The contribution of women to national productivity

Gender perspective using the KLEMS data for Colombia and analysis of women's labor insertion

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LAKLEMS
CRECIMIENTO ECONÓMICO Y
PRODUCTIVIDAD EN AMÉRICA LATINA

Context – KLEMS project (I)

- Colombia, through DANE (the National Statistical Office), is part of the *LA-KLEMS project*, funded by the Inter-American Development Bank and the OECD.

- The global KLEMS project originated in the EU, strengthening itself to consolidate databases and productivity methodologies for the European region (EU-KLEMS), North America (USA-KLEMS) and recently Latin America (LA-KLEMS).

> The fundamental purpose of the KLEMS project is **to build a database with time series** (since 1990) **by sector of economic activity** identifying the variables for each factor: **capital (K), labor (L)**, energy (E), materials (M) and services (S) in a growth accounting framework.

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Context – KLEMS project (II)

Why do we need a new methodology to measure productivity?

- Traditionally, the measurement of multifactor productivity, or **total factor productivity (TFP)**, has been measured in Colombia based on econometric estimates.

- In other cases, measurements such as labor or capital productivity are calculated as **simple reasons between the labor stock or capital and the total production.**

- Variations in these measurements are simple and not precise, since they may reflect different factors that have nothing to do with the number of worked hours (such as the increase in the amount of capital) or with the productivity of capital (as the effects of the composition of capital inputs).

"Productivity is not everything, but in the long term it is almost everything." Paul Krugman

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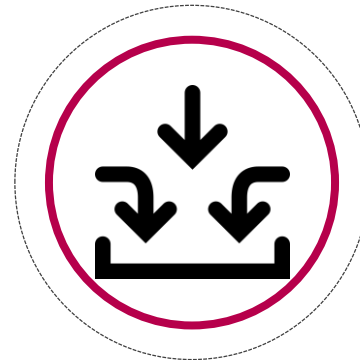
KLEMS methodological approach (III)

The KLEMS methodological approach is based on *growth accounting**, which has **the following advantages**:

It allows measuring the impact of labor composition on productivity

It measures differences in different types of capital assets

It includes the measurement of Energy, Materials and Services as intermediate inputs

* Solow (1956 y 1957), Denison (1967), Jorgenson y Griliches (1967), Jorgenson, Gollop y Fraumeini (1987) y Jorgenson, Ho y Stiroh (2005)

Proposal and contribution

KLEMS project will allow to officially identify, by the first time, **each factor contribution to the productivity by economic sector**.

➡ **LABOR**

We will be able to know the contribution to a specific economic sector, of a worker of certain:

- **Sex**
- Age group
- Educational level
- Occupational position

This series also includes the calculation of:
- Number of people employed
- Remunerations
- Hours worked

Gender Perspective analysis in KLEMS project in Colombia

⬇

How have **women contributed to the productivity** of the country's economic sectors?

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Research Questions

→ We know the dynamics of women's insertion in the labor market are different from those of men. **How and in what economic sectors do women contribute differentially to productivity?**

- Does it depend on the K accumulation of the sector?
- Is it correlated with gender stereotypes?

→ How is the impact of shocks in compensations of productivity, by women and men?

→ The use of complementary market labor data will allow us to answer: When external shocks happen, what is the effect on the dynamics of women's inactivity and unemployment? are women expelled to inactivity or contribute to the compensation of shock? In which sectors?

→ Women work less paid hours, but are they more o less productive by hour in the paid labor market?

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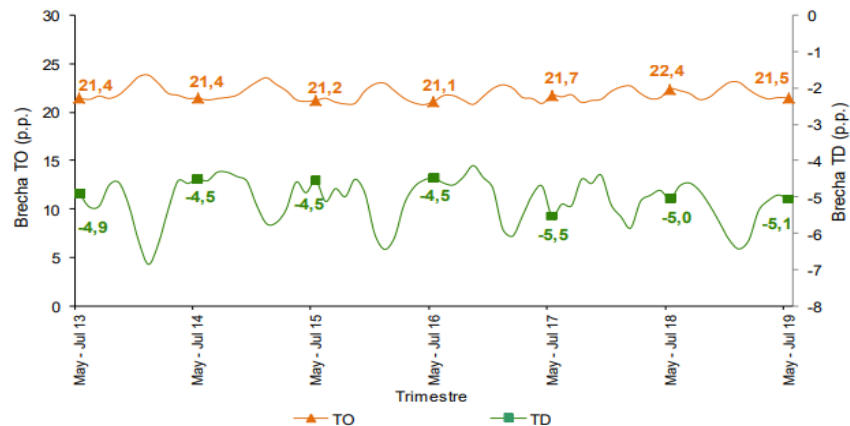# Motivation: why could women contribute differently to national productivity?

The gaps to close

Motivation (I): Labor market in Colombia, Unemployment rate, according to sex

Unemployment rate, 2008-2018
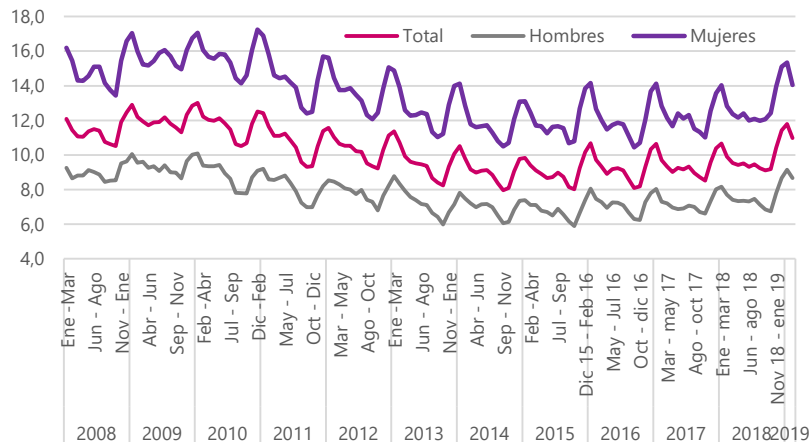
Gap in the occupation and unemployment rate (Men-Women), 2008-2018

- Women's TD has not reached one-digit values.
- The lowest recorded TD for women in 10 years is 10.4% (Sept. 2014), for men it is 5.6%.

Source: DANE - Large Integrated Household Survey, GEIH. Mobile Quarter Series, not seasonally adjusted. Numbers in percentage.

- The gap in the unemployment rate during the last decade ranged between -4.1 and -8.2 percentage points, with an average of -5.6 p.p.

- In the last month (August 2019), the gap is -6.3 p.p. It is equivalent to 357 thousand people (there are 1.5 million unemployed women versus 1.1 million unemployed men).

Motivation (II): Labor market in Colombia, Occupancy Rate, according to sex

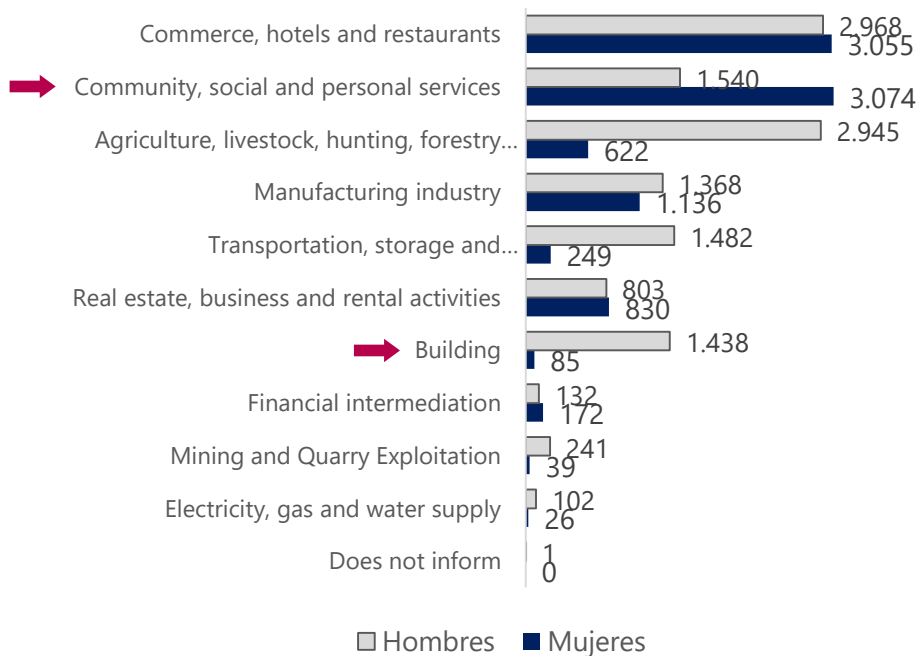### Occupancy Rate, 2008-2018
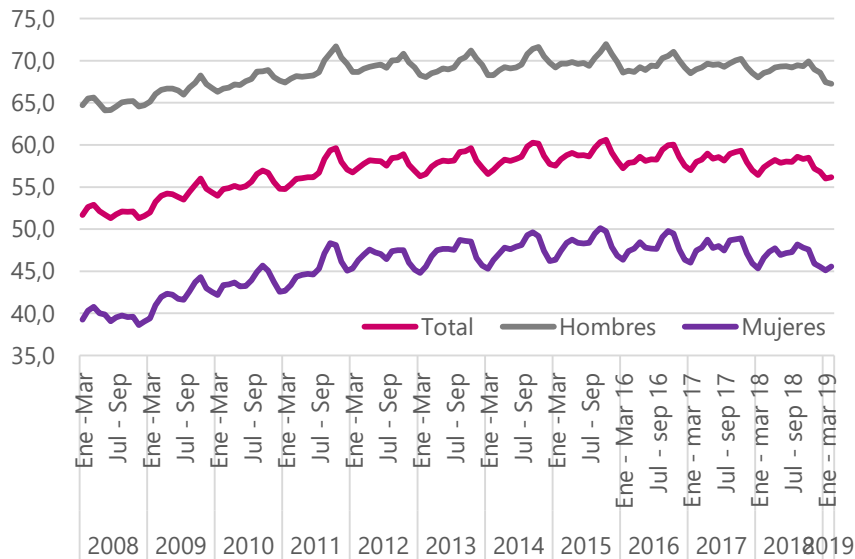
Although the unemployment gap remains, the employment rate in women has grown:

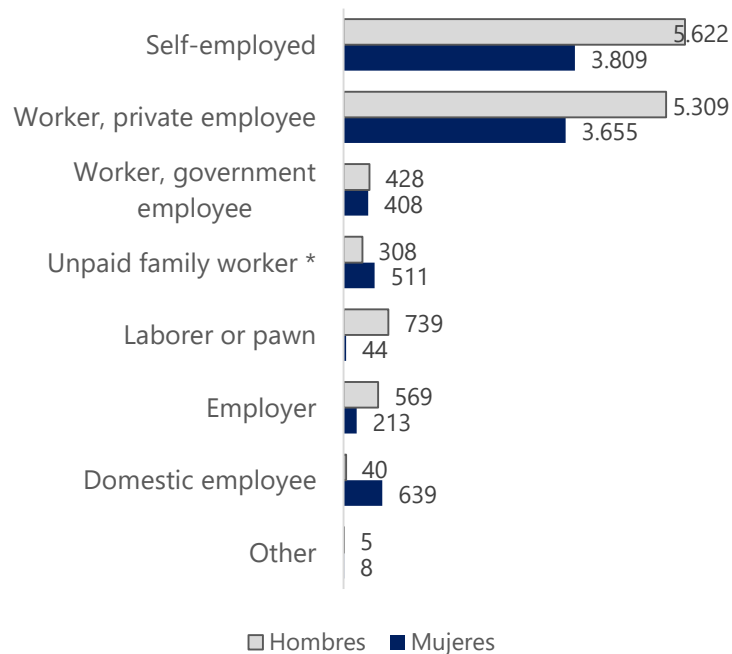In 10 years (2008 to 2018), the occupancy rate:

- **Women's** OR increased by **6.5 p.p.**
- **Men's** increased by **3.1 p.p.**

Source: DANE - Large Integrated Household Survey, GEIH. Mobile Quarter Series, not seasonally adjusted. Numbers in percentage.

Motivation (III): Working population according to sex

Distribution of women and men employed by branch of activity (thousands), Mobile quarter May - July 2019
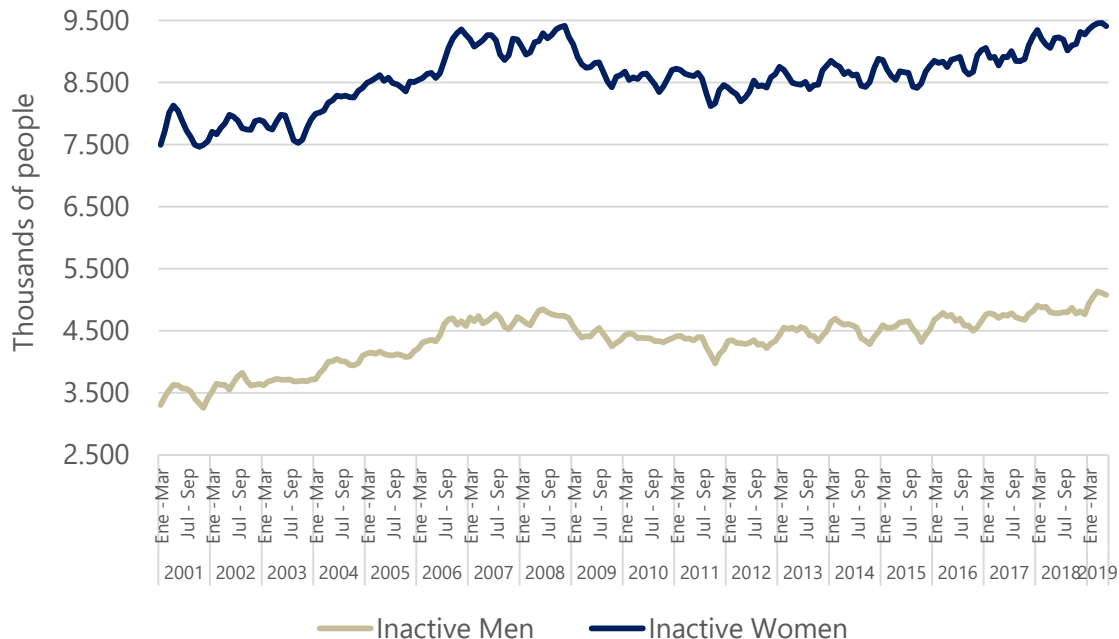
Branch of activity	Hombres	Mujeres
Commerce, hotels and restaurants	2.968	3.055
Community, social and personal services →	1.540	3.074
Agriculture, livestock, hunting, forestry...	2.945	622
Manufacturing industry	1.368	1.136
Transportation, storage and...	1.482	249
Real estate, business and rental activities	803	830
Building →	1.438	85
Financial intermediation	132	172
Mining and Quarry Exploitation	241	39
Electricity, gas and water supply	102	26
Does not inform	1	0

□ Hombres ■ Mujeres

Distribution of women and men employed by occupational position (thousands), Mobile quarter May - July 2019

Occupational position	Hombres	Mujeres
Self-employed	5.622	3.809
Worker, private employee	5.309	3.655
Worker, government employee	428	408
Unpaid family worker *	308	511
Laborer or pawn	739	44
Employer	569	213
Domestic employee	40	639
Other	5	8

□ Hombres ■ Mujeres

Source: DANE, GEIH

Motivation (IV): Labor inactivity according to sex

**Inactive population according to sex
Mobile quarter (trimester), 2001 - 2019**

Inactive Men ——— Inactive Women

Source: DANE - Large Integrated Household Survey, GEIH.
Note: Expanded data with population projections, prepared based on the results of the 2005 census.
Results in thousands. Due to the rounding effect in thousands, the totals may differ slightly

During almost the last two decades:

- **Women** have been **between 65% and 70%** of the inactive population. That is, between **7.5 and 9.5 million** people.

- **Men** have been between **30% and 35%** of the inactive population. That is, between **3.3 and 5.1 million** people.

Are this dynamic related to external shocks? In which sectors?

Motivation (V): Inactive population according to sex and type of inactivity

Labor Inactivity, porcentage by sex, within each category of time use (August, 2019)

	Total	Studying	Domestic Work (Oficios del Hogar)	Other activity
Mujer	9.475 / 65,3%	2.659 / 48,0%	5.579 / 93,5%	1.237 / 41,0%
Hombre	5.046 / 34,7%	2.879 / 52,0%	388 / 6,5%	1.778 / 59,0%

■ Hombre ■ Mujer

Labor Inactivity, porcentage of total men and women (August, 2019)

	Studying	Domestic Work (Oficios del Hogar)	Other activity
Mujer	2.659 / 28,1%	5.579 / 58,9%	1.237 / 13,1%
Hombre	2.879 / 57,1%	388 / 7,7%	1.778 / 35,2%

■ Hombre ■ Mujer
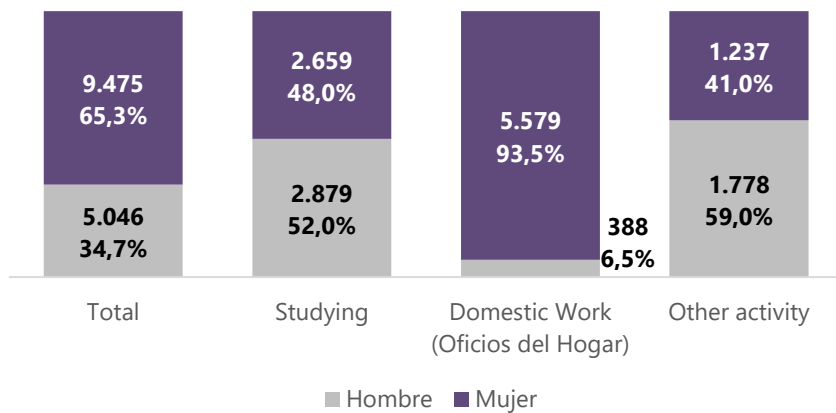
- Women are 65,3% (9,4 million) of inactive population.
- Women are 93,5% (5,5 million) of inactive population who spent most of their time in **domestic work** (during the previous week)
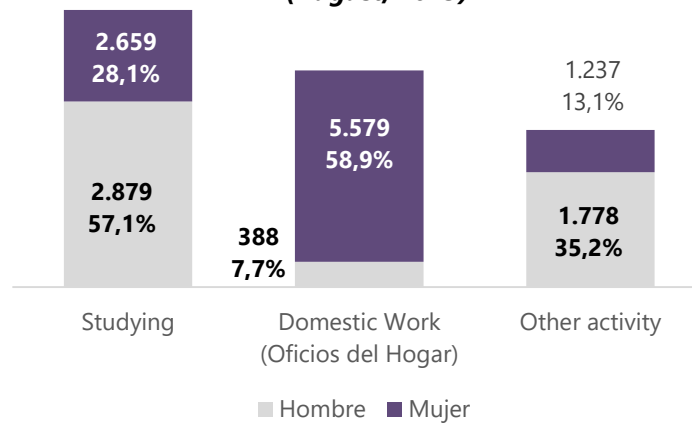
- 57% of inactive men spent the most time last week studying.
- 59% of inactive women spent that time in domestic work.

Source: DANE - Large Integrated Household Survey, GEIH.
Notes: Numbers in thousands. Another activity includes the categories permanently incapacitated for work, rentier, pensioner or retired and people who do not attract attention or believe that it is not worth working..

Motivation (VI): Labor inactivity

*Inactive people **who want to work but did not look for work** (during the last 4 weeks) **due to family responsibilities (2018)** according to sex*
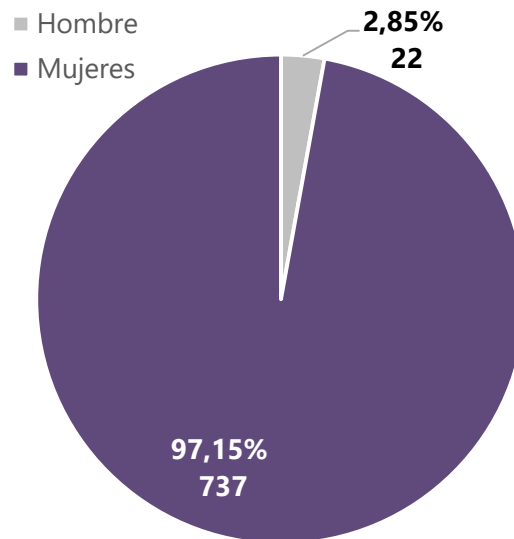
■ Hombre
■ Mujeres

2,85%
22

97,15%
737

Source: DANE - Large Integrated Household Survey, GEIH. Mobile Quarter Series, not seasonally adjusted. Numbers in percentage

Motivation (VII): Evolution of professional degrees in Colombia

Graduates according to study area, 2001-2017
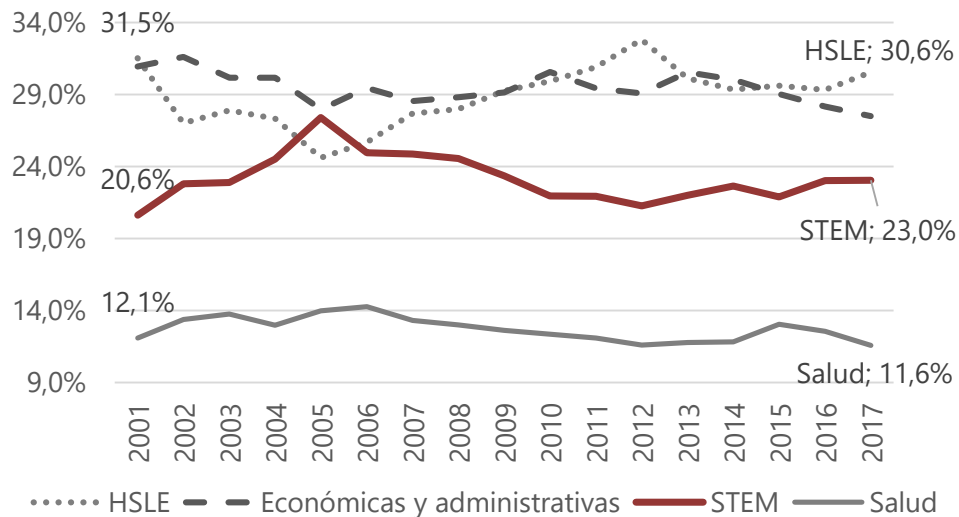
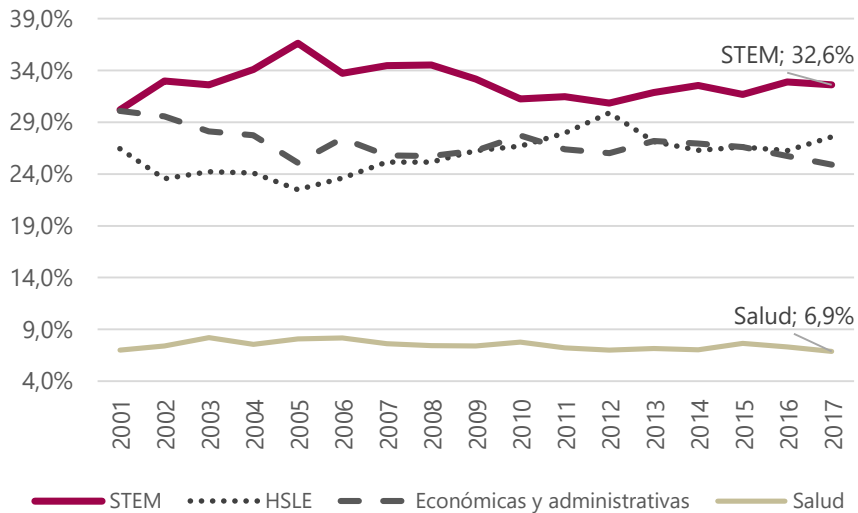Source: MEN, SNIES, 2019. Note: Architecture and arts, Agricultural Sector and unclassified, with representations below 5% are excluded. Own classification.

HSLE: Humanities, social sciences, law and education.
STEM: exact sciences, technology, engineering, mathematics.

In 2017:

- **HSLE** and **economic and administrative sciences accounted for 58%** of the professional degrees in Colombia.

- **STEM** accounted for **23%.**

Motivation (VIII): Evolution of professional degrees in Colombia according to sex

Women *graduated in higher education according to area of study, 2001-2017*
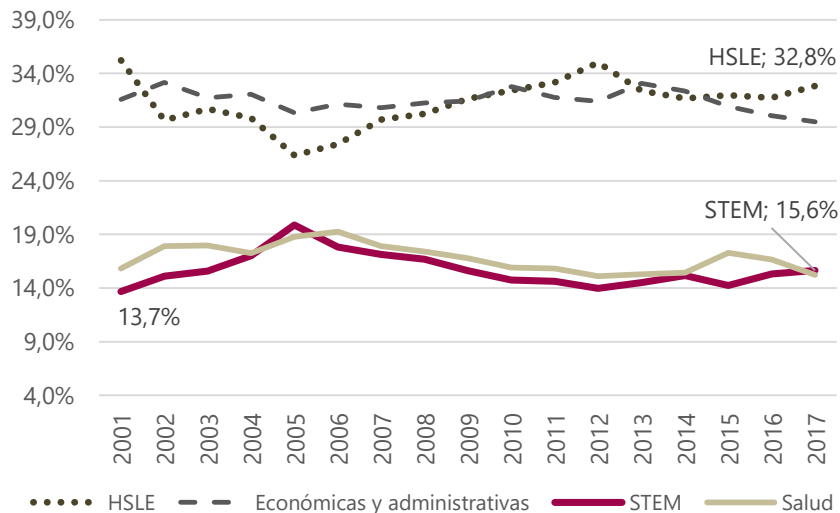

Men *graduated in higher education according to area of study, 2001-2017*

Source: MEN, SNIES, 2019. Note: Architecture and arts, Agricultural Sector and unclassified, with representations below 5% are excluded. Own classification.

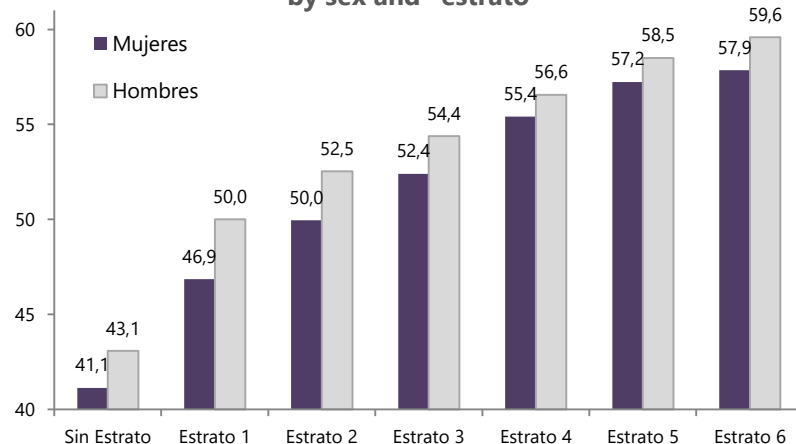# Motivation (IX): Basic and Middle Education - The performance gap has not been yet closed

Average score in Pruebas Saber 11- 2018 I

Fuente: ICFES, Saber 11

Average Score in Maths in Pruebas Saber 11, 2018 I, by sex and "estrato"
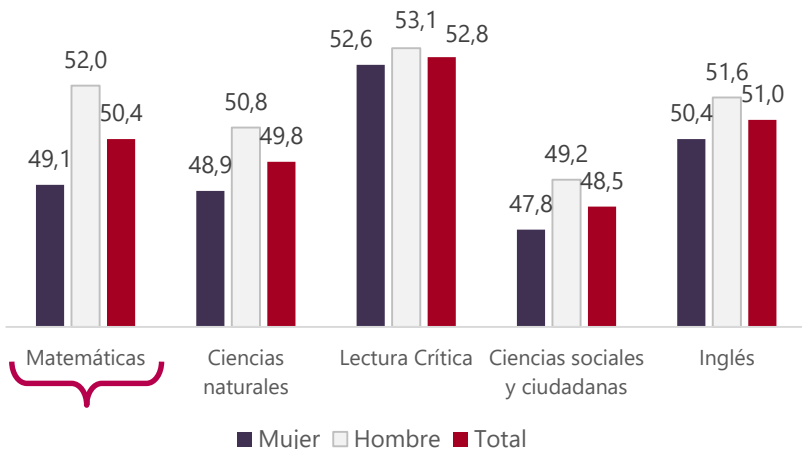
Fuente: ICFES, Saber 11

The **performance gap persists** in all areas

- **The largest gap** between men and women is in **Estrato 1.**
- **The smallest** gap is in **Estrato 4.**

Data

Series 1990 - 2018, built (now is a work in progress) by the Technical Department of National Accounts (Cuentas Nacionales - DANE), for each production factor, with the **following sources**:

- Labor market survey: Large Integrated Household Survey – GEIH.
- Series of production, capital stock, intermediate consumption and gross fixed capital formation, using as inputs:
    - Annual Structural economic surveys:
        - Annual Trade Survey
        - Annual Manufacturing Survey
        - Annual Services Survey
        - Annual Survey of Micro Establishments
        - Survey of Development and Technological Innovation
    - Other national accounts series of prices.

Methodology (I)

$$Y = F(K, L, E, M, S)$$

- In the KLEMS model, based on growth accounting, it is based on the fact that the value of the total product of a period is the sum of payments for all inputs used:

$$p_y Y = \sum_h x_h X_h + \sum_i w_i L_i + \sum_j r_j K_j$$

- $p_y Y$ is the gross value of production,
- $x_h X_h$ is the value of intermediate inputs
- $w_i L_i$ **is the value of labor**,
- $r_j K_j$ is the value of capital.

- The above, under an assumption of cost minimization, and when deriving and reorganizing, it is obtained that:

Methodology (II)

$$\frac{\dot{Y}}{Y} = \beta_x \left(\frac{\dot{X}}{X}\right) + \beta_X \sum_h \frac{\dot{x}_h}{x\left(\dot{X}/X\right)} + \beta_L \left(\frac{\dot{L}}{L}\right) + \beta_L \sum_i \frac{\dot{w}_i}{w\left(\dot{L}/L\right)} + \beta_K \left(\frac{\dot{K}}{K}\right) + \beta_K \sum_j \frac{\dot{r}_j}{r\left(\dot{K}/K\right)}$$

A   **B**

- This equation shows that the **rate of change on produced output** (from one year to another) in each considered economic sector ($\frac{\dot{Y}}{Y}$) are equal to the **weighted average of the rate of change of the different types of inputs** (intermediate, labor and capital). It is a non-parametric model based on *growth accounting*.

- In addition, in this equation the rates of change are decomposed into two terms:
  A. The **rate of change of the gross component** of inputs (intermediate, labor and capital)
  B. The **rate of change** of **the quality of input: productivity**

- This demonstrates that this model allows **the "technology" to be measured by type of input** (in the traditional model it is a general variable) and by type of capital asset, **quality of work** with its different posible attributes, and type of intermediate input.

Final comments

- The calculation model of the Total Productivity of the Factors (TPF) under KLEMS standards will allow **measuring the separate impact of changes in quantity of capital, labor and intermediate inputs**, plus **variations** in the **quality of each of them** at the variations in the product level of the economic sectors.

- It will also allow to **know the contribution of the different types of work**: to determine **gender gaps on productivity**, contribution of those who have less experience (the youngest), the most prepared, among others.

- By analyzing the dynamics of **labor inactivity** and the evidence of **the sexual division of labor**, it will be possible to have a panorama for measuring **misallocation of factors** (workers), with a gender perspective.