8	1,683	-	31 jul 2012	-	CH	Banks
Royal Bank of Scotland Group	Swiss Bank Program	78.5	55,759	-	-	-	UK	Banks
BNP Paribas	Swiss Bank Program	59.8	79,555	-	-	-	FR	Banks
St Galler Kantonalbank	Swiss Bank Program	59.2	1,998	-	-	-	CH	Banks
Banque Cantonale Vaudoise	Swiss Bank Program	57.0	4,176	8 dec 2010	-	-	CH	Banks
Edmond de Rothschild Suisse	Swiss Bank Program	45.2	1,423	-	-	-	CH	Financ svcs
Deutsche Bank	Swiss Bank Program	31.0	38,739	-	-	-	DE	Banks
EFG International	Swiss Bank Program	30.0	1,597	-	-	-	CH	Banks
Societe Generale	Swiss Bank Program	19.2	43,224	-	-	-	FR	Banks
Rothschild & Co	Swiss Bank Program	11.5	1,540	-	-	-	FR	Financ svcs

Note: The table provides information about all the banks in the estimating sample. The information can vary over time as parent-subsidiary links sometimes change. The table states the latest available information for each bank from before Switzerland committed to the implementation of the automatic exchange of financial account information (AEOI).

Continued on the next page.

Table A (*continued*): Swiss banks in the estimating sample

Name of listed Swiss bank or its listed parent	Source	Penalty (US \$ million)	Market capitalization (US \$ million)	Start of holding period	End of holding period	Country	Sector
Luzerner Kantonalbank	Swiss Bank Program	11.0	3,098	-	-	CH	Banks
CIC	Swiss Bank Program	10.5	7,549	-	-	FR	Banks
Banco Bilbao Vizcaya Argentaria	Swiss Bank Program	10.4	63,268	-	-	ES	Banks
Schroders	Swiss Bank Program	10.4	10,420	-	-	UK	Financ svcs
Standard Chartered	Swiss Bank Program	6.3	46,376	-	-	UK	Banks
Vontobel Holding	Swiss Bank Program	5.4	2,187	4 sep 2015	-	CH	Banks
Berner Kantonalbank	Swiss Bank Program	4.6	2,006	-	-	CH	Banks
Bank Linth LLB	Swiss Bank Program	4.2	368	-	-	CH	Banks
Zuger Kantonalbank	Swiss Bank Program	3.8	1,384	-	-	CH	Banks
Graubundner Kantonalbank	Swiss Bank Program	3.6	3,113	-	-	CH	Banks
Valiant Holding	Swiss Bank Program	3.3	1,540	-	-	CH	Banks
Bank Coop	Swiss Bank Program	3.2	748	-	-	CH	Banks
Walliser Kantonalbank	Swiss Bank Program	2.3	-	-	-	CH	Banks
BHF Kleinwort Benson Group	Swiss Bank Program	1.8	388	7 jul 2011	27 nov 2015	BE	Financ svcs
SB Saanen Bank	Swiss Bank Program	1.4	60	-	-	CH	Banks
Mercantil Servicios Financieros	Swiss Bank Program	1.2	10,636	-	-	VE	Banks
Banque Cantonale du Jura	Swiss Bank Program	1.0	189	-	-	CH	Banks
Medibank	Swiss Bank Program	0.8	13	-	-	CH	Banks
Hypothekarbank Lenzburg	Swiss Bank Program	0.6	308	-	-	CH	Banks
Banco di Desio e della Brianza	Swiss Bank Program	0.3	496	-	8 jun 2012	IT	Banks
Banca Intermobiliare	Swiss Bank Program	-	664	-	-	IT	Financ svcs

Note: The table provides information about all the banks in the estimating sample. The information can vary over time as parent-subsidiary links sometimes change. The table states the latest available information for each bank from before Switzerland committed to the implementation of the automatic exchange of financial account information (AEOI).