

# Trading Offshore: Evidence on Banks' Tax Avoidance

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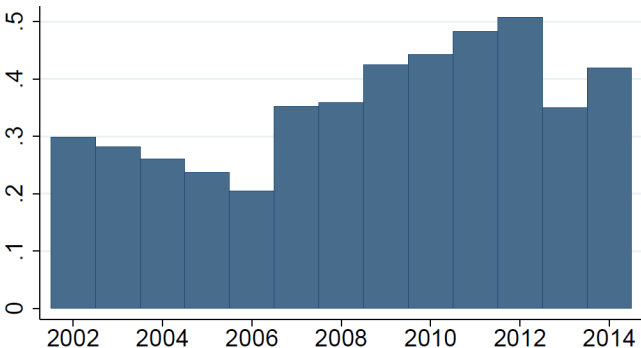
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# Motivation

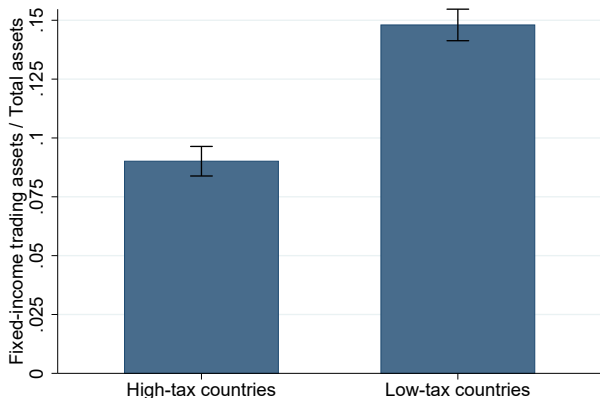
- **Proprietary trading:** Trading stocks, bonds, derivatives, etc. with the bank's own money
- Constitutes a large share of banks' profits



Profits from proprietary trading relative to total profits. International sample of banks (source: Bankscope).

→ **Where do banks make these profits?**

# Proprietary Trading Assets in Low-Tax Countries



Trading assets per total assets in low-tax countries (CTR < 0.3) and high-tax countries. Data: External Position of Banks (German Bundesbank)

# Our Paper in a Nutshell

- ① We propose that **multinational banks hold more proprietary trading assets in low-tax jurisdictions.**
  - We use regulatory data from the German central bank.
  - A 1%-point lower tax rate increases a bank's trading assets by 3-4% (fixed-income assets) to 9% (derivatives).
  - Estimated tax semi-elasticities are similar to trademarks and patents.
- ② Suggestive evidence that multinational banks shift **mostly book profits, not real activities.**
  - Suggests only an 'artificial' relocation of trading, not of traders.
- ③ Back-of-the-envelope calculation: Due to this method of profit shifting, the **German government lost € 442 million in tax revenues in 2015, or about 5% of the total taxes paid by German banks.**

# Contributions

- 1 We study a **new profit shifting method**.
  - Standard profit shifting channels in the literature: debt shifting (e.g. Huizinga et al., 2008, Egger et al., 2010), transfer pricing (e.g. Clausing, 2003, Cristea/Nguyen, 2015), and relocation of IP (e.g. Dischinger/Riedel, 2011, Griffith et al., 2014).
- 2 We study **tax avoidance in the financial sector**, which most previous studies of tax avoidance excluded.
  - Exceptions are Demirgüç-Kunt/Huizinga (2001) and Merz/Overesch (2016), who did not study profit shifting channels, and Gu et al. (2015) and Heckemeyer/de Mooij (2017), who focus on leverage.

# Outline

- 1 Introduction
- 2 Data**
- 3 Empirical Analysis
- 4 Quantification
- 5 Conclusion

# Data

- We use the [External Positions of Banks](#) database of the German central bank (Deutsche Bundesbank)
  - High-quality data without missing values
  - Covers only German banks and their foreign subsidiaries and branches (but full coverage of this group)
    - 106 bank groups
    - Affiliates in 57 countries
  - Data from 2010/12-2015/12 (monthly basis)
  - Includes detailed data on assets held for proprietary trading
    - Fixed-income assets held for trading
    - Derivatives held for trading (12/2013-12/2015)
- We merge annual employment data from the [Microdatabase Direct Investment \(MiDi\)](#) of the German central bank

# Distribution Across Countries

#	Fixed-income trading assets			Trading derivatives		
	Country	Total (in m€)	% held in branches	Country	Total (in m€)	% held in branches
1	Germany	50,315		Germany	1,171,000	
2	UK	42,596	100	UK	259,500	100
3	USA	7,417	95	USA	203,800	100
4	Italy	2,589	23	Italy	61,513	100
5	Singapore	2,422	40	Singapore	6,621	100
6	Cayman Isl.	1,493	100	Poland	1,419	0
7	Poland	670	0	Luxembourg	823	0
8	Japan	539	96	Japan	636	100
9	Luxembourg	380	0	Hong Kong	420	100
10	China	379	9	Spain	122	0
	Total	117,800	52	Total	1,816,000	35

Totals of fixed-income securities and derivatives that are held for trading by German multi-national banks, in million euro in 2014. Data: Bundesbank. Countries in which less than three banks are active are not shown here due to confidentiality requirements.



# Descriptive Statistics

Variable	Obs.	Mean	p3	p50	p97
Fixed-income trad. assets (m€)	16,668	257	0	0	1,237
Trading derivatives (m€)	6,460	2,721	0	0	56,000
Total assets (m€)	16,668	4,883	0.2	727.5	19,800
Corporate tax rate	16,668	0.24	0.00	0.25	0.40
Nominal GDP (m€)	16,668	122,520	246	36,221	1,037,047
Inflation rate (%)	16,668	2.15	-0.82	1.82	7.08
GDP growth (%)	16,668	1.93	-2.86	1.86	7.31
Regulation	16,668	1.35	1	1	3
Financial sector share	16,668	0.11	0.04	0.07	0.42
Subsidiary dummy	16,668	0.28	0	0	1
Basel III dummy	16,668	0.04	0	0	1
Bank group tot. assets (m€)	16,668	347,000	93	65,800	1,370,000
Employees (yearly)	1,290	785	0	64	16,314

All data from 12/2012-12/2015, except for trading derivatives (12/2013-12/2015). *Regulation* is an index for regulation of securities activities, ranging from 1 (unrestricted) to 4 (prohibited).

# Data: Why not Bankscope?

- Previous studies used Bureau van Dijk's **Bankscope**
- Bankscope covers more countries, but lower data quality
  - Example: *Subsidiaries of German banks in Singapore*  
**Bundesbank data**: 7 subsidiaries, all active in trading  
**Bankscope**: 1 German-owned subsidiary, trading assets missing
- Bankscope only covers subsidiaries, not branches
- We also rerun the analysis using Bankscope (and obtain similar results)
  - Data from 2002-2014 (yearly basis)
  - Data from ~100 countries

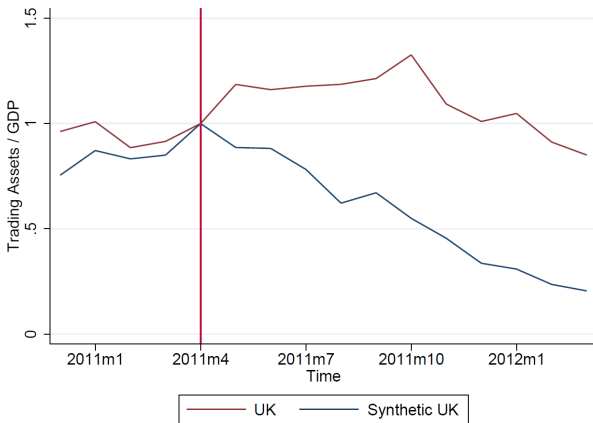
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  - Case Study
  - Empirical Strategy
  - Shifting of Real Activity?
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# Case Study: UK

- UK cut tax rate in April 2011 from 28% to 26%.

## Trading Assets/GDP in UK and Synthetic UK

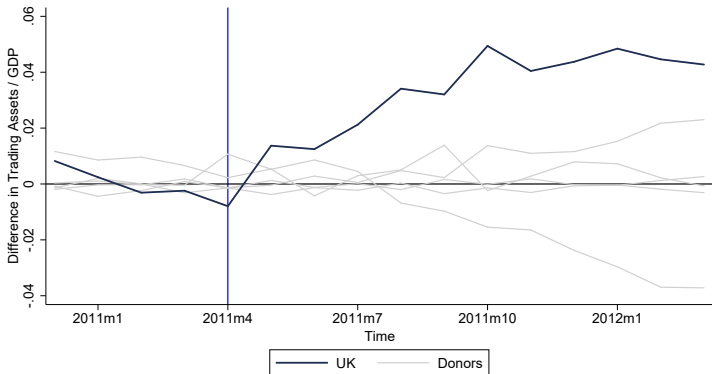


Time trends of total fixed-income trading assets held by German banks' affiliates, relative to GDP, in the UK and a synthetic control country.

## Case Study UK: Placebo Test

- UK cut tax rate in April 2011 from 28% to 26%.

**Figure: Difference in Trading Assets (UK – Synthetic UK)**



Difference between the UK and a synthetic UK in the time trends of total fixed-income trading assets held by German banks' affiliates. Grey lines represent Placebo tests. Data: Bundesbank.

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# Empirical Strategy

## Main Hypothesis

Proprietary trading activities by banks are decreasing in the corporate tax rate.

- Empirical specification

$$\log(\text{Trad. Assets}_{ijkt}) = \beta_0 + \beta_1 \text{CTR}_{jt} + \beta_2 X_{ijkt} + \phi_j + \delta_k + \gamma_t + u_{ijkt}$$

- $i$  indexes banks,  $j$  countries,  $k$  bankgroups and  $t$  time
- Control variables  $X_{ijkt}$ :  $\log(\text{Total assets})$ ,  $\log(\text{Bank group total assets})$ ,  $\log(\text{GDP})$ , inflation, GDP growth, share of financial sector in country  $j$ 's gross value added, index on regulation of banks' securities activities, Basel III dummy, subsidiary dummy
- $\phi_j$  are country FE,  $\delta_k$  bankgroup FE,  $\gamma_t$  year-by-month FE
- $\log$  calculated by inverse hyperbolic sine transformation
- Also estimate selection model (Wooldridge, 1995)

# Results: Fixed-Income Assets held for Proprietary Trading

	(1)	(2)	(3)	(4)
Wooldridge selection model				x
Corporate tax rate	-2.985*** (-6.69)	-4.376* (-1.70)	-3.058** (-1.98)	-2.893*** (-6.37)
Controls	Yes	Yes	Yes	Yes
Monthly time FE	Yes	Yes	Yes	Yes
Bank group FE	Yes	Yes	No	Yes
Affiliate FE	No	No	Yes	No
Country FE	No	Yes	No	No
R <sup>2</sup>	0.423	0.547	0.880	0.425
Observations	16,668	16,721	16,720	16,668

The dependent variable is the inverse hyperbolic sine of fixed-income securities held for trading. Monthly bank data for 12/2010-12/2015. z-statistics in parentheses, based on bootstrapped standard errors clustered by bank group and by country-month-year. Data: Bundesbank.



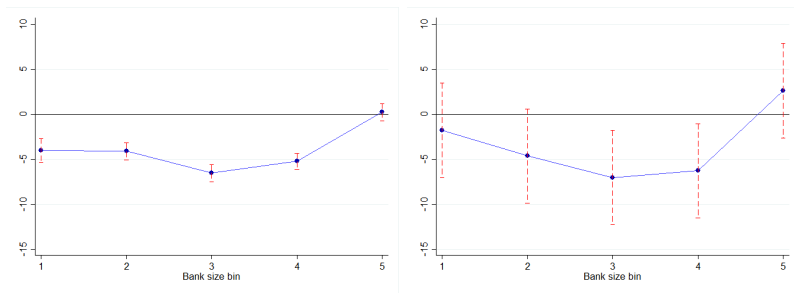
# Internal vs External Margin

Dependent variable	ln(trading assets)		Trading assets Yes/No	
	(1)	(2)	(3)	(4)
Corporate tax rate	-3.263*** (-8.57)	0.520 (0.24)	-0.136*** (-3.92)	-0.563*** (-2.79)
Controls	Yes	Yes	Yes	Yes
Monthly time FE	Yes	Yes	Yes	Yes
Bank group FE	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes
Observations	3,400	3,400	16,665	16,718
R <sup>2</sup>	0.606	0.774	0.407	0.548

The dependent variable is the natural logarithm of fixed-income securities held for trading in columns (1) and (2), and a dummy variable that is equal to one if the affiliate holds fixed-income securities for trading in columns (3) and (4). Monthly bank data for 12/2010-12/2015. z-statistics in parentheses, based on bootstrapped standard errors clustered by bank group and by country-month-year. \*\*\*, \*\*, \* indicate significance at 1%, 5%, 10% levels. Data: Bundesbank.

# Heterogeneity by Bank Size

## Estimated Coefficients for Different Quintiles of Bank Size



Estimated coefficients and 95% confidence intervals for different quintiles of bank size. Left (right) panel shows coefficients for regression without (with) country fixed effects. Data from Bundesbank, 2010-2015.

# Results: Descriptive Evidence on Derivatives

	(1)	(2)
Wooldridge (1995) selection model		x
Corporate tax rate	-9.346*** (-20.16) (-8.41)	-9.133*** (-17.56) (-8.31)
Controls	Yes	Yes
Monthly time FE	Yes	Yes
Bank group FE	Yes	Yes
R <sup>2</sup>	0.571	0.573
Observations	6,398	6,398

The dependent variable is the inverse hyperbolic sine of derivatives held for trading. Monthly bank data for 12/2013-12/2015. z-statistics in parentheses, based on bootstrapped standard errors clustered by bank group and by country-month-year. Data: Bundesbank.

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# Empirical Strategy

- Banks can either shift real activities or book profits
  - Real activities: Relocation of trading assets and employees who do the trading
  - Income shifting: Relocation of trading assets only
- To test, estimate

$$\log(\text{Empl.}_{ijkt}) = \beta_0 + \beta_1 \log(\text{Trad. assets}_{ijkt}) + \beta_2 X_{ijkt} + \delta_k + \gamma_t + \phi_j + u_{ijkt}$$

- Instrument the affiliate's trading assets with
  - Trading assets in the headquarter of the bank group
- Split sample into two subsamples (high- and low-tax countries)

# Results: Shifting of Real Activity?

	IV: Trading of headquarters				
		All		Low-tax	High-tax
	(1)	(2)	(3)	(4)	(5)
CTR	0.173 (0.06)				
IHS(Trading)		0.126 (1.09)	0.142 (0.69)	0.153 (0.35)	0.201** (0.17)
Controls	Yes	Yes	Yes	Yes	Yes
Year & bank group FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	No	Yes	No	No
First-stage coefficient		0.304***	0.283***	0.280***	0.362*
First-stage F		20.923	12.822	8.326	9.185
Observations	960	1,060	1,059	734	326
R <sup>2</sup>	0.726	0.284	0.110	0.301	0.228

The dependent variable is the inverse hyperbolic sine of the number of employees. *All* indicates that the sample consists of all foreign affiliates of German banks. *Low-tax* refers to affiliates that face a lower tax rate than the German headquarters (30%) and *High-tax* refers to the other entities. *IHS(Trading)* is the inverse hyperbolic sine of fixed-income trading assets, instrumented by the inverse hyperbolic sine of trading assets in the German headquarters. Yearly data for 2011-2015. z-statistics in parentheses, based on bootstrapped standard errors clustered by bank group and by country-month-year. \*\*\*, \*\*, \* indicate significance at 1%, 5%, 10% levels. Data: Bundesbank.

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# Back-of-the-Envelope-Calculation

## How important is the relocation of proprietary trading as a profit shifting channel?

- Estimate change in trading assets if all lower-taxed affiliates paid a tax of 30% (like German HQ) using estimated semi-elasticities
- Multiply the change in trading assets with assumed profitability
- Multiply with actual tax rate differential → tax saving for the bank
- *Or:* Multiply with German tax rate to obtain revenue loss of German government



# Implied Tax Revenue Loss

Year	Fixed-income trading assets	Trading derivatives
2011	38.6	
2012	41.4	
2013	39.6	
2014	45.7	269.5
2015	53.4	389.1

Calculated annual revenue loss (in million EUR) of the German tax authorities due to German multinational banks relocating proprietary trading activities, assuming an exogenous profitability of fixed-income trading assets (trading derivatives) of 1% (0.3%).

**Revenue loss for the German government: €442 million in 2015 (or about 5% of the total taxes paid by German banks)**

# Conclusion

- Banks relocate assets held for proprietary trading in response to tax rate differentials.
  - Estimated semi-elasticities of 4%, similar to estimates for patents.
  - Descriptive evidence: Effect even larger for derivatives.
- Similar results with Bankscope data.
- Back-of-the-envelope calculation: German government lost €442 million in tax revenues in 2015, or about 5% of the total taxes paid by German banks because of this method of profit shifting.
- Results relevant for policy makers
  - End exemptions for bank in CFC rules.
  - Apply CFC rules within Europe.