



THE PRODUCT SPACE APPROACH: A TOOL TO FOSTER DIVERSIFICATION AND SOPHISTICATION OF PRODUCTION

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The pattern of development is driven by the specific set of products a country exports (Hidalgo et al. 2007)

- Growth and development are the result of structural transformation.
- Development is a process of accumulating more complex sets of capabilities and of finding paths that create incentives for those capabilities to be accumulated and used (Hausmann, Hwang, and Rodrik, 2007).
- The reality is that less developed countries face serious problems when they try to become competitive in a new product, enter a new market, and shift production and exports toward more sophisticated products.



Diversification as a core element of competitiveness

- The productivity of a country resides in the diversity of its productive capabilities
- Productive capabilities can be thought as non-tradable inputs. According to this idea, cross-country differences in income can be explained by differences in economic complexity, as measured by the diversity of capabilities present in a country.
- Firm level productivity determines competitiveness; higher levels of productivity leads firms to go global
➡ Focus on product exports



The productive structure of the economy matters

- 1) The initial structure of production influences future productivity growth: countries with a more sophisticated export basket tend to grow faster.
- 2) Market failures, such as industry-specific learning-by-doing, knowledge spill-overs, and the potential for coordination failures means that government could play a key role in enabling firms to produce more sophisticated goods



The product space is a state of the art tool to visualise the structure of the economy (Hidalgo et al. 2007)

- The heterogeneous structure of the product space has important implications for structural change.
- Products in the periphery are less sophisticated and with a lower income elasticity of demand for exports than those in the core ➡ not all products are the same qualitatively as carriers of economic development.
- If a country produces goods in a dense part of the product space, then structural transformation is much easier because the set of acquired capabilities can be easily redeployed to the production of other nearby products.
- However, if a country specializes in the peripheral products, this redeployment is more challenging, as no other set of products requires similar capabilities.
- A country's position in the product space signals its capacity for structural transformation.
- The Product Space allows to analyse the economic structure, identify new opportunities (promising products or sectors), and thus design the right strategies and policies.



Product space: Major concepts (1)

- **Revealed Comparative Advantage (RCA):**
 - Ratio between the export share of a product and the total share of the product in world market. Countries have a revealed comparative advantage in a product if its $RCA > 1$.
- **Productive capabilities:**
 - Diversification: Number of products with $RCA > 1$
 - captures the ability to become competitive in a wider range of products
 - Ubiquity: Number of countries exporting the goods you export with $RCA > 1$
- **PRODY**
 - Revealed sophistication of each product
- **EXPY**
 - Revealed sophistication of a country's entire export basket
 - captures the ability to export products produced and exported by the rich countries to the extent that, in general, they embody higher productivity, wages, and income per capita.



Product space: Major concepts (2)

- **Proximity:**

- Inverse of the distance between goods i and j

$$\varphi_{i,j,t} = \min \{P(x_{i,t}|x_{j,t}), P(x_{j,t}|x_{i,t})\} \quad \longrightarrow \quad \text{where for any country } c,$$
$$x_{i,c,t} = \begin{cases} 1 & \text{if } RCA_{i,c,t} > 1 \\ 0 & \text{otherwise} \end{cases}$$

- **Density:**

- The possibility of jumping from current products to new potential products. Higher values indicate that the country has achieved comparative advantage in many nearby products, and therefore should be more likely to export good i in the future (i.e., that it acquires revealed comparative advantage in it).

$$density_{i,c,t} = \left(\frac{\sum_k \varphi_{i,k,t} x_{c,k,t}}{\sum_k \varphi_{i,k,t}} \right)$$



Product space: Major concepts (3)

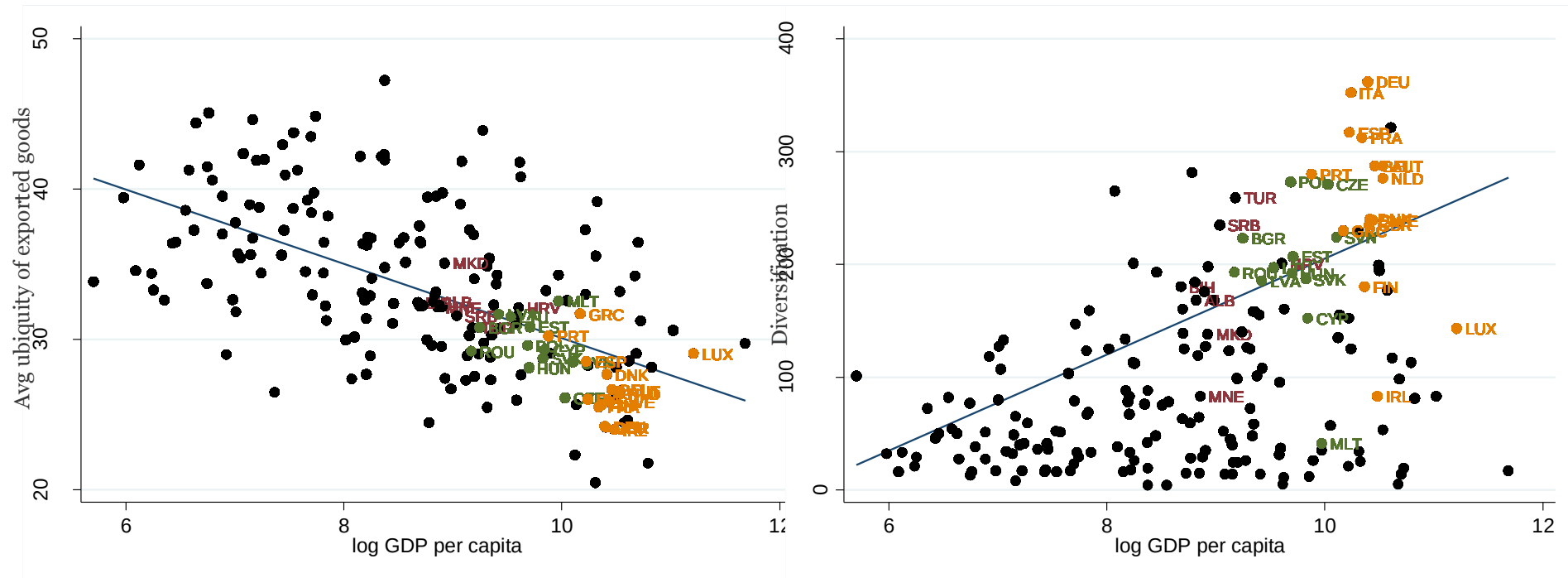
- **Open forest**

$$open_forest_{c,t} = \sum_i \sum_j \left[\frac{\varphi_{i,t,j}}{\sum_i \varphi_{i,j,t}} (1 - x_{c,j,t}) x_{c,i,t} PRODY_{j,t} \right]$$

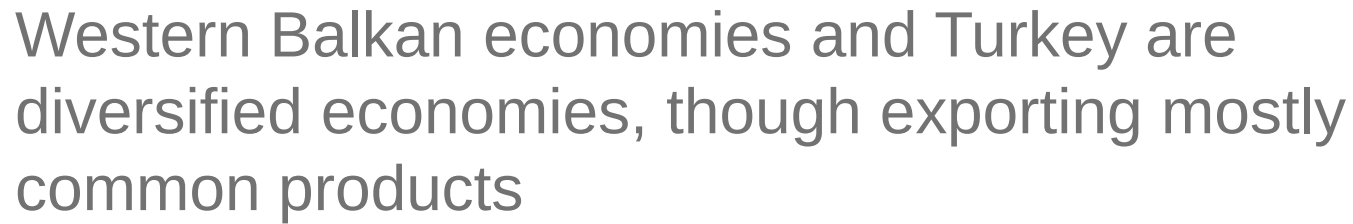
- Overall measure of the connectedness of a country's export basket. It captures the (expected) value of the goods that the country could potentially export, i.e., the products that it currently does not export with comparative advantage. This value, therefore, depends on how far the nonexported goods are from the current basket (i.e., distance, or the probability that the country can export them) and on how sophisticated these nonexported goods are.
- A higher value indicates that the current export basket is a part of the product space that is well connected to other new and valuable opportunities for structural transformation.



Rich countries are more diversified and export more uncommon products

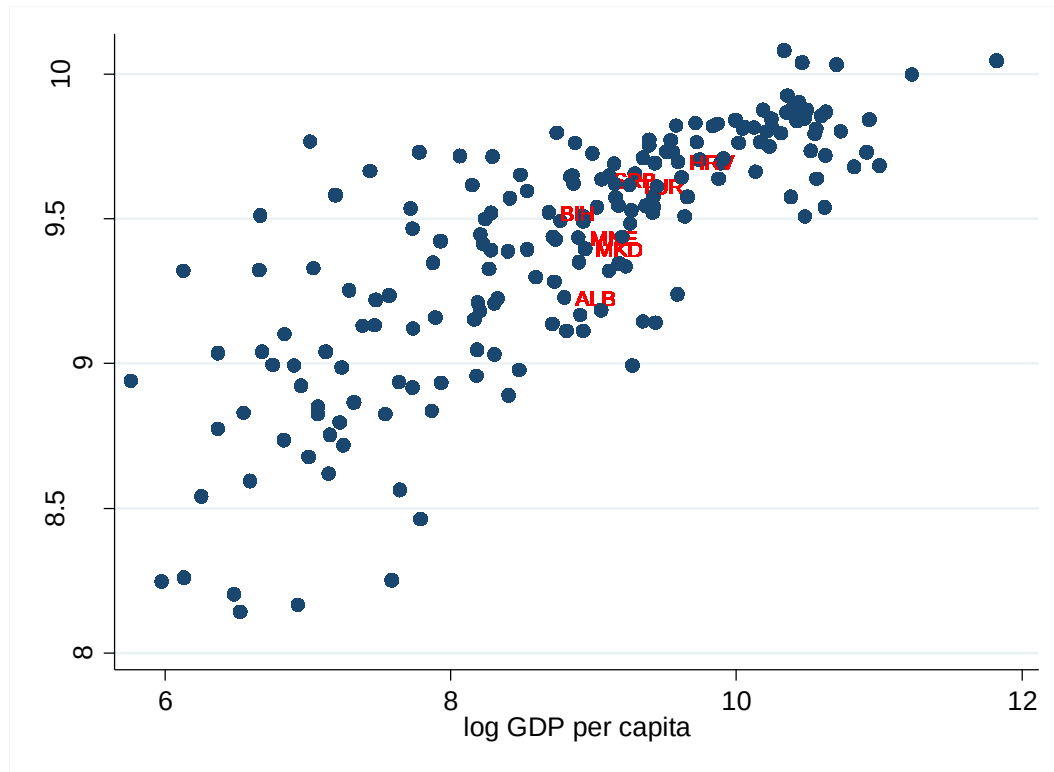


Source: OECD staff calculations using COMTRADE and World Bank data





Rich countries produce more sophisticated products

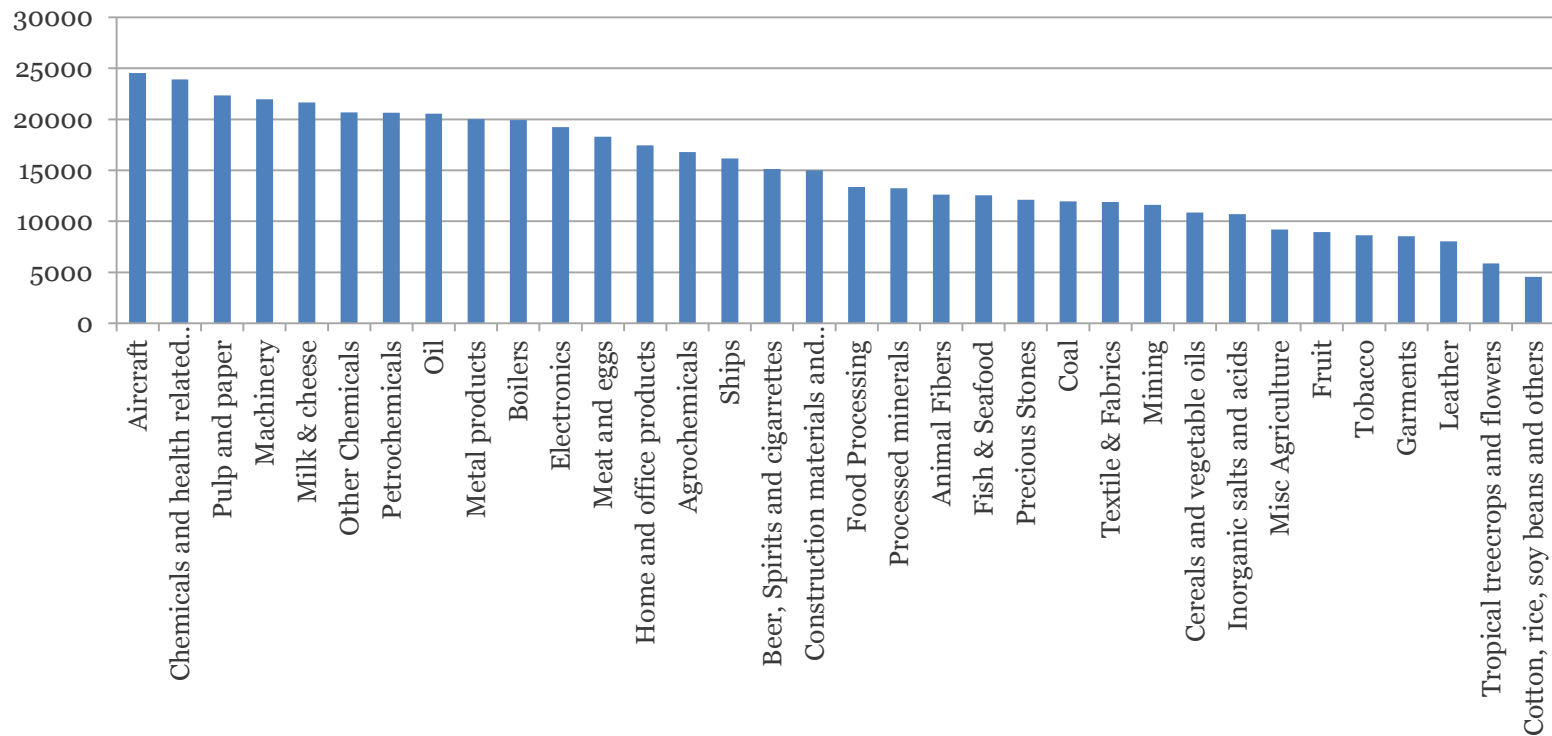


Source: OECD staff calculations using COMTRADE and World Bank data



Revealed sophistication of each sector (product community)

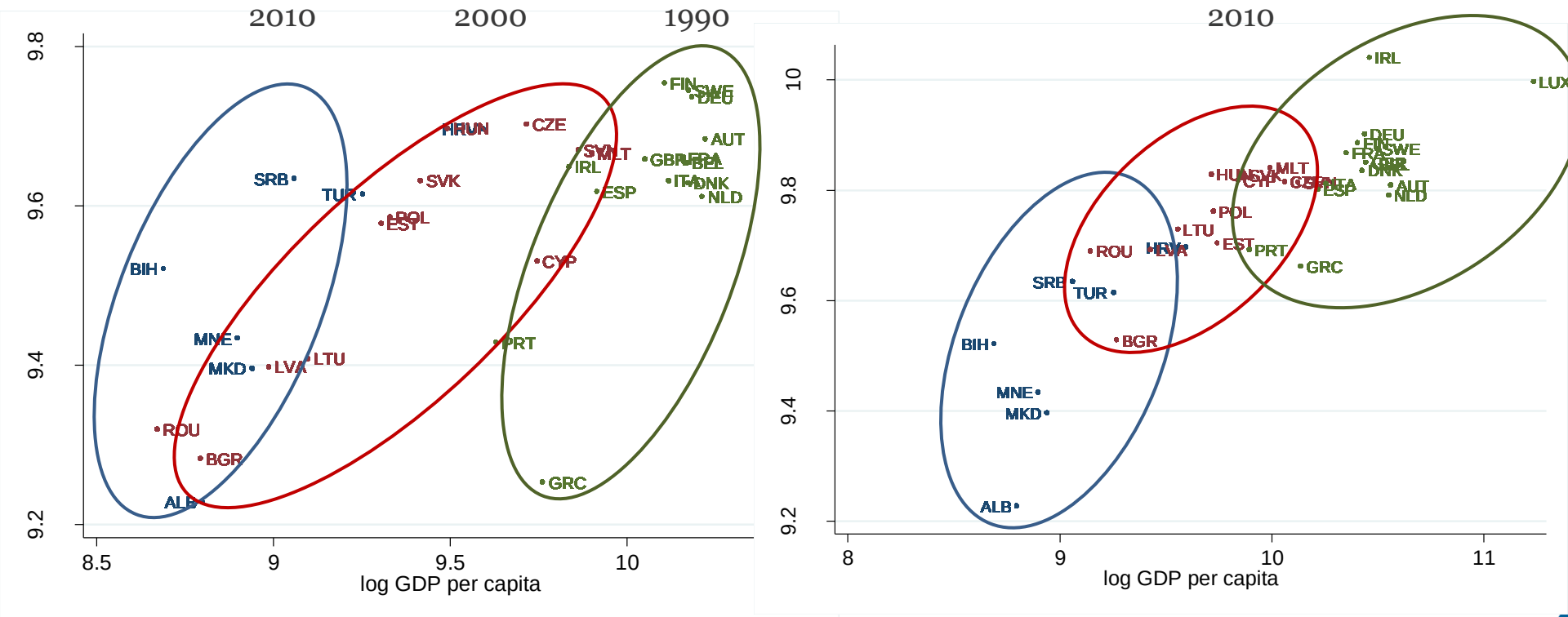
Community PRODY, 2010



Source: OECD staff calculations using COMTRADE and World Bank data



The sophistication of Western Balkan and Turkish products is lagging behind





The Product Space Map



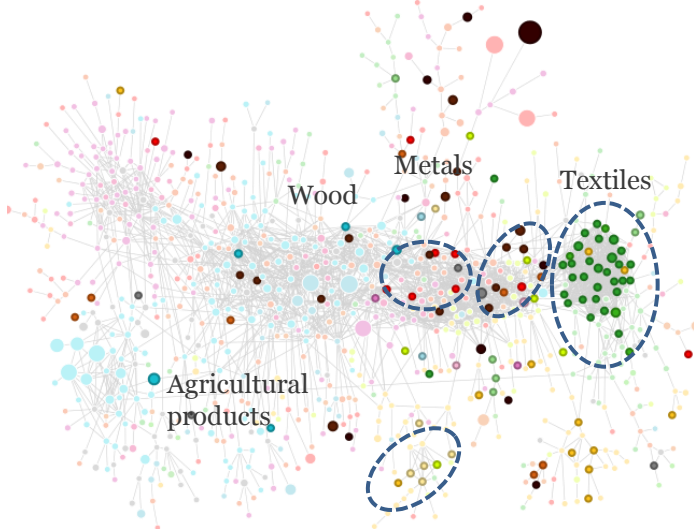
- The Product Space looks **like a forest**, which gets denser towards the centre and is sparse at the periphery
- It shows the **relatedness between products**. Nodes represent products and their size proportional to total world trade in that good.
- Many products group naturally into highly connected **communities**. They require similar capabilities (i.e. knowledge, factor input, etc)
- The distance between the products represents **the ease to jump** to another product.



Snapshots from the Product Space

Albania

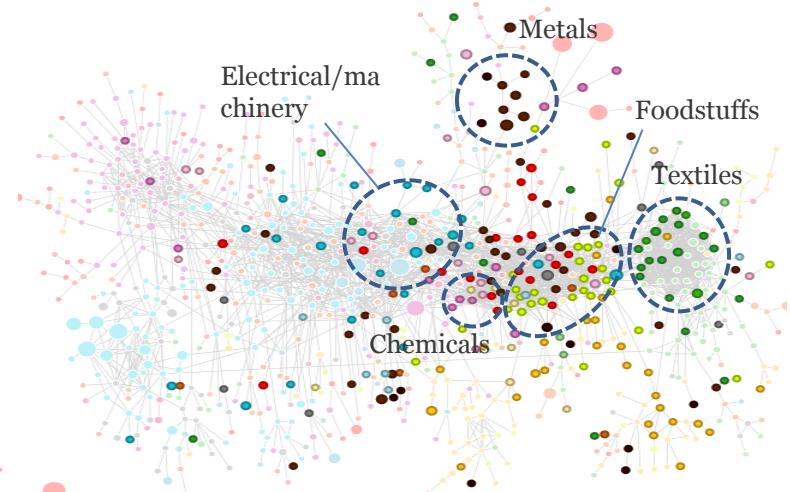
Total Value: \$1,808,800,713



2010

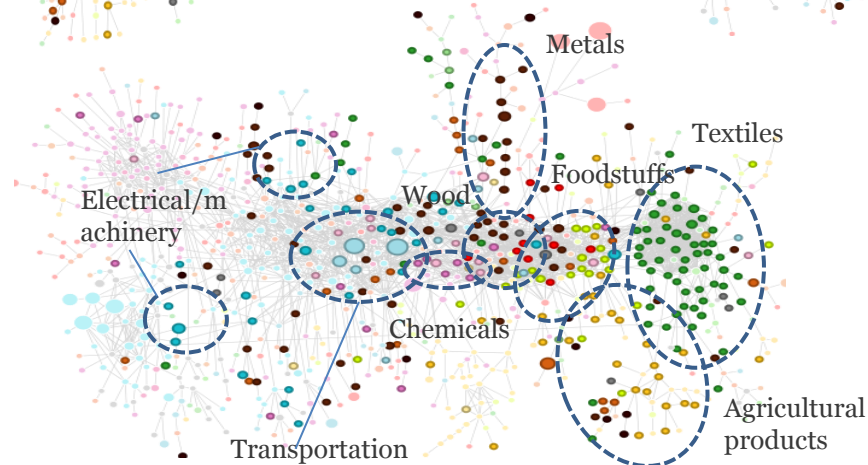
Serbia

Total Value: \$10,088,723,107



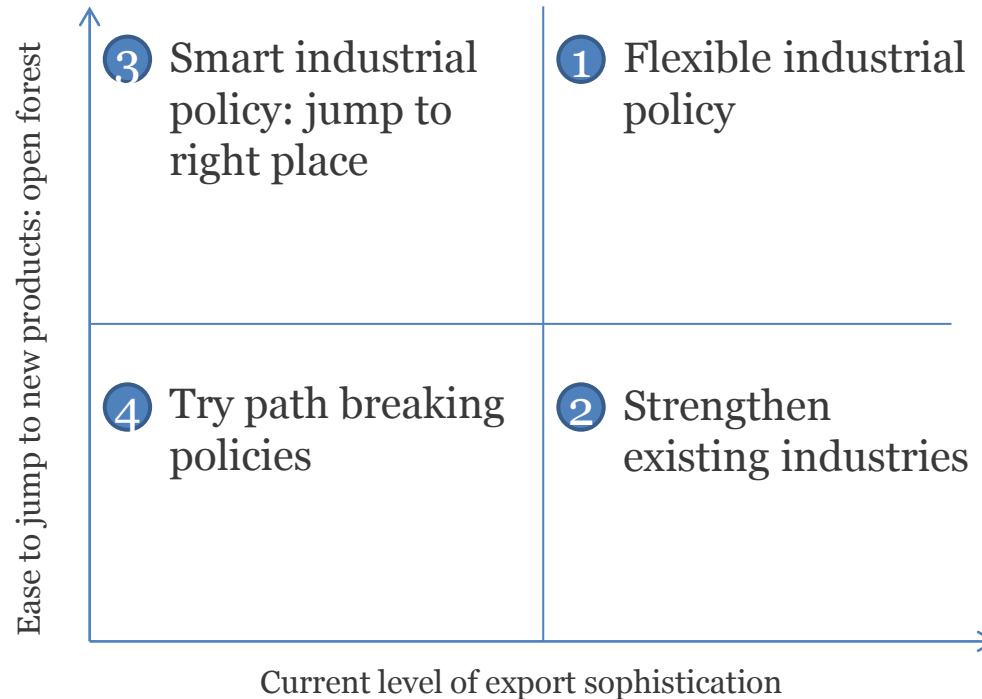
Turkey

Total Value: \$120,189,794,699





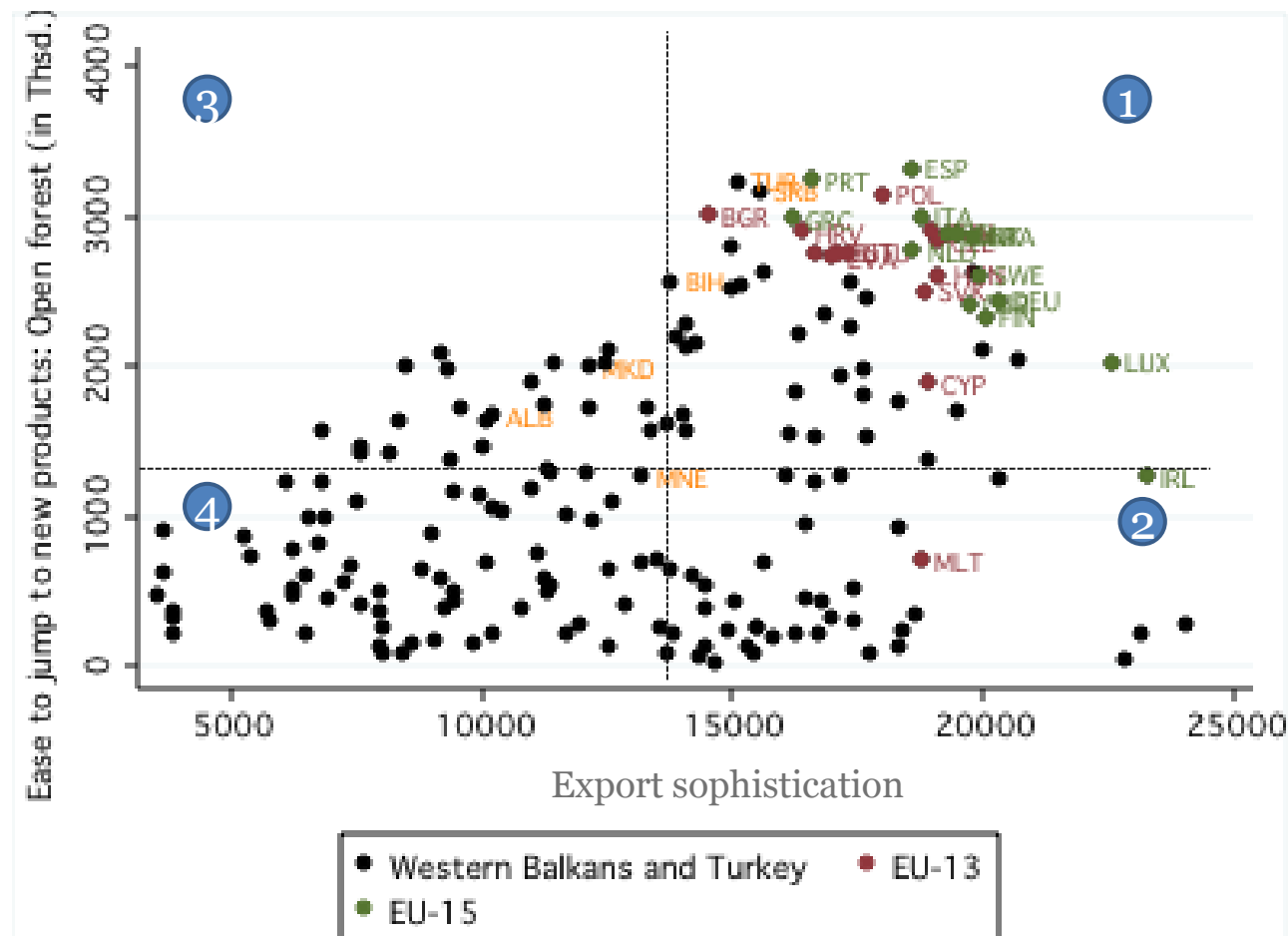
Opportunities for economic transformation



Source: Caglar, Esen (2011). An application of the product space methodology to export promotion strategies in Turkey, TEPAV.



Mixed ability to jump to other products and level of sophistication can provide different industrial policy options in the Western Balkan economies



Source: OECD staff calculations using COMTRADE and World Bank data



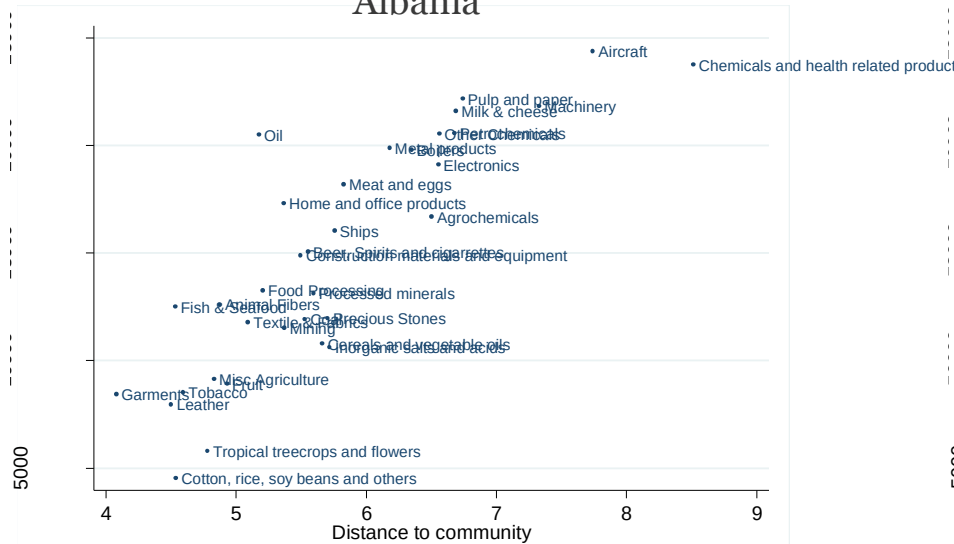
Trade-off between distance and sophistication

- Ideally, countries want to move to products that are at short distances, sophisticated, and strategic.
- Products “closest” to a country’s current export basket, use capabilities that are similar to those the country already has
 - it should not be difficult for firms (that already export these products in small amounts) to become competitive exporters of the products (i.e., increase the export share of these products and acquire revealed comparative advantage)
- “Distant” products require more specific capabilities and it is more likely that domestic firms do not have these yet
 - their successful export today is probably more challenging.
- But are these products also sophisticated (i.e. associated with higher levels of productivity and thus leading to faster growth)?
- Do these products also have a high strategic value, which would get them closer to more densely populated and sophisticated parts of the product space?
- Seldom are products simultaneously near , sophisticated and strategic.

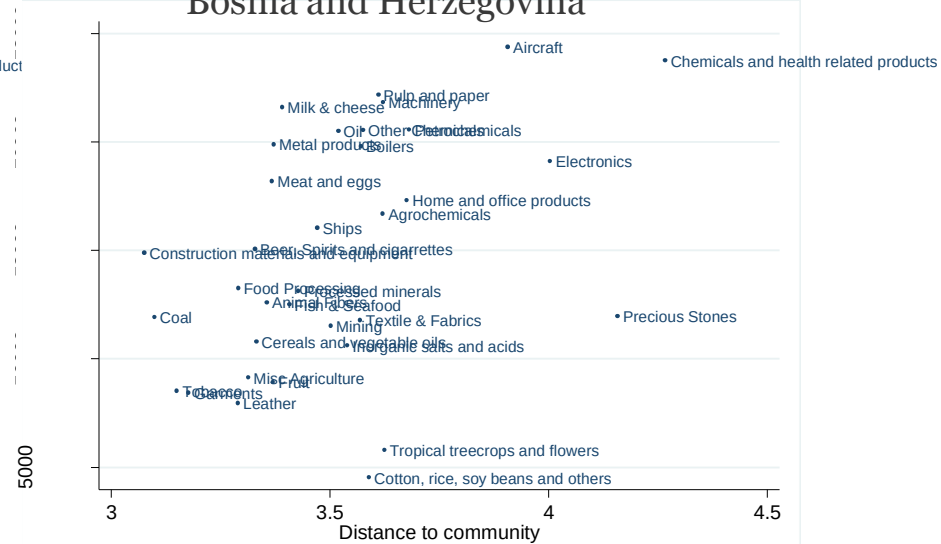


Western Balkans and Turkey: Trade-off between distance and sophistication (1)

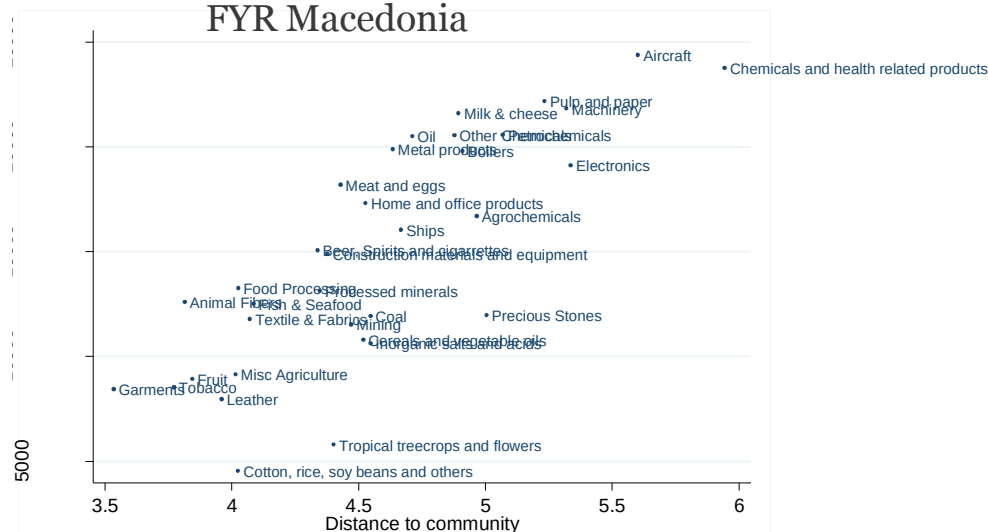
Albania



Bosnia and Herzegovina



FYR Macedonia



Source: OECD staff calculations using COMTRADE and World Bank data

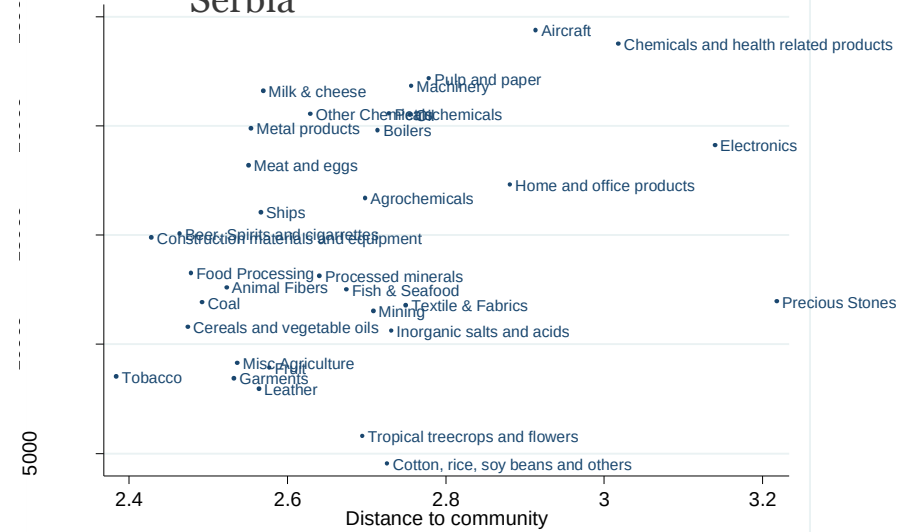


Western Balkans and Turkey: Trade-off between distance and sophistication (2)

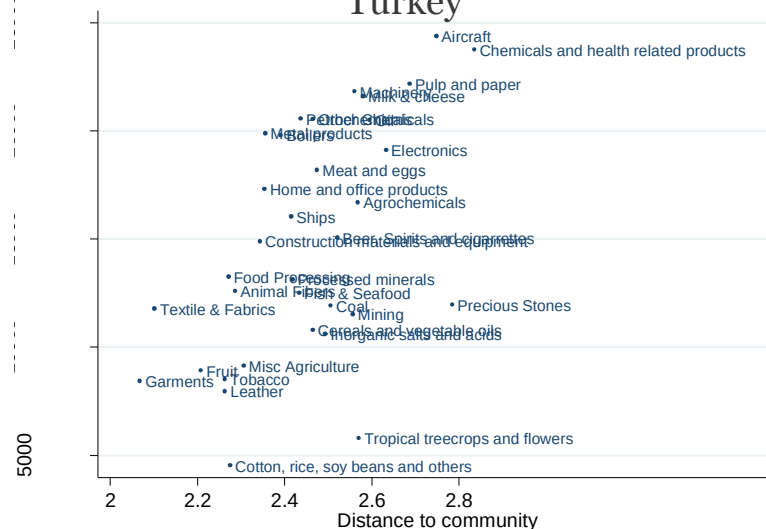
Montenegro



Serbia



Turkey



Source: OECD staff calculations using COMTRADE and World Bank data



Strategies with a trade-off between distance and sophistication: «more jobs» and «better jobs»

Jobs, jobs, jobs

- Little emphasis on production sophistication; where low-wage countries can compete on international markets
- Strategy that emphasizes industries that are very near the current set of productive capabilities, thus making the development of new products faster and less risky
- Favour job creation

Slow transformation

- Products that are in the vicinity of a country's current set of capabilities but that have a higher sophistication
- Benefit of having more sophisticated products that face less competition from low-income countries and hence would be able to expand in an environment of rising real wages

Strategic bets

- More sophisticated sectors with larger strategic value but that lie at significant greater distance
- Country may lack many of the requisite capabilities to support those industries and, therefore the strategy must involve a concerted effort to coordinate the accumulation of missing capabilities
- Costlier and riskier but could change the productive landscape
- Machinery, electronics and chemicals are the products with the highest sophistication but are distant