The Big Bang

Tax Evasion after Automatic Exchange of Information under FATCA and CRS

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Executive Summary

After decades of ineffective attempts to fight tax evasion, the Foreign Account Tax Compliance Act (FATCA) and the Common Reporting Standard (CRS) recently implemented the first encompassing international exchange of tax-related information on an automatic basis. This is an important development because tax evasion contributes to rising socio-political inequality and political sovereignty losses. This article assesses the treaties' impact on tax evasion by conducting a difference-in-difference analysis of cross-border asset data. The results shows that the treaties are successful. Household assets in tax havens that are not hidden behind corporate identities are estimated to be 67 per cent lower than they would have been without automatic exchange of information. Furthermore, this reduction is not offset by an increase in treaty circumvention using identity concealment or asset shifting to non-compliant havens or the US. FATCA and CRS thus implement the first effective international cooperation against tax evasion. The results imply that political globalisation is capable to mitigate political sovereignty losses and the rise of inequality caused by economic globalisation.

1. Introduction

Virtually all countries tax the capital income of their residents irrespective of where it is generated (Rixen 2008, pp. 57–85). However, financial globalisation and information technology made it easy for affluent households to conceal capital income from their resident tax authorities by depositing it in countries that provide financial secrecy and low tax rates, i.e. tax havens (Genschel and Schwarz 2011). A conservative estimate shows that eight per cent of households' global wealth is stashed in tax havens (Zucman 2013). This contributes to pressing socio-political problems. Firstly, tax evasion fortifies inequality because affluent households benefit disproportionally. Alstadsæter et al. (2018) show that the proportion of wealth held by the richest individuals is larger than previously assumed because they hide large sums in tax havens. Secondly, tax evasion deprives governments of urgently needed revenue because of missed capital taxes (Palan et al. 2010, p. 63) and low tax rates due to international tax competition (Genschel and Schwarz 2011). It thus undermines their ability to implement distributive policies as they see fit, which in effect limits their sovereignty (Lierse and Seelkopf 2016; Rixen 2011).

Tax compliance is difficult to enforce despite these functional pressures since comprehensive international cooperation is required to identify and sanction tax evaders (Rixen 2008). As a result, a complex landscape of international agreements aiming to curb the concealment of capital across borders developed in the past. Unfortunately, past efforts were largely unsuccessful due to limited international coverage, easy circumvention and insufficient accessibility of information (Caruana-Galizia and Caruana-Galizia 2016; Hanlon et al. 2015; Johannesen 2014; Johannesen and Zucman 2014; Rixen and Schwarz 2012; Sharman 2012a). Thus, experts have long called for an encompassing and multilateral effort – a 'big bang' in the fight against tax evasion (Elsayyad and Konrad 2012, p. 295; see also Palan et al. 2010; Sharman 2012b). The US triggered a process towards such an effective policy regime in 2010 by adopting the Foreign Account Tax Compliance Act (FATCA). FATCA adopted an automatic exchange of tax-related information (AEI) including all important tax havens. The OECD capitalised on this opportunity and implemented a multilateral agreement modelled after FATCA, i.e. the Multilateral Competent Authority Agreement (MCAA) on the Common Reporting Standard (CRS). 104 countries signed the agreement by late 2018 and the first information was exchanged in 2017. Together, FATCA and CRS demarcate a new era in international tax cooperation because of their encompassing scope and limited opportunity for tax evaders to circumvent the regulations.

While these recent AEI agreements have more potential than past efforts, there is little research on their effectiveness. In a first evaluation of FATCA and the process towards multilateral AEI it initiated, Hakelberg and Schaub's (2018) analysis shows an ensuing decrease of cross-border assets in tax havens. However, their study mostly predates the implementation of CRS, the more consequential treaty, and does not assess treaty circumvention to arrive at an overall evaluation of AEI's success. Thus, we conduct a comprehensive analysis of both FATCA and CRS. We estimate their impact with a difference-in-difference analysis of multiple datasets on international investments between 2009 and 2018 (Bank for International Settlements 2019; International Monetary Fund 2019). Most importantly, this yields an estimate of the causal effect size of AEI on households' cross-border assets with supplementary analyses of treaty circumvention efforts.

Our results show that FATCA and CRS were successful in decreasing cross-border tax evasion. Household assets in tax havens are estimated to be 67 per cent below where they would have been without AEI. We find no evidence for treaty circumvention by identity concealment through shell corporations and asset shifting to non-compliant havens or the United States that offsets this reduction. Thus, the recent AEI treaties are the first international cooperation that truly reduced tax evasion overall. We also show that cross-border assets in tax havens decreased in reaction to the international endorsement of AEI treaties with no further discernible effect following actual treaty signature and effectiveness.

This study makes several contributions to the literature. It shows the that FATCA and CRS decrease tax evasion overall based on a quantification of AEI's effect size and an analysis suggesting negligible treaty circumvention. It thus demonstrates the remarkable success of AEI, implying that, unlike past efforts, the new policy regime is effective in mitigating tax competition over internationally mobile tax bases. This finding has implications for broader debates about globalisation in political economy and political science. Globalisation theo-

rists fear that neither domestic nor international regulation can regulate unbounded economic activity and internationally mobile capital. According to this view, effectively regulating capital in a globalised world may seem futile (e.g., Sharman 2012a), which threatens the welfare state (Genschel 2002), leads to increased inequality (Alstadsæter et al. 2018) and harms domestic democracy (Rixen 2011). Rodrik (2012), for example, theorises that it is impossible to have a globalised economy, nation states as the locus of political decisions and effective democratic control over these decisions all at the same time (the 'globalisation trilemma'). In contrast, our findings suggest that it may be possible to have both economic globalisation and effective democratic governance. FATCA and CRS serve as an example of how the pressure of international capital on domestic tax states can be weakened, which offsets sovereignty losses and enables a return to more egalitarian policies. This also opposes the rise of inequality by making proper capital taxation more likely, which is promising because inequality is often made out to be one of the most pressing political problems of our times due to detrimental effects on democratic equality (Hacker and Pierson 2010) and associated political backlash (Rodrik 2018). Relieving the globalisation trilemma requires robust international cooperation, i.e. effective political globalisation, which counters voices that are sceptical towards such a possibility (e.g., Höpner and Schäfer 2012). Contra the current populist nationalist backlash, regaining domestic policy autonomy requires more and not less international cooperation.

2. How FATCA Shaped the International Tax Cooperation Regime

Tax havens exist because international tax governance is plagued by an asymmetric prisoner's dilemma. Small countries have an incentive to offer low tax rates and financial secrecy to foreign customers (Dehejia and Genschel 1999). Households use havens to evade taxes by entrusting their financial institutions with financial assets.[1] The secrecy provided by havens allows households to avoid declaring the assets and their returns to resident authorities, which effectively prevents lawful taxation. Fighting financial secrecy requires comprehensive international cooperation (Dehejia and Genschel 1999; Emmenegger and Marx 2019; Rixen 2008). The favoured strategy is to implement information exchange regimes that penetrate the secrecy tax havens offer to foreign investors. In principle, information exchange agreements allow resident countries to identify tax evaders and enforce tax laws, but past efforts were ineffective.

States mostly negotiated bilateral information-on-request (IOR) treaties granting them access to information about suspected tax evaders. However, it proved to be difficult to obtain the required reasonable suspicion, and not all tax havens were compliant. This is why empirical research shows that IOR treaties have a rather small effect and can be circumvented easily (Hanlon et al. 2015; Johannesen 2014; Johannesen and Zucman 2014). Verdicts on another important policy initiative, the EU's Savings Tax Directive (STD), are similar. The STD implemented the first major information exchange about households' cross-border investments on an automatic basis, which eliminates the need to acquire reasonable suspicion; but instead it also gave participating countries the opportunity to levy withholding taxes on foreign account holders' capital income to protect their identity. Most havens opted for this model and other important havens were non-compliant altogether. Thus, the STD could not resolve the pitfalls of past efforts (Caruana-Galizia and Caruana-Galizia 2016; Johannesen 2014; Rixen and Schwarz 2012).

2.1 FATCA and CRS

While the global incentive structure seemed to prevent effective international cooperation in the past, the US triggered a global reform process in 2010 by enacting the Foreign Account Tax Compliance Act (FATCA). FATCA forces foreign financial institutions (FFIs) to report US taxpayers' financial assets to the Internal Revenue Services (IRS) (Hakelberg 2015, 2016). FFIs were instructed to transmit information or suffer a 30 per cent withholding tax on their US income otherwise. However, the US did not take into account that some

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[1] It must be noted that not all investments in tax havens serve the purpose of evading taxes. Other reasons include keeping them safe from political threats, as indicated by the large proportion of Venezuelan assets in tax havens (Alstadsæter et al. 2018).

FFIs could not provide the required information due to domestic legislation or a lack of organisational capacity (i.e. banking secrecy). The US thus started to conclude bilateral agreements with foreign jurisdictions and effectively forced tax havens to forfeit banking secrecy (Eccleston and Gray 2014). This credible sanction threat led to an increasing number of bilateral tax treaties. By the end of 2018, 113 countries signed FATCA IGAs, including all major tax havens.

The OECD capitalised on the opportunity and endorsed automatic information exchange as the new global standard. The concessions made to the US pressured tax havens to extend information sharing to other major countries (Hakelberg 2015, 2016). The OECD developed new standards for an automatic exchange of tax-related information with the support of the G20. The ensuing policy, the Common Reporting Standard (CRS), heavily draws from the institutional design of FATCA. A large number of countries could be persuaded to participate (Lesage et al. 2019). The G20 finance ministers endorsed the CRS in February 2014 (OECD 2014). By May 2014, more than 60 jurisdictions signed the corresponding treaty, the Multilateral Competent Authority Agreement (MCAA). MCAA ensures that participating jurisdictions have a common legal framework and the administrative capacity to exchange information. While FATCA is institutionalised in bilateral agreements that ensure unidirectional information sharing to the US, CRS MCAA is a multilateral initiative with reciprocal information sharing. However, participating countries must conclude bilateral agreements with other jurisdictions they would like to transmit information. Thus, not all countries complying to CRS MCAA do actually exchange information. By the end of 2018, 104 jurisdictions signed the agreement.

Overall, CRS and FATCA install a new AEI policy regime that covers large parts of the world and all major tax havens. It demarcates a new era in international tax cooperation because prior approaches were fragmented, limited in scope and less stringent.

2.2   How tax evaders react to AEI

Households evade taxes to save money. Conventional utility maximisation theory characterises them as rational actors who choose an optimal level of tax compliance. It expects that tax compliance decreases when the tax rate in their resident country rises, the tax rate offered by havens decreases and the probability of being caught by their resident tax authority decreases (Allingham and Sandmo 1972). The probability of being caught, e.g. due to an audit, is mostly unknown to households, which is why they have to rely on an estimate in their decisions. How then should tax evaders react to the adoption of AEI in this simple framework?

AEI drastically increases the probability of households to be detected by their resident authorities if they have illicit investments in tax havens. We expect that they react to this changing circumstance by refraining from tax evasion or by (continued) efforts to evade using more or less sophisticated methods to circumvent detection. Those who refrain from tax evasion in reaction to AEI includes households that would have moved assets to tax havens if there were no AEI, and households who already own assets in havens that they now declare. Households who declare illicit assets have the option to keep them in the tax haven of their choice or to withdraw them. Since the former eliminates the main purpose of investments in tax havens, i.e. financial secrecy, the latter option is most likely (see Johannesen and Zucman 2014, pp. 87–8). Overall, we expect that the move towards tax compliance following AEI reduces assets in tax havens relative to their counterfactual level if there were no AEI. This is because (a) households who would have evaded taxes now opt for licit investments outside tax havens, and (b) because former tax evaders decrease their investments in havens.

Other households, however, should still opt for tax evasion after AEI. This involves both novel investments in tax havens and continued illicit investments that predate AEI. The least sophisticated method to circumvent AEI is to invest in a non-compliant haven (asset shifting). This approach could reliably be detected in data following former information exchange agreements (Johannesen and Zucman 2014; Rixen and Schwarz 2012), but these were not nearly as encompassing as FATCA and CRS. If households react to FATCA and CRS by asset shifting, we should observe an increase of assets in non-compliant havens.

More sophisticated households rather choose to conceal their identity to circumvent AEI. There is a great deal of evidence suggesting that households use shell companies and other corporate identities to hide their investments, not least because of the Panama Papers (see also Hanlon et al. 2015; Johannesen and Zucman 2014). Identity concealment is achieved by falsely attributing asset ownership to a legal entity rather than the tax

evading household vis-à-vis the reporting authorities. In principle, FATCA and CRS require reporting financial institutions to see behind the corporate veil and collect information on beneficial rather than immediate ownership (OECD 2014), but it is rather unlikely that this is always feasible or even attempted. If successful, no information about the assets is transmitted and tax evasion cannot be detected.

Assets hidden behind shell companies appear as liabilities to the countries that host them in international investment data. For example, assets that belong to a rich household through a company in Panama are attributed to Panama. These shell companies are primarily hosted by tax haven jurisdictions (Hanlon et al. 2015). Panama and the Virgin Islands are particularly important (Johannesen and Zucman 2014, p. 85). If households circumvent AEI by intermitting a corporate veil, we should thus observe an increase of assets attributed to havens in the data. This includes both liabilities reported by other havens as well as liabilities reported by non-havens because assets successfully hid behind a company can be invested anywhere (Hanlon et al. 2015). For example, households can choose to invest their funds attributed to a Panamanian company in US equities or in a Swiss bank account.

It is the goal of our analysis to dissect how households reacted to AEI to evaluate its overall success. To what extent did they opt for tax compliance or circumvention efforts? The data used for this assessment are described in the following section.

3. Data

3.1 What countries are tax havens?

It is necessary for the quantitative analysis to distinguish countries as tax havens or non-havens. We rely on Johannesen and Zucman (2014) who provide a list of 52 tax havens in the Online Appendix of their article. The list classifies countries as havens when they fail to meet one of the following criteria: regulation must ensure that banks keep records of the information that can be requested under treaties, domestic legislation must allow domestic tax authorities to access bank information and there must be a legal basis for the exchange of information with foreign tax authorities. All other countries are classified as non-havens. The list is historical in the sense that the IOR treaties Johannesen and Zucman analyse as well as the recent AEI treaties require havens to abolish this regulatory blind spot, i.e. to ensure that information can be collected and exchanged. This implies that compiling a current list of havens based on these criteria would not be feasible. However, tax havens' past efforts to conceal the identity of foreign investors are a powerful indicator for their business model (cf. Hakelberg and Schaub 2018, p. 361).

3.2 Cross-border investments

We rely on two data sources to assess the effectiveness of AEI. Firstly, the Locational Banking Statistics (LBS) from the Bank for International Settlements (BIS) (2019) in both their disaggregated and aggregated form. The disaggregated LBS contain information on foreign bank deposits and debentures held by 196 countries (saver countries) in 30 countries (bank countries); and the aggregated LBS quantify overall deposits and debentures held in 47 bank countries (see the Online Appendix for full country lists). We use quarterly data on outstanding liabilities of bank countries vis-à-vis foreign non-bank entities in saver countries. The observation period is restricted from 2009:I to 2017:IV, which is situated entirely in the post-financial crisis era and in which the STD is fully implemented (Rixen and Schwarz 2012). The disaggregated data indicate, e.g., assets held by French residents in Switzerland; and the aggregated data, e.g., all assets held by foreigners in Switzerland.

The LBS data have three drawbacks (Johannesen and Zucman 2014). Firstly, they only relate to bank deposits and debentures, disregarding other important forms of capital. Secondly, they do not cover all tax havens. The aggregated LBS cover investments in 19 tax havens, while the disaggregated LBS only cover investments in 10. Thirdly, the data do not reveal how much assets belong to tax evading households because the counterparty category non-bank entities includes assets from companies and tax-compliant households. This should not be a major concern since it is reasonable to assume that AEI treaties affect neither companies nor legitimate

investments of households, but it is necessary to know the share of assets belonging to households to quantify the effect of AEI. We follow Zucman (2013) and assume that the share amounts to 50 per cent of all assets.[2]

To reconcile the drawbacks of the BIS LBS data, we also use the Coordinated Portfolio Investment Survey (CPIS) by the International Monetary Fund (IMF) (2019), which contains yearly data on cross-border equity and debt securities by 83 saver countries in 234 bank countries, restricted to 2009-2018. The main advantages of the IMF data in relation to the BIS data are their larger country coverage since they quantify investments in all 52 tax havens, as well as their focus on portfolio securities, which is the most important cross-border asset form held by households (Zucman 2013, p. 1326). Their disadvantage is that it is not possible to restrict data coverage to liabilities vis-à-vis non-bank entities like in the BIS data. They include the position of banks, which invalidates the estimate of households' asset share. It is therefore not possible to arrive at a justified causal effect estimate. Therefore, we rely on the CPIS data only to assess whether the results are fundamentally different when more tax havens and other forms of capital are considered.

3.3   Automatic exchange of information

We compile a dataset that contains information on FATCA and CRS. It contains three dummy variables that codify important developmental stages of the AEI programs. They each indicate whether information transmission from the bank country to the saver country in a dyad is envisaged at specific points in time. All information regarding FATCA only concern observations where the US are the saver country because of its unidirectional nature, whereas CRS is a multilateral initiative and includes signatories as both saver and bank countries. The first variable (endorsement) equals one if the AEI treaties have been endorsed internationally at any point in the past, which we define as a voiced and credible commitment to the implementation of an AEI regime. The CRS was endorsed by the G20 finance ministers and central bank governors in February 2014 (OECD 2014, pp. 9–10). There were earlier official announcements, but it only became clear in early 2014 that the policy was mostly ready and would be pursued insistently in the near future. The endorsement date for FATCA is set to 2012:I. The law was already passed in 2010, but it was unclear whether it would have any real effect. In February 2012, the US treasury finally outlined in detail how FATCA treaties would be institutionalised and also released a joint statement with five European countries that agreed to AEI (Ernst & Young 2012).

The second variable (signed) indicates whether there is a signed agreement in a dyad. Concerning FATCA, it is set to one as soon as a bank country signed a FATCA IGA with the US. Regarding CRS, the dummy switches to one when both countries in a dyad signed the MCAA or a comparable agreement.[3] We gather these data from different sources (see Online Appendix). The results are depicted in Figure 1, which displays how AEI signatures develop over time. Over 8000 dyads signed AEI treaties by the end of 2018, of which 2099 were signed between tax havens as the bank country and non-havens as the saver country.

For the third variable (ever effective), we utilise the Automatic Exchange Portal (OECD 2018) and the US Department of the Treasury's (2018) Resource Center. Both sources contain information on which exchange relationships are effective. Remember that after signing CRS MCAA, countries need to arrange information flows with other interested countries in bilateral agreements. Thus, not all countries actually exchange information under the MCAA. The Automatic Exchange Portal allows us to identify active relationships. The variable is a dummy that identifies countries that activated AEI relationships by 2018:IV. Ideally, the variable would indicate the exact point in time when countries start collecting information on foreign account holders

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[2] Zucman (2013) derives the 50 per cent share from the finding that individuals own about $1.4 trillion in bank accounts in tax havens based on official Swiss National Bank statistics and anomalies in the international investment data of countries. These $1.4 trillion make up about half of total deposits in tax havens according to BIS data. The BIS data include debt instruments in addition to bank deposits, so we further assume that their household ownership share is identical. This approach is not optimal but the best available quantification.

[3] Some countries institutionalised the CRS in bi- or multilateral treaties outside the MCAA. For example, the United Kingdom concluded agreements with its overseas territories and the EU concluded an agreement with Switzerland.

since rational tax evaders should react primarily to this turning point. However, the provided information does not allow us to pinpoint the exact dates consistently.[4] Thus, we only use the variable to test whether AEI's impact is limited to country-pairs that (plan to) exchange information.

Figure 1: Number of signed dyadic AEI relationships
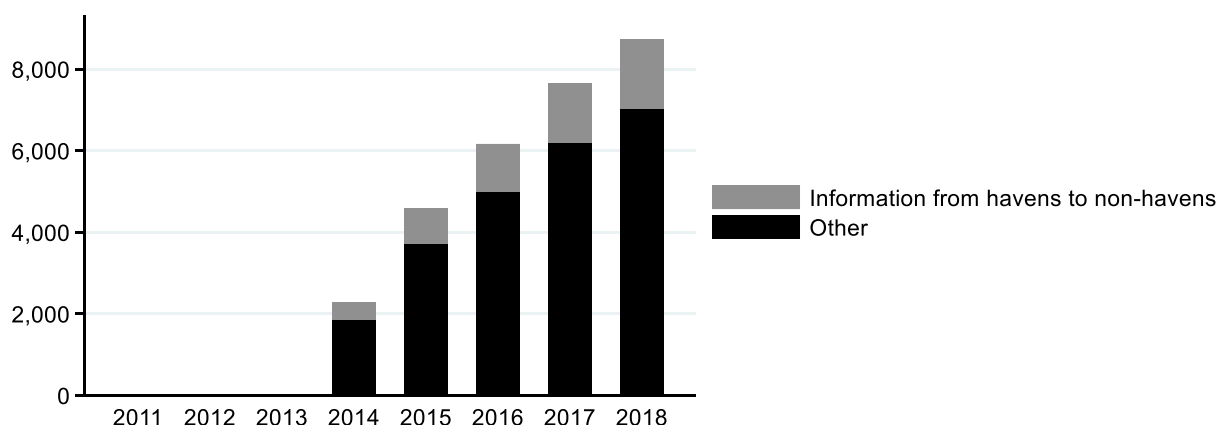
Note: Country-pairs can appear twice because, e.g., Germany-Switzerland and Switzerland-Germany are two separate dyads.

4. Analysis

In this section, we present graphical and regression based evidence on the impact of AEI. Both the graphs and regressions compare foreign assets in a treatment and control group, i.e. groups that AEI should and should not influence according to theory. The presentation of graphical evidence is complicated by a further disadvantage of the data, namely systematically missing data points. Data availability increases substantially over the analysed period in both data sources. This makes it misleading to plot aggregate or mean cross-border assets over time because meaningful comparison of the treatment and control groups becomes impossible. In an effort to present graphical evidence despite this disadvantage, we plot the average percentage deviation from dyad- or country-specific mean assets (depending on the dataset). This approach does not eliminate the bias caused by increasing data availability from the plots but minimises it compared to other approaches.

Furthermore, we present regression based evidence. The regressions are variants of the difference-in-difference (DiD) estimator and, in their simplest form, have the following baseline specification:

$$\log y_{ijt} = \alpha_{ij} + \gamma_t + \text{ß}_1 Treatment_{ijt} * Haven_j + \varepsilon_{ijt}$$

where yijt denotes the assets of saver i in the bank country j at time t, αij dyad fixed effects for the country-pairs ij, γt time fixed effects (quarter-years or years depending on the data source), Treatment variants of the AEI dummies introduced in the previous section, Haven a dummy variable identifying whether the bank country is a tax haven and εijt the error term. The DiD research design assumes that cross-border assets follow the same trend in the treatment and control group in the absence of a treatment, i.e. AEI, which means that the difference in assets between the groups is constant over time (common trend assumption). Furthermore, it assumes that AEI only affects the treatment group, i.e. specific tax havens (no spillover assumption). When these assumptions hold, it is possible to interpret changes in the difference between treatment and control group after AEI as a causal effect because the difference would have continued to be constant without AEI (see Lechner 2010). Thus, ß1 is the estimate of the causal effect of AEI treaties. The two-way fixed effects remove

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[4] The data inconsistently refer to one of the following three points in time: (a) bilateral treaties that govern information exchange come into law, (b) the first information exchange or (c) the first year information is collected.

all possible bias stemming from quarter-year-specific influences as well as variables that invariantly affect each dyad over time from this estimate. Following the advice of Bertrand et al. (2004), we estimate block-bootstrapped standard errors with 1,000 repetitions clustered at the dyad level because the dependent variable exhibits autocorrelation.

4.1 Effect of AEI on household assets in tax havens

Figures 2 and 3 both compare cross-border assets in tax havens and non-havens using the aggregated BIS data (Figure 2) and the IMF data (Figure 3), offering a first graphical representation of AEI's effects. Both figures show that assets in havens and non-havens followed a similar trend before the global adoption of AEI, which began to pick up pace with the endorsement of FATCA in 2012. Furthermore, both figures suggest a negative effect of AEI on assets in tax havens because they begin to lag behind assets in non-havens towards the end of the observation period. The differential is more pronounced in the BIS data compared to the IMF data, which is to be expected since the IMF data cover a larger proportion of non-household assets. Furthermore, while the BIS data indicate that, on average, assets in tax havens declined in the post-AEI period, they increase substantially in the IMF data. It is important to remember that both data sources include investments not intended for tax evasion. The figures must thus be interpreted with caution. For example, the increase of assets in the IMF data need not indicate an increase of tax evasion and possibly belongs to legitimate companies. We can only derive statements about the effect of AEI from the difference in trends between the treatment and comparison groups.

Figure 2: Assets in havens and non-havens (aggregated BIS data)
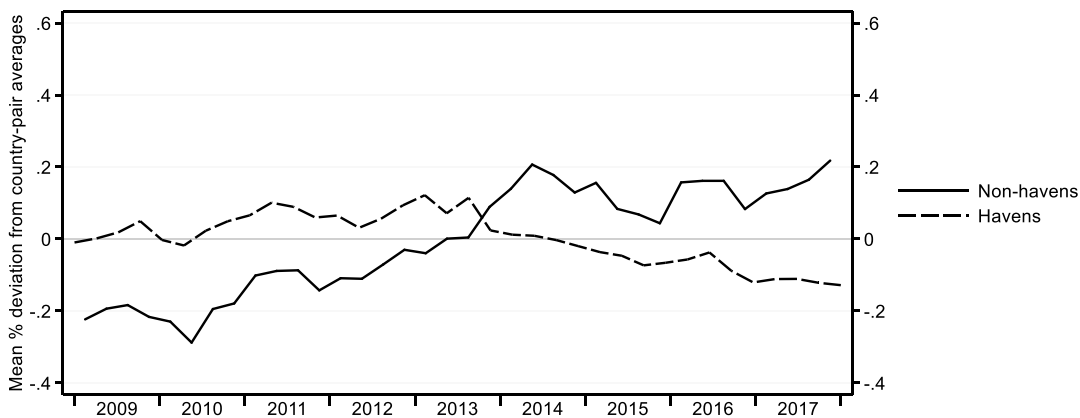
Note: Each data point indicates the average percentage deviation from country-specific means for a specific quarter-year.

Figure 3: Assets in havens and non-havens (IMF data)
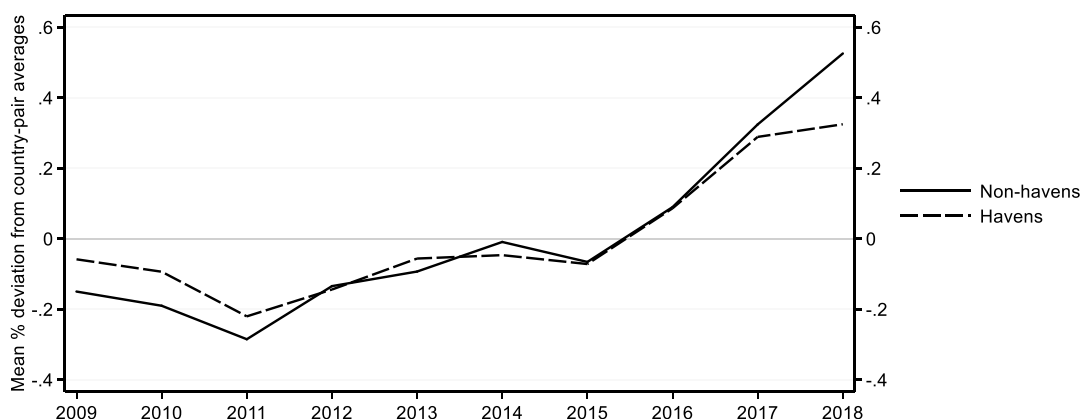
Note: Each data point indicates the average percentage deviation from dyad-specific means for a specific year.

We now turn to regression-based evidence for an in-depth analysis of the impact of AEI. A first set of models depicted in Table 1 analyse the disaggregated BIS and IMF data restricted to assets of non-havens (saver countries) in both tax havens and other non-havens (bank countries). The aim is to assess the impact of AEI on households' cross-border assets. The first four models pertain to BIS data and the last four models to IMF data, whereas the model specification and variable choice is identical in the two blocks of models. Models 1 and 5 only contain interactions terms between signed and dummies that identify whether the bank country is a tax haven. They thus test how assets in havens with a signed AEI agreement developed relative to other assets, i.e. investments in non-havens and in havens with no signed AEI treaty. Models 1 and 5 follow the logic that AEI should only affect assets in tax havens, which is why AEI-compliant havens are defined as the treatment group and all other observations as the control group. The results indicate a significant reduction of assets in havens following AEI in both the BIS and IMF data.

Models 2 and 6 analyse whether this effect is stronger in dyads that actually (plan to) exchange information. We add an interaction between signed, haven and ever effective. The results show that AEI signature affects dyads with activated information exchange to the same degree since the coefficient of the added interaction term is small and insignificant in both the BIS and IMF specification. Thus, AEI also reduces assets in havens that signed AEI but do plan to exchange information with their counterparty.

Models 3 and 7 drop the ever effective interaction and instead introduce the endorsement dummy as well as an interaction with the tax haven dummy. The models allow us to discriminate to what extent the reduction of assets in havens was caused by AEI endorsement and signature. They therefore use two treatment variables, i.e. the two interaction terms containing the haven dummy. Results from both specifications show that assets in tax havens reduced significantly relative to assets in non-havens following AEI endorsement. There was no further reduction in reaction to signature. This indicates that endorsement reduced investments in all tax havens and that actual signature had no subsequent effect, which is surprising and demands further investigation.

Note that regarding the CRS, the signed variable only equals one when both countries in a dyad signed the MCAA. It is conceivable that households already refrain from evading taxes after AEI endorsement in view of the possibility that information about their behaviour will be exchanged. However, it would be peculiar if AEI endorsement also affects constellations where it is unlikely that savers are subjected to a credible threat of information exchange. This primarily concerns saver countries that do not participate in AEI in the observation period, of which there are many in our datasets. To analyse whether investments of these savers were also affected by AEI, we create an additional dummy that identifies whether the saver country in a dyad signed the CRS by the end of the respective observation period or is the US. The negated form (1 - ever signed (saver)) identifies dyads in which the saver never institutionalised AEI.

Table 1: Effect of AEI on cross-border assets

Data	BIS				IMF			
Bank countries	Havens and non-havens							
Saver Countries	Non-havens							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Signed * Haven	-0.17***	-0.22***	-0.04	-0.08*	-0.14***	-0.07	-0.05	-0.03
	(0.04)	(0.09)	(0.04)	(0.05)	(0.05)	(0.12)	(0.06)	(0.06)
Signed * Haven * Ever effective		0.07				-0.09		
		(0.10)				(0.13)		
Endorsement			-0.07	0.14**			0.09**	0.06
			(0.05)	(0.06)			(0.04)	(0.05)
Endorsement * Haven			-0.26***	-0.41***			-0.13**	-0.16**
			(0.04)	(0.07)			(0.06)	(0.07)
Endorsement * (1 - Ever signed (saver))				-0.38***				0.06
				(0.06)				(0.10)
Endorsement * Haven * (1 - Ever signed (saver))				0.31***				0.13
				(0.09)				(0.17)
Constant	2.62***	2.62***	2.62***	2.63***	3.38***	3.38***	3.38***	3.38***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Observations	85,765	85,765	85,765	85,765	39,990	39,990	39,990	39,990
Number of dyads	3,599	3,599	3,599	3,599	5,714	5,714	5,714	5,714
Dyad fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year fixed effects	Yes	Yes	Yes	Yes	No	No	No	No
Year fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

Note: Block-bootstrapped standard errors clustered around dyads in parentheses. * $p<.1$, ** $p<.05$, *** $p<.01$.

Models 4 and 8 build upon the preceding models by adding an interaction term between endorsement and the negated form of ever signed as well as an interaction term between endorsement, haven and negated ever signed. The two interactions allow us to assess whether dyads where the saver never signed AEI reacted in a different manner. Both results indicate that investments of non-compliant savers in tax havens were affected to a smaller degree by AEI endorsement, which lines up with our expectations. This is indicated by the positive coefficient of the interaction between endorsement, haven and the negation of ever signed, which must be interpreted relative to the negative coefficient of the interaction between endorsement and haven. However, this coefficient is only significant in the BIS specification. Furthermore, the Model 4 hints at a negative effect of AEI signature, but the coefficient is small and only weakly significant.

Overall, the results demonstrate that the endorsement of AEI negatively affected cross-border assets of non-havens in tax havens; and that saver countries that never joined AEI were affected to a lesser degree. We now turn to the interpretation of the effect size, which is the main quantity of interest of the analysis. We rely on the effect estimate from Model 4, which uses the BIS data. If the identification assumptions hold, the estimate for the treatment effect Endorsement * Haven can be interpreted as a causal effect of AEI. The results indicate a 67 per cent decrease of households assets in tax havens.[5] Since we have no estimate on the share of assets belonging to households in the IMF data, we cannot use them to quantify AEI's causal effect. The household share would have to be 22 per cent to arrive at the same causal effect as in the BIS data, which does not seem utterly out of the question considering inclusion of bank assets in the IMF data.

To ensure the validity of the results, we first evaluate the identification assumptions, i.e. common trends and no spillover. As all results from robustness tests reported hereafter, a full discussion is available in the Online Appendix. It shows that the common trends assumption is adequate, but the absence of spillover is debatable. The causal effect quantification also relies on the assumption that 50 per cent of BIS assets belong to households, which is unlikely to be pinpoint exact. Identification is further complicated by the fact that we are interested in cross-border tax evasion but only observe foreign assets that are actually attributed to non-havens, which excludes assets hid behind corporate identities in secrecy jurisdictions. Therefore, the 67 per cent estimate should be treated as a rough approximation and interpreted with care. The discussion in Section 5 will discuss what this number actually tells us.

Secondly, we want to rule out that the results using the disaggregated BIS data are driven by selective data availability since investments in only 10 tax havens are observed. We thus use the aggregated BIS data, which cover investments in 19 havens, to estimate two additional models. The treatment is a dummy that switches to one from either 2012:I or 2014:I on, which corresponds to the endorsement of FATCA and CRS. The results are almost identical with estimated causal effects of 69 and 71 per cent. Furthermore, the previous results from Table 1 already show that the specifications using the IMF data, which cover investments in all 52 tax haven, generally point in the same direction.

Thirdly, we want to rule out that assets decreased in reaction to an alternative treatment effect. We supplement the dataset of Johannesen and Zucman (2014) with new bilateral information-on-request (IOR) treaties. The data is used to re-estimate the main specification from Table 1, which leaves the results unchanged. Furthermore, several events during the observation period might bias the estimates, namely the Swiss, Luxembourg and Bahamas Leaks as well as the Panama Papers. They were publicised in February 2014 (Swiss Leaks), November 2015 (Luxembourg Leaks), September 2016 (Bahamas Leaks) and April 2016 (Panama Papers). Therefore, we create four dummy variables for dyads involving the four jurisdictions as the bank country. They switch to one in years or quarter-years of leak publication. A re-estimation of the main models including the

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[5] The effect size calculation is not straightforward because the dependent variable in the regression is logged. Furthermore, we rely on the assumption that 50 per cent of assets in tax havens belong to households. The causal effect is thus calculated by: $\frac{(\exp(\text{ß})-1)}{0.5}$.

dummies does not affect the inferences. We contend it is AEI that caused the estimated decrease of assets in tax havens.

4.2   Treaty circumvention

We now turn to an assessment of tax evaders' efforts to circumvent AEI to arrive at a comprehensive evaluation of its success. We first run a set of regressions to test whether households shifted assets to non-compliant havens to avoid detection. The results are depicted in Table 2. Models 1 and 3 test for shifting to traditional tax havens using the BIS and IMF data, respectively. The regressions are restricted to the US and non-haven countries that signed CRS MCAA as saver countries, and to all countries identified as tax havens as bank countries. Asset shifting implies that assets in non-compliant havens should increase relative to assets in compliant havens. Models 1 and 3 only contain the signed variable. Its small and insignificant coefficients suggests that shifting cannot be observed.

Table 2: Treaty circumvention

	Data	BIS		IMF	
	Bank countries	H	H&NH	H	H&NH
	Saver countries	NH	NH*	NH	NH*
	Further sample restrictions	Only saver countries that ever signed AEI agreements			
	Model	(1)	(2)	(3)	(4)
Signed		-0.05		-0.03	
		(0.08)		(0.07)	
CRS endorsed			0.21***		0.46***
			(0.04)		(0.03)
CRS endorsed * Haven			-0.47***		-0.17***
			(0.07)		(0.05)
CRS endorsed * US			-0.10		-0.11
			(0.06)		(0.09)
Constant		4.50***	4.15***	3.44***	3.62***
		(0.12)	(0.08)	(0.13)	(0.06)
Observations		14,893	37,578	9,005	35,105
Number of dyads		525	1,413	1,125	4,827
Dyad fixed effects		Yes	Yes	Yes	Yes
Quarter-year fixed effects		Yes	Yes	No	No
Year fixed effects		No	No	Yes	Yes

Note: "H" refers to havens and "NH" to non-havens. "NH" includes all non-haven countries but the US. Block-bootstrapped standard errors clustered around dyads in parentheses. * p<.1, ** p<.05, *** p<.01.*

The US does not transmit information to other countries. Hakelberg and Schaub (2018) contend that the US and its financial sector may exploit this status and attract foreign capital as a secrecy jurisdiction. Thus, Models 2 and 4 assess whether households shifted assets to the US in reaction to CRS. The samples are restricted to assets of non-havens (saver countries) in both havens and other non-havens (bank countries), only using saver countries that ended up signing CRS MCAA. The regressions contain a dummy that switches to one in 2014:I, i.e. the endorsement of CRS, as well as interactions of this variable with the haven dummy and a dummy indicating whether the bank country is the US. The results of both models show that assets of non-havens in non-havens increased substantially from 2014 on; and that relative to this development, assets in tax havens

decreased, which is in line with the results from the main specifications reported above. Most importantly, however, assets of non-havens in the US did not increase relative to assets of non-havens in non-havens other than the US. This implies that foreign assets in the US increased substantially after AEI, but so did assets in other non-havens. Thus, we cannot observe asset shifting to the US.

Figure 4: Development of inter-haven assets
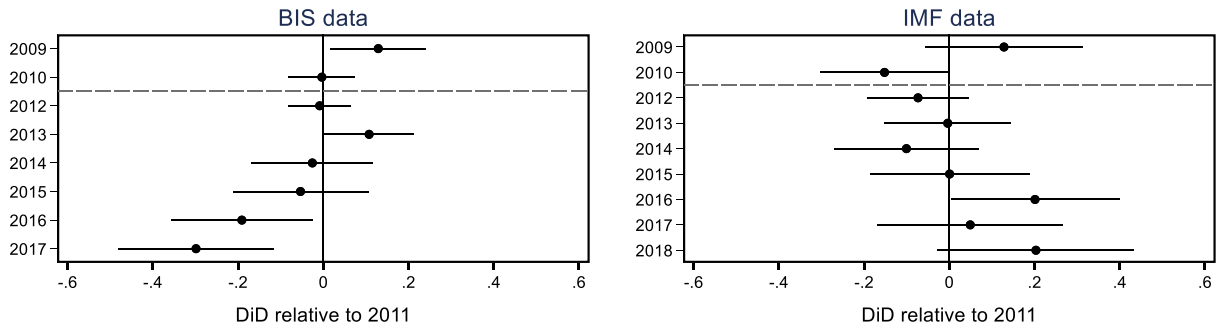
Note: The plotted coefficients indicate the difference between inter-haven assets and assets of non-havens in non-havens relative to their difference in 2011. The black lines represent 95 percent confidence intervals. The full regression Table is available in the Online Appendix.

We lastly turn to more sophisticated circumvention efforts through shell companies or other corporate identities. To this end, we assess how assets attributed to tax havens evolved following the endorsement of AEI as the new global standard. This is based on regression models but can only yield suggestive evidence. We first consider inter-haven assets and the results are depicted in Figure 4. The underlying regression includes dyadic fixed effects and is restricted to investments of havens in havens as well as investments of non-havens in non-havens. Information on the development of inter-haven assets alone would be of little use because they de- and increase for reasons other than households' use of shell corporations, e.g. due to legitimate investments of companies. Thus, Figure 4 depicts the results from a regression that also follows the DiD logic. It shows, for particular years, the difference between assets of havens in havens and assets of non-havens in non-havens relative to their difference in 2011, i.e. the last year before FATCA began the global implementation of AEI. The aim of this approach is to remove the impact of overall economic development from the assessment of inter-haven assets. If tax evaders reacted to AEI by concealing their illicit investments behind a corporate veil, we expect to observe a relative increase in inter-haven assets. The results show that, in the BIS data, inter-haven assets declined over the years relative to assets between non-havens, suggesting that less shell corporations were used after AEI. The IMF data point towards a modest increase in inter-haven assets, but the (in)significance of the coefficients as well as rapid coefficients shifts in the later years suggest that this trend is far from conclusive. Taken together, the results do certainly not indicate distinct treaty circumvention efforts.

Figure 5: Development of havens' assets in non-havens
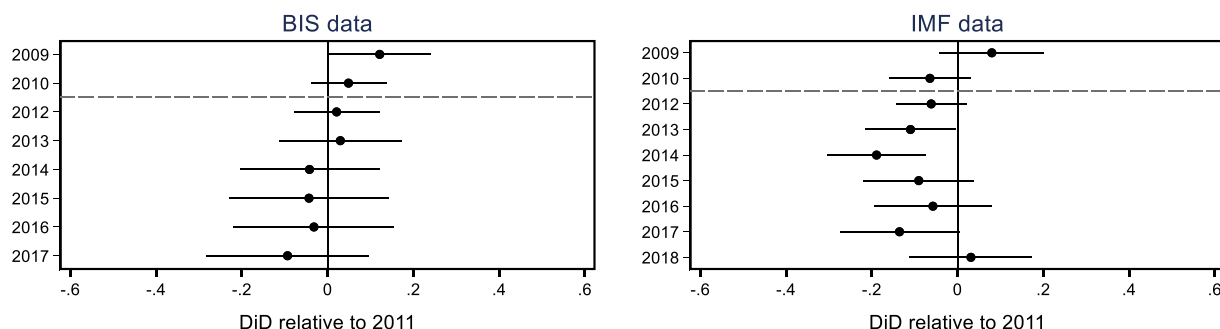
Note: The plotted coefficients indicate the difference between havens' assets in non-havens and non-havens' assets in non-havens relative to their difference in 2011. The black lines represent 95 percent confidence intervals. The full regression Table is available in the Online Appendix.

Figure 5 depicts the result from a regression using the same approach to compare assets of havens in non-havens relative to assets of non-havens in non-havens. Both BIS and IMF data yield the same result. Assets of havens in non-havens remained constant following AEI relative to assets of non-havens in non-havens. If interpreted without considering statistical significance, the results rather point towards a decrease. Most importantly, they do not indicate an increase of efforts to circumvent information exchange by 'roundtripping' (Hanlon et al. 2015).

5. Discussion

Our results can be summarised as follows. AEI substantially reduced households' cross-border assets. According to the BIS data, cross-border assets in tax havens by households with residency in AEI compliant jurisdictions decreased by roughly 67 per cent relative to their counterfactual level. Although it is not possible to derive an exact causal effect from the IMF specifications, their results are generally in line with the BIS data. Lastly, there is very little evidence for efforts to circumvent AEI by asset shifting or intermitting a corporate veil. The BIS data even show a decline of such efforts. Overall, the decrease of 67 per cent is substantial and trumps estimates of the effectiveness of prior international cooperation against tax evasion by a large margin (e.g., Johannesen and Zucman 2014), but how can it be interpreted?

Firstly, we are confident that the results indicate an overall decrease of tax evasion. In combination, the BIS and IMF data have a comprehensive coverage of tax havens and capital forms, which implies that the results are not driven by selective data coverage. Furthermore, the decrease of assets in tax havens is not offset by an increase in treaty circumvention. The data are not perfect because they still have some blind spots, e.g. derivatives, but the most important capital forms and tax havens are all covered in some way. Furthermore, there is no indication that remaining capital forms should react differently to AEI since FATCA and CRS treat them the same way.

Secondly, the estimated 67 per cent decrease should not be misinterpreted. It tells us that specific household assets in tax havens would be 67 per cent higher if there were no AEI, and not that assets decreased by 67 per cent in absolute levels. Figures 2 and 3 indicate that assets in havens only decreased slightly (BIS) or even increased substantially (IMF). Although it is unclear what part households' illicit investments play in this development, tax havens apparently did not suffer massive financial losses following AEI. Our results rather suggest that havens would have benefitted to a much larger extent from rapid financial expansion in times of quantitative easing. It is possible that, in absolute terms, there is now only marginally less tax evasion compared to the time before AEI implementation – there is no way to tell with the data at hand and our estimate must be interpreted relative to an unobserved counterfactual (Lechner 2010).

 Furthermore, the results do not imply that cross-border tax evasion overall is 67 per cent below its counterfactual level. The estimated decrease conveys no information about assets hid behind a corporate veil since

these are not attributed to the relevant non-haven jurisdictions. These illicit cross-border assets still exist and our analysis only shows that the decrease of directly attributable assets was not offset by an increase of sophisticated treaty circumvention. Nevertheless, this is an encouraging result because it implies an overall reduction of tax evasion following AEI. We thus interpret AEI as successful.

Lastly, our results also suggest that AEI's effect followed the international endorsement of FATCA and CRS. Subsequent treaty signature and effectiveness had no further impact in our main regressions. This implies that the treaties caused a shift towards tax compliance years before information about foreign accounts would be collected and exchanged. We attribute this behaviour to the significant uncertainty introduced by the recent AEI treaties. As aforementioned, FATCA and CRS had a progressively encompassing scope and multilateral enforcement. Tax evaders could not be sure after the initial announcement and subsequent international endorsement exactly which countries would (be forced to) join the treaties and exchange information. Households with residency in non-compliant jurisdictions or households invested in non-compliant tax havens thus had to fear that their resident jurisdiction and tax haven of choice would participate in AEI in the future. Possible detection, even when it should be known that the chance is rather low, seems to deter tax evaders (Hanlon et al. 2015).

6. Conclusion

Are FATCA and CRS MCAA the 'big bang' agreements that scholars have been advocating (Elsayyad and Konrad 2012; Palan et al. 2010)? The results presented in this study are encouraging and the estimated 67 per cent reduction not offset by treaty circumvention is substantial. FATCA and CRS thus implement the first policy regime that reduces tax evasion overall. Thereby, the treaties mitigate the pressing socio-political dysfunctions caused by tax evasion. They are no panacea and our results certainly do not suggest that they eliminate tax evasion altogether. However, their success aids in returning sovereignty over tax policy back to governments by limiting tax evasion and ensuing international tax competition over internationally mobile capital. Comparative data show that taxes on portfolio capital are on the rise again after decades of decreasing rates. It is likely that AEI contributes to this trend (Ahrens et al. 2018). AEI should thus strengthen countries' ability to care for their citizens with (re)distributive policy. Thereby, the treaties also aid in keeping the rise of inequality in check. Income inequality has risen drastically in the past because capital owners pulled away from citizens dependent on labour income (Piketty and Saez 2014), which negatively affects domestic democracy (Emmenegger and Marx 2019; Hacker and Pierson 2010; Rodrik 2018). AEI attenuates this development because it improves the proper taxation of capital. All this implies that contra the 'globalisation trilemma' (Rodrik 2012), it is feasible to combat the ills of economic globalisation with effective political globalisation while preserving national sovereignty.

Nevertheless, policy makers need to stay on their toes. The G20 proclaimed in 2009 that the era of banking secrecy is over. Even after comprehensive AEI, we rather think that the end of simple banking secrecy is over. Tax evaders still hide behind corporate identities, and our results only suggest a reduction of such efforts in the BIS data. If eliminating tax evasion altogether is the long-term goal, it will be necessary to ensure that banks in tax havens identity the beneficial owners of assets and report them. This will be a difficult task. Furthermore, the most important financial centre in the world, the US, do not transmit information to any other jurisdiction and might develop tax haven operations in the future (Hakelberg and Schaub 2018). Although our results do not yet indicate this, the development might take some more time to unfold. Several loopholes remain, and the ultra-rich who can afford tailored wealth management will exploit them. This suggests that policy makers need to continue putting pressure on financial secrecy.

7. References

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