Effects of IP Taxation on Economic Activity: A Review of the Literature

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Why Should the Government Promote Innovation?

- Insofar as social benefits from R&D exceed private returns (due to positive spillovers, net of any negative "arm's race" effects), private investment in R&D will be inefficiently low.
- Innovation is seen as key to firm productivity and economic growth.
- *Domestic* ownership of innovative assets is seen as a matter of national interest.

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Tax Policy Considerations

- Income derived from innovative activity is inherently mobile.
- Patent and other IP income may be especially susceptible to shifting and contribute to erosion of the domestic tax base.

$\Rightarrow$ **Challenge for tax policy consists of incentivizing (domestic) innovation while deterring (outbound) income reallocation.**

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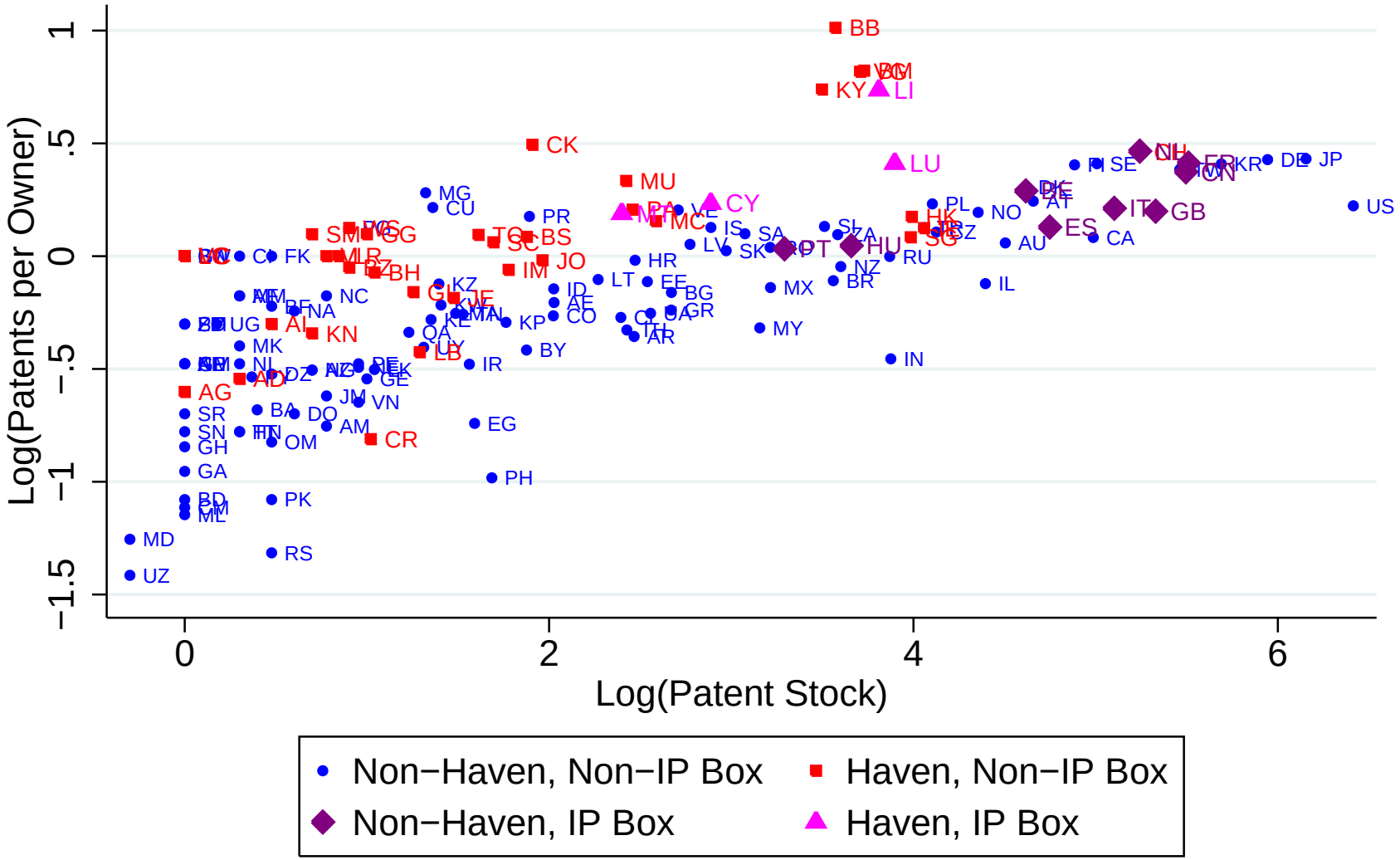
Firm Patent Intensity

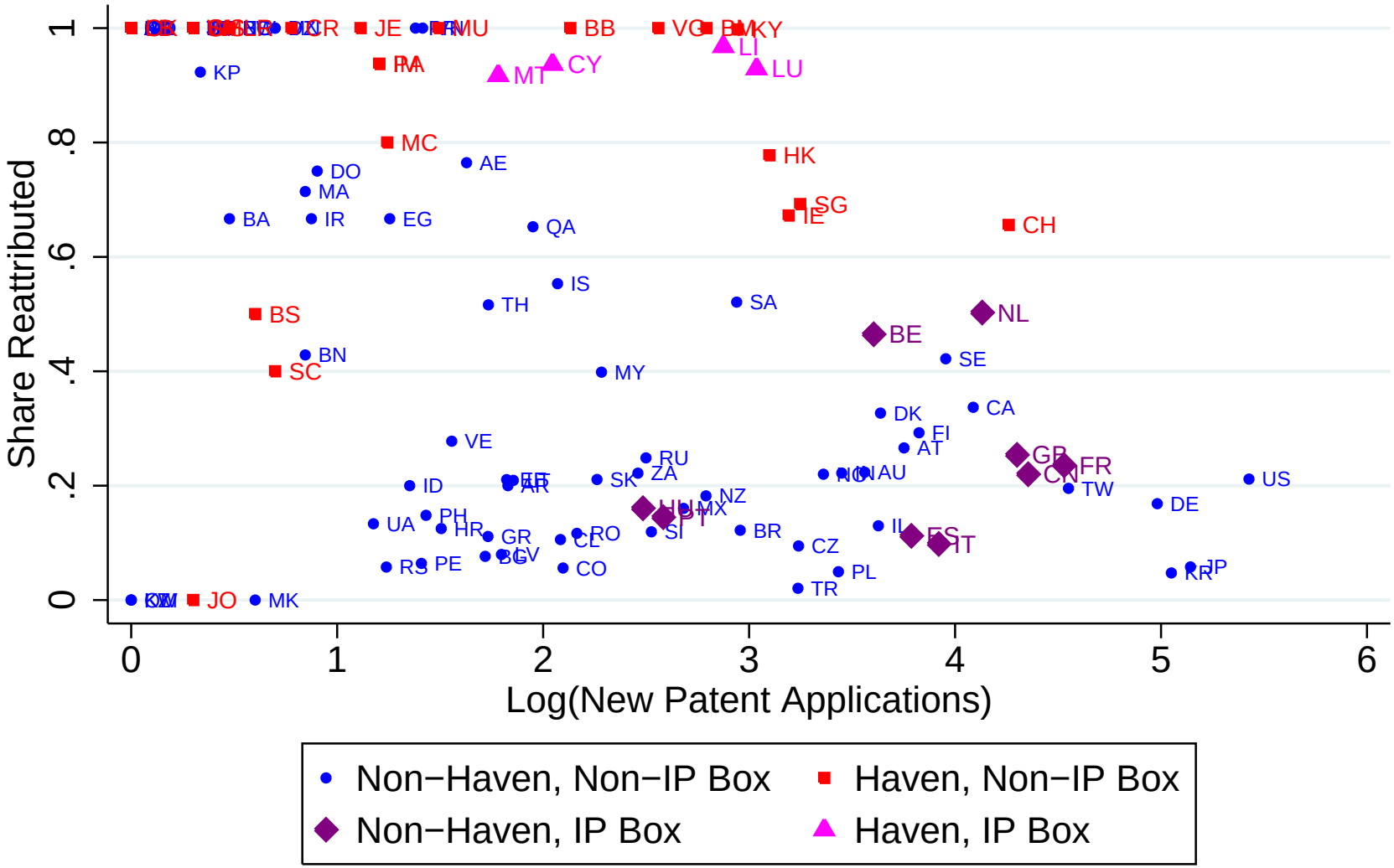
by Owner Country (2012)



Source: Bradley, Dauchy, and Robinson (2015)

Patent Cross−Border Reattributions

by Owner Country (2012)



Source: Bradley, Dauchy, and Robinson (NTJ, 2015)

"Traditional" Tax Policy Levers

Input-Based

- Policies that subsidize *investment* in innovation:
  - $\Rightarrow$ R&D tax credits, expensing allowances, etc.

Output-Based

- Policies that affect after-tax investment *returns* (combined with anti-avoidance provisions):
  - $\Rightarrow$ Corporate income tax rates (CIT)
  - $\Rightarrow$ CFC (Subpart F) rules, transfer pricing regulations, etc.

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"Traditional" Tax Policy Levers - Empirical Findings

Effects of CIT and CIT differentials on patent ownership location:

- Griffith, Miller, and O'Connell (*Journal of Public Economics*, 2014)
  - 1 pp $\uparrow$ in statutory CIT $\Rightarrow$ 3.5-3.8% $\downarrow$ in *share* of MNC patent applications in a given country
- Karkinsky and Riedel (*Journal of Intl Economics*, 2014)
  - 1 pp $\uparrow$ in statutory CIT *differential* $\Rightarrow$ 3.8% $\downarrow$ in new patent applications

"Traditional" Tax Policy Levers - Empirical Findings

Effects of CIT versus R&D incentives (measured according to OECD's B-index) on patenting activity and quality:

- Ernst and Spengel (*ZEW discussion paper*, 2011)
  - New patent applications are increasing in the generosity of R&D incentives
- Ernst, Richter, and Riedel (*Intl Tax and Public Finance*, 2014)
  - Patent *quality* is *decreasing* in the generosity of R&D incentives
  - 1 pp $\uparrow$ in statutory $\tau^{IP} \Rightarrow$ 0.1-0.5% $\downarrow$ in patent quality index

"New" Tax Policy Levers

Output-Based

- Policies that reward *commercialization* of successful *innovation*:

$\Rightarrow$ **Patent/IP/Innovation Box regimes**: FR (2000); HU (2003); BE, NL (2007); ES, LU, CN (2008); MT, (NL) (2010); LI (2011); CY (2012); UK (2013); PT (2014); IT (2015)

$\Rightarrow$ Combine incentives for R&D investment while deterring base erosion

Background on Patent/IP Box Legislation

- Specific IP Box provisions vary widely, but all apply a reduced tax rate to income generated from patented products: $\tau^{IP} <$ CIT.
- Foreign-owned taxpaying entities are generally eligible.
- Benefits cannot generally be conditioned on location of patent development (though headed to change).
- Contract R&D is generally permissible.
- Treatment of R&D expenses, existing or acquired IP, and breadth of included income sources represent important points of divergence.

$\Rightarrow$ **Special regime provisions may foster different incentives for real activity and intangible asset ownership.**

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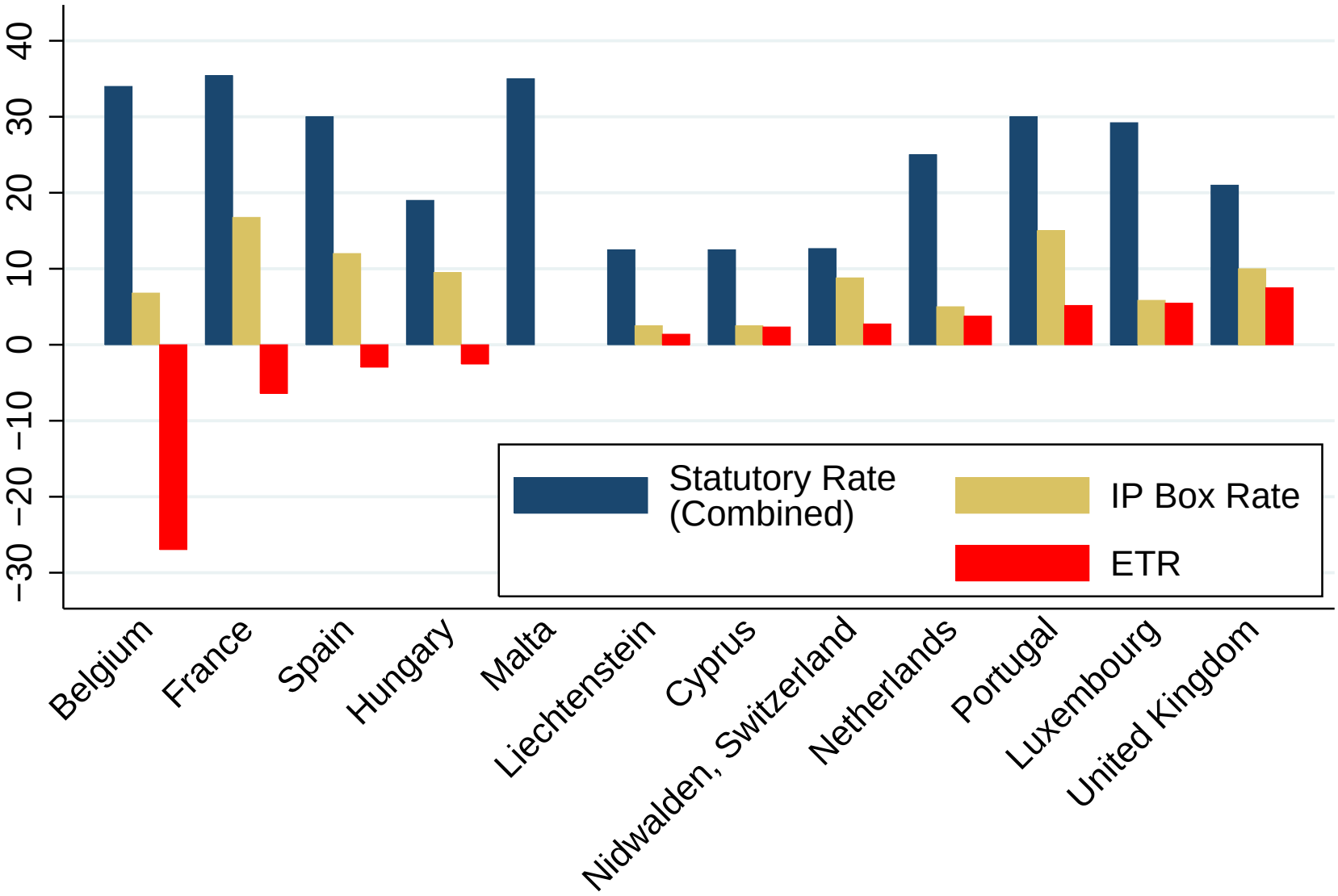

Source: Evers, Miller, and Spengel (ITAX, 2014).

Research Questions

How do IP Box regimes influence real activity (versus income reallocation), and what role do special provisions play?

- Firms may increase R&D and patent development at home *or abroad*.
- Firms may patent pre-existing inventions or modify the timing thereof.
- Firms may adjust the location of patent ownership and income flows.

$\Rightarrow$ **Concern**: IP Boxes might merely aggravate/modify patterns of income reallocation and promote "harmful" tax competition without necessarily increasing *domestic* innovation.

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"New" Tax Policy Levers - Empirical Findings

- Relative recency of most IP Box adoptions coupled with lags in patent granting process and massive data requirements have rendered empirical research largely infeasible in this area until very recently.

Notable exceptions include:

- Bradley, Dauchy, and Robinson (*National Tax Journal*, 2015)
- Alstadsæter, Barrios, Nicodeme, Skonieczna, and Vezzani (*CESIfo working paper*, 2015)

$\Rightarrow$ Note: These should be taken as preliminary evidence of *short-run* impacts on *patent* activity.

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Bradley, Dauchy, and Robinson - Research Design

- What is the effect of preferential patent income tax rates, τ^{IP}, on new patent applications by owner/applicant or inventor country for cases involving:
  a. Co-located owners and inventors?
  b. Cross-border owner/inventor (re)attributions?

- To what extent do these effects vary according to important IP Box provisions: namely,
  a. Treatment of R&D expenses?
  b. Treatment of acquired IP?

Bradley, Dauchy, and Robinson - Research Design (cont.)

- Collapse >19 million patent applications 1990-2012 to the country-year level and distinguish counts by owner/applicant and inventor countries and cross-border mismatches therein.
- Estimate impact of τ^{IP} on log(*Applications*) (plus interactions with specific provisions) by owner or inventor countries, controlling for:
  - CIT, GDP, population, quality of patent protections
  - Indicators for territorial taxation and high withholding tax rates on royalty receipts

$\Rightarrow$ Inclusion of country fixed effects implies that identification arises from within-country *changes* in treatment of patent income.

$\Rightarrow$ Year fixed effects absorb global fluctuations in patent activity due to macroeconomic conditions.

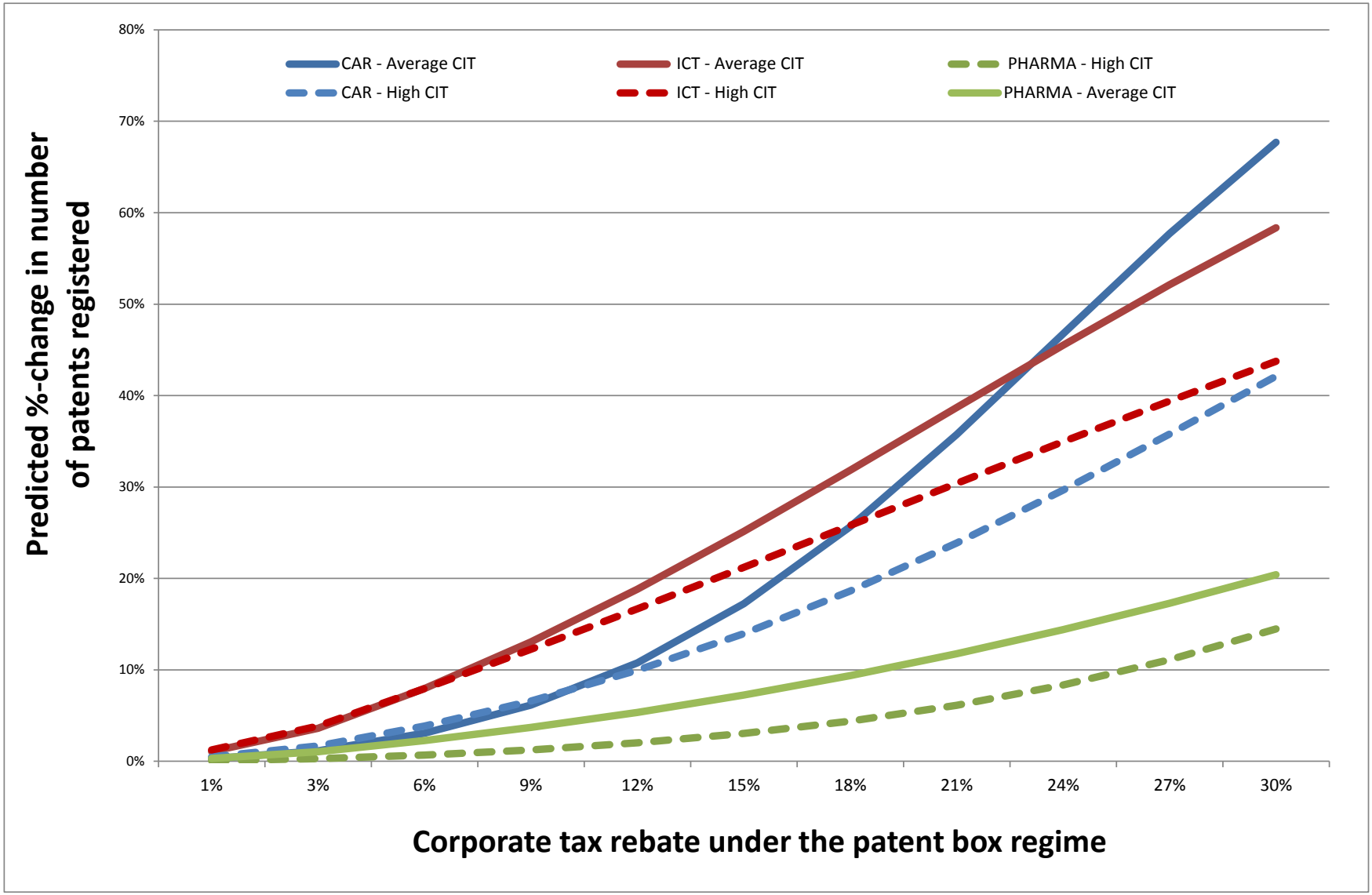
Bradley, Dauchy, and Robinson - Summary of Findings

- 1 pp $\downarrow$ in statutory $\tau^{IP} \Rightarrow 3\% \uparrow$ in new patent applications.
- This effect appears largely driven by co-located (domestic) patent owners and investors.
- Patent applications featuring cross-border reattributions involving tax havens are—if anything—declining in the generosity of IP Box regimes (i.e. CIT - τ^{IP}).
- Special provisions have no significant impact on inventor applications, but deductibility of R&D expenses against gross income amplifies τ^{IP} effect on owner applications, especially for patents involving co-located owners and inventors.

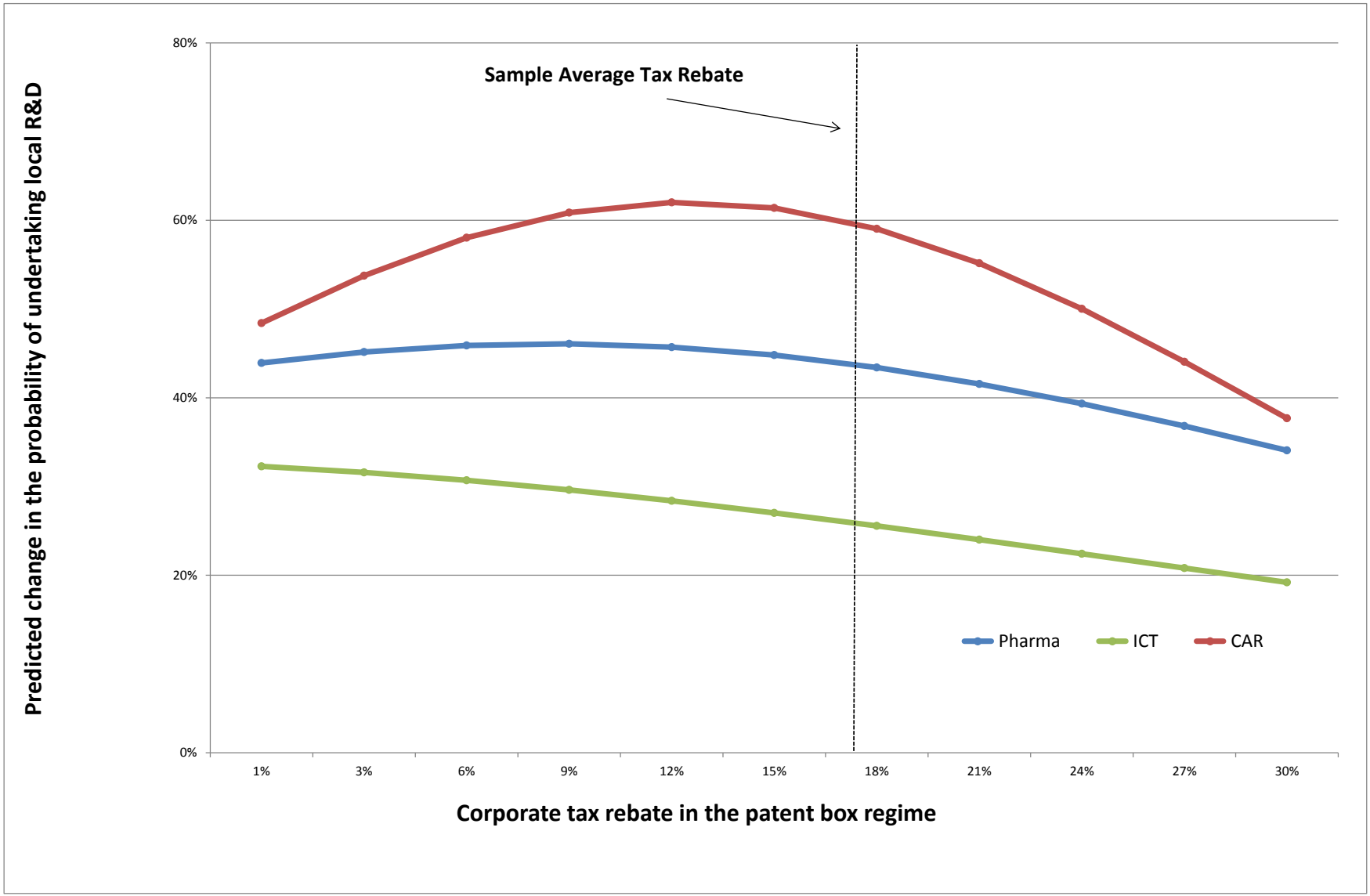
Alstadsæter et al. - Research Design

- Focus on subset of the 2000 largest global corporate R&D investors in the automotive (CAR), information and communications technology (ICT) and pharmaceutical (PHARMA) industries
- Collapse EPO patent application data 2000-2011 to the owner/applicant country-year level *within multinational group*
- Estimate impact of (CIT - τ^{IP}) on new application counts within industrial sectors (plus interactions with specific IP Box provisions)

Alstadsæter et al. - Figure 2



Alstadsæter et al. - Figure 4



Alstadsæter et al. - Summary of Findings

- Controlling for CIT and non-tax patent box characteristics, τ^{IP} generosity has a significant positive effect on patent applications, with even larger effects on "high-quality" patents.
- Interactions of τ^{IP} generosity with special provisions generally exhibit predicted sign and imply large differential effects associated with the breadth of included sources of IP income.
- Self-development conditions nullify the positive impact of τ^{IP} generosity on patent applications, yet promote the likelihood of increasing *local* R&D.

Conclusions - What Have We Learned?

- IP Boxes promote *patenting* activity based on patent ownership and inventor countries, at least in the short term.
- Cross-border patent (re)attributions appear largely insensitive to preferential regimes.
- Special provisions can have important impacts on the relative effectiveness of IP Boxes at attracting real activity versus affecting the location of patent ownership.

Conclusions - Open Questions

- To what extent are IP Boxes merely inducing shifts in application timing or in the decision to patent existing trade secrets?
- Should we expect radically different long-term impacts (e.g. through inventor relocations)?
- To what extent might IP Boxes discourage riskier R&D projects (with potentially greater spillover benefits)?
- To what extent do knowledge spillovers flow across borders?

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