



# **A macro-economic approach to understand the affordability of a nation's defence budget**

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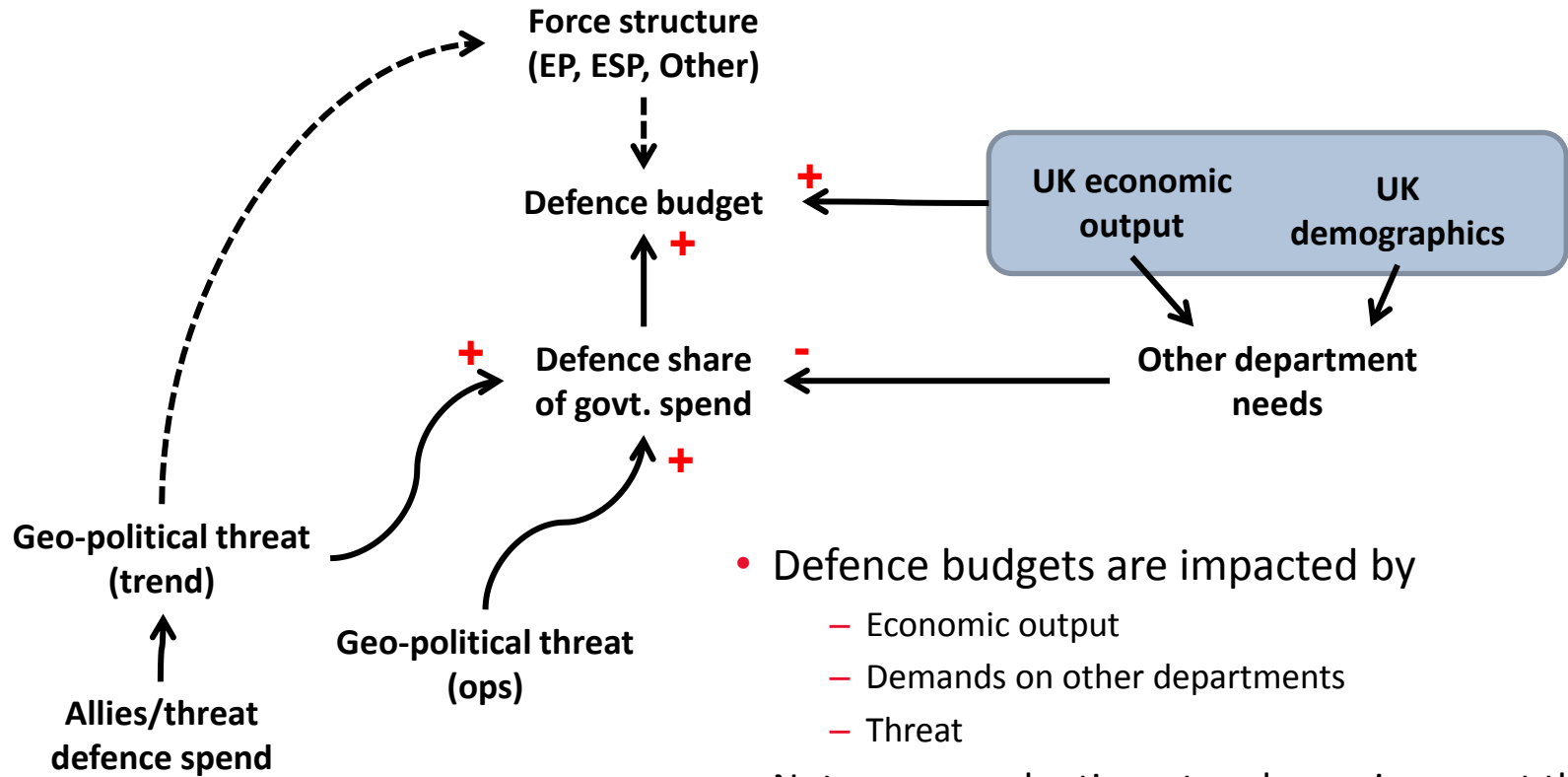
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- This is a review of work we have been developing over several years at DAS & MEF
- Insights have been used for a variety of studies for defence primes and supporting parts of UK MoD
- The challenge we set ourselves
  - “Could we develop a framework to create scenarios for UK total defence spending beyond CSR (e.g. to 2020 and beyond) reflecting UK’s public spending needs”
- Why would we want to set this challenge?
  - SDSRs ought to have an eye on the long term view. Can proposed force structures remain affordable to UK?
  - Defence acquisition decisions impact on timeframes well outside the CSR horizon
  - Economic growth is uncertain - need to explore alternative scenarios
  - Global economics is shifting balances of wealth and power
  - Clients need to get an independent view on the defence spending of nations including UK

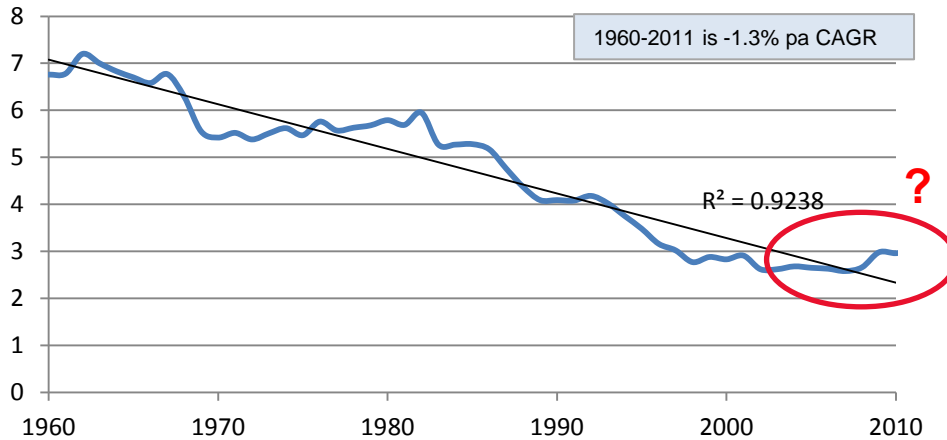
# A high level systems map of our challenge



- Defence budgets are impacted by
  - Economic output
  - Demands on other departments
  - Threat
- Note we are adopting a top down view – not the traditional bottom up
  - How much can UK afford to spend before we get to the capability choices

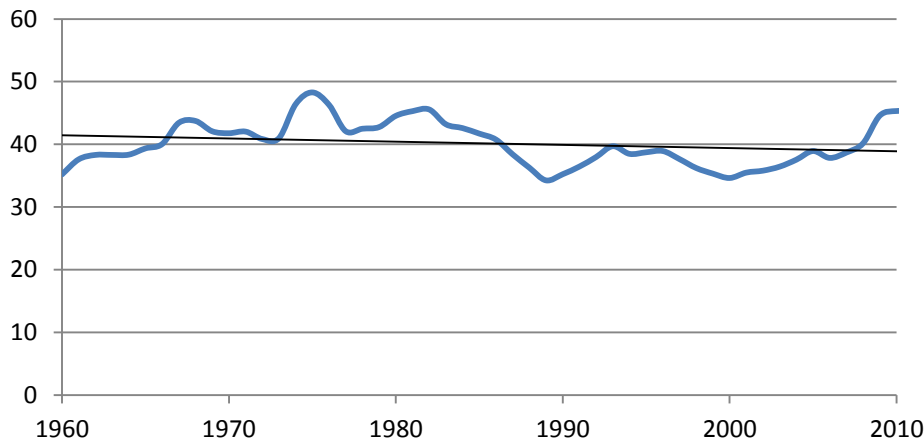
# UK defence spending has been falling since WW2

UK defence spend (% of UK GDP)



- Decline has taken place over the decades
- Periods of stability and decline
- Key questions
  - What will happen this time
  - Impact of economic performance
  - Maintaining current long term trend or are we in a new era?

UK public spending (% of UK GDP)

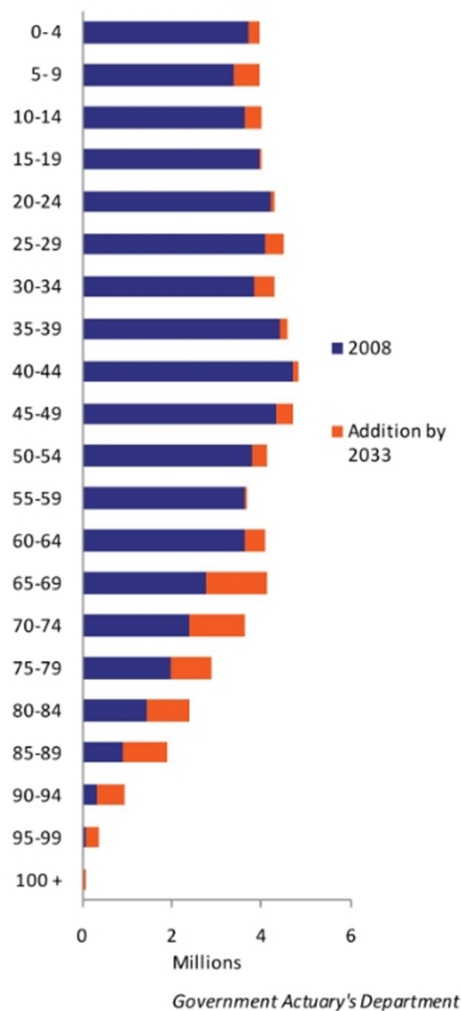


- Some correlation within the cycles for both public spending and defence
- Little shift in long term trend
- Defence spending often gets squeezed when general spending tight

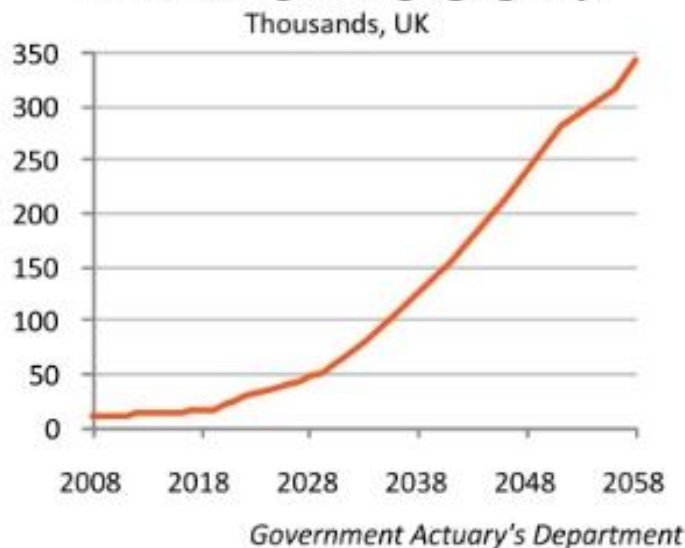
# UK demographics and macro economics are driving demands on other departments – example ageing population

- The increase in non-working populations will be a major driver of other departmental demands

The projected increase in the UK population 2008-2033 is concentrated in older groups  
By five-year age bands



Telegram overload - centenarians will continue to be the fastest growing age group

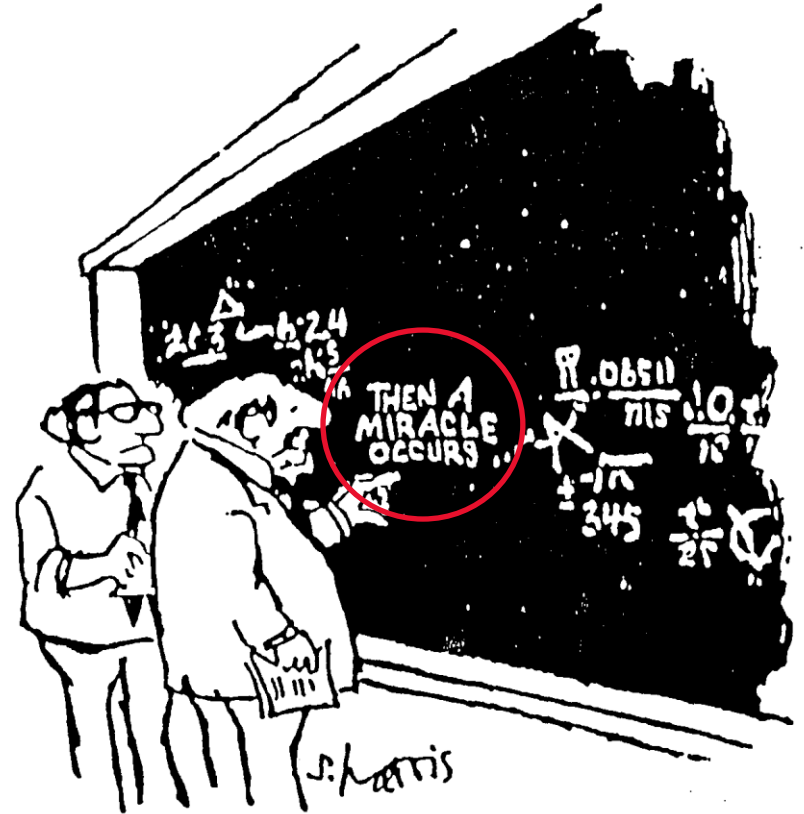


# Our approach – Use a macro economic core model (MGEM) to produce key driver estimates for a defence share model (DEFMOD)



Starting point/hypothesis	Requirement	Approach
<b>Defence spending appears to correlate with the state of public finances in the short term</b>	Represent the short/medium term public finances derived from UK economy	<ul style="list-style-type: none"> <li>• Deploy a comprehensive macro economic model of the UK</li> <li>• Reflect official Treasury/OBR forecasts and forecast beyond</li> <li>• Play out alternative scenarios</li> <li>• Output key metrics used to drive defence spending</li> </ul>
<b>Defence within public spending priorities has declined as a long term trend</b>	Represent the drivers for defence spend	<ul style="list-style-type: none"> <li>• Explore long term trends for public spending</li> <li>• Long term trends in other department spending</li> <li>• Incorporate demographic drivers</li> </ul>
<b>Defence is based on maintaining comparative strength with allies/against threats</b>	Understand the relative change in defence spend by allies and threats	<ul style="list-style-type: none"> <li>• Ensure the macro economic model incorporates other global economies and use this to better understand global defence spending</li> </ul>
<b>Geopolitical actions</b>	Be able to include/understand political action	<ul style="list-style-type: none"> <li>• Allow scenarios where political intervention can be incorporated</li> </ul>

- MGEM is an example of a type of model that seeks to represent global economies as a system of systems
  - These types of models used by OECD, IMF, European Commission, US Fed as well as economics consulting houses
  - MGEM has provided global forecast inputs to a number of scenario projects
  - MEF modelling expertise used recently by Economist Intelligence Unit (EIU)
- We only have time to give an overview of the key features of the MGEM model so for the non-economists it may appear that....



- MGEM is an example of a *structural* macroeconomic model
  - Explicit economic drivers/structure specified (superior for meaningful shock/policy modelling)
  - Contrasts to a pure time series model i.e. “black box” statistical model (no drivers specified)
  - MGEM leverages current macro economic modelling knowledge and is developed by Manchester Economic Forecasting (based at Manchester Metropolitan University)
  - Models economic disequilibrium; doesn’t assume economy is always “on trend”
  - Reflects the model philosophy/approach of the Fair global model (Ray Fair, Yale University)
- It has *wide* global coverage:

Zone	
Major 7	US, Japan, Germany, France, Italy, Canada, <b>UK</b>
Other OECD	Spain, Holland, Belgium, Sweden, Switzerland, Australia, Mexico, Korea, Denmark, Finland, Austria, Norway, Ireland, Greece, Portugal, Luxembourg, Slovenia, Slovakia, Iceland, Czech Republic, Poland, Hungary, N Zealand, Estonia, Chile, Israel
BRIC+	Argentina, Brazil, Russia, South Africa, India, China
Dynamic Asia	Thailand, Singapore, Malaysia, Taiwan, H.Kong SAR, Indonesia, Philippines
Other trade zones	East&Central Europe, Africa & M.East, Latin America, Rest of the World



- Labour Market
  - Sluggish labour market/wage dynamics (as in Fair Model)...
  - ..thus threat of inflationary spiral is relatively low (in OECD country models)
- Demand side
  - Trade (goods and services) consistent across the 49 countries/zones
  - Incorporates cognitive limitations on the economic agents – backward looking expectations (ie no “rational expectations” assumed)
  - Components of GDP are explicitly modelled:
    - Consumption (public and private)
    - Investment (public, private)
    - Net trade (goods, services)

- Supply side – capacity of the economy
  - Uses a calculation of potential GDP based on the full use of factors of production
    - Capital, labour and technology
    - Incorporates the impact of R&D i.e. quality adjusted Investment
- Comparing Demand & Supply – gives a measure of the “output gap”
- Policy Modelling:
  - Monetary Policy - Taylor Rule for Interest Rate Setting
    - Short-term rates respond to off-target inflation and the output gap
  - Exchange Rate
    - Moves with UK:US interest rate differentials + risk premium
  - Fiscal Policy
    - Next slide

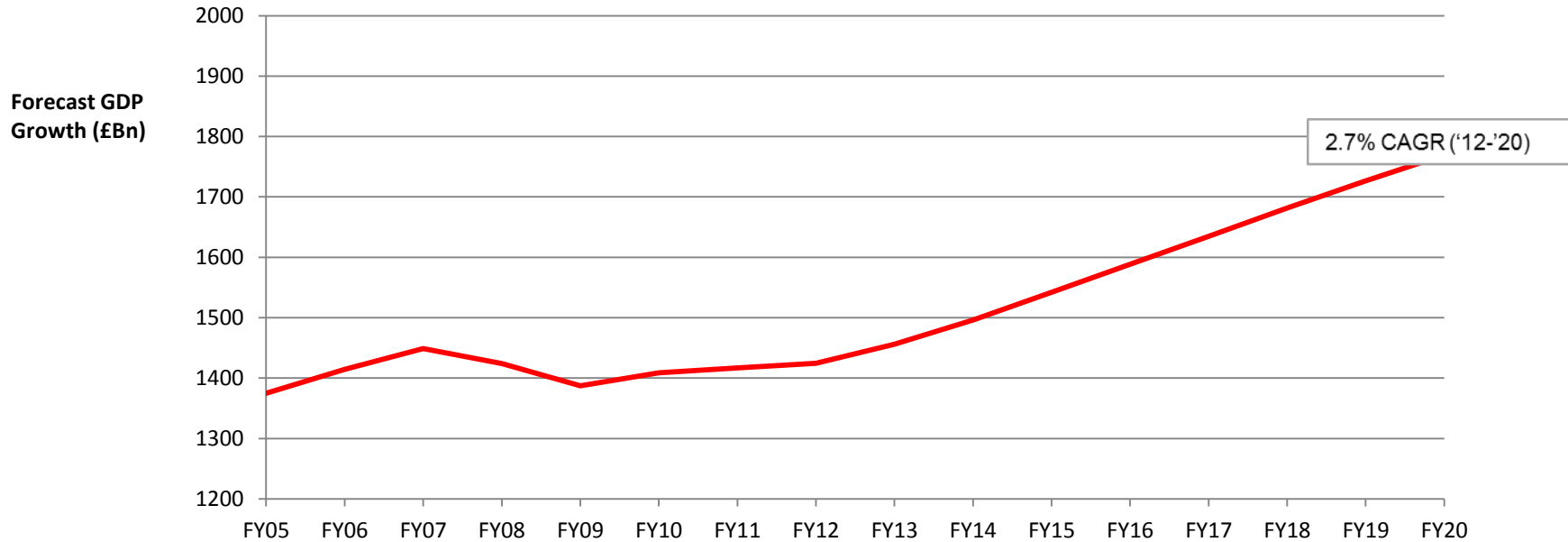
National Debt – is the accumulation of past budget deficits which themselves are the shortfall of public revenue to spending.

National debt is a key driver as a proxy for fiscal capacity

- How MGEM models the broad components of public debt:
  - Spending – partly determined by political/budget decisions & partly mandatory eg unemployment (thus dependent on the state of the economy)
  - Revenue – depends on the interaction of any (planned) tax rate changes over forecast + state of economy (ie various tax bases)
- UK Budget/OBR Forecasts imposed as the Central Forecast:
  - Spending – OBR forecasts of Consumption (Procurement + Wage & Salaries) & Capital Spending imposed over forecast.
  - Revenue – any (planned) tax rate changes imposed over forecast.
- UK scenario exercises often examine the fiscal consequences (Budget Deficit ↔ National Debt) of any deviation from OBR forecasts for the path of the economy

# The macro economic model can be used to develop a forecast aligned to OBR – central forecast

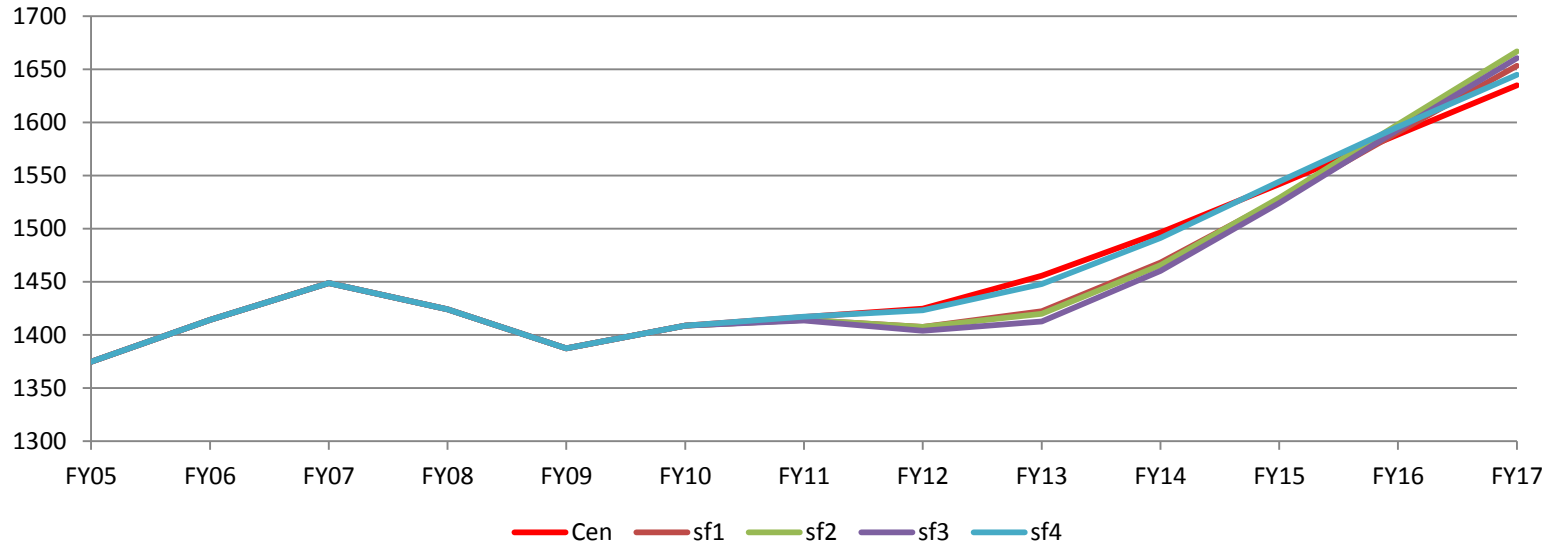
## UK GDP Central Forecast (Sept 2012) (£Bn FY11 constant)



- This provides alignment to official OBR estimates and forecasts beyond 2015
- We can also now step off and undertake a variety of scenarios

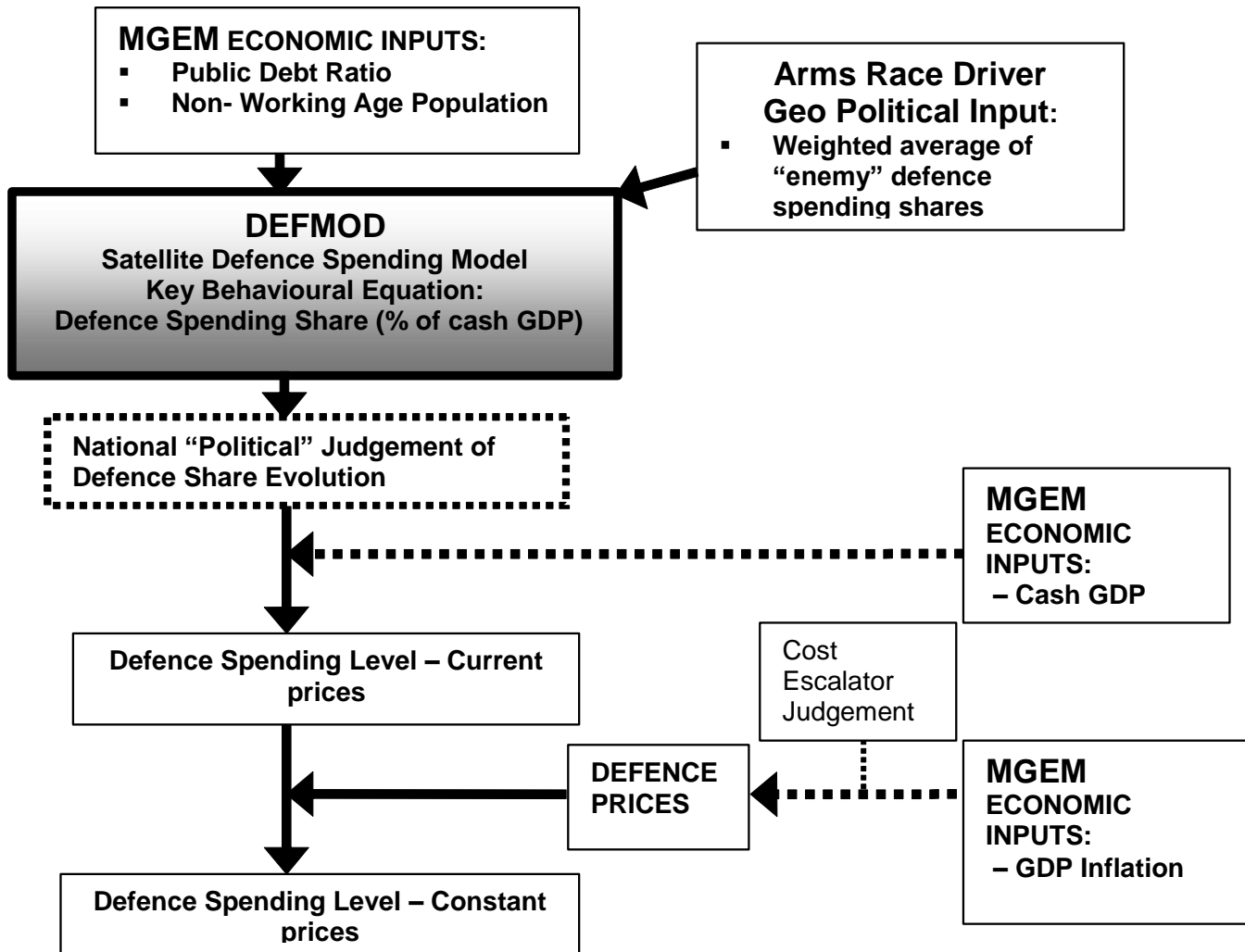
# We can use our structural model to represent a set of alternative scenarios

## UK GDP Central Forecast (Sept 2012) (Bn FY11 constant)



Scenario	Geo political	Global economy	UK economy	UK govt Fiscal policy/QE
Central forecast	Current	OBR/HMT forecast	OBR/PESA aligned	
sf1	Small Labour majority by 2015	Eurozone crisis remains	Weaker than predicted – business and consumer	Keep current policy + Further QE
sf2	Small Labour majority by 2015	Eurozone crisis remains	Weaker than predicted – business and consumer	Keep current policy + Further QE. Manage to build consumer confidence
sf3	Large Labour majority by 2015	Eurozone crisis remains	Deep double dip recession	Plan B policy – major housing programme, cyclical. Further QE
sf4	Chinese arms race gathers pace US avoids sequestration	Stronger	Stronger recovery than expected	Keep current policy

# DEFMOD has been developed to estimate impacts on defence budget



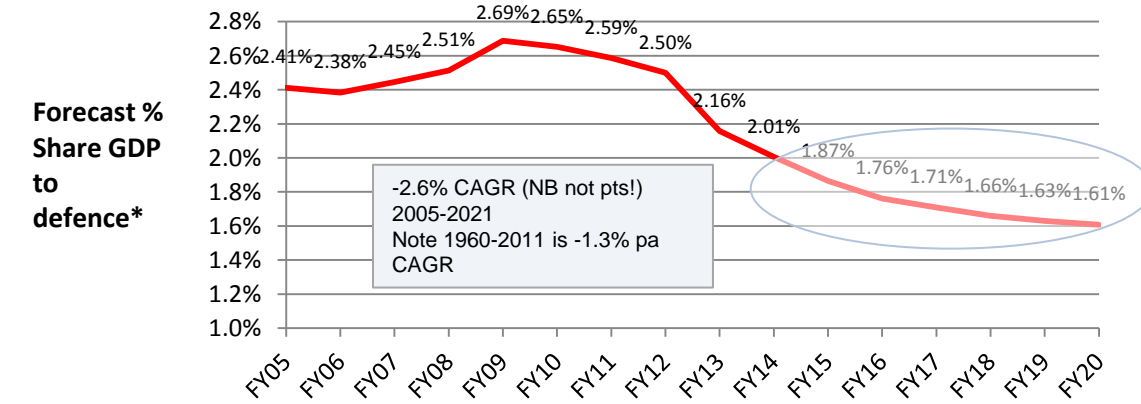
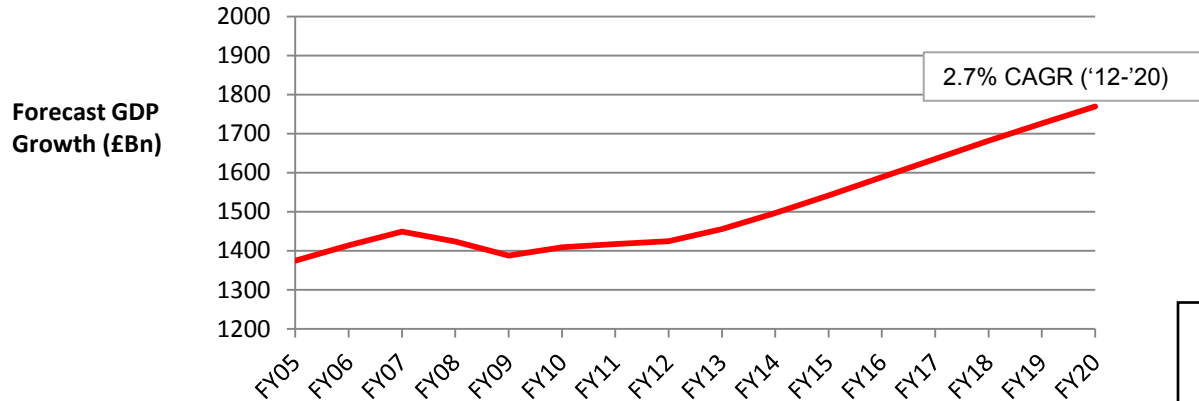
- Defence spending data collated from NATO, CIPRI, national sources and IISS Military Balance
- Key success has been synthesis of data within a structured database

# How does the model work? MGEM drives forecast GDP & other drivers

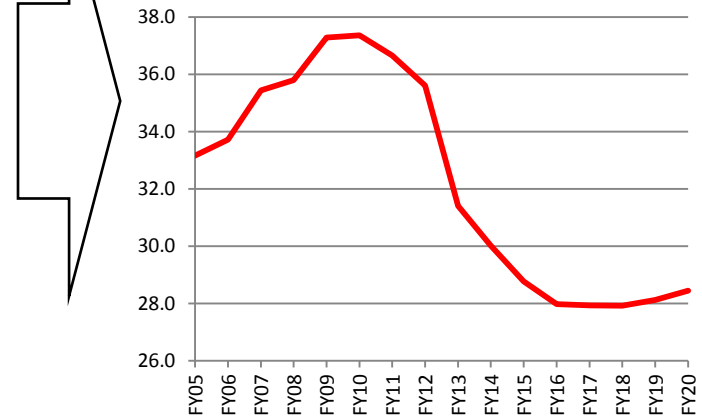
## DEFMOD estimates defence share of GDP



### UK defence budget\* Central Forecast (Sept 2012) (% UK GDP and £Bn FY11 constant)



Combination of GDP forecast (levels) and the estimated defence share of GDP drives the overall Defence Budget (levels)

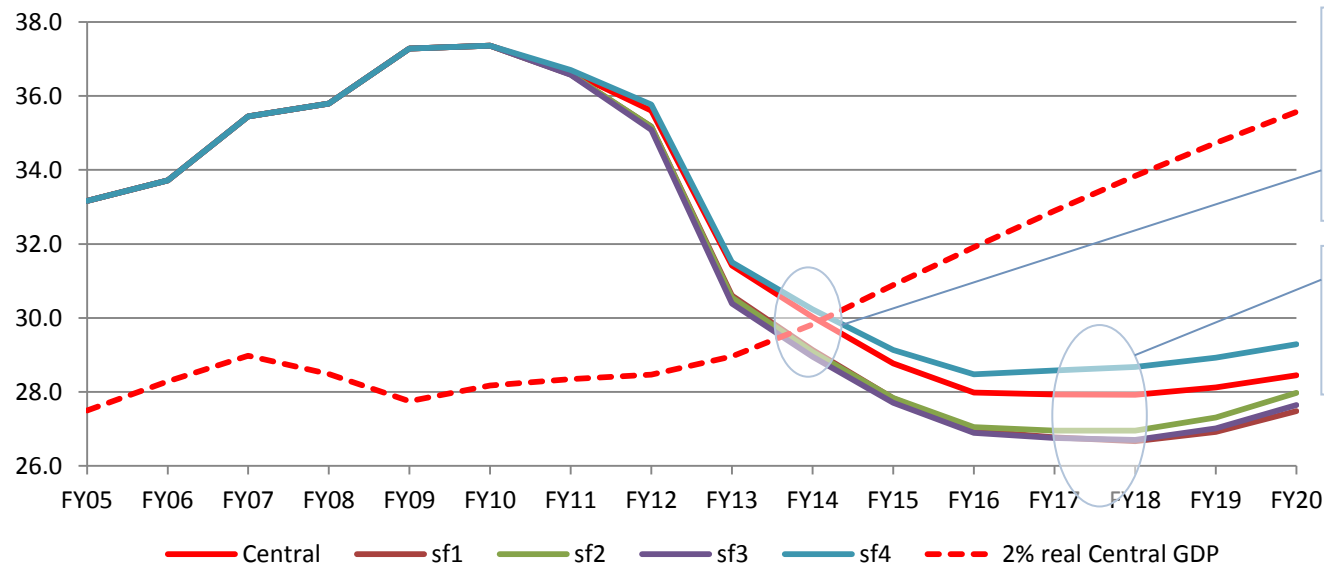


\* Based on Defence spending ie Total DEL minus depreciation and impairments

Source: DAS/MEF Global Defence Budget Macro Economic Model

# We can now create a set of alternative defence budget scenarios

## UK defence budget\* scenarios (prepared Sept 2012) (£Bn FY11 constant)



Post 2014 defence spend falls below 2% real GDP – fiscal pressures alone could force reshape of UK defence posture. Fiscal scenarios can be influenced by political choices – but illustrate the challenges

Scenario modelling captures scale of uncertainty - UK defence budget may have up to £9.2bn additional cumulative pressure over next 10 years

Scenario	Geo political	Global economy	UK economy	UK govt Fiscal policy/QE	Cumulative diff.£Bn ('05-'20)
Central forecast	Current	OBR/HMT forecast	OBR/PESA aligned		0.0
sf1	Small Labour majority by 2015	Eurozone crisis remains	Weaker than predicted – business and consumer	Keep current policy + Further QE	-8.8
sf2	Small Labour majority by 2015	Eurozone crisis remains	Weaker than predicted – business and consumer	Keep current policy + Further QE. Manage to build consumer confidence	-7.4
sf3	Large Labour majority by 2015	Eurozone crisis remains	Deep double dip recession	Plan B policy – major housing programme, cyclical. Further QE	-9.2
sf4	Chinese arms race gathers pace US avoids sequestration	Stronger	Stronger recovery than expected	Keep current policy	4.4

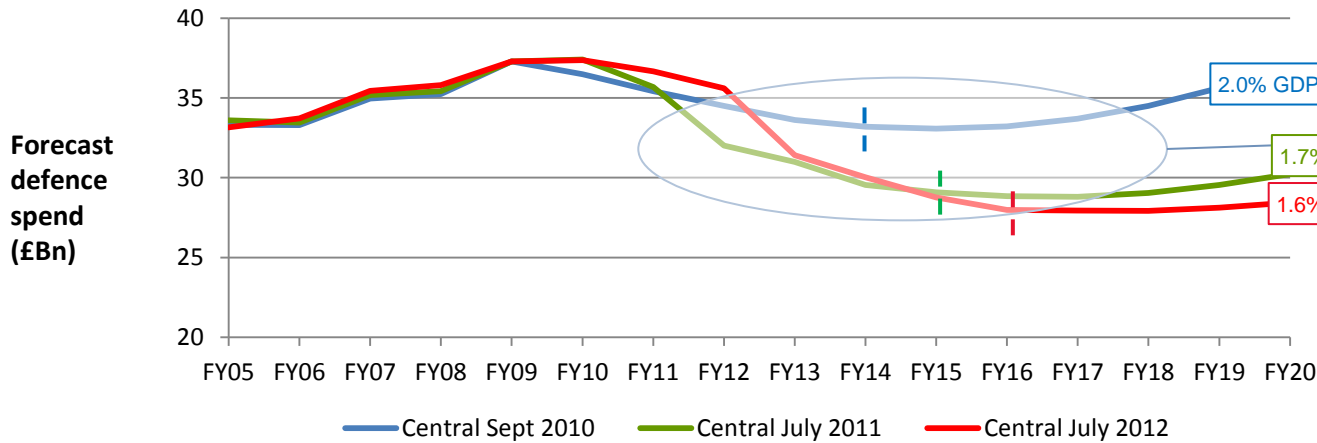
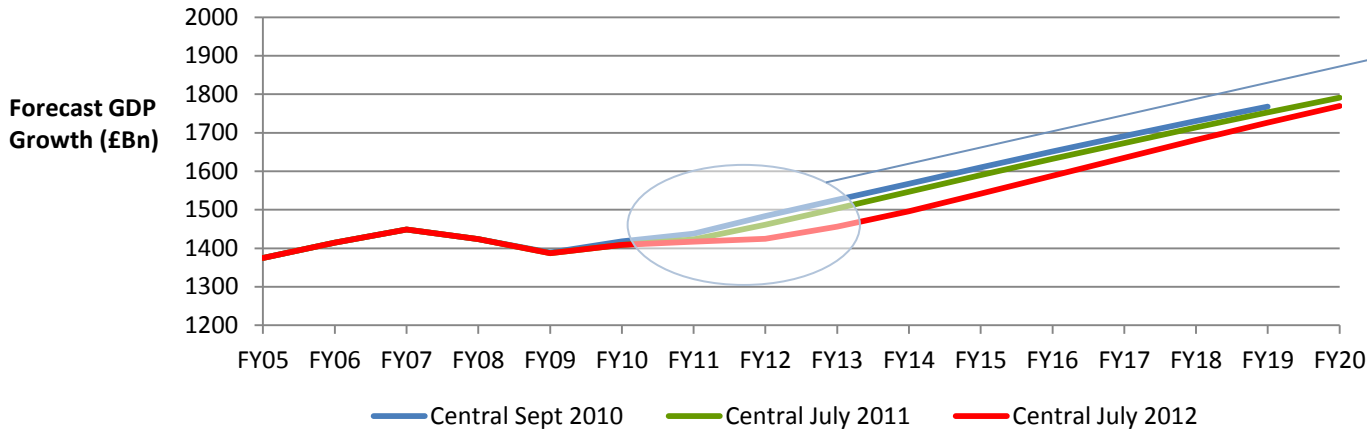
\* Based on Defence spending ie Total DEL minus depreciation and impairments



# The DAS/MEF models have been able to track the deepening challenges for UK economy in general and UK defence in particular

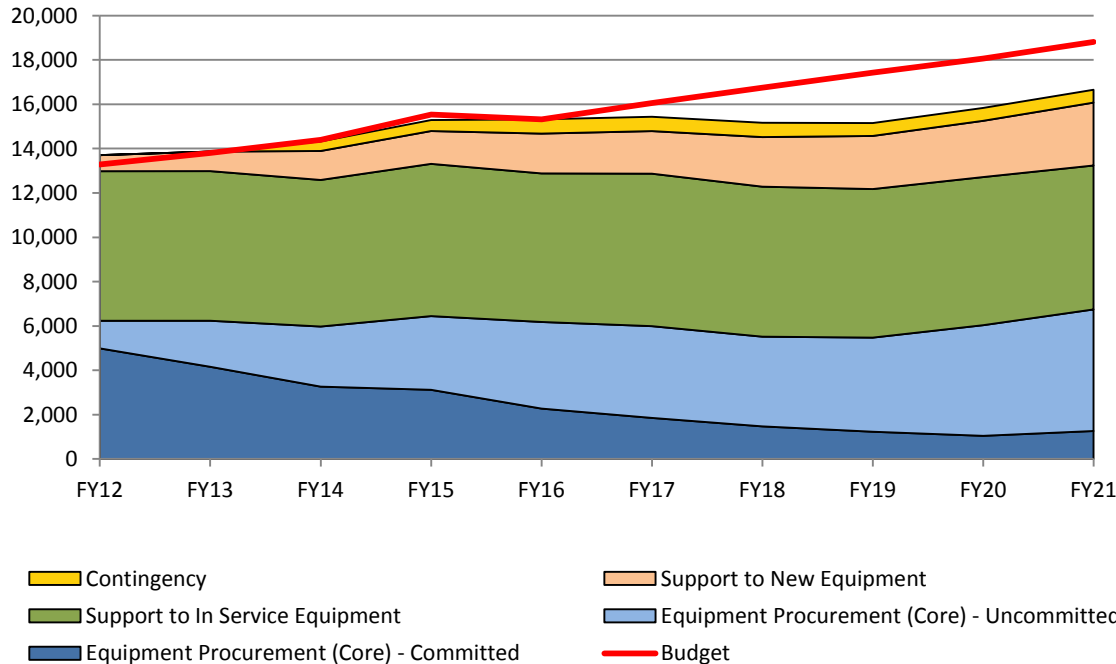


UK GDP and defence budget Central Forecast comparisons (£Bn FY11 constant)



# Latest MoD reporting suggests that total defence spend by 2020 planned to be around £42bn cash

## UK defence EP post Round 12 (Feb 2013) (£M cash)

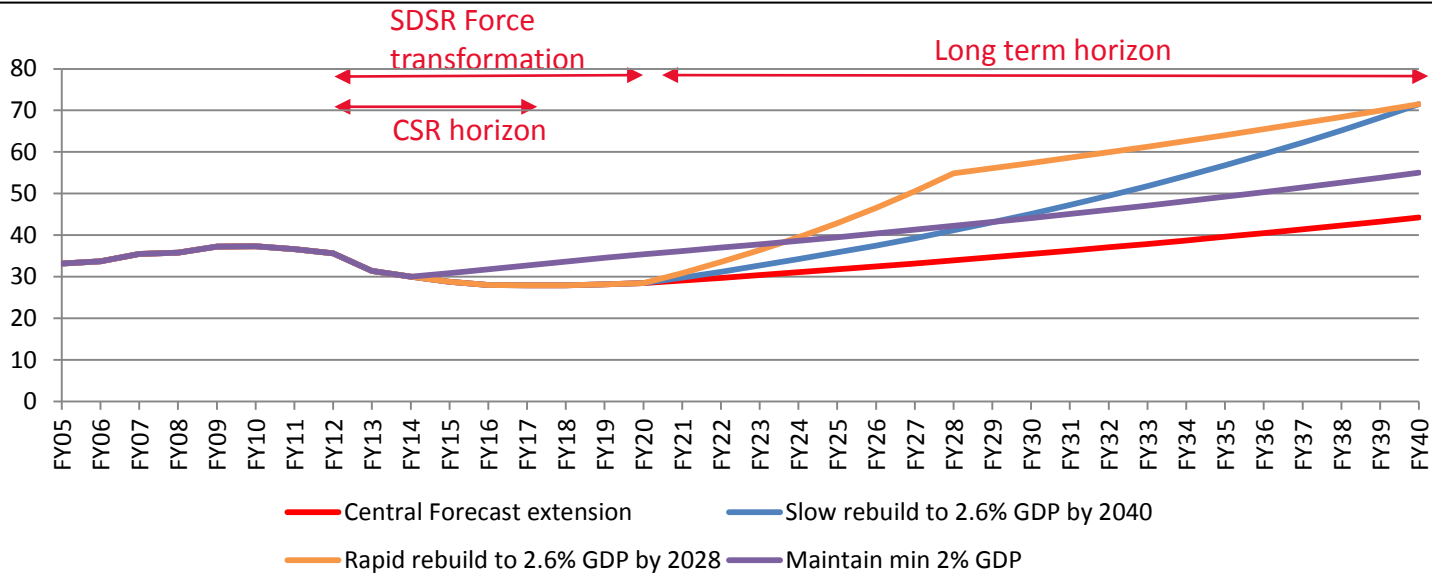


- Report stated EP will be 45% of total defence budget by 2021 (para.4)
- This would equate to Defence Spend of around £31-34bn (FY11 constant) (@2%pa inflator, DEL or Defence Spend basis in MoD report)
- We can see that this is considerably more than our forecast
  - Political will to maintain the %GDP for defence
  - Optimistic GDP forecasts post CSR

# We can extend our scenarios further driven by share of GDP for defence

- Long term forecasts shaped by public statements from MoD Centre and Cabinet
- Alternative long term futures reflect
  - Maintaining a long term 2%/yr GDP growth
  - Defence share of GDP

## Long term UK defence budget scenarios (£Bn FY11 constant)

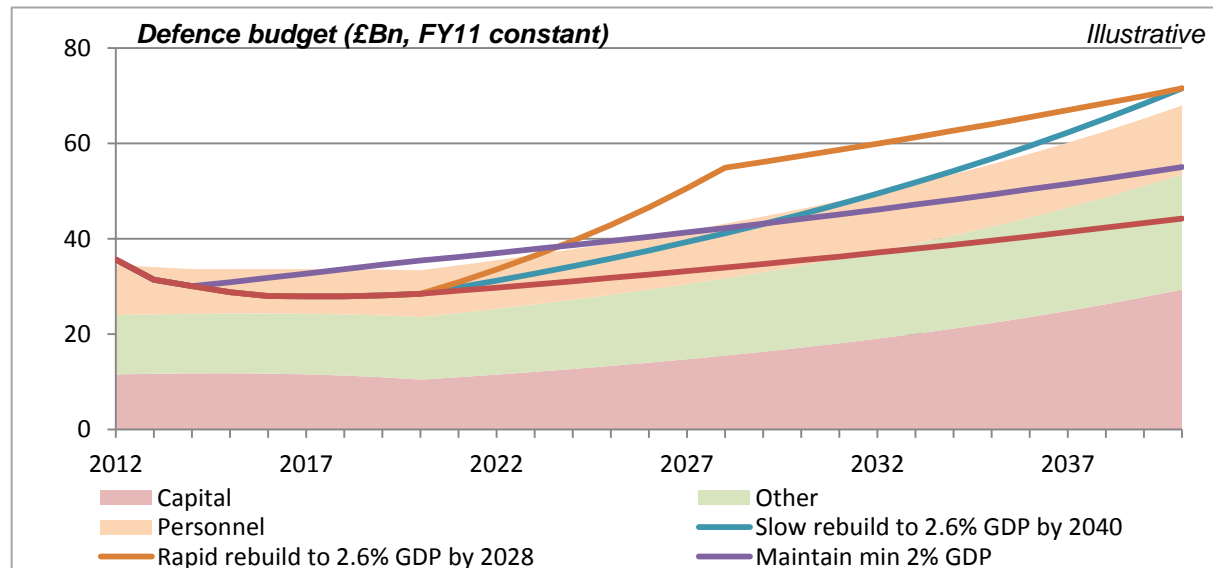
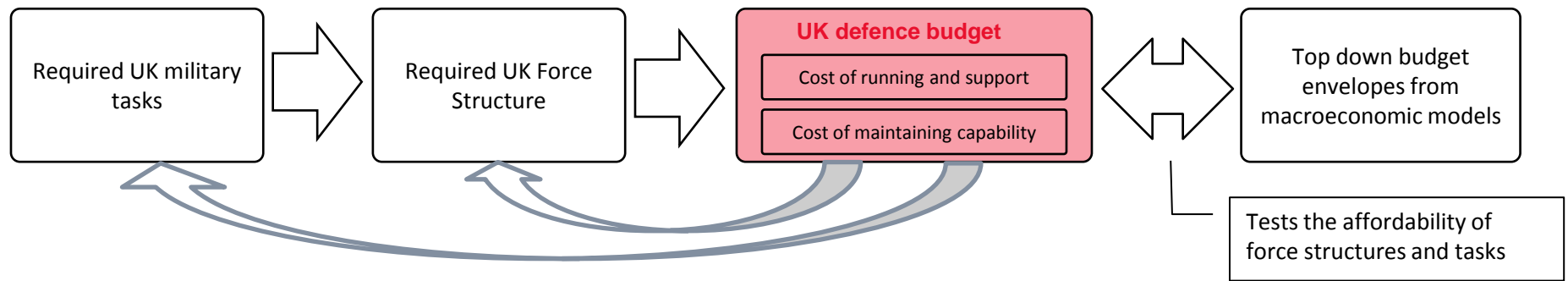


We can use these (or other) budget scenarios to test affordability of force structures and military policy (in terms of tasking)

Scenario	Description	Budget 2012-2040 CAGR	Budget 2020-2040 CAGR
Central Forecast extension	Maintain 1.6% of GDP post 2020	0.8%	2.2%
Slow rebuild to 2.6% GDP by 2040	Reach 2.6% of GDP by 2040	2.5%	4.7%
Rapid rebuild to 2.6% GDP by 2028	Reach 2.6% of GDP by 2024	2.5%	4.7%
Maintain min 2% GDP	Do not let defence slip below 2% in 2015+	1.6%	2.2%

# These top down forecasts support other modelling work – Force Structures

- DAS has developed its Force structures models that can overlay the costs of transition, operating and maintaining capability for force structure options
- See Craig Clark’s SCAF presentation September 2010



- Work to date
  - Need for the top down model
    - Defence stakeholders facing an uncertain future
    - Scenario testing as part of planning important
    - Fiscal and demographic pressures will continue to bear down – by how much?
    - Potential use as within SDSR initial exploration of options
  - Debate needs to move to fundamental question on defence role – away from individual project focus
  
- A research agenda going forward - DEFMOD can be enhanced
  - Further data collection
  - Revisit geopolitical driver algorithms
  - Enhance usability - create the toolset for collaborative work (workshops, on-line DEFMOD scenarios)



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