

Space Resources: Political Economy Aspects

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Historic Resource Utilization & Space

- Problem of production
- Problem of allocation

1. Production efficiency (static): specialization in alliances and trade

2. Allocation? Autonomy/Security

Fragility of space environment as commons

Space resources and security

- Historic fragility of space assets and environment
- Space role in monitoring and time-allowance (ICBMs vs IRBMs) as cornerstones of MAD
- Space competition and weaponization of Moon and other celestial bodies challenges

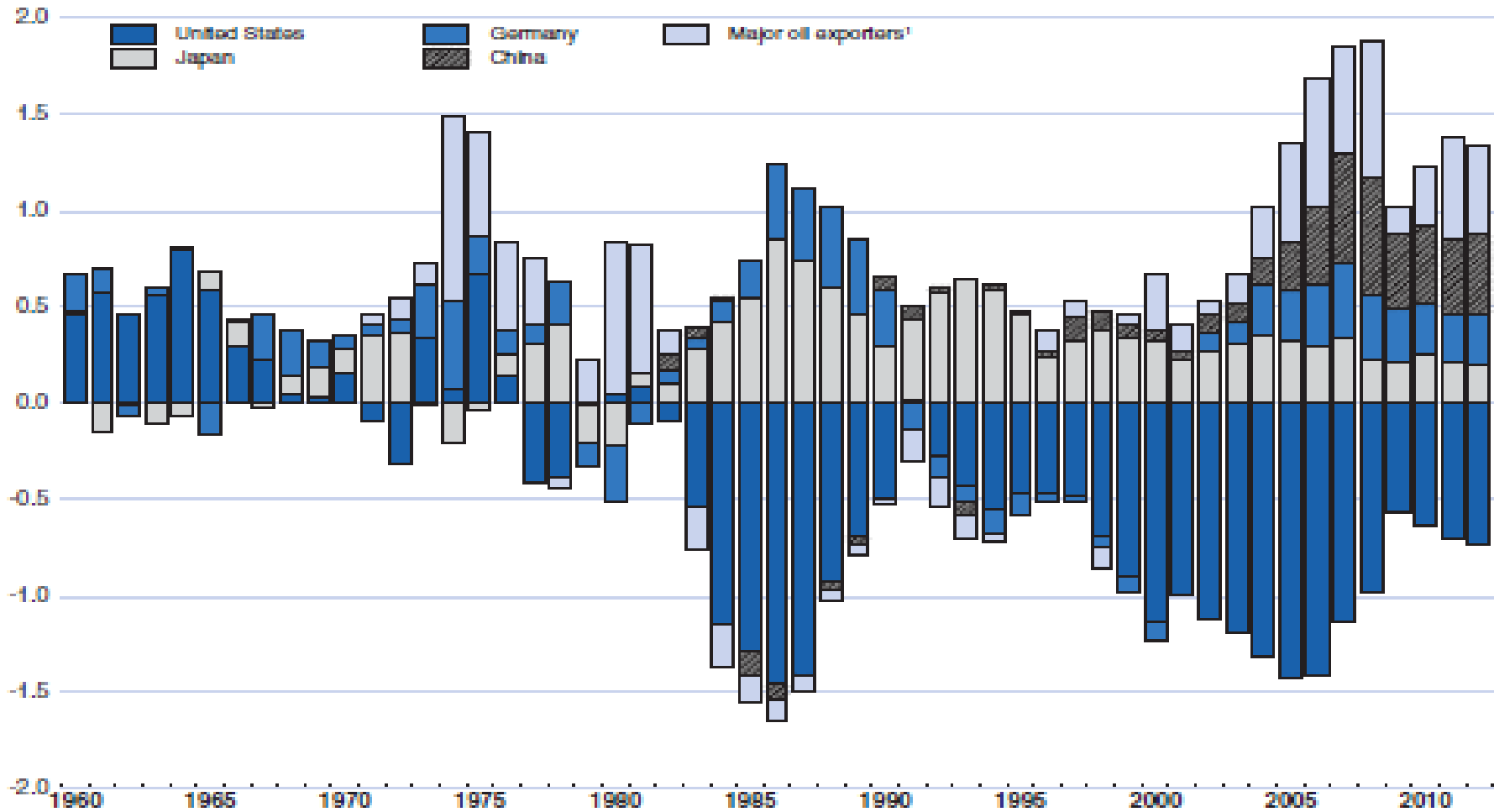
Thus, 10 October

- Of 1963 came in effect the PTBT and of 1967 came in effect OST
- Benefit of all mankind
- Peaceful uses
- No appropriation of celestial bodies

- Commonalities between space environment and high seas perceptions as global commons
- Economic exploitation of blue waters developed under the National State framework also to enhance sustainability
- In Space: Different Model (INTELSAT formation)

Specialization and Trade

Current account balance, in per cent of world GDP

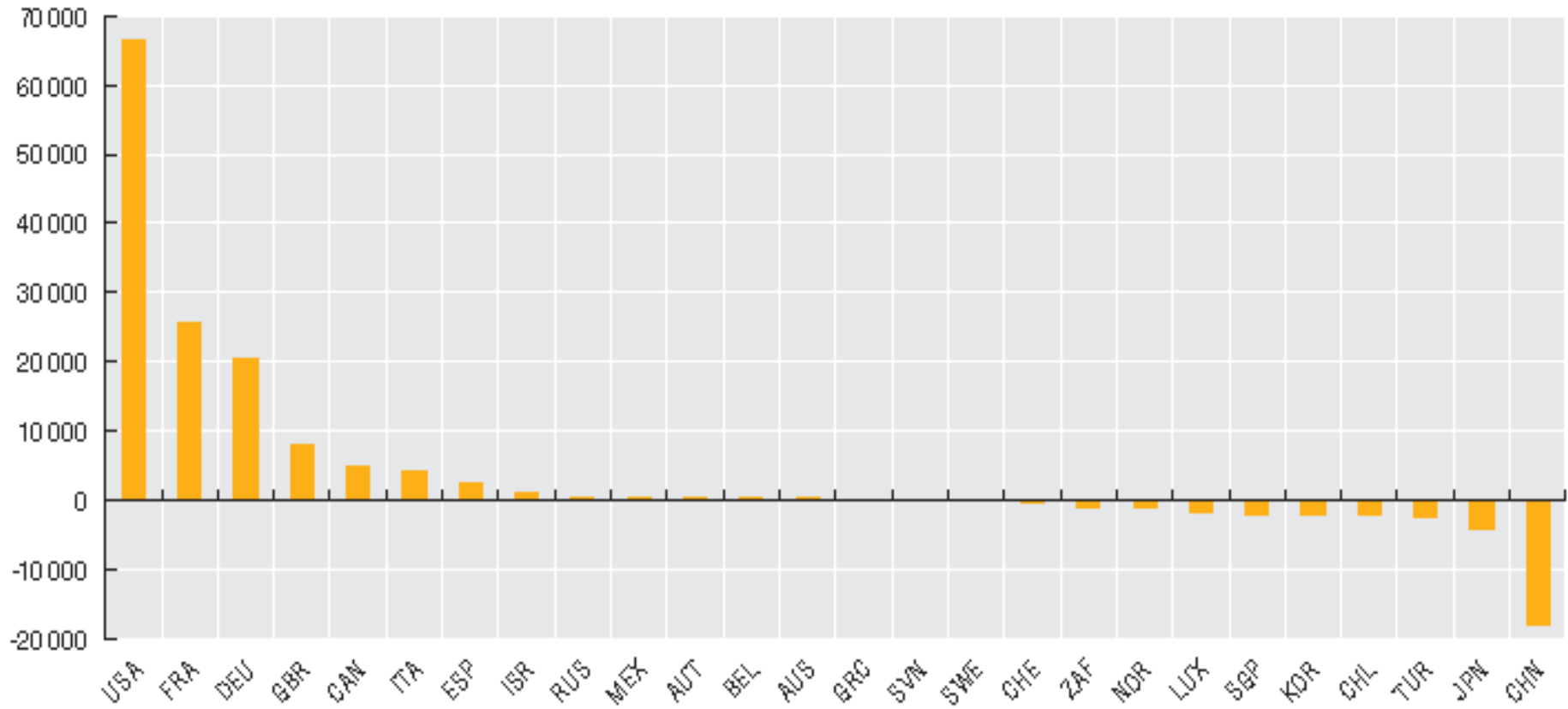



1. Refers to Saudi Arabia before 1992.

Source: OECD Economic Outlook 89 database; OECD Economic Outlook 21 database; and IMF, International Financial Statistics.

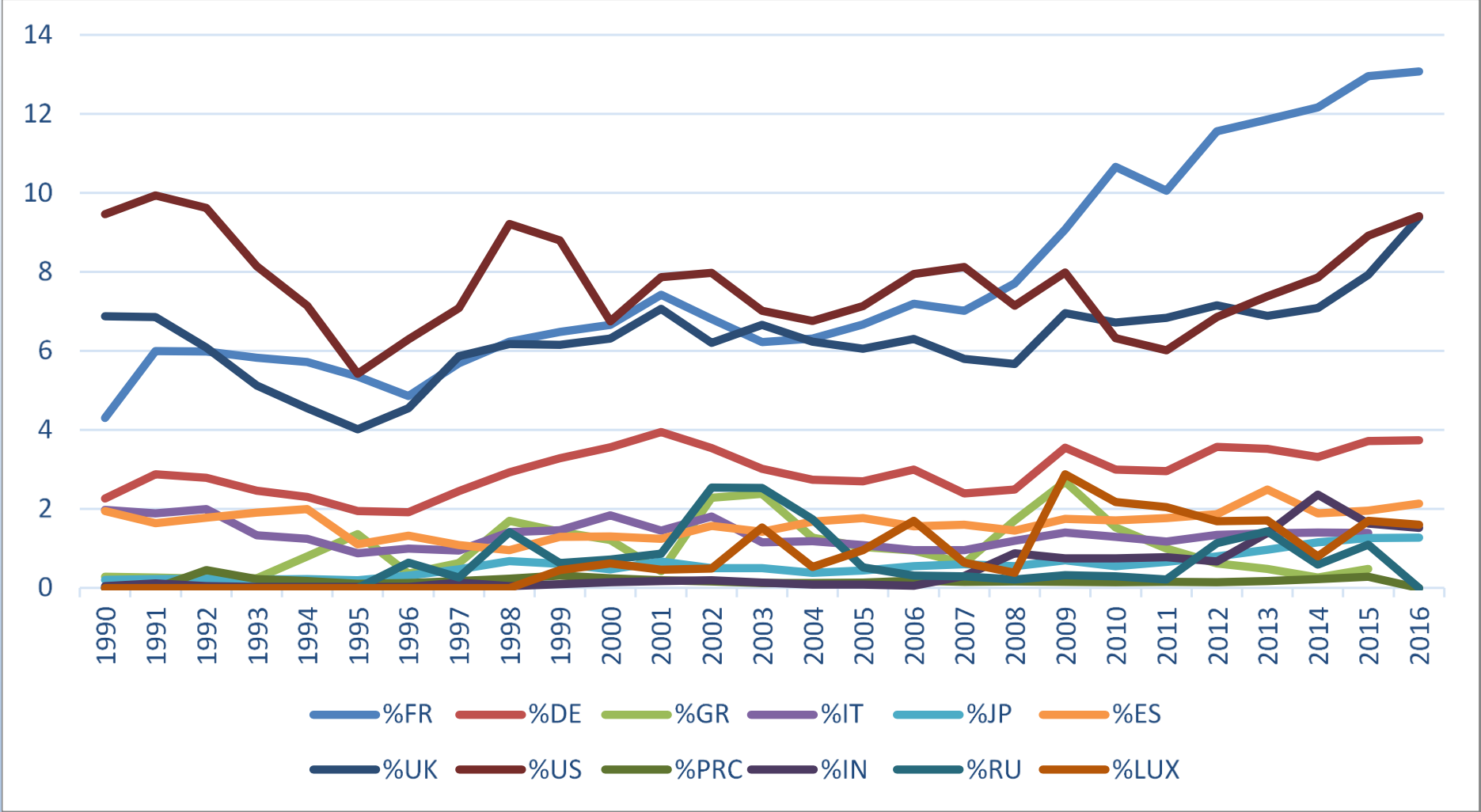
StatLink  <http://dx.doi.org/10.1787/888932428937>

2013 trade balance in Aerospace Goods



StatLink  <http://dx.doi.org/10.1787/888933142007>

Exports of Aerospace Manufactured Goods for Selected Economies (% of Total Exports)



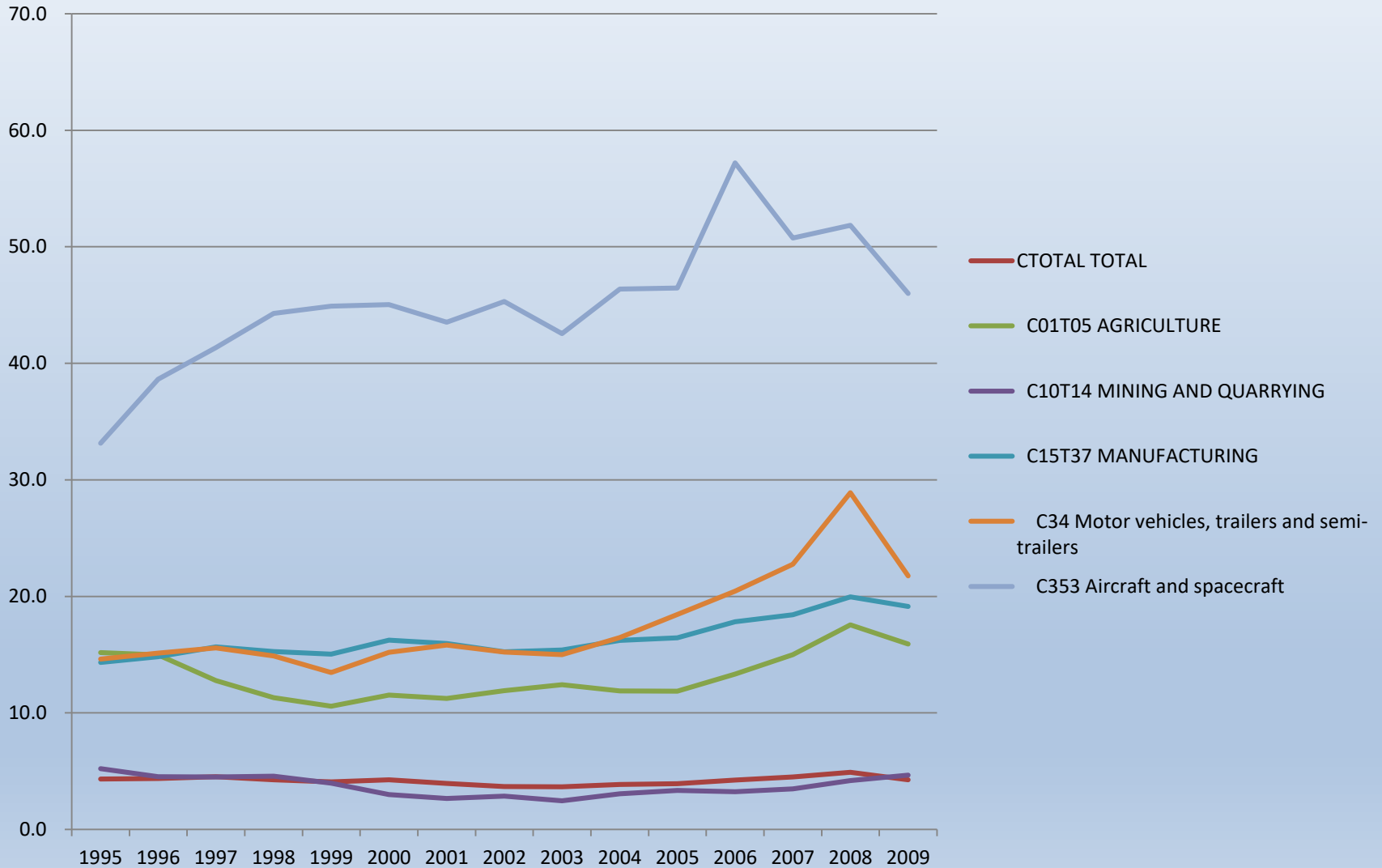
Data Source: OECD

Notes: the data is (annual) time series. The variables are as follows: %FR refers to French data, %DE refers to German data, %GR refers to Greek data, %IT refers to Italian data, %JP refers to Japanese data, %ES refers to Spanish data, %UK refers to UK data, %US refers to US data, %PRC refers to Chinese data, %IN refers to Indian data, %RU to Russian data and %LUX to Luxembourg data.

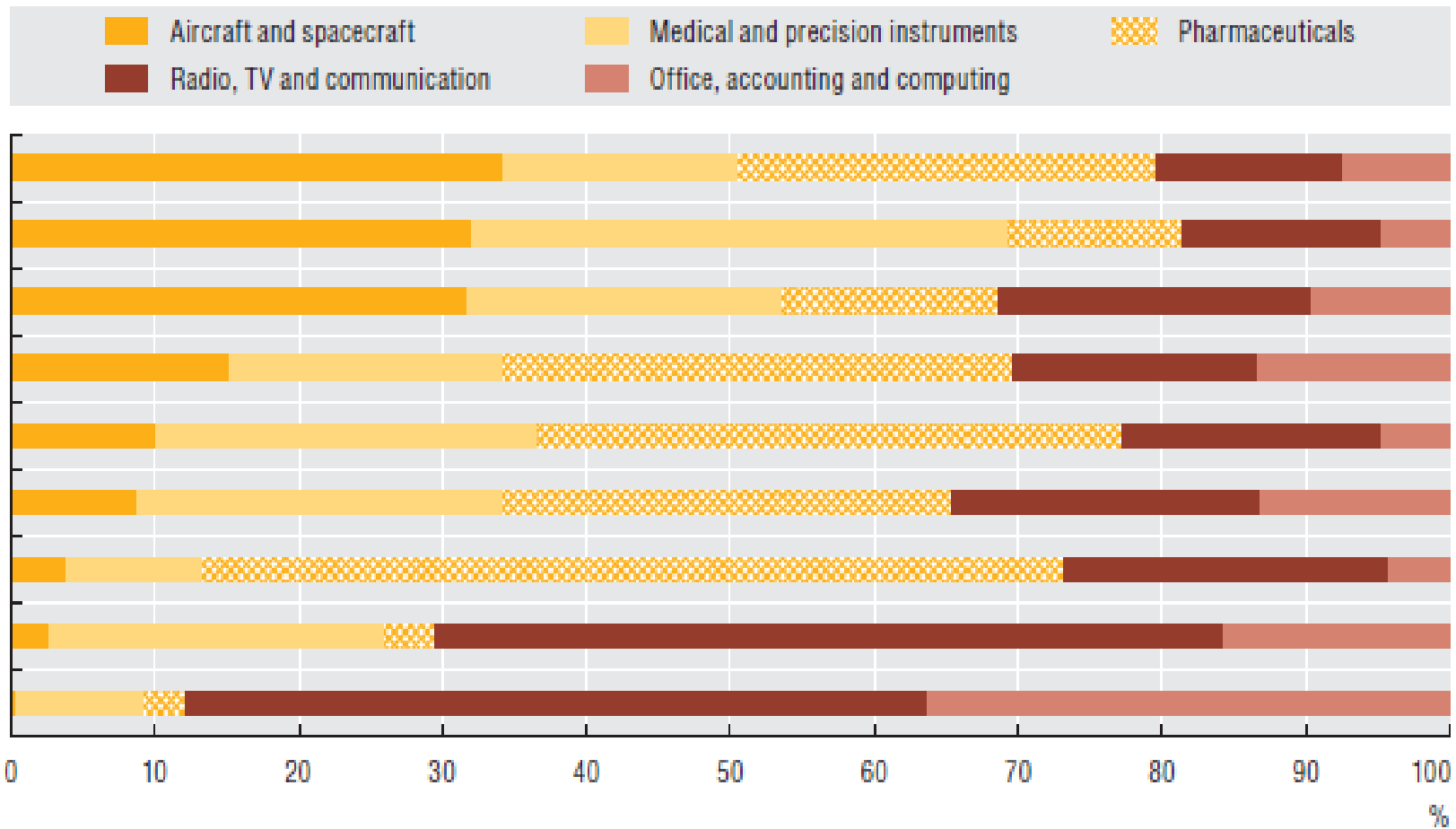
US A&D Exports

| Country | Export size(Billion Dollars) |
|--------------|------------------------------|
| China | 16.3\$ |
| France | 13\$ |
| U.K. | 10.1\$ |
| Canada | 9.3\$ |
| Germany | 7.4\$ |
| Japan | 7.2\$ |
| UAE | 5.8\$ |
| Saudi Arabia | 5.6\$ |
| Brazil | 5.5\$ |
| Singapore | 4.9\$ |

US % of Exports over Production



Export specialization (2009)



New environment

- Replenishable space assets (FBC, ORS, New Space)
- Perceptions of future commercial gains
- Technology development leads to security gains extending beyond strategic into tactical/ wider security aspects

Space as a competitive environment also within traditional alliances

Challenges ?

- Security equilibrium in terms of WMD
- What of the “other” billions

Regulation of commons...

- Gold Rush
- East India Company
- Space Colonization and Conflict

Benefit of all: Fair versus Equal

- ‘There is nothing more unequal than the equal treatment of unequal entities’ (Aristotle)

'All mankind' & exploitation of resources

- Adam Smith, father of a Competitive Economy?
- Reference to the 'invisible hand'

Invisible hand and distribution...

- [The rich] consume little more than the poor, and in spite of their natural selfishness and rapacity...they divide with the poor the produce of all their improvements. They are led by an invisible hand to make nearly the same distribution of the necessaries of life, which would have been made, had the earth been divided into equal portions among all its inhabitants, and thus without intending it, without knowing it, advance the interest of the society, and afford means to the multiplication of the species.”

Invisible hand applicable to space?

- With regards to the power of competition to bring about motivation of economic activity, exchange and growth
- With regards to the distributional aspects within the economy, whereby the rich spend more than the poor and stimulate the economy
- 'trickle down economics'- **unworkable if unenforceable** when institutions rather than individuals are concerned?

Trickle down economics: Lessons for Space?

- Issue of economic development, or control and governance?
- The 'poor' are now much better-off both in terms of national and international frameworks
- Yet distributional aspects are suffering and so is the security and safety provision. At national level this is nullified by the governance process

Proposals for mechanisms to enhance resource development at the expense of self-governance may thus be counterproductive

At global level

Fragility of space environment as commons

No one-handed solutions

Thank you for your attention



Back-Ups

Thus for sustainability, the concept of
'compensation' of losers by winners
(Kaldor Hicks) is important

Security and wider collaboration effects

- *In the case of a single superpower, that country will naturally be the low-cost provider and is likely to end up being the single provider... This result occurs because the low-cost provider still equates marginal private cost with marginal private benefit, but other providers drop out and produce nothing. Thus, in the cases of providing security guarantees, the United States is clearly the dominant provider, with more than half of defense and intelligence spending. It is likely to remain the sole provider of the public good (if this term is aptly applied here) as long as it remains so dominant.*
- *'Alas, it is but a small step from the benevolent actor to the nationalistic actor, one who acts unilaterally and concentrates on the benefits to the dominant country, perhaps with a bow to the interests of friends and coalitions of the coerced.'* (Nordhaus, 2005)

Evolution from science-based collaboration to competitiveness-enhancing partnerships

- A prerequisite for a virtuous arrangement within alliances and relevant types of (science) collaboration is clearly the matching of the evolution of the institutional landscape and allocative mechanisms to the evolution of the collaboration following its success from a 'public good' to a competitiveness-enhancement entity.
- Finally, the demand/user characteristics in combination with the cost characteristics may indicate that a competitive collaboration, rather than a 'public good' collaboration result in an optimized level of output.

Public and Private Goods

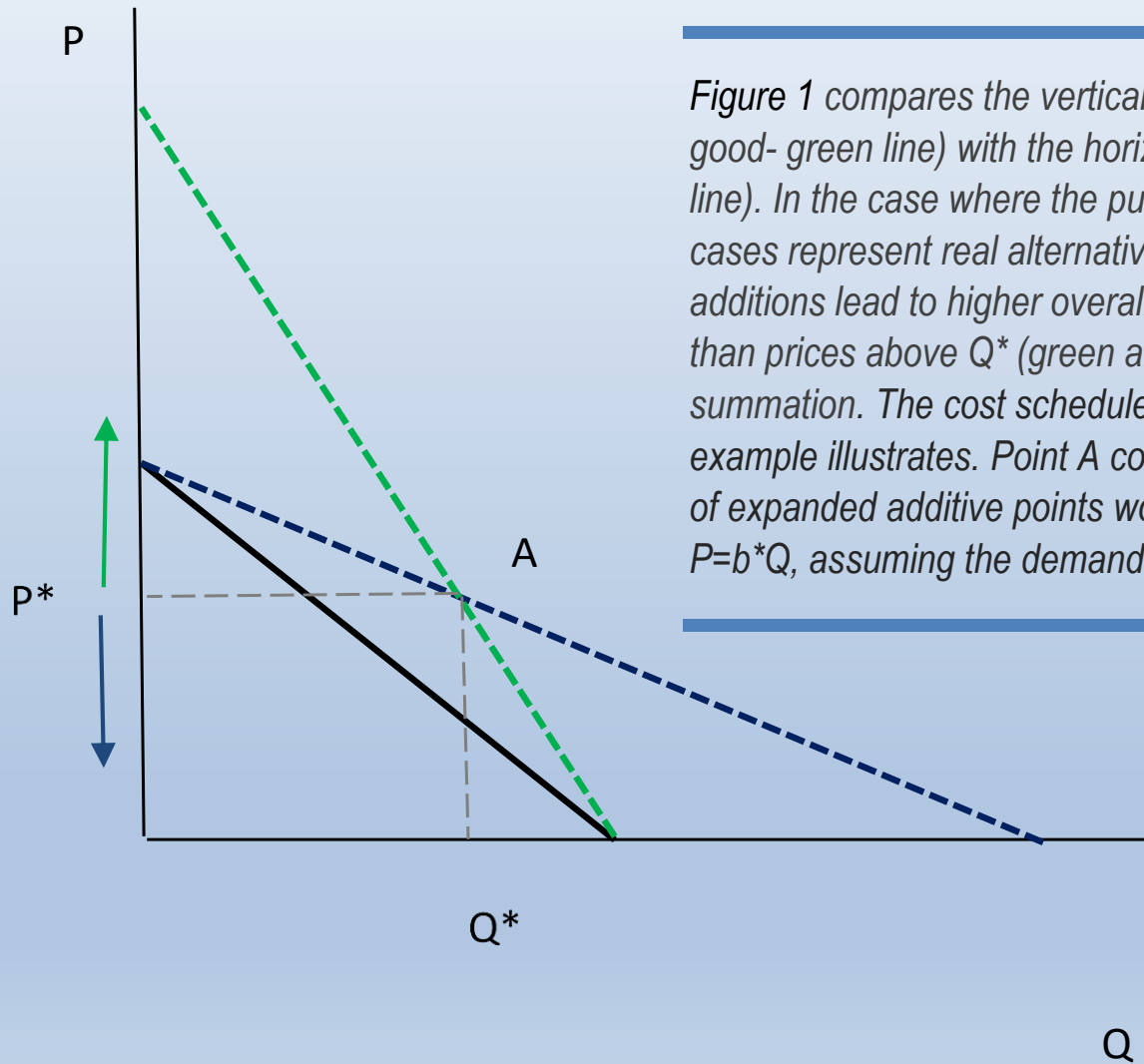


Figure 1 compares the vertical additive case of demand curves (public good- green line) with the horizontal additive case (private goods- blue line). In the case where the public good is by convention these two cases represent real alternatives. Hence at prices below Q^* horizontal additions lead to higher overall levels of output demanded (blue arrow) than prices above Q^* (green arrow), when compared to vertical summation. The cost schedules are not necessarily different as a later example illustrates. Point A corresponds to (P^*, Q^*) , while a sequence of expanded additive points would be connected by a line of the form $P=b^*Q$, assuming the demand equation is $P= a-b^*Q$.