



Institute for  
Fiscal Studies

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## Corporate taxes and the location of innovative activity

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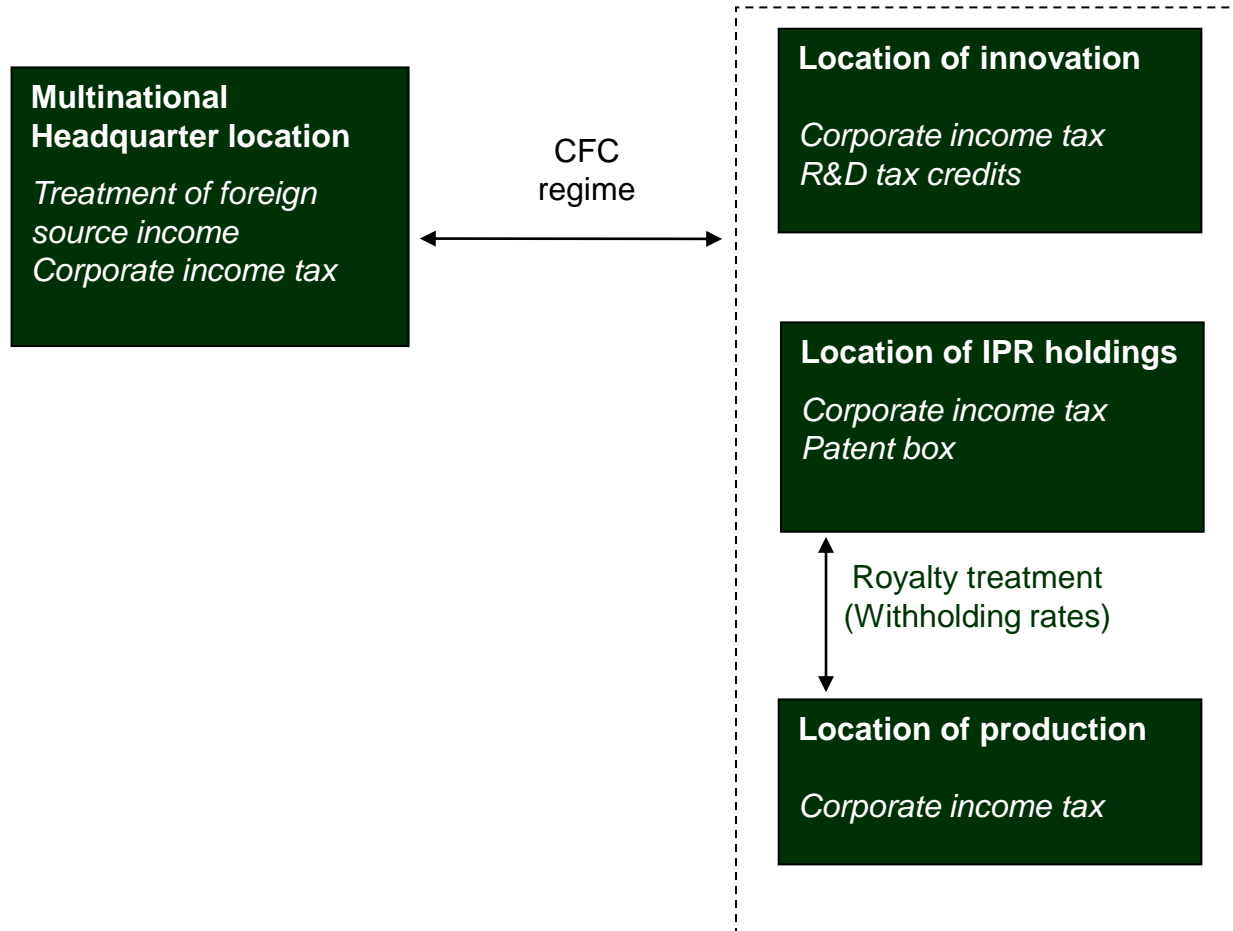
# Motivation I – IP is important and mobile

- Intangible capital accounts for growing share of inputs
  - OECD described growing significance intellectual property & its simultaneous use by many different parts of a firm as *“one of the most important commercial developments in recent decades.”*
  - since the mid 1990s UK investment in intangible (knowledge) assets has been greater than that in fixed capital and is now about 50% higher
- The income from IP is highly mobile
  - A tax lawyer quoted in the New York Times noted:  
*“...most of the assets that are going to be reallocated as part of a global repositioning are intellectual property...that is where most of the profit is.”*
  - A front page story in the Wall Street Journal described how Microsoft saved at least \$500m in taxes by licensing its intellectual from an Irish subsidiary

# Motivation II – IP and policy

- Many governments want to encourage the creation and use of intangible capital to boost productivity - tax policy is one instrument that governments can use
- Intellectual property has been in policy spot light
  - Controlled Foreign Companies (CFC) regimes
  - Patent Boxes
- Number of important questions:
  - how does tax policy affect the level and location of innovation?
  - are the benefits of innovation contingent on activity being geographically located in the country?
  - how to tax mobile income?

# Location and taxes



# Policy: Patent Boxes



- Substantially reduced rate of corporation tax for the income derived from patents
- Recently introduced by a number of European countries
  - Belgium 6.8% (full rate, 34%); Netherlands 10% (full rate, 25%); Luxembourg 5.9% (full rate, 39%)
  - UK to introduce in 2013, 10% (full rate, 24% in 2013) at a cost of £1.1bn

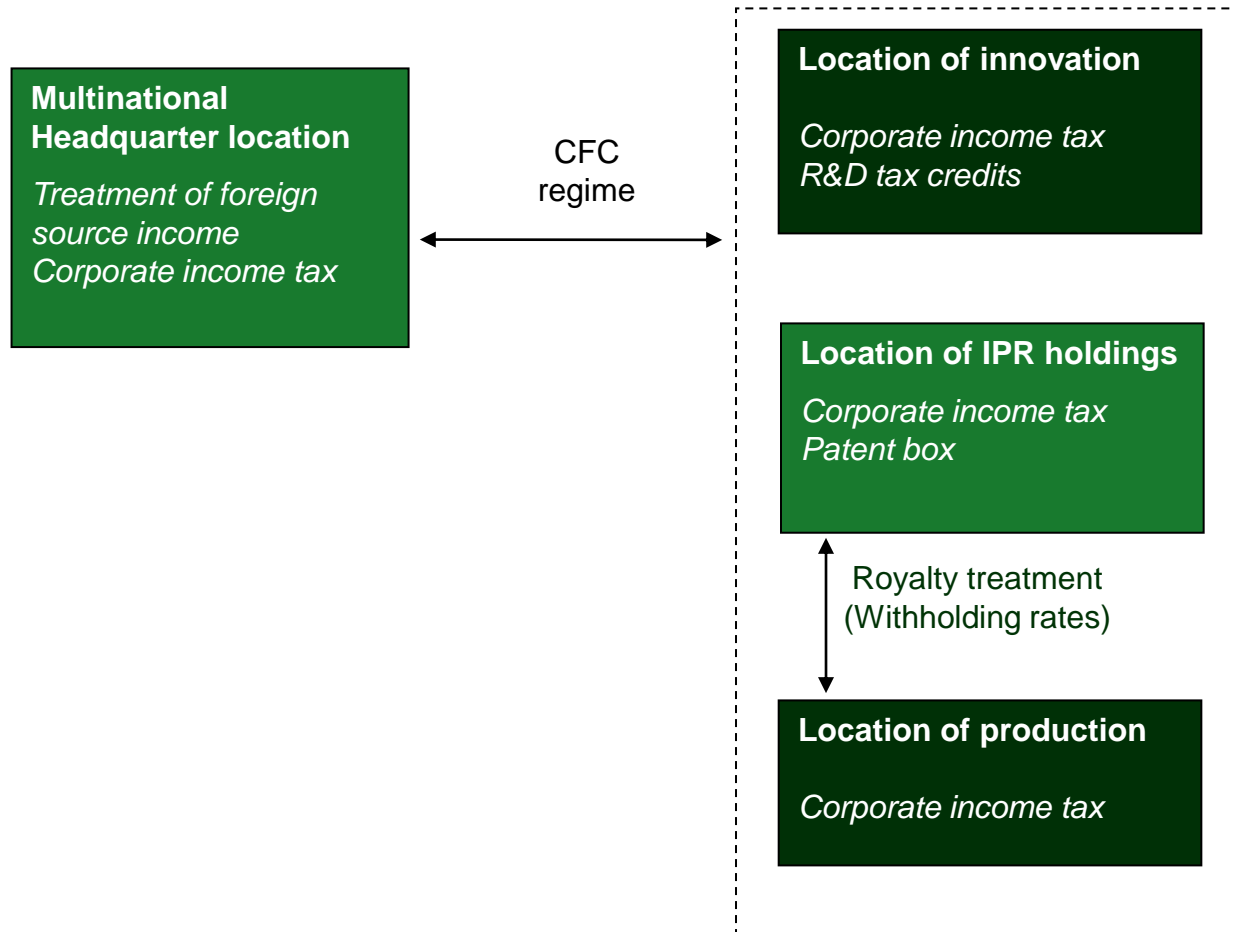
# Patent Box as an innovation policy

- Original stated aim of UK policy: *“strengthen the incentives to invest in innovative industries and ensure the UK remains an attractive location for innovation”*
- Poorly targeted - targets **income** from ideas, not the activity that generates new ideas
- Research can be located separately from income
  - unclear that attracting IP will also attract innovative activities
- Large deadweight cost / significant revenue cost / implementation difficulties / benefits accrue to a small number of firms / distorts the decision to invest in patentable technologies

# Patent Box as a preferential rate for mobile income

- Preferential rate on an important form of more mobile activities
  - Mirrlees review: *“In principle, it would be efficient to tax rents from relatively immobile activities at a higher rate than rents from more mobile activities”*
  - allow higher rates to persist on less mobile activities
- How responsive is the location of intellectual property to corporate taxes?

# Location and taxes





# Impact of tax on location of intellectual property

- *Griffith, Miller and O'Connell (2011)* - provide empirical evidence on how responsive the location of IP is to corporate tax
- Model the impact of corporate taxes on innovative European multinationals' choices over where to hold patent applications
- Allow heterogeneity (observed and unobserved) in where patents are located and how responsive such choices are to tax
  - important for predicted patterns of movements across countries
- Simulate the effect of Patent Box

# Data

- Multinational firms ownership structure
  - European parent firms and their European and US subsidiaries
  - consider location of patent applications (EPO, 1985-2005)
- Tax data
  - statutory corporate tax rates
  - CFC regime operated in home country

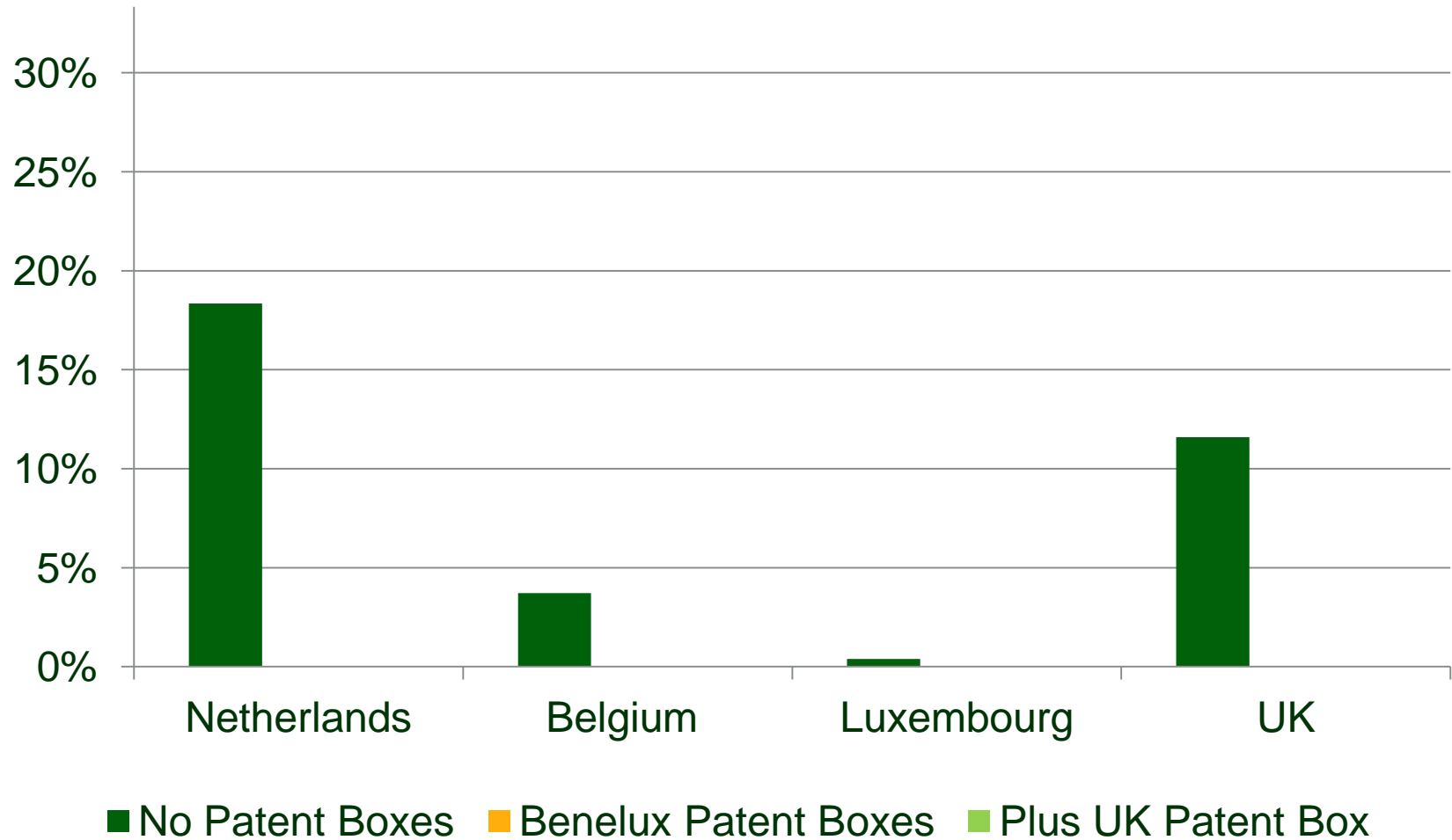
# Summary of estimation results

- Firms respond to taxes when choosing where to hold IPR
- Important to account for:
  - interactions between tax jurisdictions
  - observed and unobserved heterogeneity in responsiveness
  - unobserved country effects
- Size of effect:
  - Own tax elasticities: a ten percentage point fall in the tax rate would increase the share of patent holdings by between 7%-15%
  - Range of cross tax elasticities between pairs of countries, e.g. 10% increase in the Belgium tax rate leads to a 0.5% increase in the share of patents in the UK while the same increase in the French tax rate increase the UK share by 2.6% points.

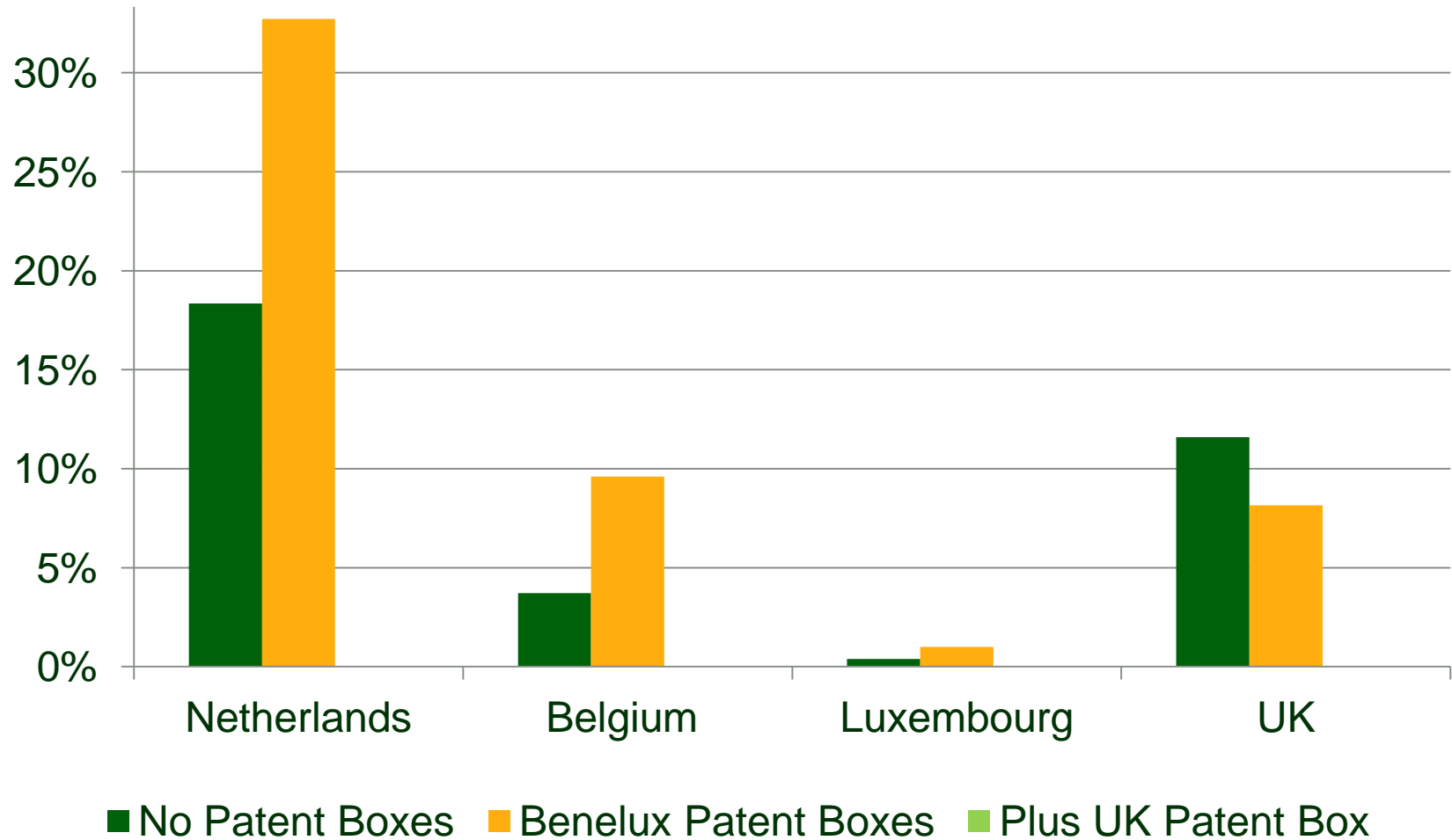
# Counterfactual policy analysis: Patent Boxes

- What is the likely affect of Patent Boxes?
  - how do we expect the location of patents to change when favourable tax regimes are introduced?
  - what effect will this have on tax revenue?
- Don't observe firms actual behaviour – policies are too recent

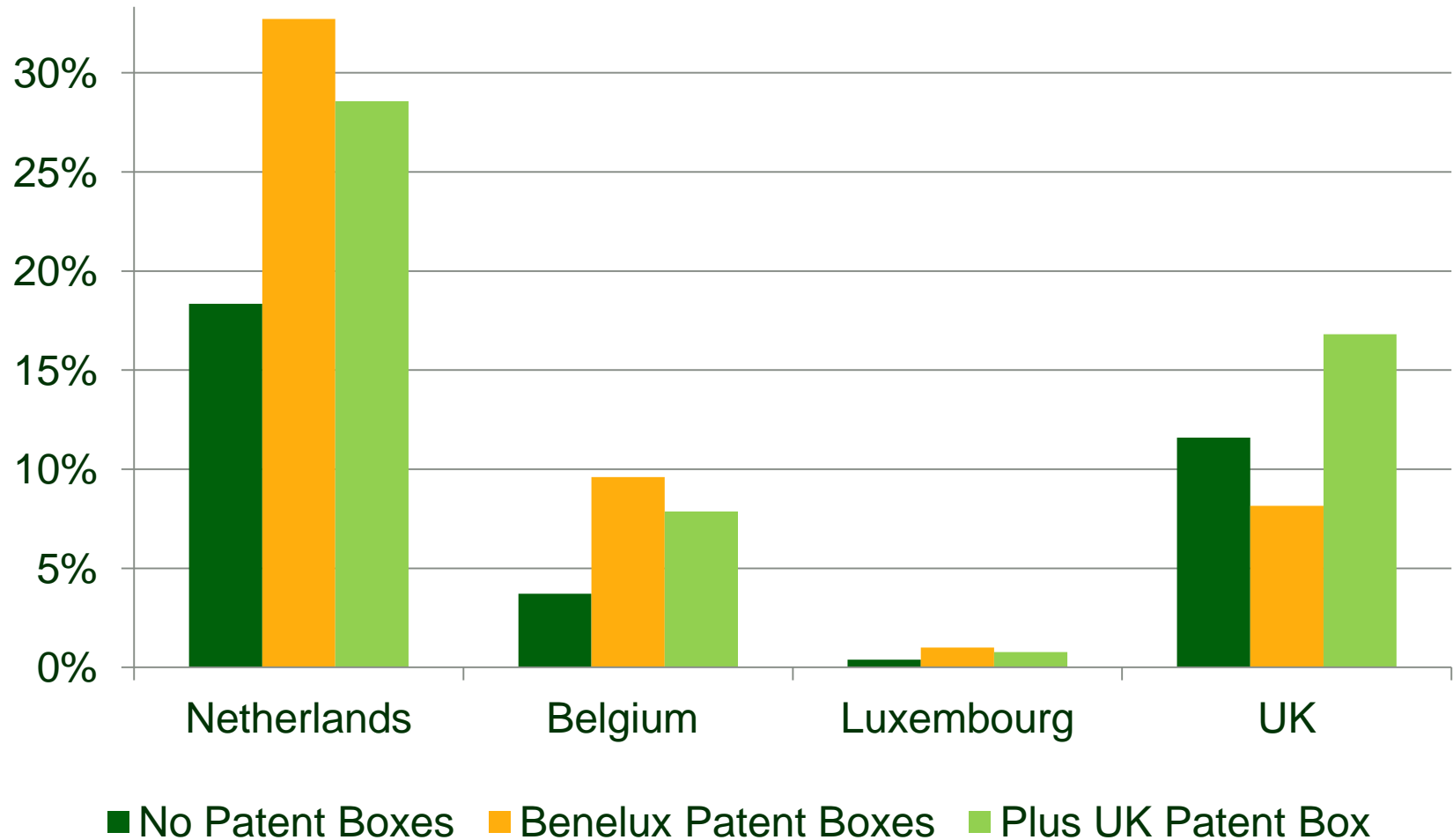
## Effect of Patent Boxes: share of new patent applications



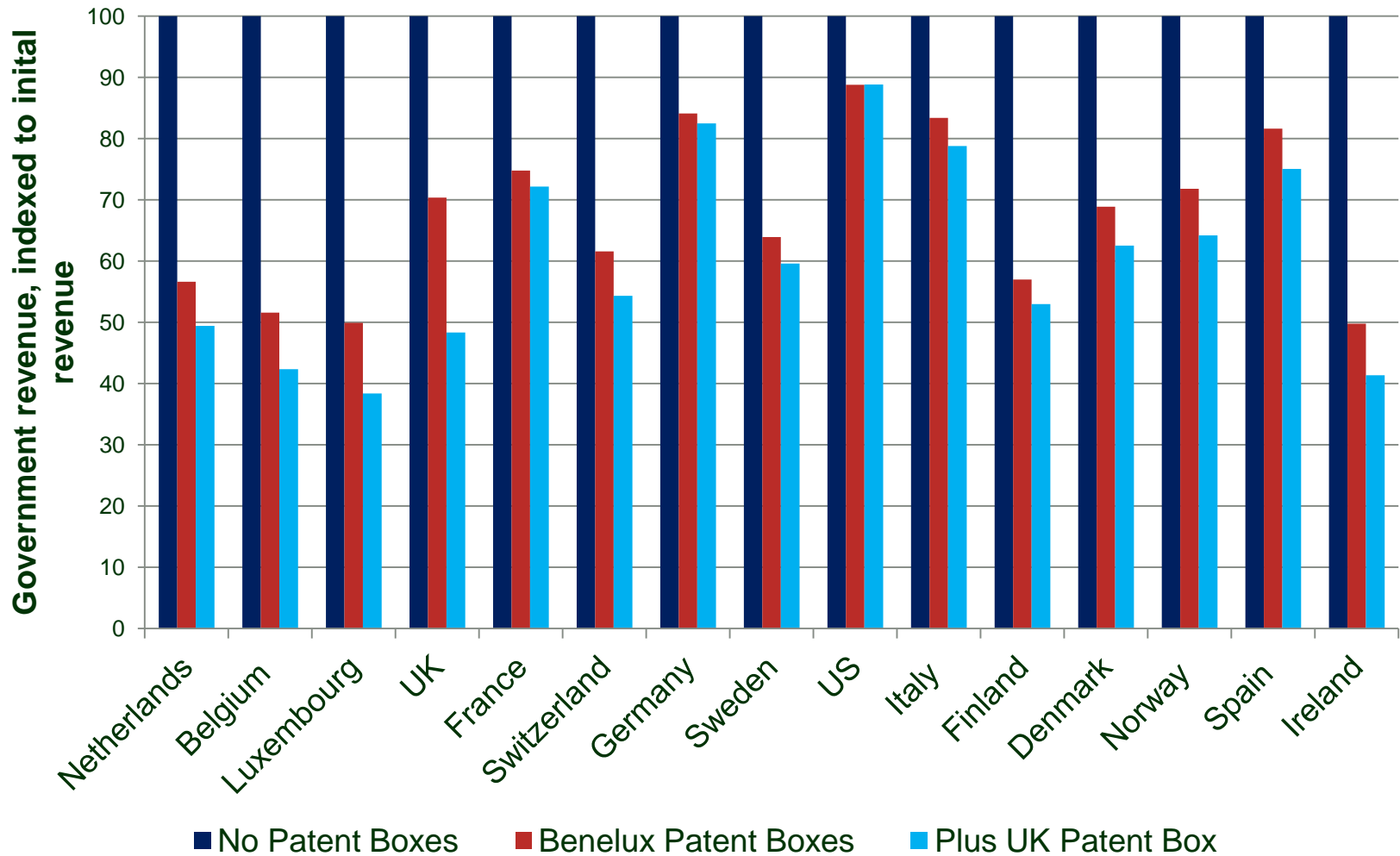
## Effect of Patent Boxes: share of new patent applications



## Effect of Patent Boxes: share of new patent applications



# Tax revenue (indexed to 100 before Patent Boxes)





# Government Tax Competition

- We find indicative evidence that tax competition could erode any benefits
- Theoretical results on preferential rates are predicated on underlying assumptions
  - isolate tax competition in one part of the tax system, or
  - leads to no tax on mobile income and lower all revenues for all governments
- Going forward – model government behavior to consider strategic government tax setting
  - write down government's maximisation problem and find optimal policy

# Summary and concluding comments

- Governments are grappling with questions of how to tax innovation and the associated income
  - the mobility of income raises additional challenges
- A number of European governments have introduced Patent Boxes
- Patent Boxes are poorly targeted at innovation; the effect of the location of real innovative activities is unclear (but important)
- We find that the location of firms' patent applications respond to corporate taxes. Patent Boxes attract patent income but also lead to a reduction in government revenues.