How education incentives during a commodities boom can help economic growth in Colombia

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Key messages

- Ensuring human capital development is important for economic growth but demand for education may be reduced during a commodities boom.
- Providing financial incentives for education can help offset the reduction of human capital accumulation caused by a commodities boom.
  - Efforts may be most effective if targeted at people in regions that are heavily dependent on mining.

How should commodities boom revenues be used to promote economic development?

Over the last decade, high international prices have led to a boom in oil and mining production in Colombia. As well as expanding the extractive industries sector, the boom has driven growth in other sectors. Notably, the service sector—which has a high demand for unskilled labor—grew during the boom.

The mining sector plays an important role in Colombia’s economy contributing around 10% to GDP and has represented between 40 and 70% of total exports annually over the last ten years. The recent commodity price boom has led to debates on the role of natural resources in the Colombian economy. However, there is not currently a consensus on how the increased revenues from commodities booms should be used to promote the country’s economic development.

On the basis that lower levels of human capital in particular regions reduce their production capacity and future economic growth, a team of local researchers sought to investigate how a boom in commodity prices affects economic growth through human capital accumulation.

Human capital development during commodities booms

Historically, booms in the production of natural resources have changed the geographic locations and levels of qualification required to meet the country’s labor demands. Commodity booms are also known to have an impact on human capital (employee knowledge and skills) accumulation. For example, Santos (2014) showed that school attainment decreased under Colombia’s gold boom (2008-2012).

Additionally, extraordinary increases in the export prices of mining products between 2009 and 2014 transformed Colombia’s labor composition and the levels of human capital accumulation in different regions of the country (Santos, 2014). As human capital accumulation decreases in regions that experience natural resources booms, the future production capacity of these regions is reduced, limiting their economic growth.

References


Santos, R. (2014). Not all that glitters is gold: Gold boom, child labor and schooling in Colombia. Documentos CEDE.

1 As observed in the Colombian National accounts data.
The analysis

To analyze the relationships between the commodities boom, human capital accumulation, and economic growth, the research team simulated the Colombian economy under a 25% increase in international export prices in the mining sector.

In particular, the team aimed to identify:
- The effect of commodity price shocks on human capital accumulation, measured by the amount of skilled labor in the economy
- How these effects feed back into the composition of the labor force in terms of years of schooling, as an indicator of skill level
- How the (changing) composition of the labor force interacts with the demand for labor and what effect this has on economic sectors
- The medium-term (5-10 years) effects of the variations in human capital accumulation on GDP growth

To do this, the researchers ran a dynamic computable general equilibrium (CGE) model using a Social Accounting Matrix (SAM) for Colombia that they built with national accounts data for 2015. The data from 2015 served as the base year. The team complemented the 2015 SAM with projections for growth in population, labor force and productivity to generate a baseline scenario.

The team simulated the 25% shock in mining products export prices for six years, beginning in 2019. The simulated price shock was similar to a shock on mining products that affected the Colombian economy between 2009 and 2014.

Key findings

The team’s analysis indicates a number of economic changes under a 25% increase in international export prices in Colombia’s mining sector:
- GDP and consumption increase by 3% annually, on average.
- Investment increases by 0.6% on average.
- The real exchange rate appreciates at an average of 8% each year.
- Total exports increase sizably (14% on average):
  - Only mining sector exports increase, other sector exports decrease, as is typical under Dutch disease conditions
  - Total imports also increase by 9% on average, partly to compensate for the increase in exports.
- The trade balance is negative for the economy
  - The trade balance deficit is a direct consequence of the exchange rate appreciation.
  - The appreciation of the exchange rate means local currency value increases so that imports are cheaper.
- The composition of sectoral production changes
  - Output increases in the mining, primary (raw materials), service and other services sectors.
  - However, production is reduced in the sectors of agriculture, industry, refinery and finance.

The price shock also provokes changes to Colombia’s labor composition and educational demands:
- Household demand for higher education increases by 2.3% during the simulation period.
  - The number of people entering higher education increases to provide more semiskilled and skilled workers in the period after the shock.
- Unskilled wages decrease in comparison to semi-skilled wages, as do semi-skilled wages in comparison to skilled wages.
- However, the labor supply of unskilled workers decreases relative to semiskilled workers while that of semiskilled workers decreases relative to skilled workers.
Further effects of these are felt after four years:

- The relative wages of unskilled and semiskilled workers (that are now scarcer labor types) increase by around 10%.
- Household demand for all levels of education and training reduces given the relative abundance of skilled labor and the scarcity of unskilled and semi-skilled labor.
  - While unskilled wages become more attractive than semiskilled wages, semiskilled wages improve but do not yet become more attractive than skilled wages.
  - This effect has direct repercussions on labor composition, which is mostly composed of unskilled and semi-skilled labor in the long term.

The shock on commodity prices creates a cyclical dynamic that leads to decreases and increases in the labor supply of unskilled labor (compared to the baseline). It mostly decreases the supply of semiskilled labor while producing a small (due to its relative size) oscillation in the supply of skilled labor.

The shock increases both the opportunity and direct costs for households sending their members to study. Opportunity costs (the value of wages not earned while in education) increase as wages for unskilled labor increase. Meanwhile, direct costs (money spent, such as for tuition fees) increase because the government’s education subsidy is a fixed sum in the national budget: the greater the number of people studying, the lower the allocation for each person.

The greater the education subsidy per person, the lower the school dropout rate (ceteris paribus) as households assume less of the cost of education. People who drop out of education to work generally do not return to study, thereby reducing the development of skilled labor in the country.

Conclusions and policy messages

Human capital formation has been shown to be important for economic growth. Under a commodities boom where education demand is reduced, the government needs to provide incentives to increase the skilled labor supply.

Policy instruments such as conditional transfers for education (education subsidies) can mitigate the effects of the commodities price shock on school dropout rates, and simultaneously, on human capital accumulation, contributing to economic growth in the long run.

While the results from this analysis are for the whole economy, an international commodities price shock will be felt more keenly in production regions. As such, governmental interventions may be better focused in the specific regions and sectors where the economy depends more heavily on mining.