BCG

GSMA

The Economic Benefits of Early Harmonisation of the Digital Dividend Spectrum and the Cost of Fragmentation in Asia

Report on the Asia-Pacific Region

Shanghai, 21 June 2012

THE BOSTON CONSULTING GROUP

Overview of the study

In 2010, BCG and GSMA collaborated on a study on the socio-economic impact of allocating the 700MHz band to mobile in the Asia-Pacific region

This year, we have collaborated again to quantify in more detail the economic impact of a delay in rollout, and of interference due to non-harmonization

The study also details best practices for handling the switchover, building on a number of case studies from Europe and the Asia-Pacific

Agenda

Methodology

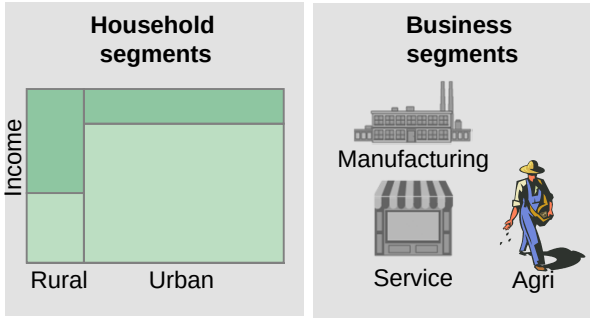
Economic impact of a delayed rollout

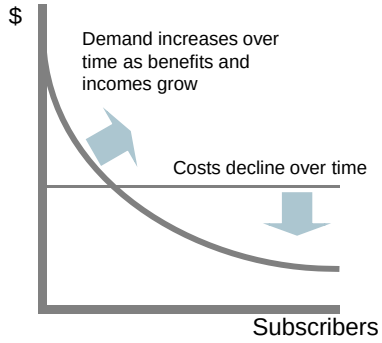
Economic impact of non-harmonization

Ensuring a smooth switchover

Study builds on rigorous cost-benefit analysis to estimate incremental adoption uplift from mobile broadband

Cost-benefit analysis of businesses and households → **Baseline estimate for Internet penetration** → **Incremental effect of mobile broadband in 700 MHz band**



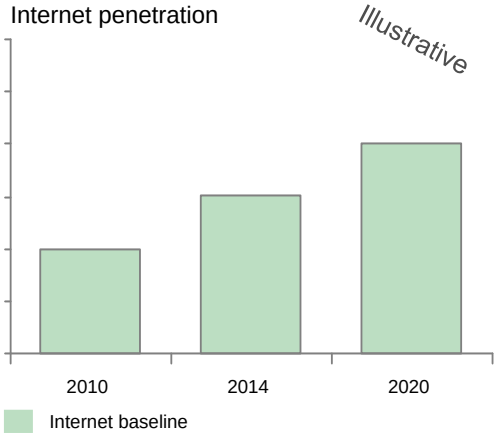


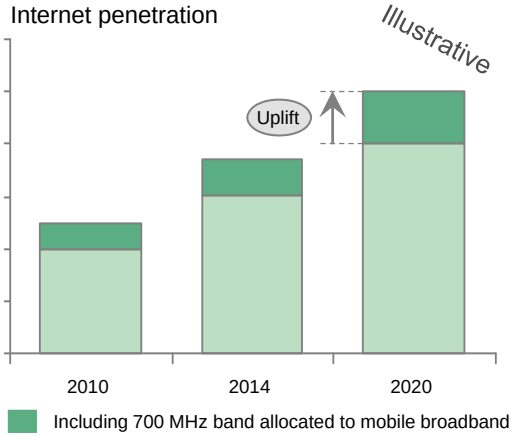
Mobile broadband in 700 MHz band will increase benefits and reduce costs

- Greater coverage and lower service costs will improve accessibility
- Economic benefits from increased productivity and rate of adoption
- Significant social and economic benefits in rural areas

Benefits
- Increased profits for businesses
- Increased income/welfare for households

Costs
- Device
- Subscription/ access

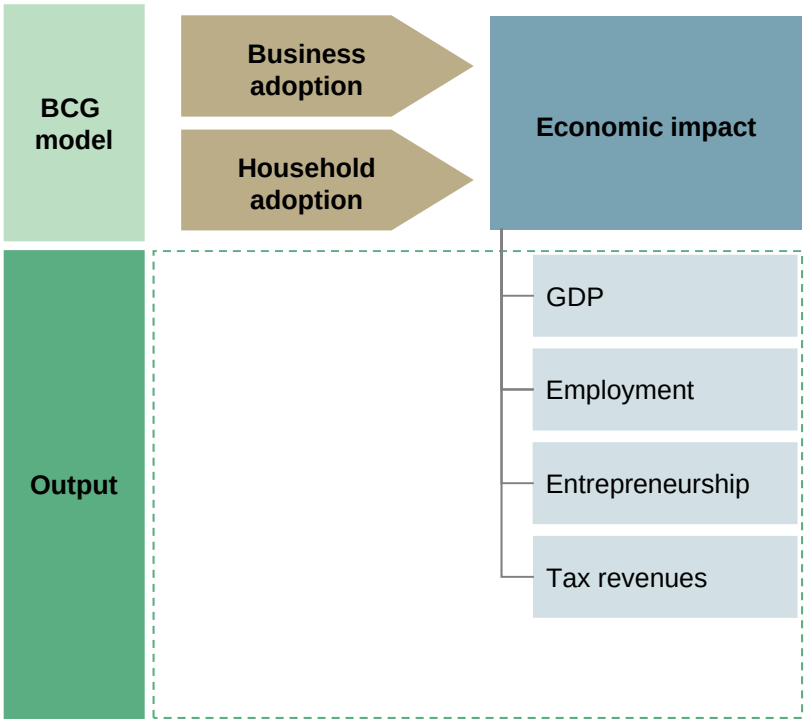




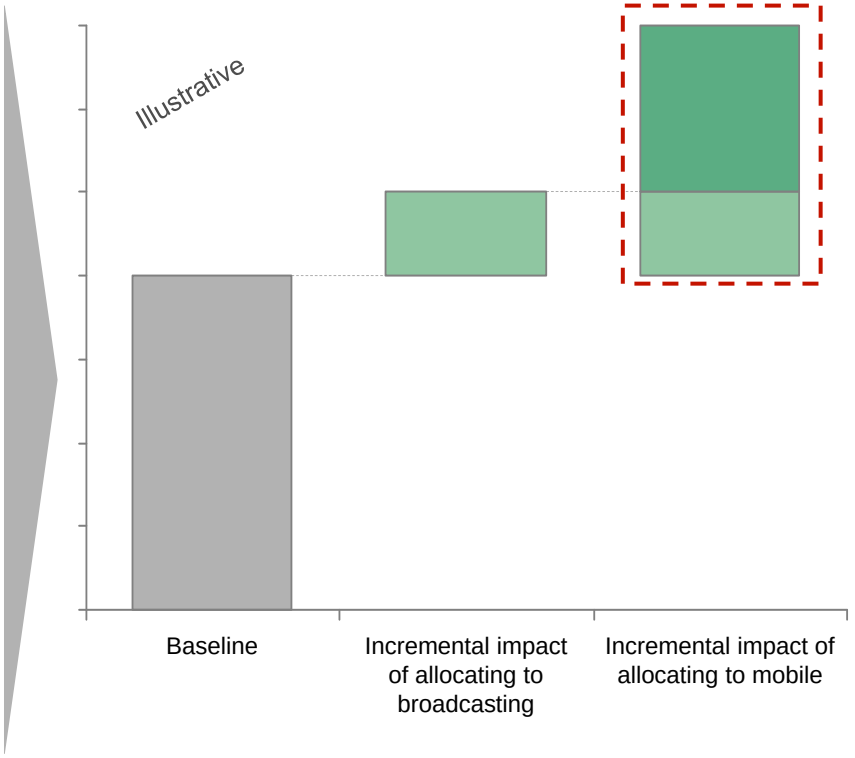
Note: Figures are illustrative

Adoption of internet is translated into four economic factors

Four economic factors are modelled...



... to assess incremental value of allocating 700 MHz band to mobile



Costs related to digital switchover assumed to be sunk costs, and are not factored in the estimates

Note: Graphs are illustrative

Analysis of four representative study countries extrapolated to estimate impact for entire Asia-Pacific

Countries clustered based on HDI[1], urbanisation and mobile penetration...

Current human development level

- Increased mobile access, particularly in rural areas, has potential to improve education, healthcare, rural employment, etc.
- Current UN Human Development Index (UN HDI) score used as metric of development

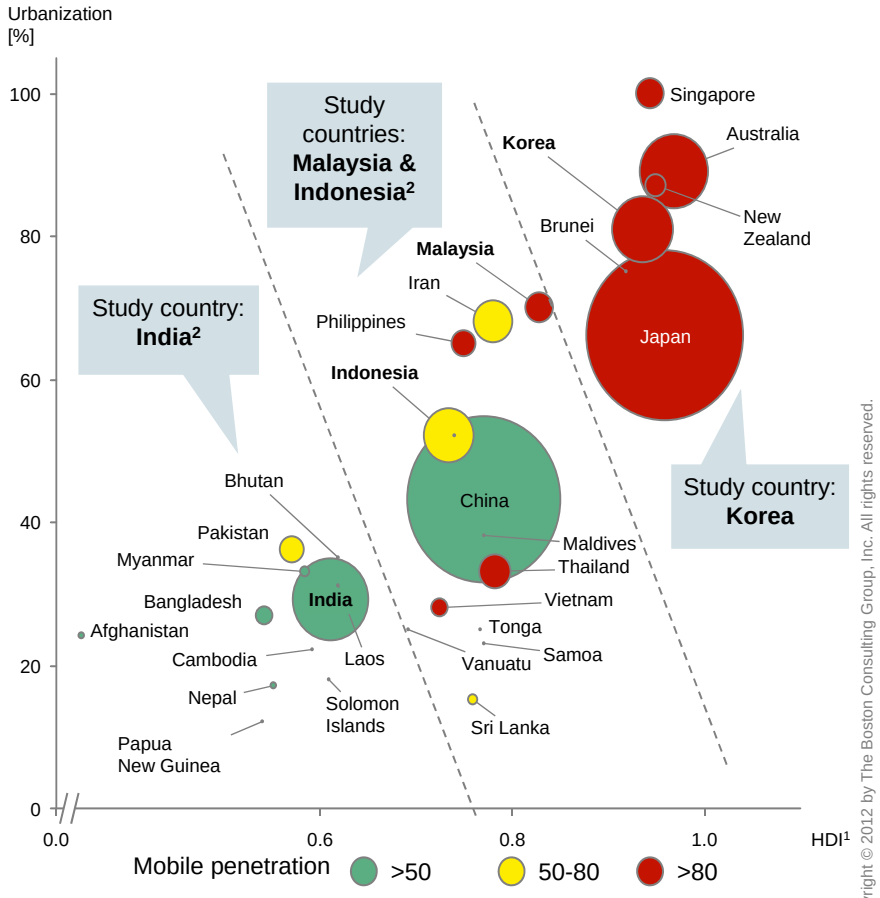
Rural-urban split

- High proportion of rural, low-density population increases incremental value of 700 MHz band

Mobile penetration

- High mobile penetration decreases incremental value of 700 MHz band

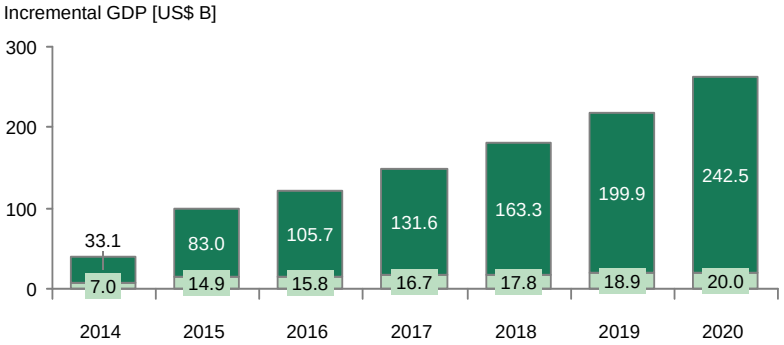
... and representative countries modelled to aggregate socio-economic impact



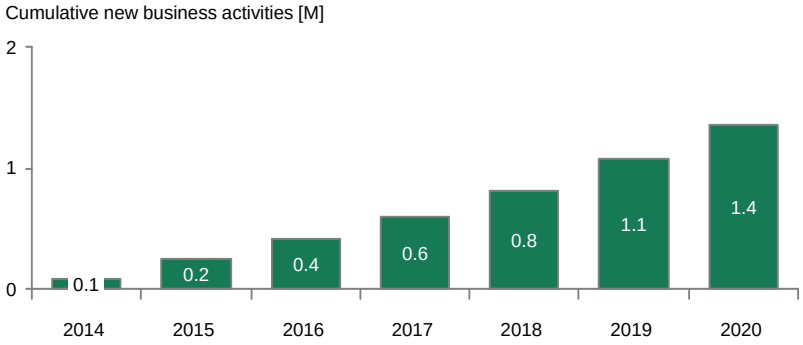
1. Human development Index 2. Two countries chosen to reflect diversity of cluster 2. Two regions modelled to reflect country diversity
Note: Size of bubble denotes GDP at constant prices (2009) , Kiribati, Marshall Islands, Micronesia, Tuvalu and North Korea omitted as HDI is not reported
Source: IMF; UNDP; CIA World Factbook; ITU; BCG Analysis

Allocation of 698-806 MHz band to mobile will have significant incremental economic benefits over broadcasting

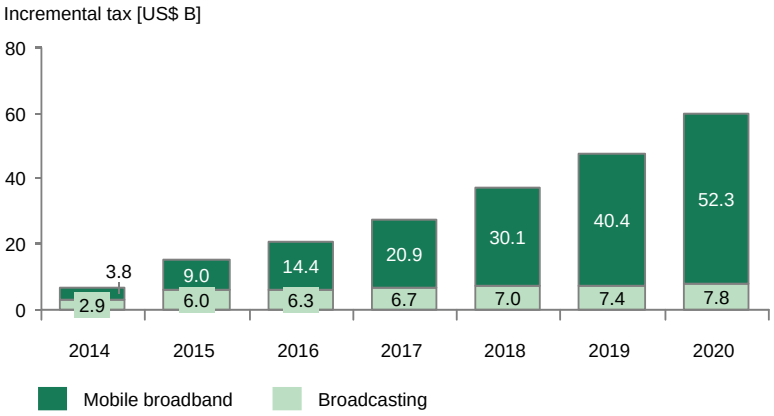
GDP increased US$ 959B 2014-2020 (NPV US$ 865B)



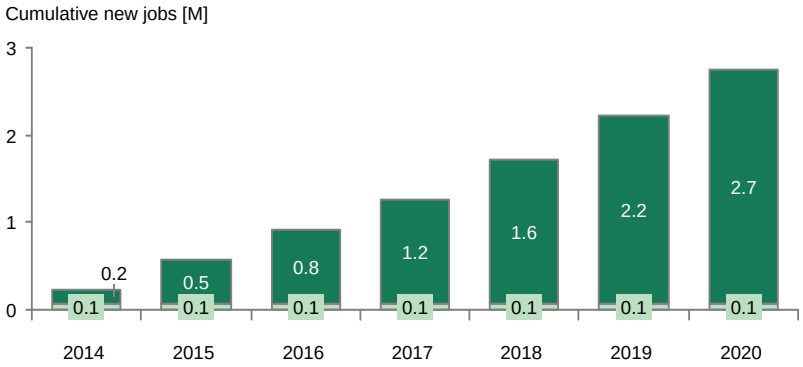
1.4M new business activities by 2020[1]



Government revenues up US$ 171B (NPV US$144B)



2.7M additional jobs created by 2020



1. Incl. new independent businesses as well as new departments/units/business areas within existing firms
Note: NPV discounted by study country government security rates for each cluster; 1.5% for Korea, 2.8% for Malaysia, 4.0% for Indonesia and 5.0% for India
Source: Datamonitor; EIU; OECD; World Bank; National statistics units; BCG analysis

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Methodology

Economic impact of a delayed rollout

Economic impact of non-harmonization

Ensuring a smooth switchover

Delaying the decision would affect rollout and hence impact total benefits

Description

Estimate the opportunity cost of delaying harmonisation by one or more years

Opportunity cost is assessed at two different time scales

- **Direct effect:** One time loss by delaying the decision one year
- **Indirect effect:** Loss in the first three years after harmonisation relative to baseline

Factor	Assumption	
Roll-out timeline	Start: Full effect:	**2015/16** **2016/17**
Service cost decrease[1]	Highly penetrated: Other countries	**6%** **10%**
Increase in rural needs benefit	First year impact: Full effect:	**5%** **10%**
Increase in rural wants benefit	First year impact: Full effect:	**10%** **20%**
Business prod. gains	First year impact: Full effect:	**5%** **10%**
Agricultural prod. increase	First year impact: Full effect:	**5%** **10%**

1. First year effect is 50% of stated effect

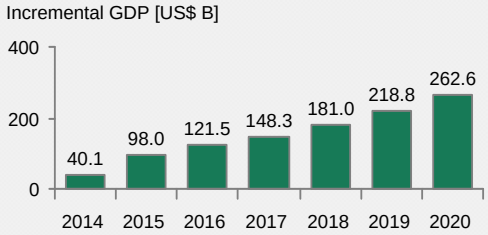
Delays will have major implications for GDP and jobs

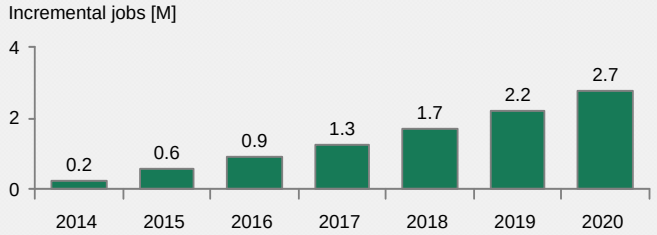
harmonisation

Delaying the decision have major impact on short term GDP effects...

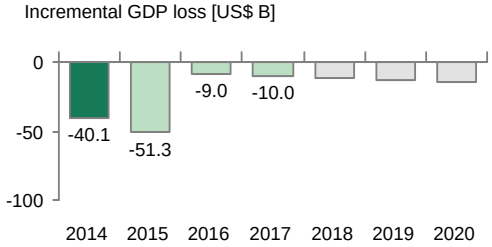
... and reduce job opportunities

Baseline (2014)





2015

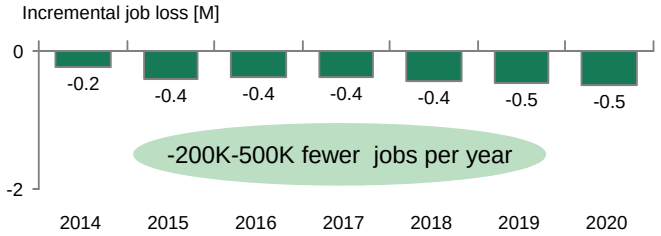


Direct loss

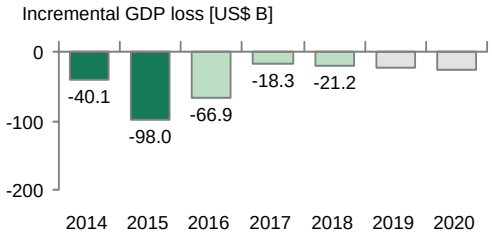
Indirect loss[1]

- 40 B

- 70 B

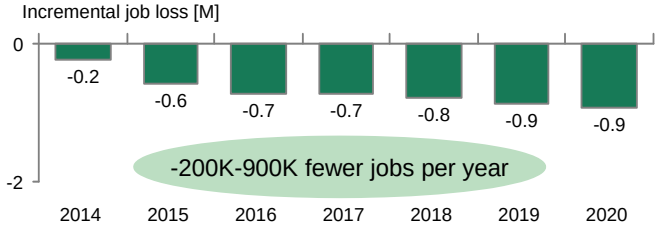


2016



- 138 B

- 106 B



1. First 3 years after harmonisation

Source: Datamonitor; EIU; OECD; World Bank; National statistics units; BCG analysis

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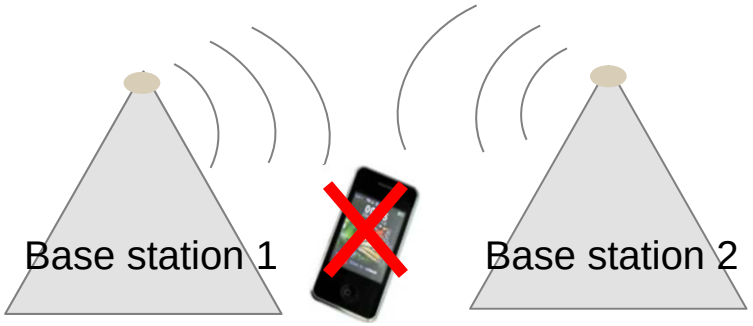
There are two likely spectrum allocation scenarios that would create cross-border interference in the region

Two high-power signals on same frequency will risk interference



Two scenarios may arise in Asia

1. **FDD vs TDD technology used across borders**
2. **Only half of the intended spectrum is allocated to IMT, whilst the rest is allocated to DTT services**

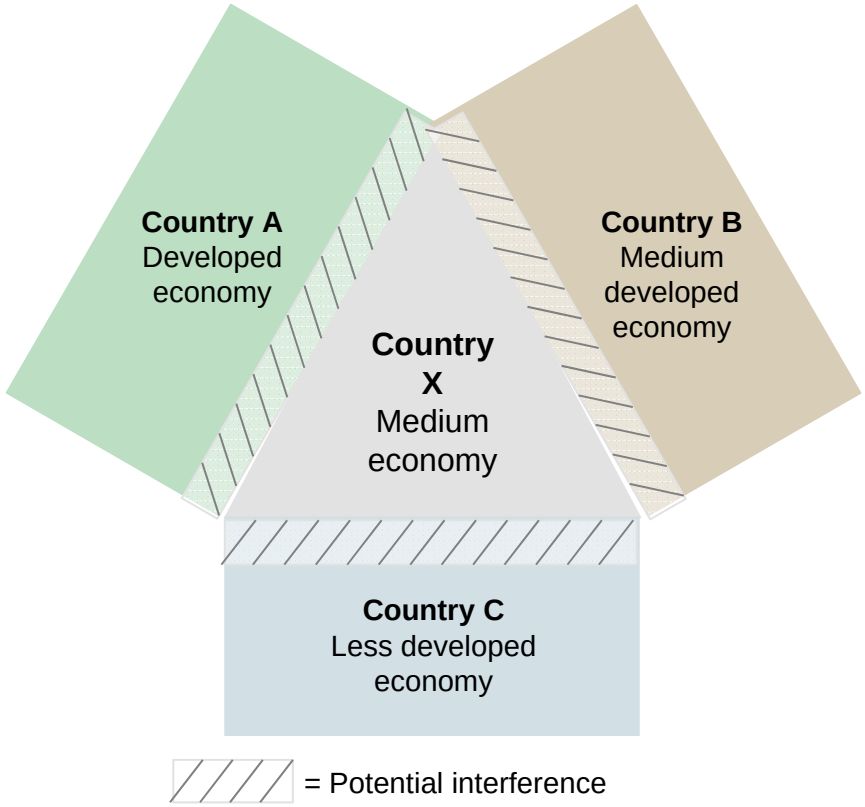
Such interference will cause a reduction in quality of the desired signal

Both allocations will result in interference with neighbours

1. Digital signals are still by definition radio signals which, if directly interfering, will react like a radio frequency interference
Source: Expert calls

We model the potential implications of non-harmonisation for a representative country X and its neighbouring countries

We model a representative country X with three neighbouring countries



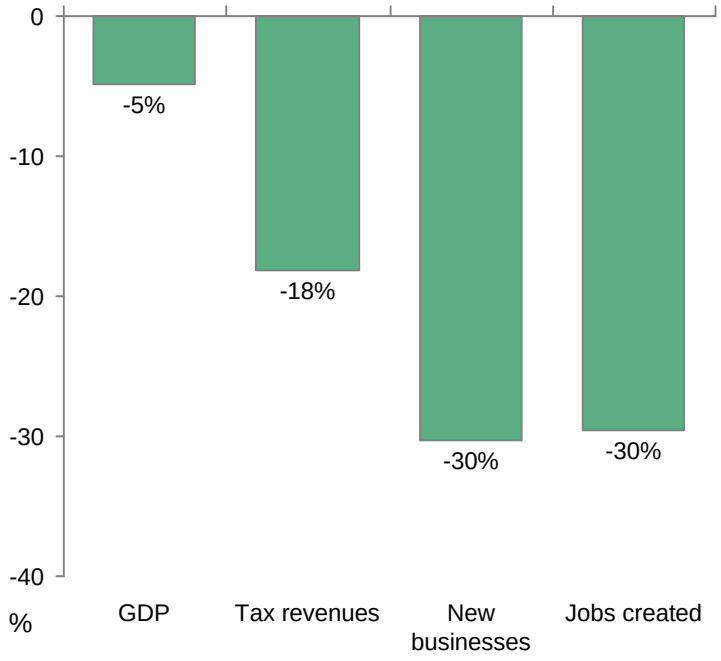
Country X adopts a non-harmonised solution

Country X adopts a non-harmonised 700 band solution, as a result of either

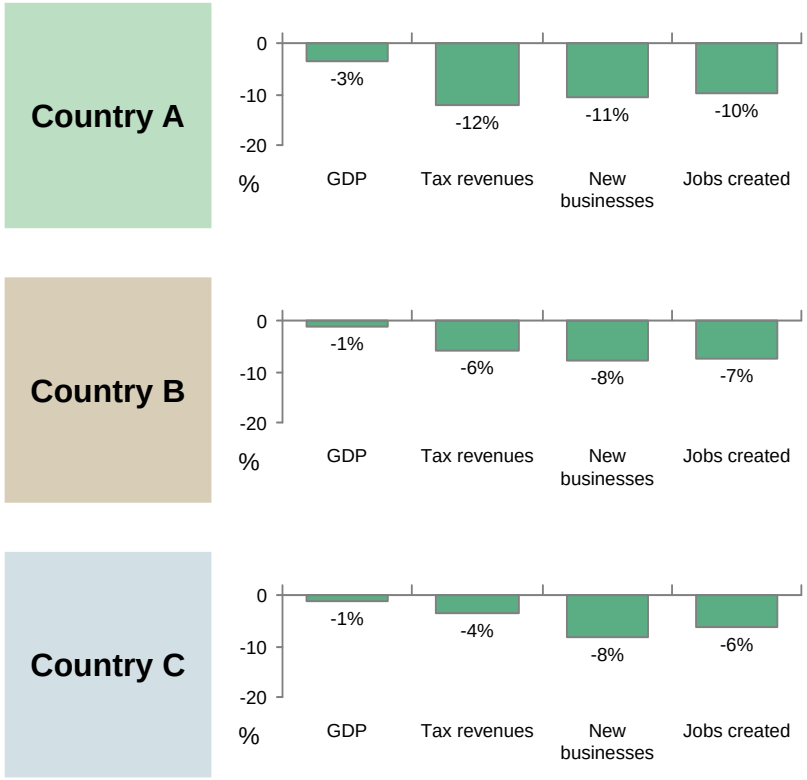
Implications of non-harmonisation will be assessed for both own and neighbouring countries

Both country X and neighbours will have reduced benefits

i **Benefits of the 700 band reduced by 5-30% for country X**



ii **Neighbouring countries experience reduction in benefits vs base case**



Source: Datamonitor; EIU; OECD; World Bank; National statistics units; BCG analysis

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Key steps for smooth switchover implementation

Proposed steps based on observations from best practice countries

1 Assess and consult

- **Cost-benefit analysis of deploying spectrum** to alternative services
- **Cost-benefit analysis of harmonisation** with neighbouring countries and region
- **Consultation** with stakeholders and neighbouring countries

2 Select methodology

- **Planning**
  - e.g. Block planning vs. minimum moves approach
- **Implementation**
  - e.g. TRU method[1]
- **Reallocation**
  - price-based preferred e.g. auctions

3 Implement

- Completion of the **switchover** to digital TV
- **Clearance** of digital TV services affected
- **Implementation of restack channel plan**
  - e.g. area-by-area implementation

Thorough assessment and stakeholder consultation is key to reap the full benefit of the digital dividend

1. Method retunes existing transmitters and combiners while keeping services on air with temporary transmitters and combiners as opposed to a method that replaces transmission infrastructure

Source: ACMA, COAI, Ministry of Economic Development of New Zealand, GSMA reports, press search, expert interviews