UNIVERSIDAD DE SANTIAGO DE CHILE

Comments on paper

Effects of Innovation and ICT on Structural Change and Productivity Growth: Insights from the latest KLEMS Dataset , 1990 - 2016

K. M. Vu

André Hofman

WorldKLEMS Conference
October 12, 2022
Manchester, England

LAKLEMS
CRECIMIENTO ECONÓMICO Y PRODUCTIVIDAD EN AMÉRICA LATINA

Abstract

This paper examines the effects of structural change, digital transformation, and innovation on productivity growth in industrialized economies.

To capture the different patterns of structural change, the study introduces two measures: productive structural change (PSC) and unproductive structural change (USC).

The paper finds distinctive evidence and rich policy insights on the effects of structural change, digital transformation, and innovation on productivity growth.

On the basis of an overview of the literature the author calls for studies that provide not only more conclusive evidence on the effect of structural change on economic growth, but also a deeper understanding of the nature of structural change and the mechanism through which structural change influences growth.

This paper aims to make contribution in this direction by introducing a new approach to measure structural change labeled as “productive structural change” (PSC) and use the panel data of industrialized economies over the period from 1995 to 2019 provided by the 2021 version of the EU-funded KLEMS database, which is elaborated in Section 2.

Among its main findings, the paper evidences that PSC together with digital transformation (DX) and innovation have a robust positive effect on productivity growth.

Furthermore, DX and innovation also have a significant effect on PSC, which suggest that DX and innovation boost productivity growth not only directly but also indirectly through fostering structural change.

At the same time, however, PSC has a significant negative effect on employment growth in short term, which implies that policy makers may hesitate to embrace reforms to boost productivity growth through stimulating PSC.

Structural change, however, is not always found to be growth-enhancing. For example, McMillan, Rodrik, and Verduzco-Gallo (2014) show that, unlike in Asia, the contribution of structural change to productivity growth was negative for Latin America during the period 1990-2005 and for Africa during 1990-2000.

There are also studies contending that structural change may not be conducive to productivity growth. Baumol (1967) shows that labor may shift from a sector with higher and rapidly-growing productivity to sector with a lower and stagnant productivity, which causes a decline in the overall economy's productivity growth rate, ceteris paribus. The case of rapid expansion of the lower-productivity service employment in the US can serve as a piece of evidence Baumol (1985).

The shift-share methodology is qualified as an interesting way to quantify the contribution of labor reallocation to productivity growth, however, its results may be problematic due to its assumption that productivity growth within each sector is independent of structural change (Timmer and Vries, 2009).
For example, for a given economy, labor productivity growth in the agriculture, which is considered as its “within-sector” effect, is more likely driven by the reallocation of labor from this sector to other sectors.

Questions and evaluation

This is a very nice and stimulating paper on an important and well studied subject.

The author presents a new form of evaluating structural change with results for a number of developed countries. *To capture the different patterns of structural change, the study introduces two measures: productive structural change (PSC) and unproductive structural change (USC).*

Another important observation is that …Although the shift-share method provides an intuitive way to quantify the contribution of labor reallocation to productivity growth, its results may be problematic due to its assumption that productivity growth within each sector is independent of structural change.

Questions and evaluation

A first and logical observation and question is why the author restricted himself to only developed countries. Structural change is about development so it is logical to include developing countries.

A second observation, related with the above, is that Khuong does make reference to developing countries, especially when he mentions the McMillan - Rodrik and Timmer - de Vries studies which presents a lack of structural change in Latin America.

However, in a follow-up study, de Vries finds structural change effects in Latin America if the informal sector is taken into account.

Questions and evaluation

Especially in agriculture, informal labour is widespread and the sector can be quite heterogeneous, with a modern productive part and a subsistence part with very low productivity. Taking this into account, can affect the structural change results.

Finally, an observation on the description of the shift-share methodology in the paper. In equation 1 he defines a simplified framework of the shift-share approach as the decomposition of two main sources: the first source is referred to as the within-sector effect and the second part is the shift share effect.

However, shift-share analysis is widely used to decompose the changes in an aggregate variable over time into three components:

components: a within-industry effect, sectoral static effect, and sectoral dynamic effect as follows:

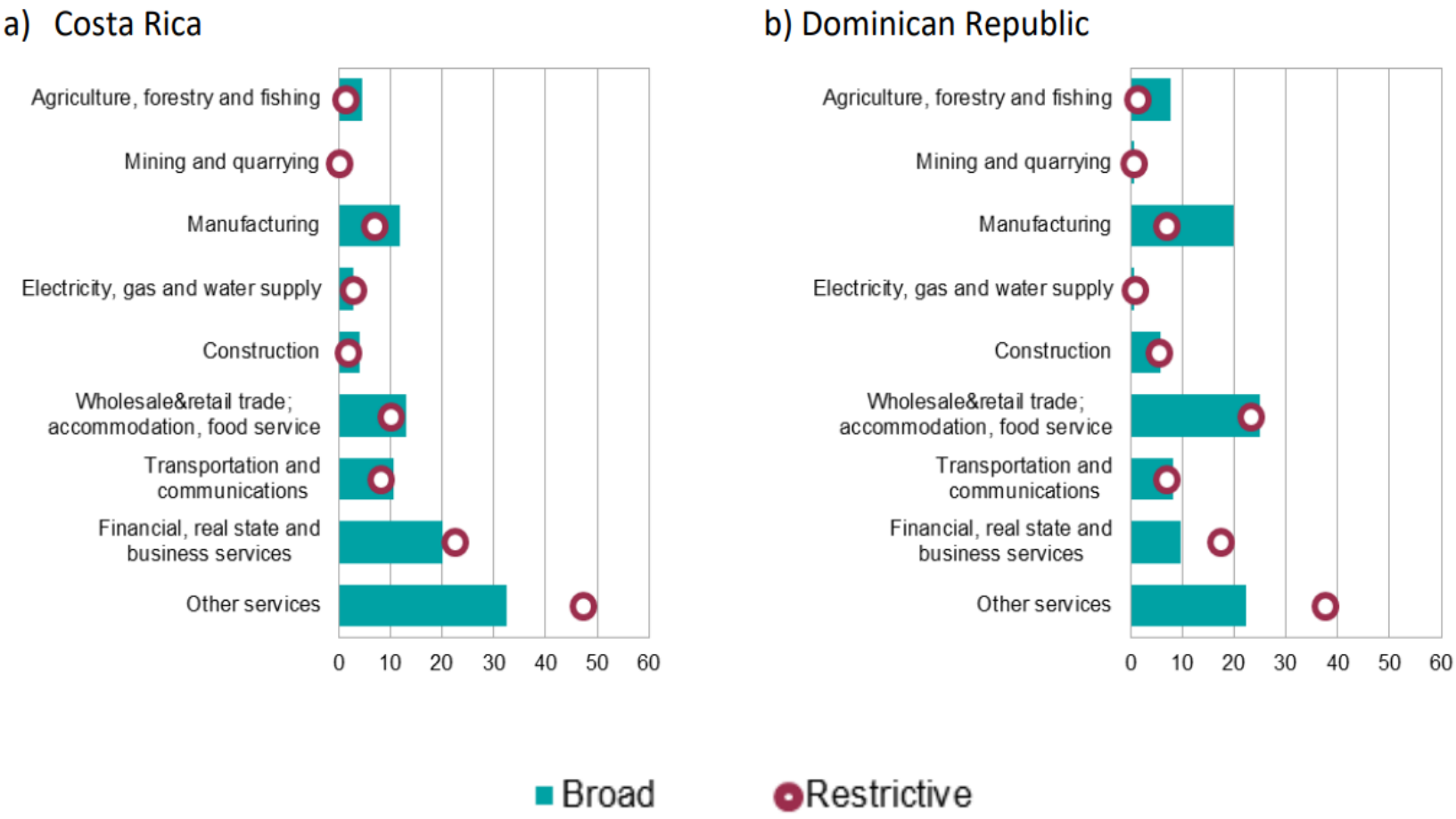
$$\frac{Y_T^K}{Y_T} - \frac{Y_0^K}{Y_0} = \sum_{j=1}^{J} \theta_{j0} \left(\frac{Y_{jT}^K}{Y_{jT}} - \frac{Y_{j0}^K}{Y_{j0}} \right) + \sum_{j=1}^{J} (\theta_{jT} - \theta_{j0}) \frac{Y_{j0}^K}{Y_{j0}} + \sum_{j=1}^{J} (\theta_{jT} - \theta_{j0}) \left(\frac{Y_{jT}^K}{Y_{jT}} - \frac{Y_{j0}^K}{Y_{j0}} \right) \quad [9]$$

Within-industry effect — *Static effect* — *Dynamic effect*

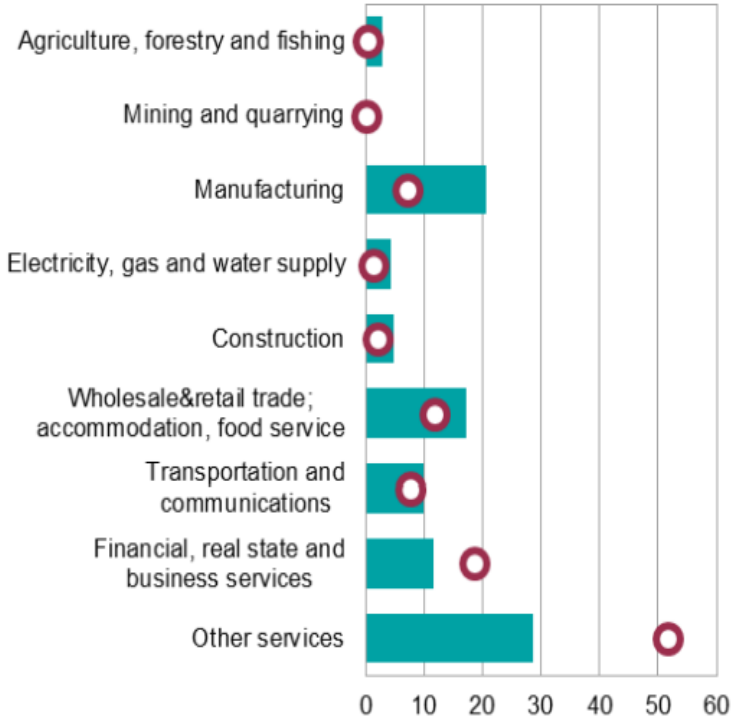
Sectoral effect

where $\frac{Y_T^K}{Y_T} - \frac{Y_0^K}{Y_0}$ is the change in knowledge intensity between years 0 and *T*, *j* is the industry, and θ_{jT} is the share of GVA in industry *j* in year *T*.

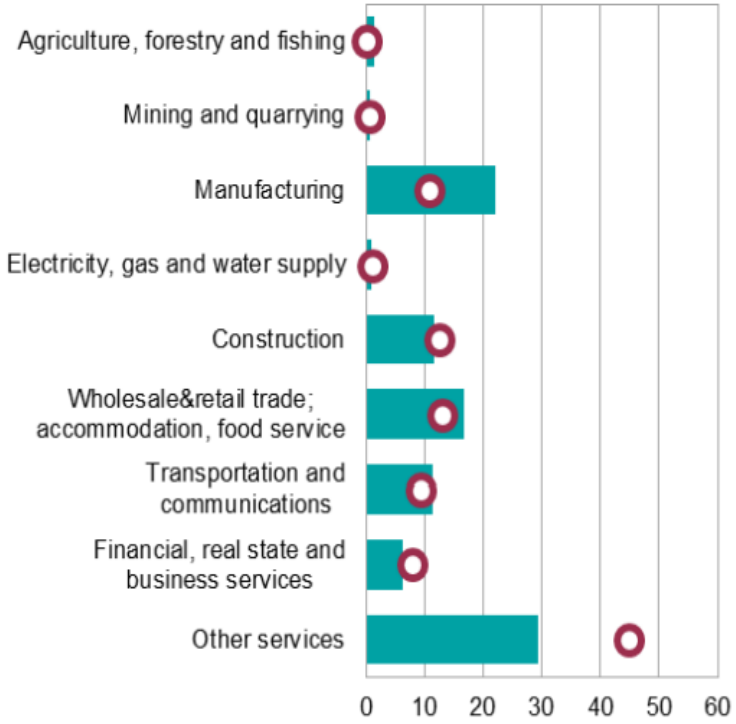
Figure 14. Knowledge-based GVA by industry. Broad and restrictive approach, 2016. Total GVA = 100 (percentage of total knowledge-based GVA)



c) El Salvador

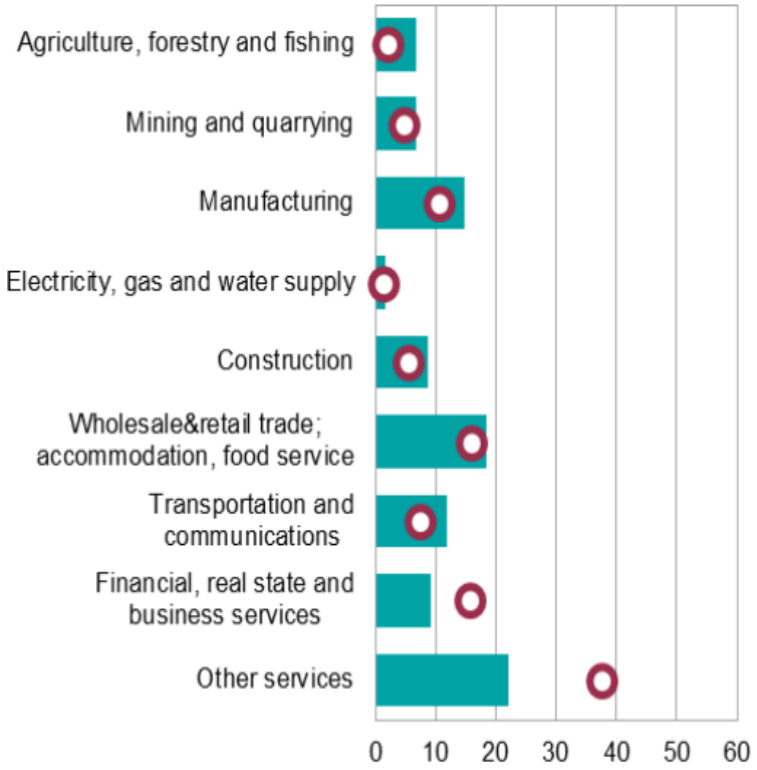


d) Mexico

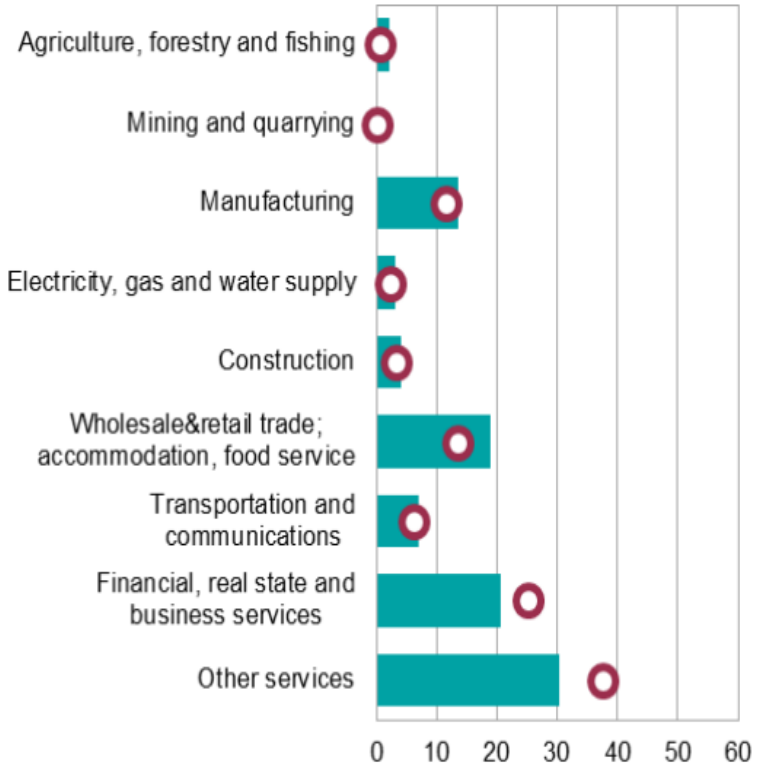


Broad Restrictive

e) Peru



f) Spain



Broad Restrictive

g) US

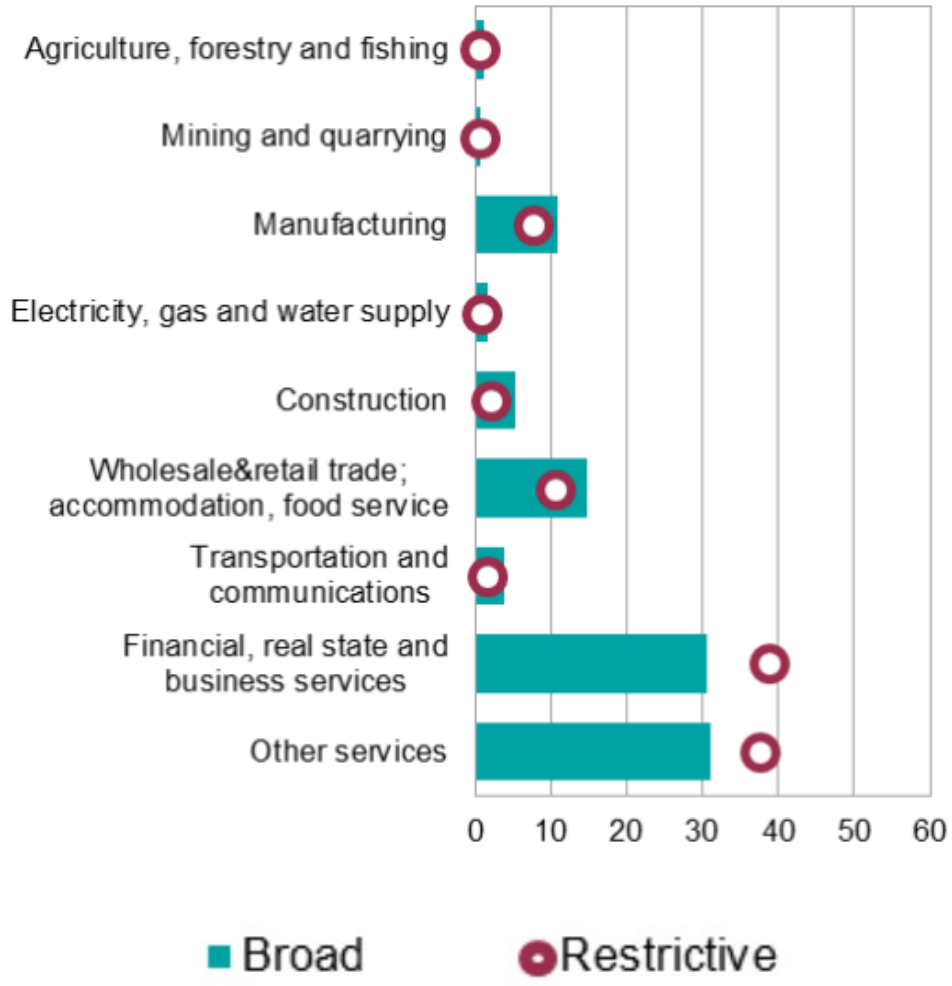
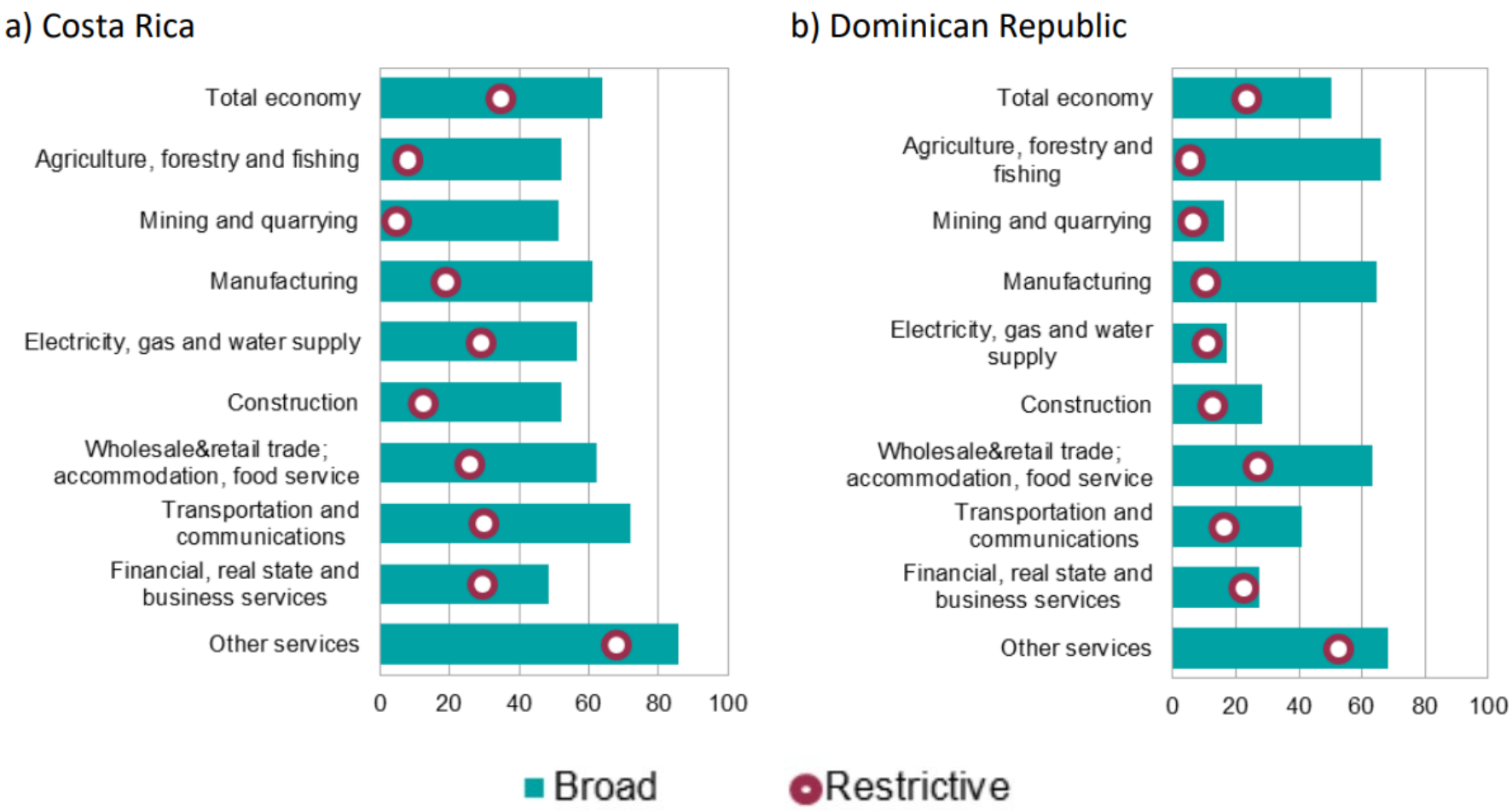
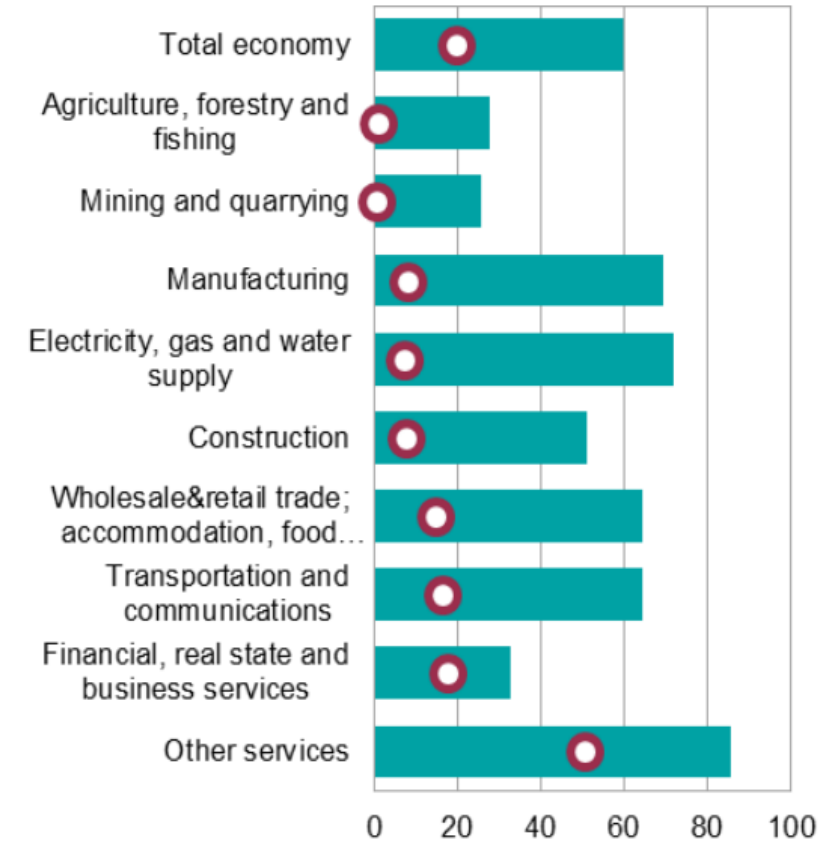

Agriculture, forestry and fishing
Mining and quarrying
Manufacturing
Electricity, gas and water supply
Construction
Wholesale&retail trade; accommodation, food service
Transportation and communications
Financial, real state and business services
Other services
0
10
20
30
40
50
60
Broad
Restrictive

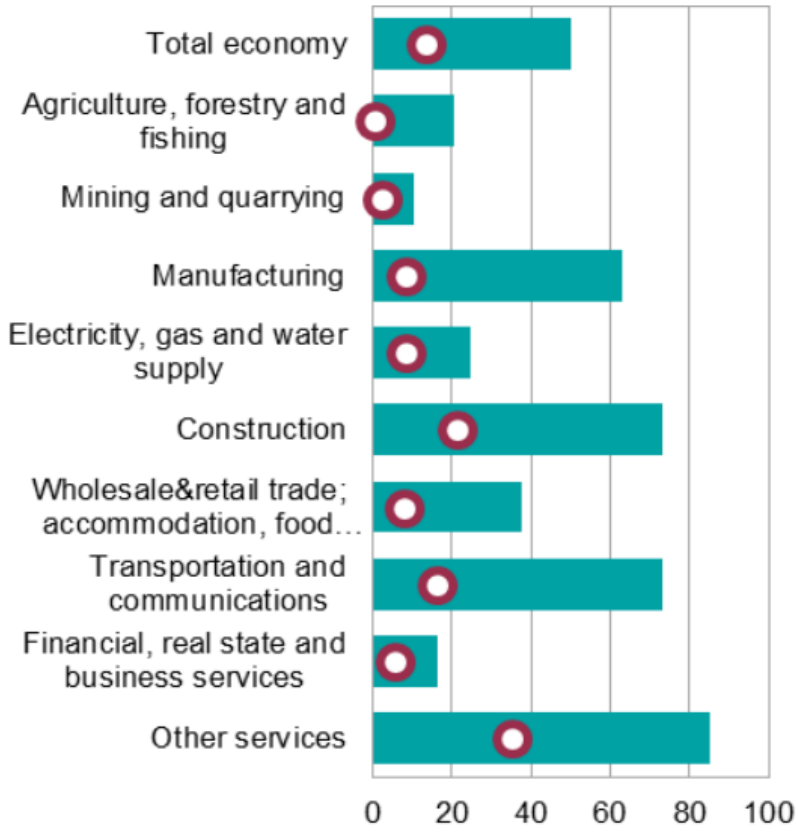
Figure 15. Knowledge-based GDP by industry. Broad and restrictive approach, 2016. Total industry = 100 (percentage of each industry's GVA)



c) El Salvador

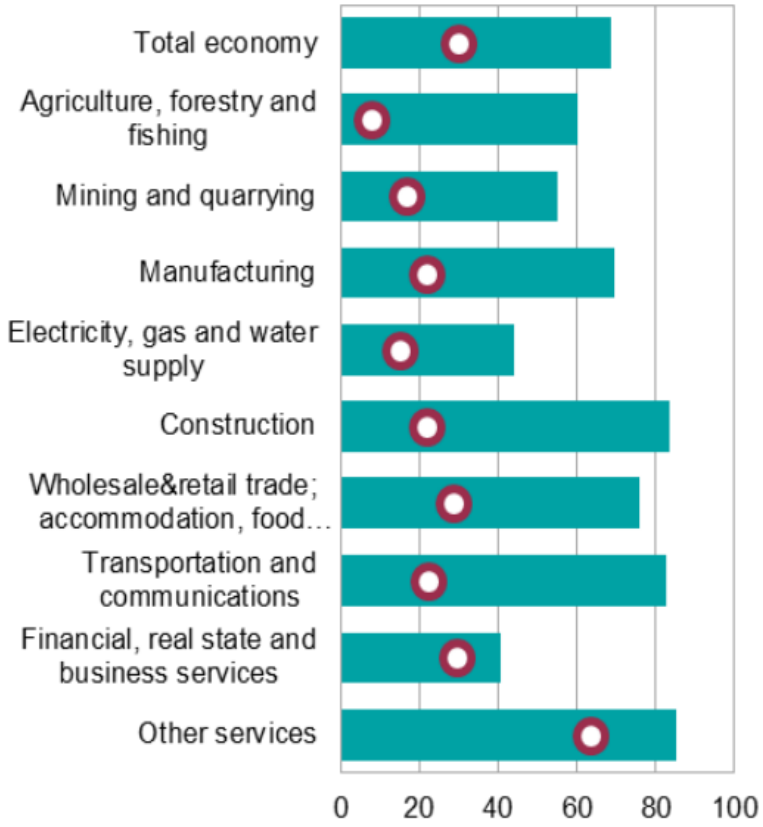


d) Mexico

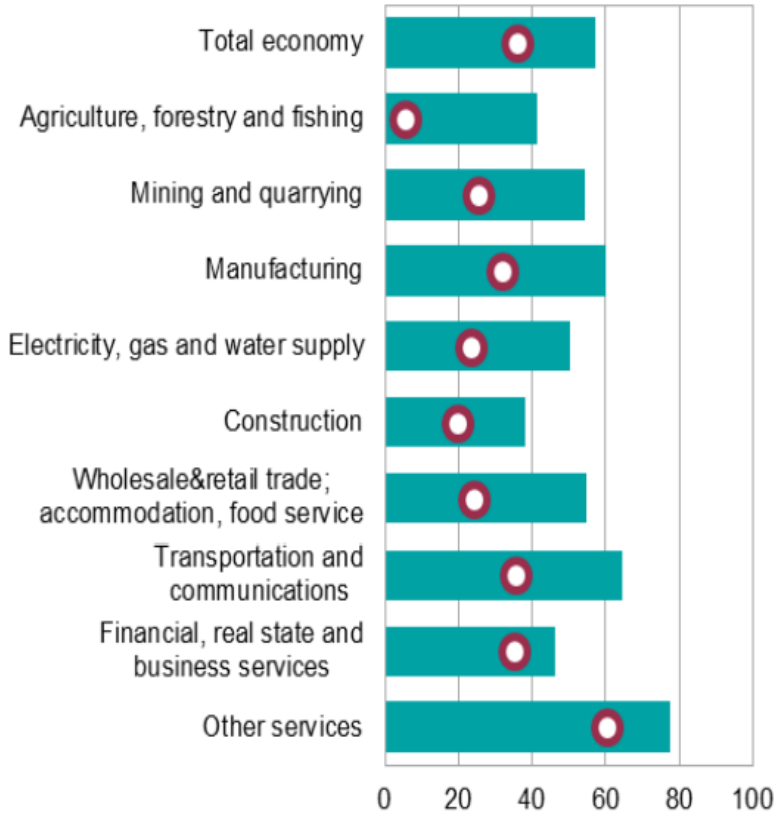


Broad Restrictive

e) Peru

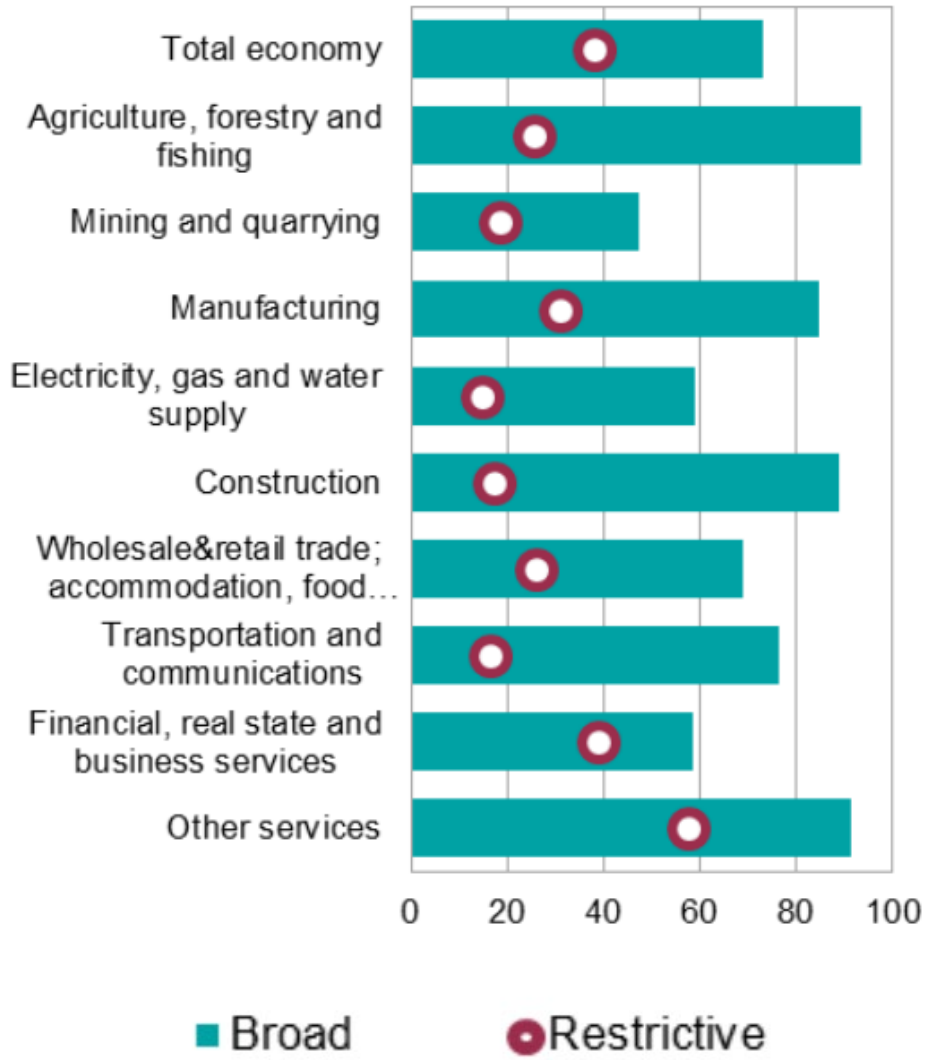


f) Spain



Broad Restrictive

g) US


Total economy
Agriculture, forestry and fishing
Mining and quarrying
Manufacturing
Electricity, gas and water supply
Construction
Wholesale&retail trade; accommodation, food…
Transportation and communications
Financial, real state and business services
Other services
0
20
40
60
80
100
Broad
Restrictive