

Quantifying the OECD BEPS Indicators – An update to BEPS Action 11

Daniel Klein, Christopher Ludwig, Katharina Nicolay and
Christoph Spengel



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How tax 'aggressive' are multinational corporations?

*„There is a widespread perception that BEPS has grown over time, [...]“ but
„[...] estimates within the Hines-Rice approach
have tended to be smaller in magnitude when using more recent time
periods.“*

Dhammika Dharmapala (2014)



The
Guardian

**Facebook's UK tax bill rises to
£15.8m - but it is still just 1% of sales**

**Margaret Hodge MP says it is 'outrageous' how
little tax the company pays in Britain**

October 08 2018



FINANCIAL TIMES

Corporation tax

OECD drafts principles for \$100bn
global corporate tax revolution

Technical blueprint would upend
taxation of US tech groups but still
needs political agreement

October 12 2020

In a nutshell

Research Question

- How to transparently revive the three most convincing OECD BEPS indicators?
- How do the OECD BEPS indicators develop over time?

Data

- FDI position data from the OECD Foreign Direct Investment Statistics and GDP data from the World Bank (Indicator 1)
- Unconsolidated financial data from the Bureau van Dijk ORBIS database (Indicator 4)
- Country-level data on receipts for the use of IP as balance of payments from the World Bank and data on the gross domestic expenditure on R&D from the UNESCO Institute for Statistics (Indicator 5)

Empirical Strategy

- Transparent replication of OECD Indicators 1, 4 and 5

Findings

- Macro-Data Indicators (Indicator 1 and Indicator 5): Noisy indicators with moderately convincing evidence of any BEPS trends.
- Micro-Data Indicator (Indicator 4): Well specified indicator that indicates the existence of BEPS and highlights a declining time trend.

BEPS Action 11

Measuring and Monitoring BEPS

One of the key components of Action 11 is the development of “indicators” to

- identify the scale and economic impact of BEPS
- track changes in BEPS over time
- monitor the effectiveness of measures implemented to reduce BEPS.



A dashboard of indicators might provide evidence of the presence of BEPS and indicate trends.

The six OECD BEPS Indicators – Focusing on three relevant measures

Disconnect between real and financial activity

- **Indicator 1:** Concentration of high levels of FDI relative to GDP

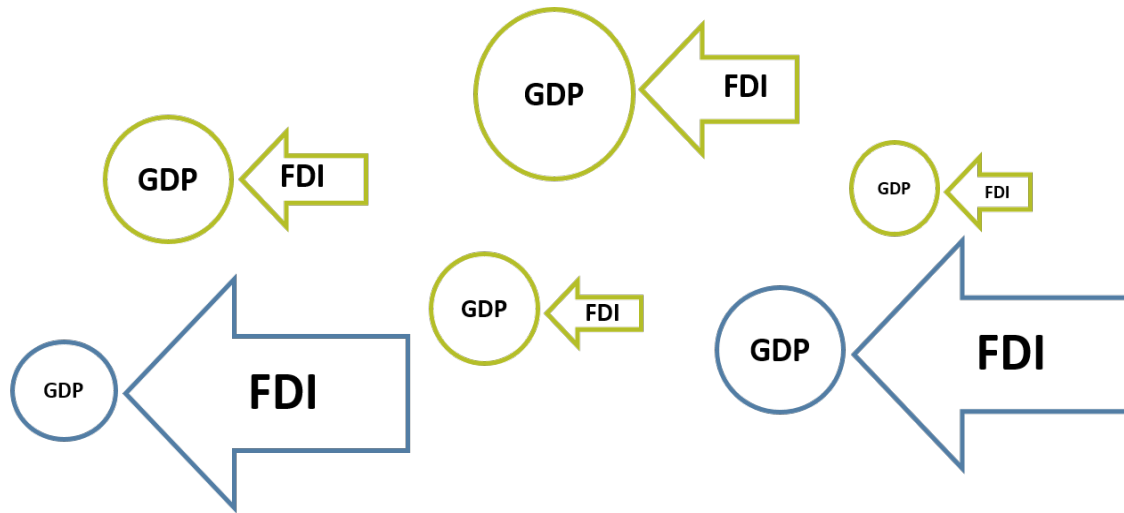
Surprisingly low tax or profit measures

- Indicator 2: Differential profit rates compared to effective tax rates
- Indicator 3: Differential profit rates between low-tax locations and worldwide MNE operations
- **Indicator 4:** Effective tax rates of large MNE affiliates relative to non-MNE entities with similar characteristics

Use of potential profit shifting channels

- **Indicator 5:** Concentration of high levels of royalty receipts relative to R&D spending
- Indicator 6: Interest expense to income ratios of MNE affiliates in high-tax locations

Indicator 1: Concept



$$\text{Indicator 1} = \frac{\text{Average } \frac{\text{FDI}}{\text{GDP}} \text{ of high-ratio countries}}{\text{Average } \frac{\text{FDI}}{\text{GDP}} \text{ of all other countries}}$$

Indicator 1: Methodology and Data

$$\text{Indicator } 1_t = \frac{\sum_{i=1}^I \frac{FDI_{i,t}}{GDP_{i,t}}}{\sum_{j=1}^J \frac{FDI_{j,t}}{GDP_{j,t}}}$$

Variables

FDI	Foreign direct investments
GDP	Gross domestic product
subscript i	Countries in the high-ratio group
subscript j	Countries in the low-ratio group

Data

- Macro-level data
- OECD Foreign Direct Investment Statistics:
 - FDI position data of the 3rd edition of the Benchmark Definition of FDI: includes inward and outward FDI positions from and to OECD countries for the time periods from 2005 to 2013
 - FDI position data of the 4th edition of the Benchmark Definition of FDI: for the time periods from 2014 to 2018
- World Bank: GDP data in current US dollar for the years 2005 until 2018

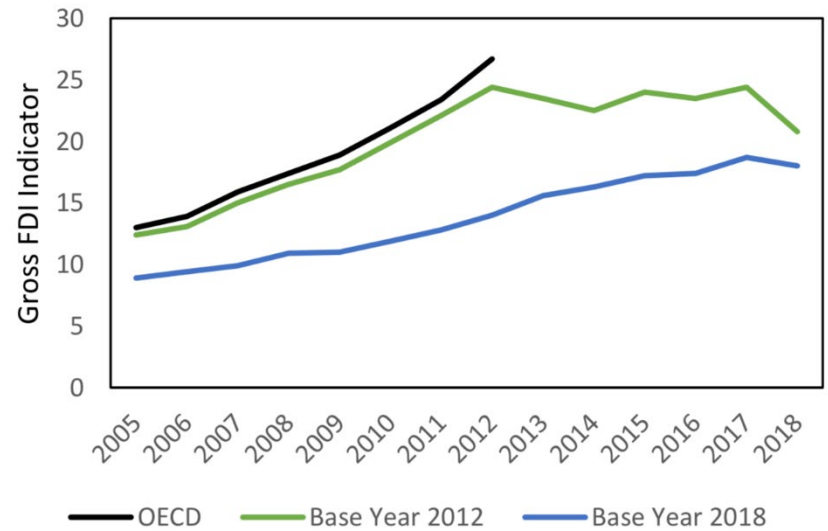
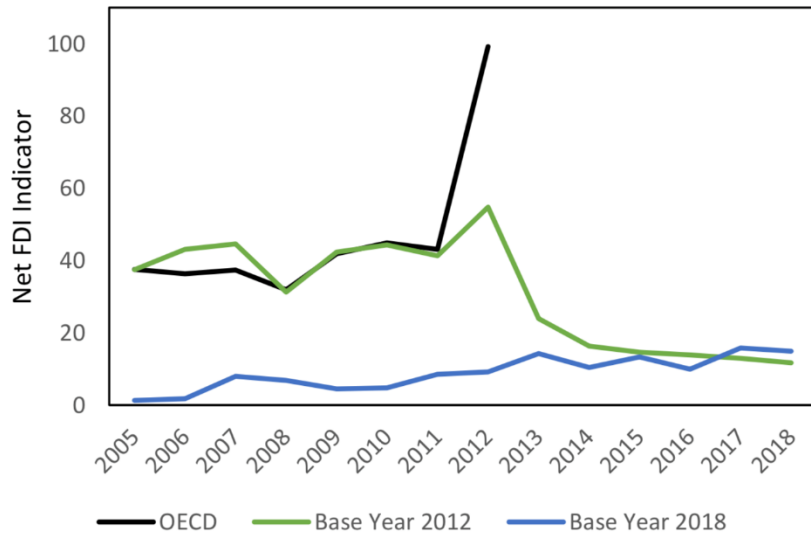
Indicator 1:

Countries in high-ratio group

Panel A		Net FDI
	Base Year 2012	Base Year 2018
1	Bahamas	Barbados
2	Barbados	Cyprus
3	Bermuda	Dominica
4	Cayman Islands	Ireland
5	Hong Kong	Marshall Islands
6	Hungary	Mauritius
7	Ireland	Mongolia
8	Liberia	Netherlands
9	Malta	Panama
10	Marshall Islands	Papua New Guinea
11	Mauritius	St. Kitts and Nevis
12	Singapore	Singapore
13	St. Kitts and Nevis	Turks and Caicos Islands
14	Trinidad and Tobago	

Panel B		Gross FDI
	Base Year 2012	Base Year 2018
1	Bahamas	Bahamas
2	Barbados	Barbados
3	Bermuda	Curacao
4	Cayman Islands	Cyprus
5	Curacao	Ireland
6	Ireland	Luxembourg
7	Luxembourg	Malta
8	Malta	Marshall Islands
9	Marshall Islands	Mauritius
10	Netherlands	Netherlands
11		Switzerland

Indicator 1: Comparison

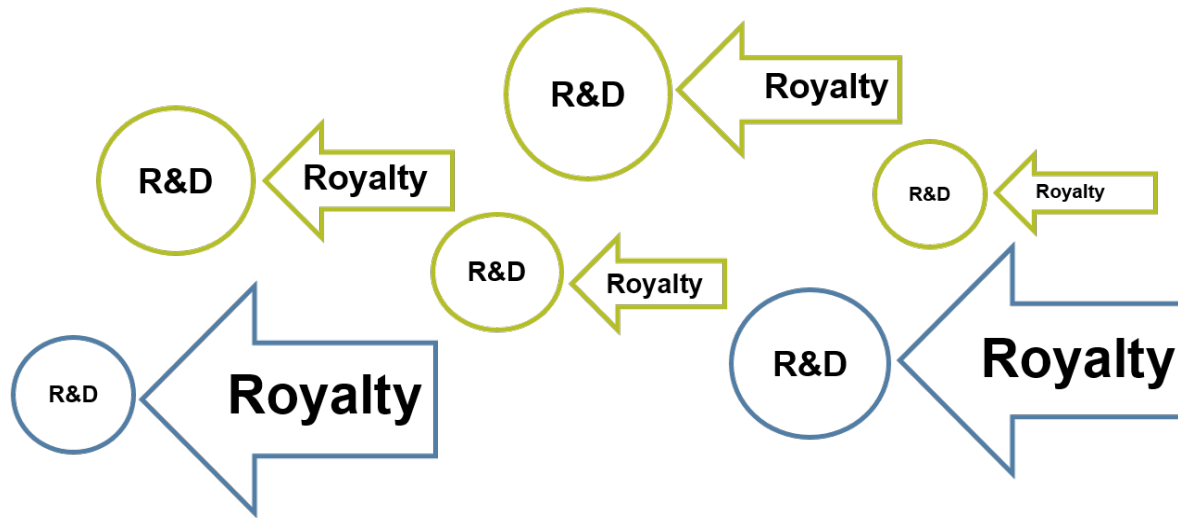


Indicator 1: Implication

- Close replication of OECD BEPS Indicator 1 with original data and specifications possible.
- Updated data and specifications indicate some mismatch between real and financial activity

Noisy macro-data indicator cannot convincingly distinguish real activity and BEPS.

Indicator 5: Concept



$$\text{Indicator 5} = \frac{\text{Average } \frac{\text{Royalty Income}}{\text{R\&D Expenses}} \text{ of high-ratio countries}}{\text{Average } \frac{\text{Royalty Income}}{\text{R\&D Expenses}} \text{ of all other countries}}$$

Indicator 5: Methodology and Data

$$\text{Indicator } 5_t = \frac{\frac{\sum_{i=1}^I \text{Royalty receipts}_{i,t}}{\sum_{i=1}^I \text{R \& D spending}_{i,t}}}{\frac{\sum_{j=1}^J \text{Royalty receipts}_{j,t}}{\sum_{j=1}^J \text{R \& D spending}_{j,t}}}$$

Variables

R&D	Research and development
subscript i	Members of the high-ratio group
subscript j	Members of the low-ratio group

Data

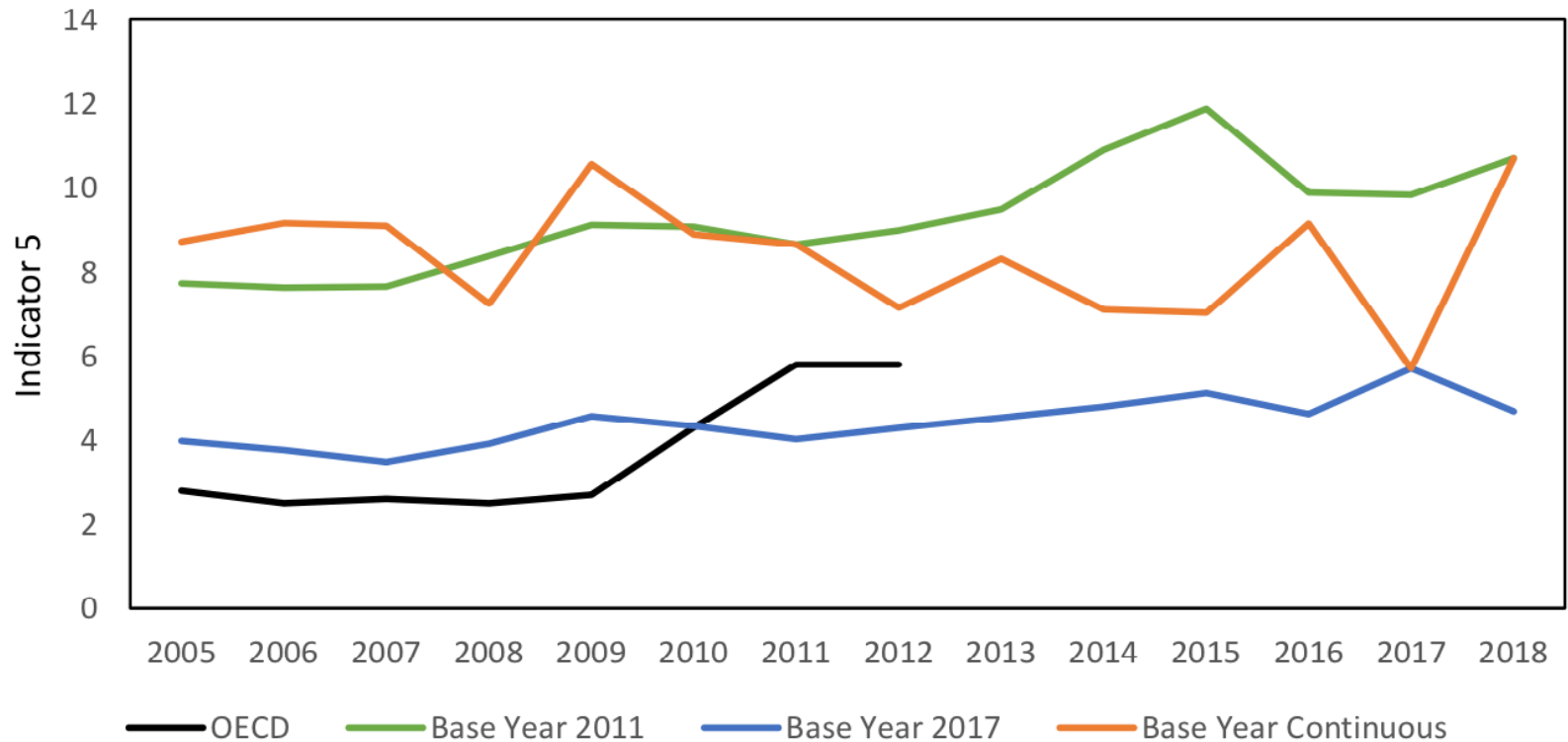
- Macro-level data
- World Bank: country-level data on receipts for the use of IP as balance of payments in current US dollar for the years 2005 until 2018
- UNESCO Institute for Statistics (UIS.Stat): data on the gross domestic expenditure on R&D

Indicator 5:

Countries in the high-ratio group

	Base Year 2011	Base Year 2017
1	Guatemala	El Salvador
2	Hungary	Hungary
3	Ireland	Luxembourg
4	Lesotho	Madagascar
5	Luxembourg	Malta
6	Madagascar	Netherlands
7	Malta	Singapore
8	Netherlands	Switzerland
9		United Kingdom

Indicator 5: Comparison

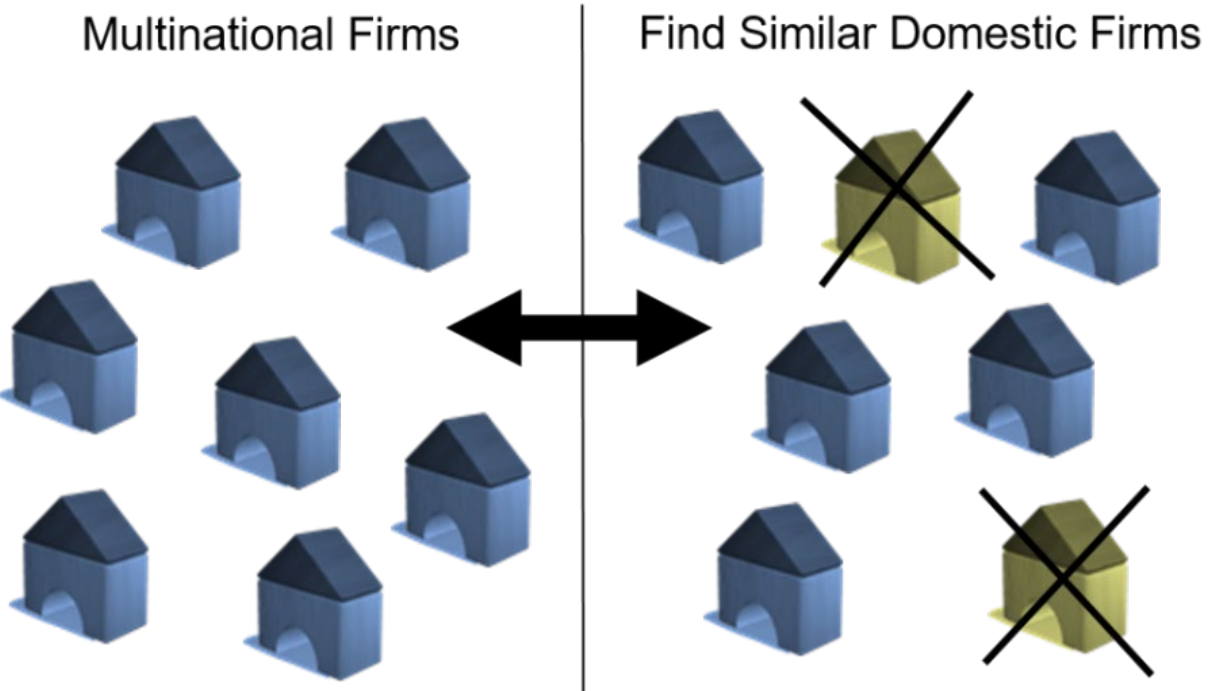


Indicator 5: Implication

- Replication of OECD BEPS Indicator 5 with original data and specifications not convincingly possible.
- Updated data and specifications indicate a constant BEPS trend.

Noisy macro-data indicator of aggregated royalty income and R&D expenditures is not precisely reproducible and does not convincingly measure a BEPS channel.

Indicator 4: Concept



Indicator 4: Methodology and Data

$$ETR_{f,c,i,t} = \beta_1 large_{f,c,i,t} \times year_t + \beta_2 large_{f,c,i,t} \times MNE_{f,c,i} \times year_t + \beta_3 X_{f,c,i,t} + \delta_i + \delta_{c,t}$$

Variables

$ETR_{f,c,i,t}$	Effective tax rate for firm f in country c , industry i and year t
$Large_{f,c,i,t}$	Dummy variable: 1 for firms with more than 250 employees, 0 otherwise
$MNE_{f,c,i}$	Dummy variable for multinational firms
$Year_t$	Dummy variable
$X_{f,c,i,t}$	Vector of firm-specific control variables
δ_i	Industry fixed effects
$\delta_{c,t}$	Country-year fixed effects

Data

- Firm-level micro data
- Unconsolidated financial data from the Bureau van Dijk ORBIS database: Panel 2000 – 2016

Extension

- We extend the indicator by applying a propensity score matching approach to estimate the average treatment effect (ATE)
 - We borrow from Bilicka (2019) and Finke (2013) and match MNEs to domestic firms based on the logarithm of total assets, the logarithm of firm's productivity, the debt to equity ratio and the ratio of intangible to total assets within year, industry and country

Indicator 4: Baseline regression

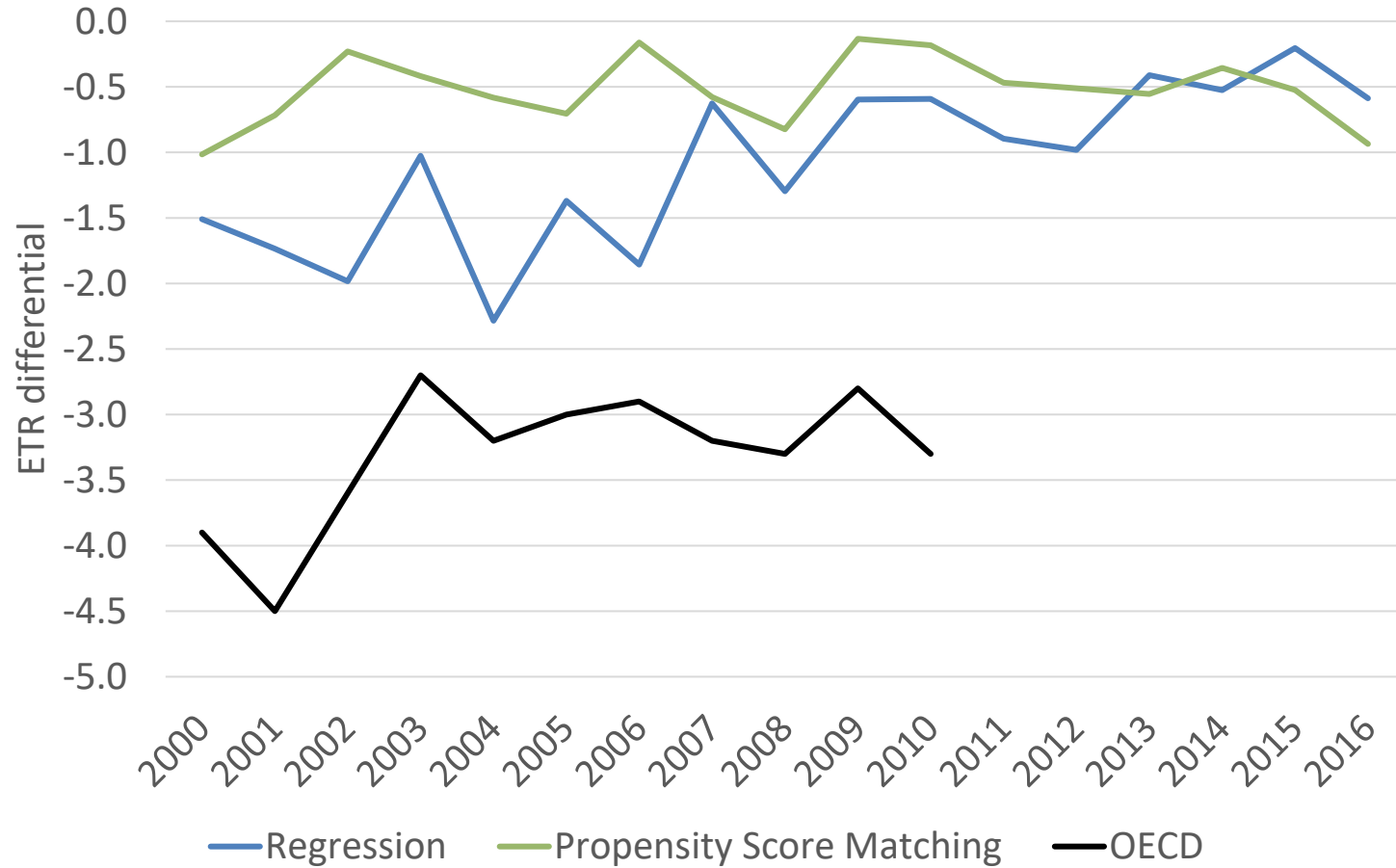
Dependent Variable: ETR

	Panel from 2000 to 2016	Panel from 2000 to 2010
Variable	(1)	(2)
Large	0.5886*** (0.0855)	0.7142*** (0.1059)
Large x MNE	-0.9606*** (0.0982)	-1.4648*** (0.1221)
Profitability (EBIT/TOAS)	-23.4167*** (0.0940)	-19.0960*** (0.1095)
log Total Assets (TOAS)	-0.2308*** (0.0088)	-0.1130*** (0.0105)
Innovation (IFAS/TOAS)	-2.3959*** (0.1010)	-3.5671*** (0.1148)
Position in Group	-0.7428*** (0.0300)	-0.8877*** (0.0352)
Country-Year Fixed Effects	x	x
Industry Fixed Effects	x	x
Time limited to 2010		x
R2 (within)	0.362	0.363
Number of firms	1,001,429	751,148
Observations	5,048,716	2,796,459

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors are clustered on firm level

Indicator 4: Comparison



Indicator 4: Implication

- Replication of OECD BEPS Indicator 4 with original specifications indicates an overestimation of BEPS by the OECD.
- Updated data and specifications indicate the existence of BEPS but with a diminishing trend.

Well specified comparison of multinational and domestic firms indicates the existence of BEPS over time.

Conclusion

- Close replication of three indicators from each OECD Action 11 dimension:
 - Disconnect between real and financial activity
 - Surprisingly low profits or tax measures
 - Use of potential profit shifting channels
- Indicator 1 and Indicator 5 cannot provide convincing evidence of BEPS.
- Estimates of Indicator 4 show that multinational firms have lower ETRs than domestic firms.
 - This difference diminishes over time, possibly due to effective BEPS countermeasures.

Transparent updates on the existence and extent of BEPS contribute to the ongoing public and academic debate on the necessity to reform the corporate income tax system.

Thank you for your feedback!



Contact

- Daniel Klein d.klein@uni-mannheim.de
- Christopher Ludwig christopher.ludwig@zew.de
- Katharina Nicolay katharina.nicolay@zew.de
- Christoph Spengel spengel@uni-mannheim.de