

Measuring Intangibles in Brazil

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Outline

I. Objectives of paper – joint with Sergio Kannebley, Maira Scarpelli and Siddharth Sharma

- How important are the “new sources of growth” for development?

II. Methodology and data

- Apply CHS to a developing country

III. Main findings

IV. What’s next? Towards a work program for development

- “Make the policy case” for intangibles
- Measure intangibles for more developing countries
- Focus on asset types most relevant for development – from the firm level up
- Focus on intangibles related to green growth
- Benefits from an alliance with WAVES?

I. Objectives

Begin to understand, in developing countries, the extent to which intangibles are a “new source of growth” and if so, what do about it:

- the extent of investment in intangible assets
- the importance of these investments in driving innovation, aggregate TFP, output and job growth
- policy implications, including policy linkages to more inclusive growth

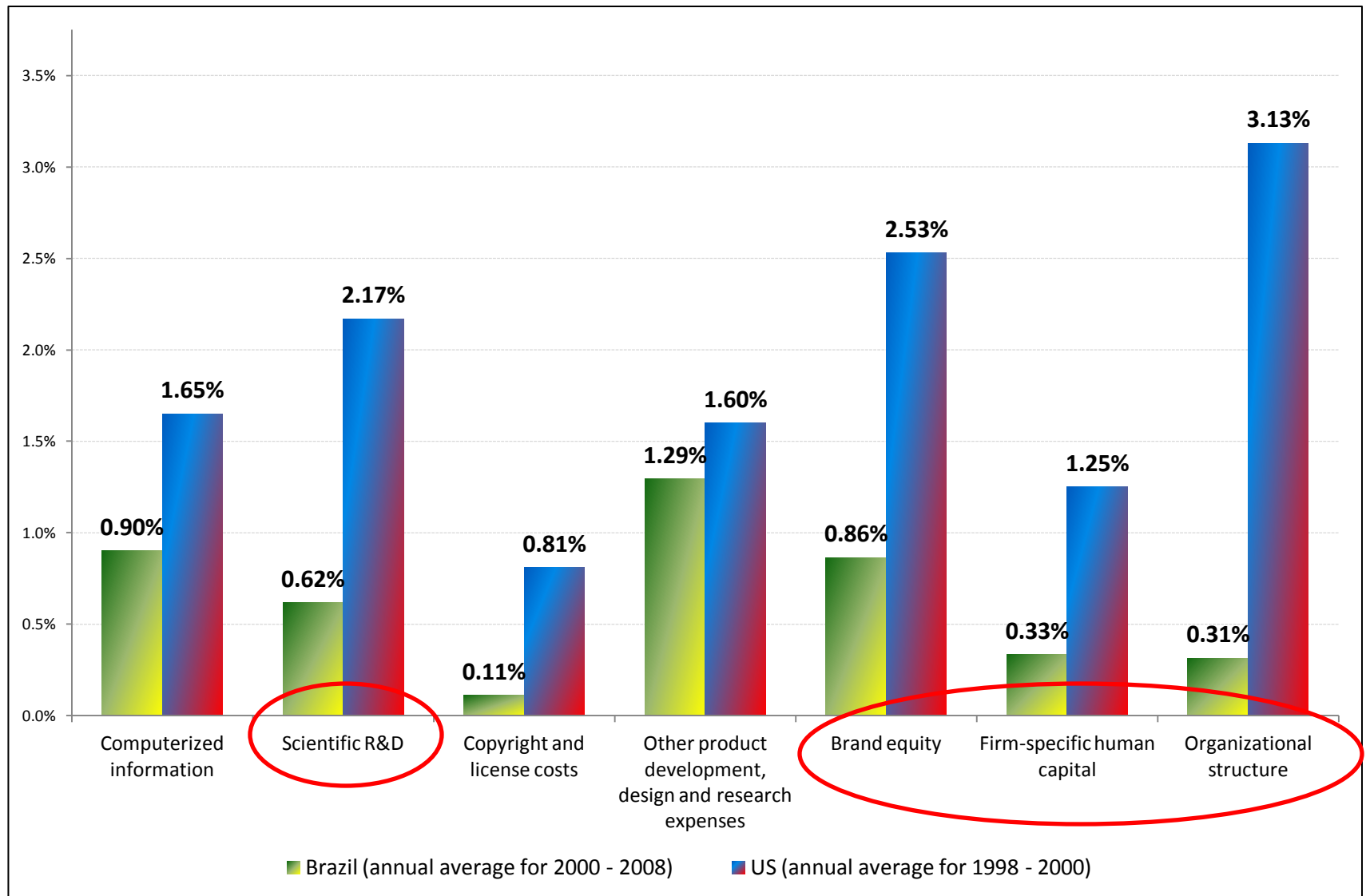
II. Methodology and data

- Same categorization of intangibles as CHS – for methodological comparability
- Focus on business expenditures
- Closest Brazil counterparts to US data cited in CHS
 - Preferred method: build up expenditures from firm-level survey data
 - Alternative: use official data such as National Accounts
 - Availability of expenditure data poorer in Brazil, so rely more on indirect revenue of intangible producing industries
- Key R&D data only goes back to 2000, so restricted to 2000-08
- Calculate estimates at industry-level as well (55 2-digit industries)

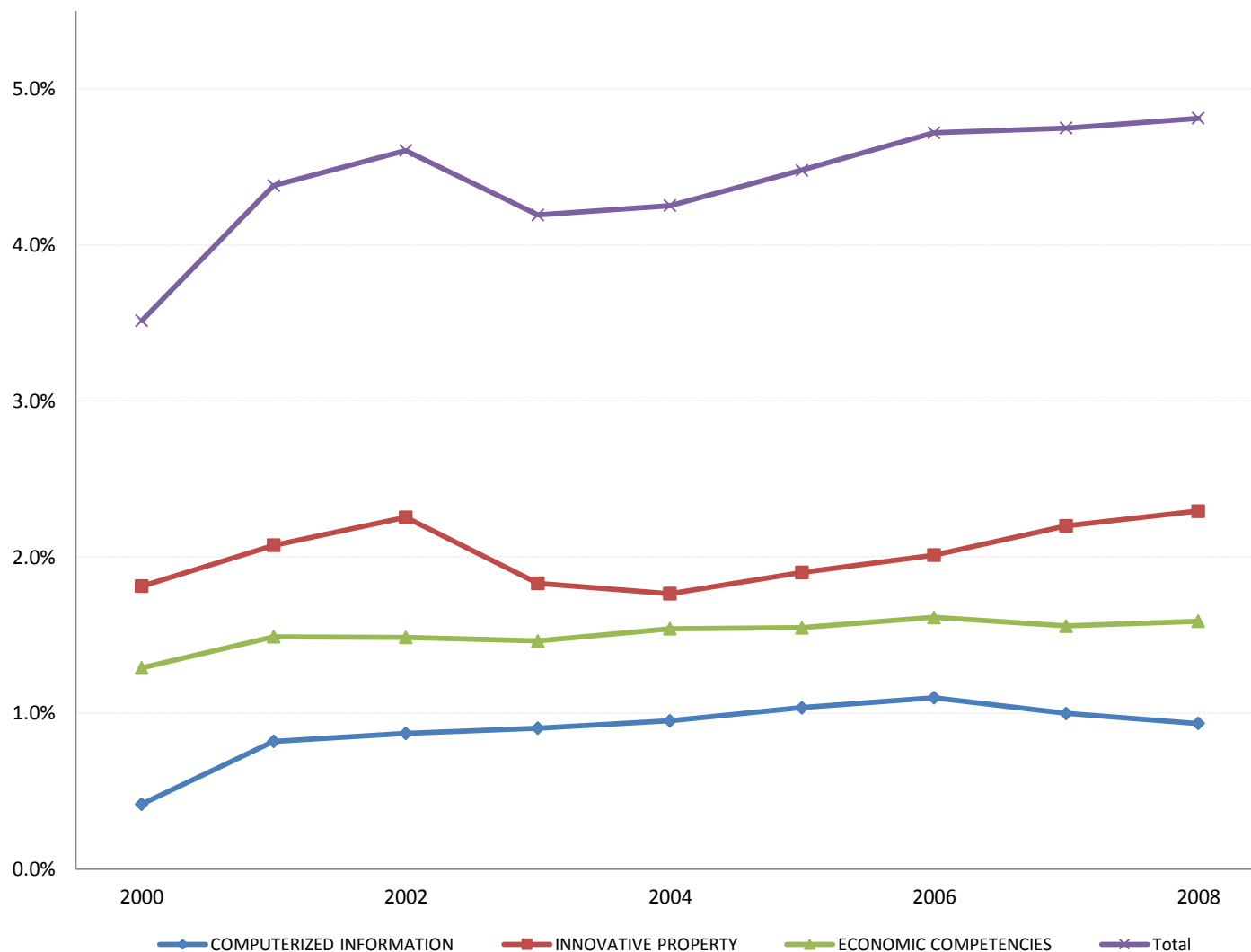
III.1 Main findings: Cross-country comparison

| Table 1: Cross-country Comparison of Aggregate Intangible Expenditures (% of GDP) | | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-----|
| | Germany | France | Italy | Spain | UK | US | Japan | China | Brazil | |
| | 2006 | 2006 | 2006 | 2006 | 2006 | 2000 | 2000-05 | 2006 | 2006 | |
| 1. Computerized info. | 0.69 | 1.33 | 0.61 | 0.75 | 1.42 | 1.24 | 2.03 | 1.88 | 1.10 | 23% |
| 2. Innovative property | 3.38 | 2.98 | 2.13 | 2.66 | 2.88 | 4.07 | 5.42 | 3.40 | 2.01 | 43% |
| a) R&D, including social sciences and humanities | 1.62 | 1.22 | 0.56 | 0.60 | 0.98 | 1.69 | 2.57 | 1.02 | 0.56 | |
| b) Mineral exploration and evaluation | 0.01 | 0.04 | 0.09 | 0.04 | 0.04 | 0.78 | - | 0.21 | 0.03 | |
| c) Copyright and license costs | 0.20 | 0.29 | 0.10 | 0.17 | 0.20 | 0.55 | 1.01 | 0.08 | 0.11 | |
| d) Development costs in financial industry | 0.70 | 0.56 | 0.56 | 0.50 | 0.06 | 0.55 | 1.84 | 0.47 | 1.10 | |
| e) New architectural and engineering designs | 0.85 | 0.87 | 0.82 | 1.35 | 1.60 | 0.50 | - | 1.62 | 0.21 | |
| | | | | | 60% | 53% | | | | |
| 3. Economic competencies | 3.14 | 3.84 | 2.63 | 2.19 | 6.44 | 5.94 | 3.39 | 2.34 | 1.61 | 34% |
| a) Brand equity | 0.88 | 1.55 | 1.13 | 0.67 | 1.77 | 2.25 | 1.83 | 0.63 | 0.93 | |
| <i>Of which: - Advertising expenditure</i> | 0.65 | 1.15 | 0.75 | 0.30 | 1.40 | 2.07 | - | 0.63 | 0.84 | |
| <i>- Market research</i> | 0.23 | 0.40 | 0.38 | 0.37 | 0.37 | 0.18 | - | - | 0.09 | |
| b) Firm-specific human capital | 1.21 | 1.41 | 0.99 | 0.78 | 2.33 | 1.05 | 0.46 | 0.29 | 0.34 | |
| <i>Of which: - Continuing vocational training</i> | 0.61 | 1.17 | 0.68 | 0.68 | - | - | - | 0.29 | - | |
| <i>- Apprentice training</i> | 0.60 | 0.24 | 0.31 | 0.10 | - | - | - | - | - | |
| c) Organizational capital | 1.05 | 0.88 | 0.50 | 0.75 | 2.35 | 2.64 | 1.10 | 1.41 | 0.34 | |
| <i>Of which: - Purchased</i> | 0.51 | 0.30 | 0.14 | 0.26 | 0.47 | - | - | - | 0.04 | |
| <i>- Own account</i> | 0.54 | 0.58 | 0.36 | 0.49 | 1.88 | - | - | 1.41 | 0.30 | |
| Total Expenditures | 7.21 | 8.15 | 5.37 | 5.60 | 10.74 | 11.25 | 10.84 | 7.62 | 4.72 | |

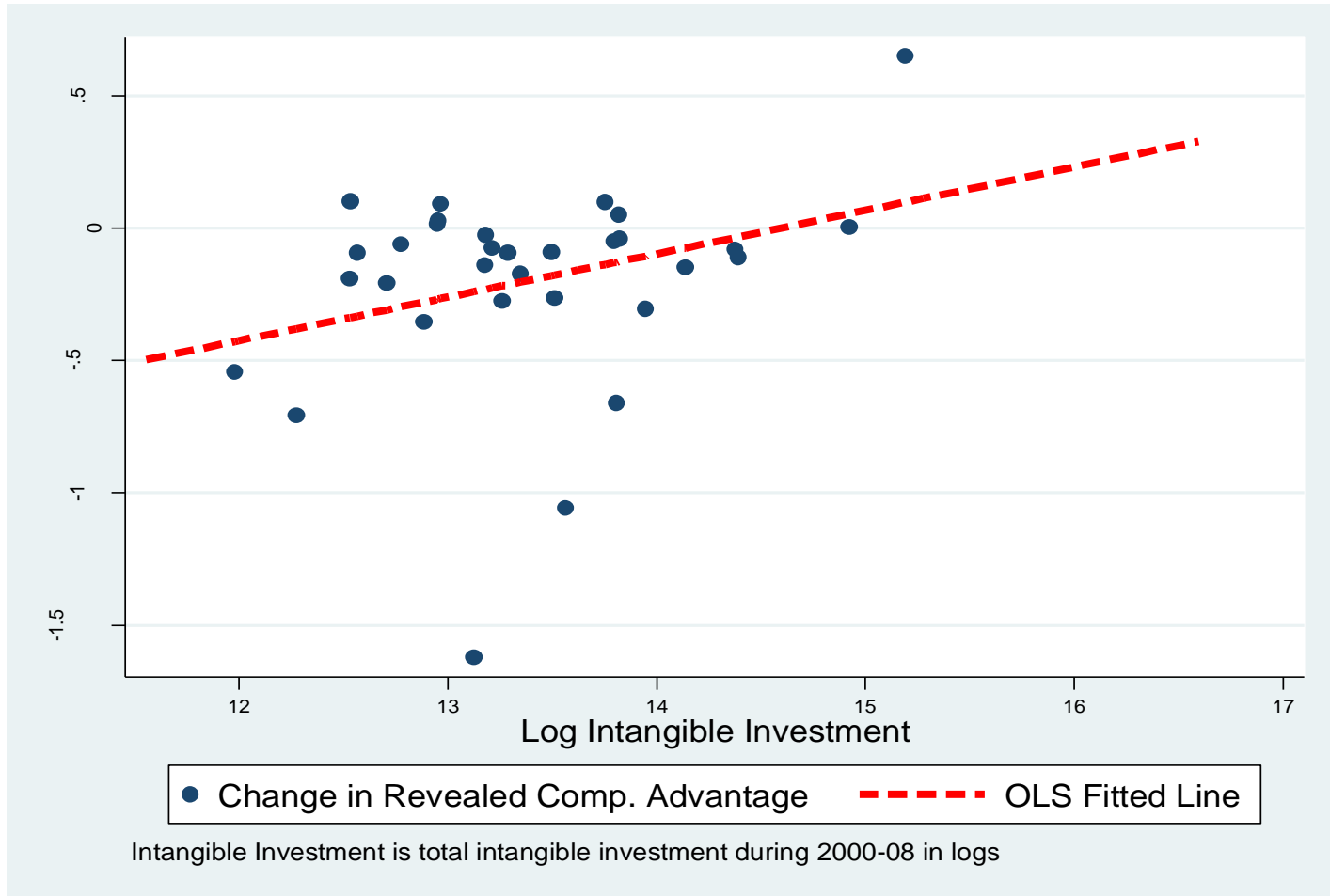
III.2 Spending by category of intangibles (% of GDP)



III.3 Time trend in intangible expenditures (% of GDP)



III.4 Intangible investment & export growth



III.5 Intangible capital correlated with TFP*

| Table 2: Intangible investment and TFP across manufacturing industries in Brazil | | | | | | | | |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Dependent variable | TFP1 | TFP1 | TFP1 | TFP1 | TFP2 | TFP2 | TFP2 | TFP2 |
| Industry FEs | No | No | Yes | Yes | No | No | Yes | Yes |
| Year FEs | No | Yes | No | Yes | No | Yes | No | Yes |
| Intangible capital | 0.190* | 0.416** | 0.175 | 0.585** | 0.206** | 0.420** | 0.191* | 0.574** |
| | (1.810) | (2.390) | (1.640) | (2.130) | (1.960) | (2.390) | (1.800) | (2.090) |
| Constant | -0.077 | -0.095 | -0.070 | -0.162 | -0.083 | -0.100 | -0.077 | -0.161 |
| | (-1.570) | (-1.070) | (-1.530) | (-1.360) | (-1.710) | (-1.110) | (-1.670) | (-1.340) |
| R-squared – within | | | 0.012 | 0.218 | | | | 0.208 |
| - between | | | 0.091 | 0.091 | | | | 0.101 |
| - overall | 0.016 | 0.206 | 0.016 | 0.202 | 0.019 | 0.198 | | 0.195 |

* except for industry fixed effects model without controls for time, for TFP1

2 different estimates of TFP based on different assumptions for initial K stock

TFP1: growth of inv in 1st 5 years + depreciation varies (stable K/output)

TFP2: ...equal to 10% for all sectors

IV.1 What's next?

- (1) “Make the policy case” for intangibles
 - **how to make the intangibles agenda resonate with policymakers?**
 - demonstrating how policy affects **TFP, output and job growth** thru the interaction of resource reallocation, investment in intangibles and innovation
 - given limited budgets, what are tradeoffs in promoting specific investments: how important are intangibles relative to other investments?
 - what policy barriers should be removed
 - what missing policies should be added

- (2) Measure extent & desirability of investments for more developing countries
 - Data on more developing countries = more learning of what's important

 - Once sufficient no of countries, understand whether a country's investment in intangibles is higher or lower than predicted based on its main determinants
 - No presumption that US levels optimal, either for US or for other countries
 - Explore whether levels are higher or lower than what is explained by key drivers of investment: endowments, industrial structure, technological capabilities, and business environment

IV.2 What's next?

(3) Focus on assets most relevant for development – from the firm level up

- Break down spending on economic competencies into:
 - (i) "**absorption-related competencies**"=investments in those intangibles that allow firms to make better use of existing physical assets, and better use of new-to-the-firm technologies (e.g. training, organizational change , building brand equity, marketing)
 - (ii) "**connectedness-related competencies**"=investments in connecting entrepreneurs, firms and institutions in ways that facilitate productive global knowledge flows, within and across countries (e.g. network-building, on local and foreign knowledge consultants, suppliers, universities and the diaspora, and learning from relations with customers)
- Measure firm-level investments in specific industries: **ongoing case study of the Chilean wine industry**, given importance of branding, knowledge network building, and the existence of non-price estimates of product quality

(4) Focus on green intangibles related to green growth

- Use data on green technologies and products to measure green intangibles
 - recent Brazil paper breaks down green R&D spending beyond renewable energy including biodiversity (energy systems, sustainable resource extraction) and green agriculture (biotech and sustainability of agricultural production)

IV.3 What's next?

(5) Benefits from an alliance with WAVES?

- WAVES (Wealth Accounting and Valuation of Ecosystem Services) is a global partnership launched in 2010 to **measure** the share of natural capital in national accounts, and **promote its use in economic decision-making**
- Natural capital = minerals & energy, forest timber, agricultural land, fisheries, water + air & water filtration, flood protection, carbon storage, pollination for crops & habitat for wildlife services (values often not captured in markets)
- In the approach adopted by UN Statistical Commission of the System for Environmental-Economic Accounts (SEEA), “intangible capital” is computed as a residual by subtracting from estimated total wealth the values of physical capital, natural capital, and net foreign financial assets
- **A similar agenda = Beyond traditional GDP –**
“income for the long-term & including knowledge assets”
 - **Build capacity to measure**
 - **Demonstrate benefits to policymakers**