

Productivity and Investment in the Brazilian Economy during the 2000s

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MOTIVATION

Introduction

- Productivity growth is a strategic element in the process of economic growth and development;
- The Brazilian economy has presented a low rate of productivity growth in the 2000's;
- The paper aims to investigate the causes of this low rate of productivity growth in the Brazilian economy in the period under analysis.

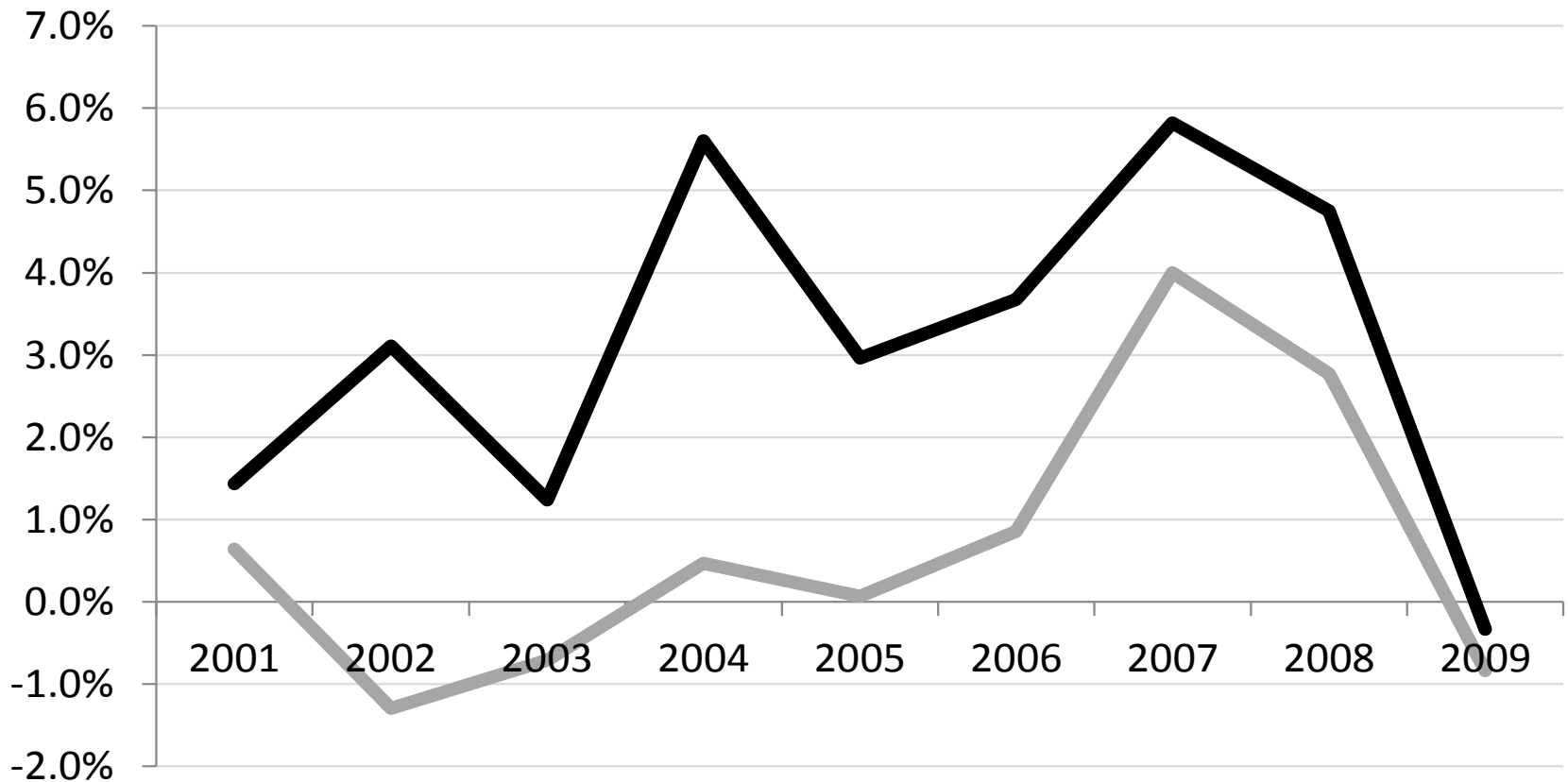
Main hypothesis

- Embodied technical change is one of the key sources of productivity growth in a developing economy;
- There is a causal relationship between the low trend rate of investment growth and the low trend rate of productivity growth, mainly in manufacturing industries;
- Investment realized by manufacturing industries in the period did not involved new plants, but mostly the acquisition of new equipment and machinery to be used within the existing plants:
 - A pattern of investment that implies less productivity gains.

PRODUCTIVITY PERFORMANCE

Annual Growth Rates of Labor Productivity and Real Value Added

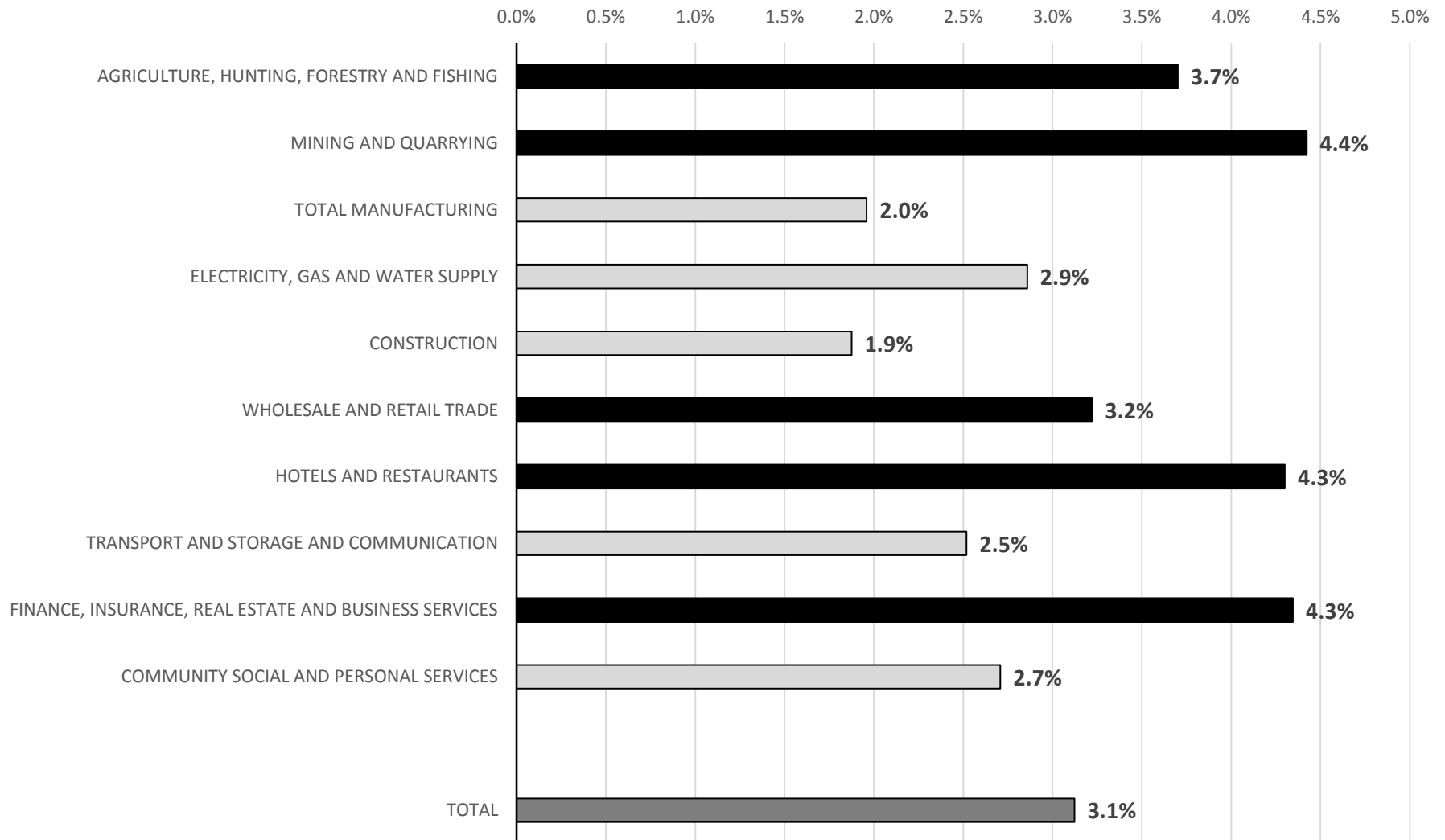
— Labor Productivity — Value Added



Annual Growth Rates of Labor Productivity and Real Value Added

- From 2000 to 2004:
 - Lower rate of growth of real value added and an outward oriented pattern of economic growth
 - Lower rate of growth of labor productivity
- From 2004 to 2008:
 - Higher rate of growth of real value added and a domestic markets oriented pattern of economic growth
 - Higher rate of growth of labor productivity
- The World Financial crises interrupts the higher pace of growth in 2009

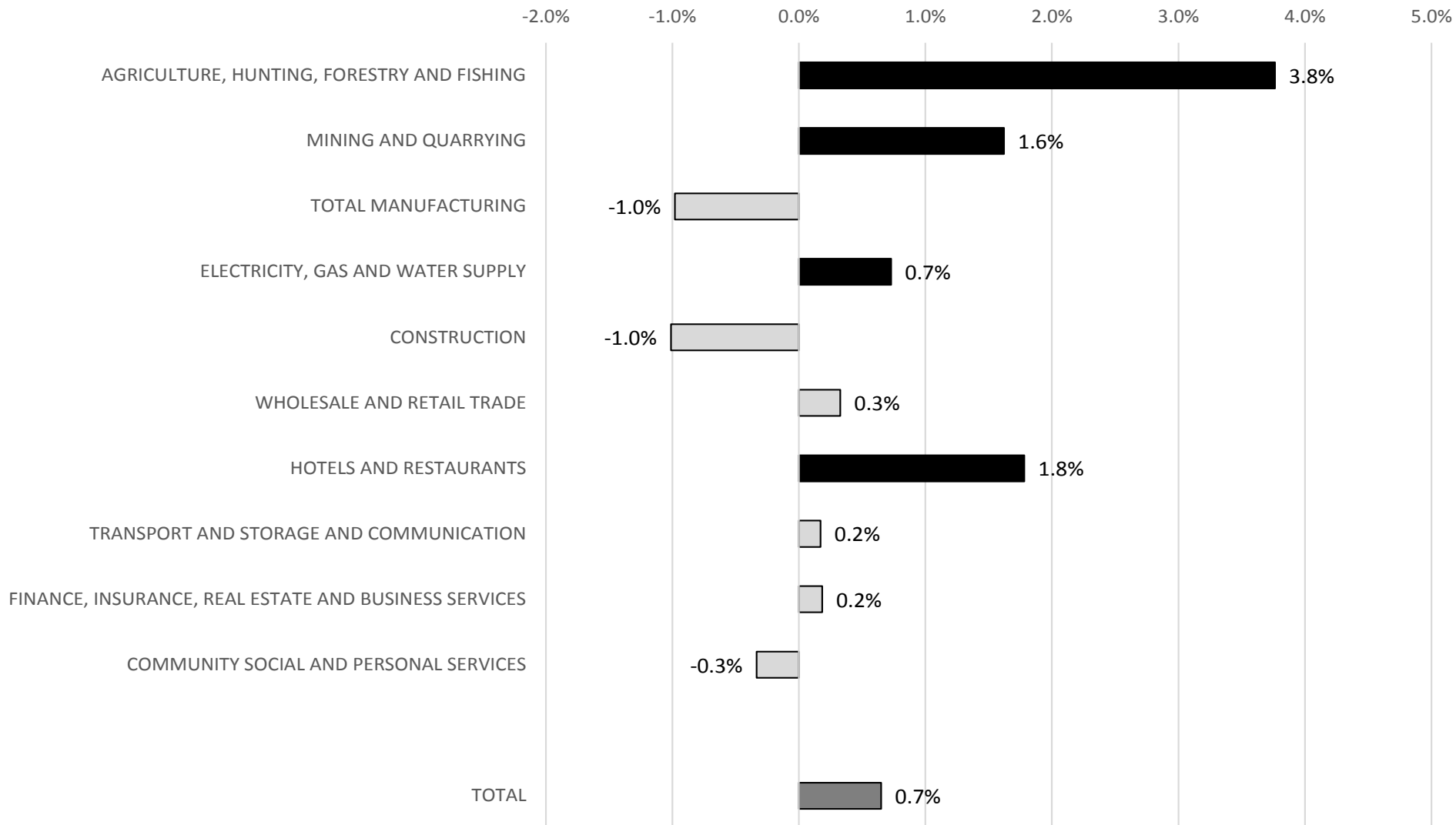
Annual Average Growth Rate of Real Value Added by Industry (2000-2009)



Annual Average Growth Rate of Real Value Added by Industry (2000-2009)

- *Higher growth industries:* AGRICULTURE, HUNTING, FORESTRY AND FISHING; MINING AND QUARRYING; WHOLESALE AND RETAIL TRADE; HOTELS AND RESTAURANTS; and FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES;
- *Lower growth industries:* **TOTAL MANUFACTURING**; ELECTRICITY, GAS AND WATER SUPPLY; CONSTRUCTION; TRANSPORT AND STORAGE AND COMMUNICATION; and COMMUNITY SOCIAL AND PERSONAL SERVICES;
- Note that the dynamics of an industry value added share in total value added depends also upon relative prices changes;

Annual Average Growth Rates of Labor Productivity by Industry (2000-2009)



Annual Average Growth Rates of Labor Productivity by Industry

- *Higher growth industries:* AGRICULTURE, HUNTING, FORESTRY AND FISHING; MINING AND QUARRYING; ELECTRICITY, GAS AND WATER SUPPLY ; and HOTELS AND RESTAURANTS.
- *Lower growth industries:* TOTAL MANUFACTURING; CONSTRUCTION; WHOLESALE AND RETAIL TRADE; TRANSPORT AND STORAGE AND COMMUNICATION; FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES; and COMMUNITY SOCIAL AND PERSONAL SERVICES.
- Note again that relative prices changes have to be isolated in order to have a precise estimate of an industry contribution to the growth of aggregate labor productivity

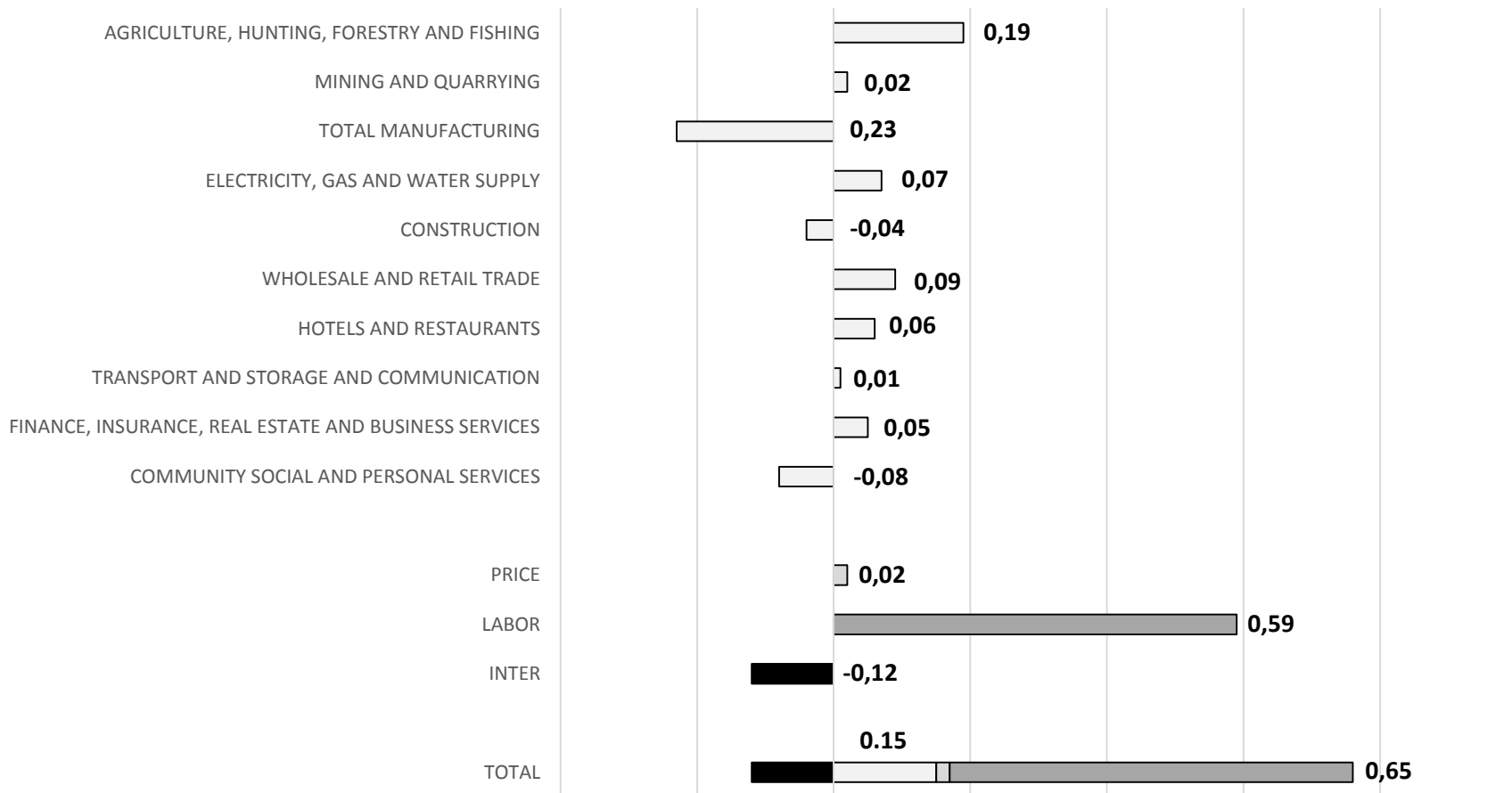
Diewert's Labor Productivity Growth Decomposition

$$\begin{aligned}\hat{X}_t &= \sum_i q_{t-1}^i \hat{X}_t^i \\ &+ \sum_i q_{t-1}^i \sigma^i \\ &+ \sum_i q_{t-1}^i \rho^i \\ &+ \left(\sum_i q_{t-1}^i \hat{X}_t^i \rho^i + \sum_i q_{t-1}^i \hat{X}_t^i \sigma^i \right. \\ &\quad \left. + \sum_i q_{t-1}^i \rho^i \sigma^i + \sum_i q_{t-1}^i \hat{X}_t^i \rho^i \sigma^i \right)\end{aligned}$$

Labor Productivity Growth (Diewert) Decomposition

□ Direct □ Price ■ Labor ■ Inter

(0.40) (0.20) - 0.20 0.40 0.60 0.80 1.00

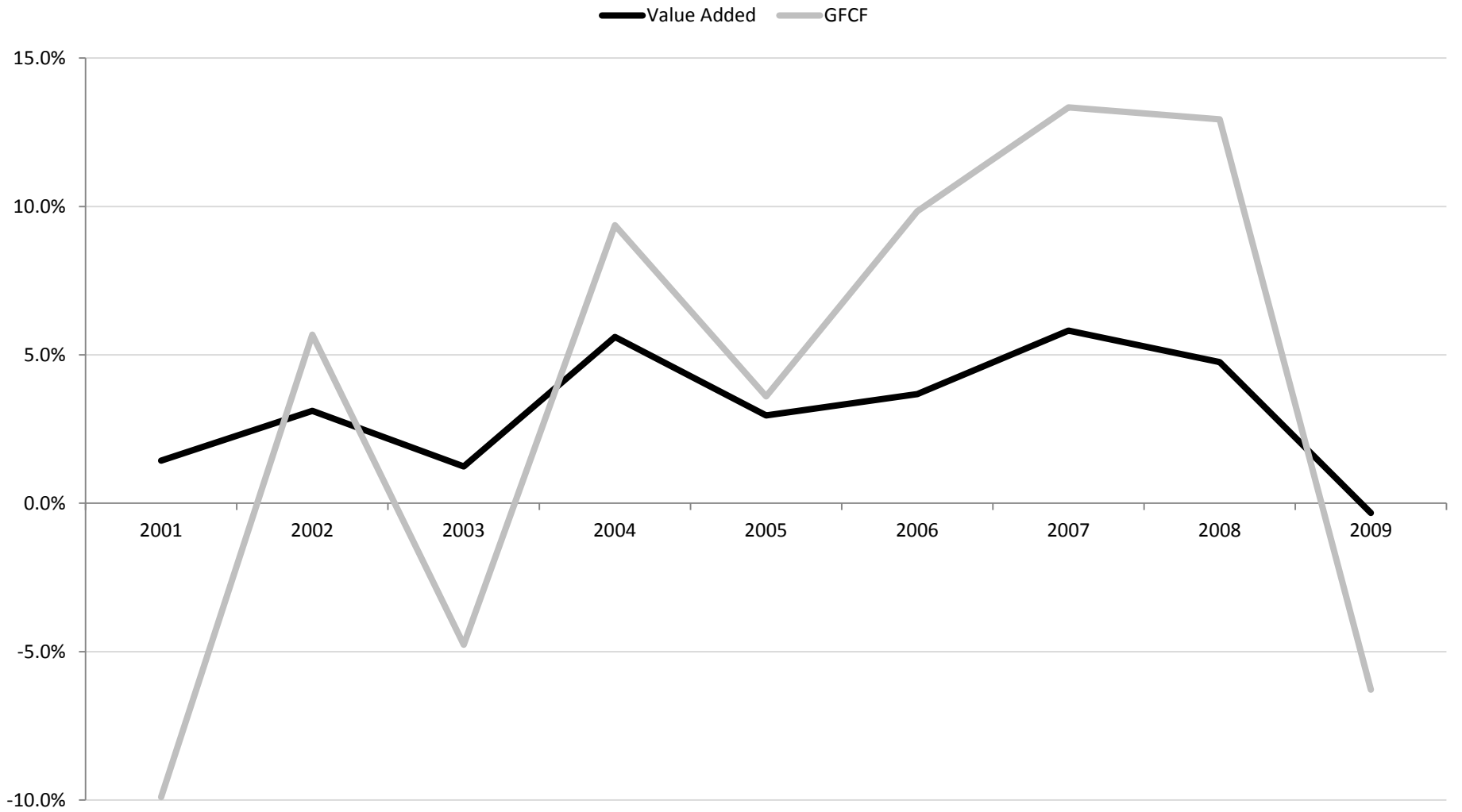


Labor Productivity Growth (Diewert) Decomposition

- AGRICULTURE, HUNTING, FORESTRY AND FISHING industry has the greater contribution to aggregate labor productivity growth in the period
- TOTAL MANUFACTURING has the smallest contribution to aggregate labor productive growth
- Observe that the *labor reallocation effect* is the main contributor to overall labor productivity growth in the Brazilian economy in the 2000s

INVESTMENT PERFORMANCE

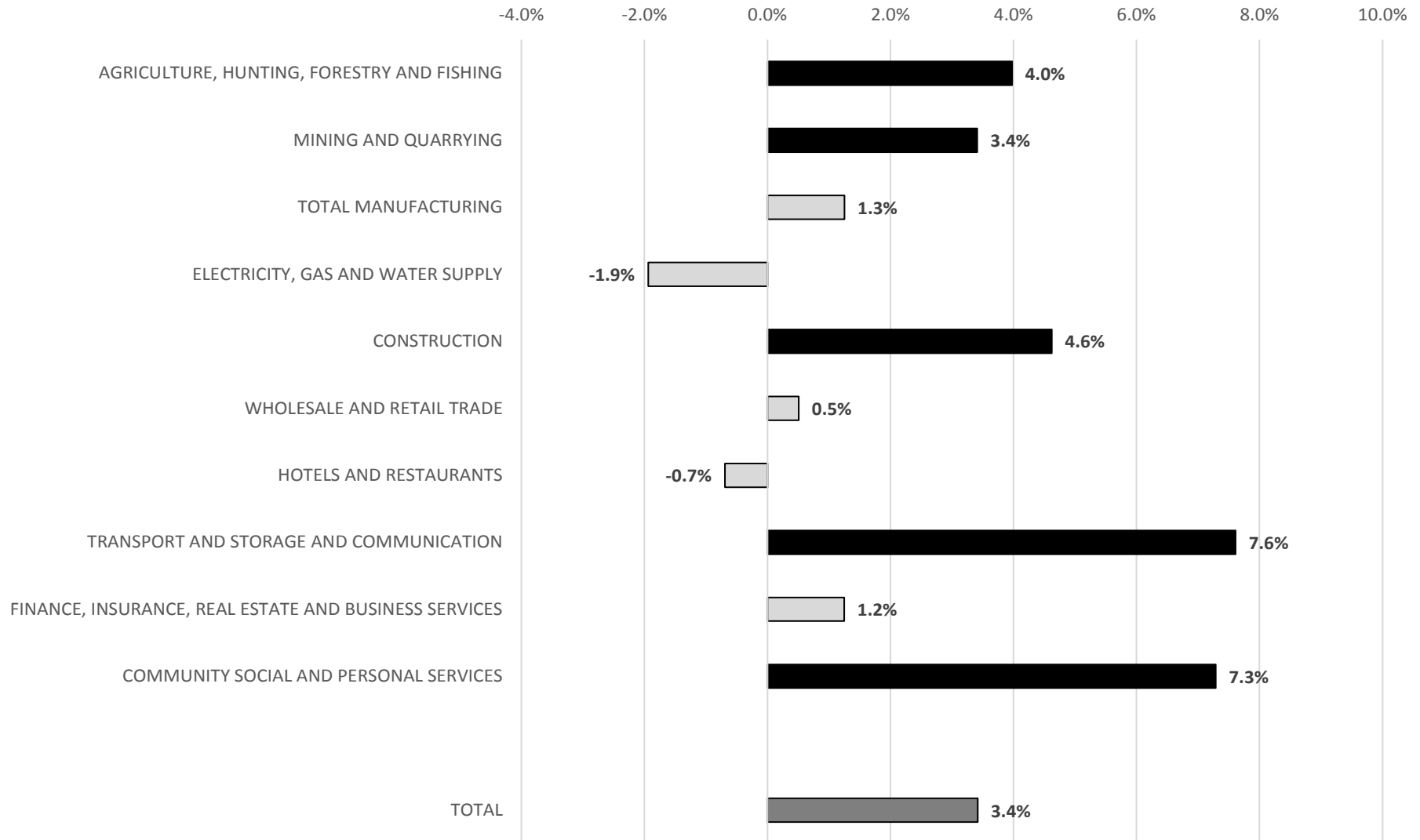
Annual Growth Rates of Total GFCF and Real Value Added



Annual Growth Rates of Real GFCF and Real Value Added

- Real GFCF growth follows a similar pattern to the rate of growth of real value added
 - From 2000 to 2004 Real GFCF grows at -0.2 % per year in average leading to a decrease in the investment share of aggregate output
 - From 2004 to 2008 Real GFCF grows at 9.9 % per year in average leading to an increase in the investment share of aggregate output
 - In 2009 the world crises has a huge influence on the pace of fixed capital formation of the Brazilian economy, leading to a decrease of 6.3% in real GFCF

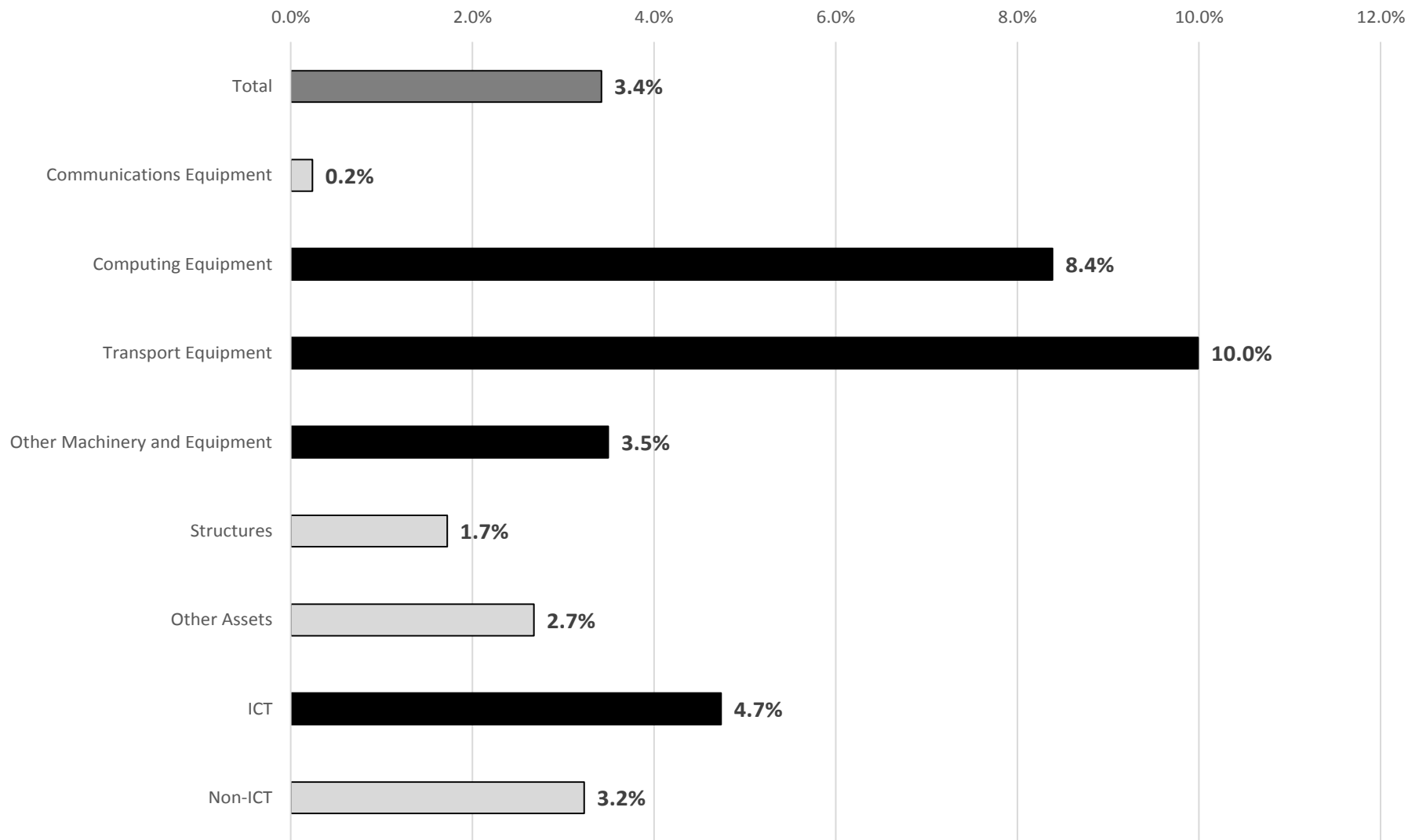
Annual Average Growth Rates of GFCF by Industry



Annual Average Growth Rates of GFCF by Industry (2000-2009)

- *Higher growth industries:* AGRICULTURE, HUNTING, FORESTRY AND FISHING; MINING AND QUARRYING; CONSTRUCTION ; TRANSPORT AND STORAGE AND COMMUNICATION; and COMMUNITY SOCIAL AND PERSONAL SERVICES.
- *Lower growth industries:* TOTAL MANUFACTURING; ELECTRICITY, GAS AND WATER SUPPLY; WHOLESALE AND RETAIL TRADE; HOTELS AND RESTAURANTS ; and FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES .
- *Remark:* observe the important direct and indirect influence of the Brazilian government in the capital formation process, particularly from 2004 on.
- *Remark:* note the poor performance of TOTAL MANUFACTURING industry in contrast with the good performance of the AGRICULTURE, HUNTING, FORESTRY AND FISHING and MINING AND QUARRYING industries.

Annual Average Growth Rates of GFCF by Asset (2000-2009)

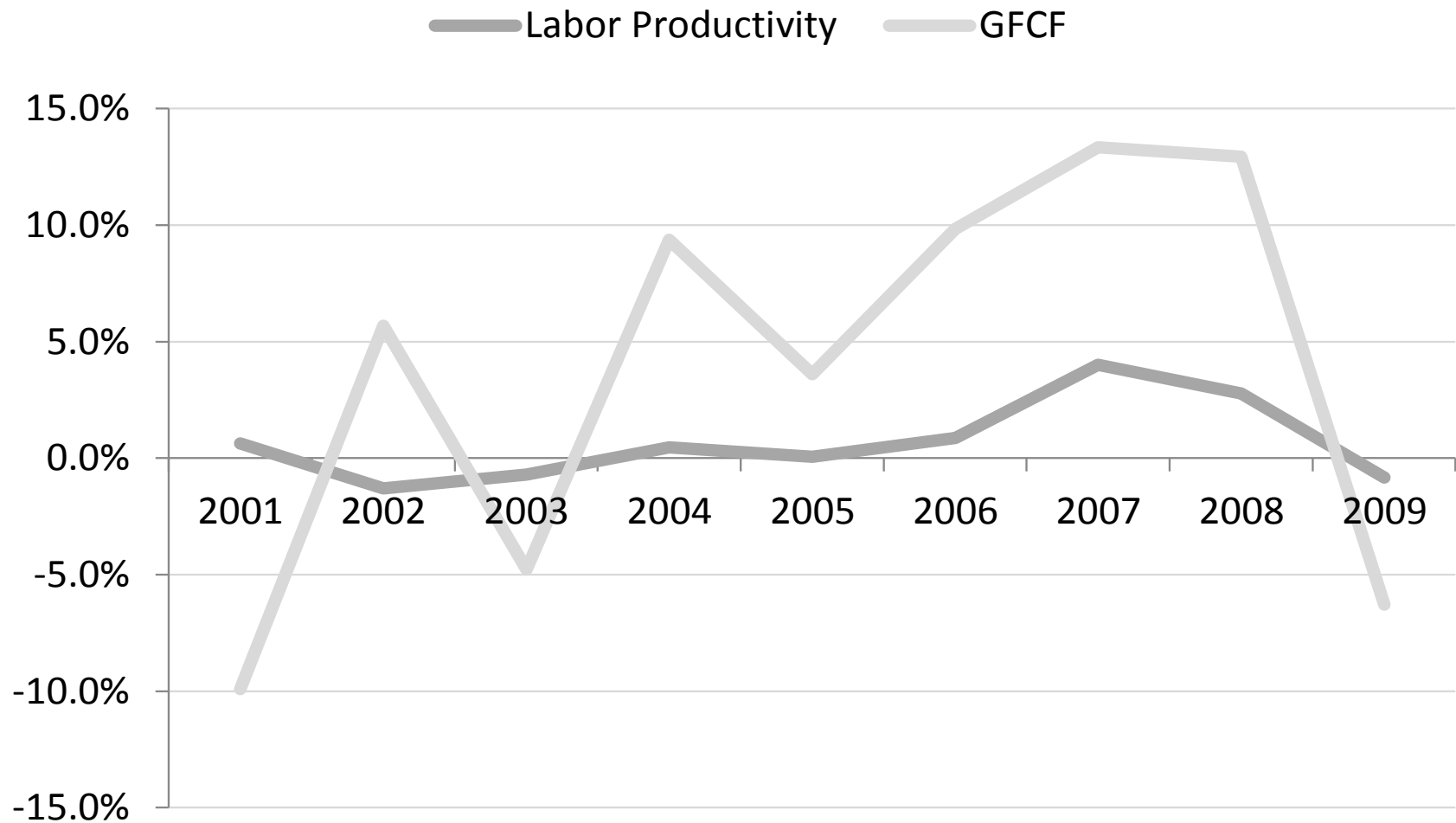


Annual Average Growth Rates of GFCF by Asset (2000-2009)

- *Higher Growth Assets:* Transport equipment; computing equipment; other machinery equipment;
- *Lower Growth Assets:* Communications equipment; **Structures**; Other Assets;
- *Remark:* low growth rate of structures compared to the higher rates of growth of equipment and machinery.

PRODUCTIVITY AND INVESTMENT

Annual Growth Rates of Labor Productivity and GFCF



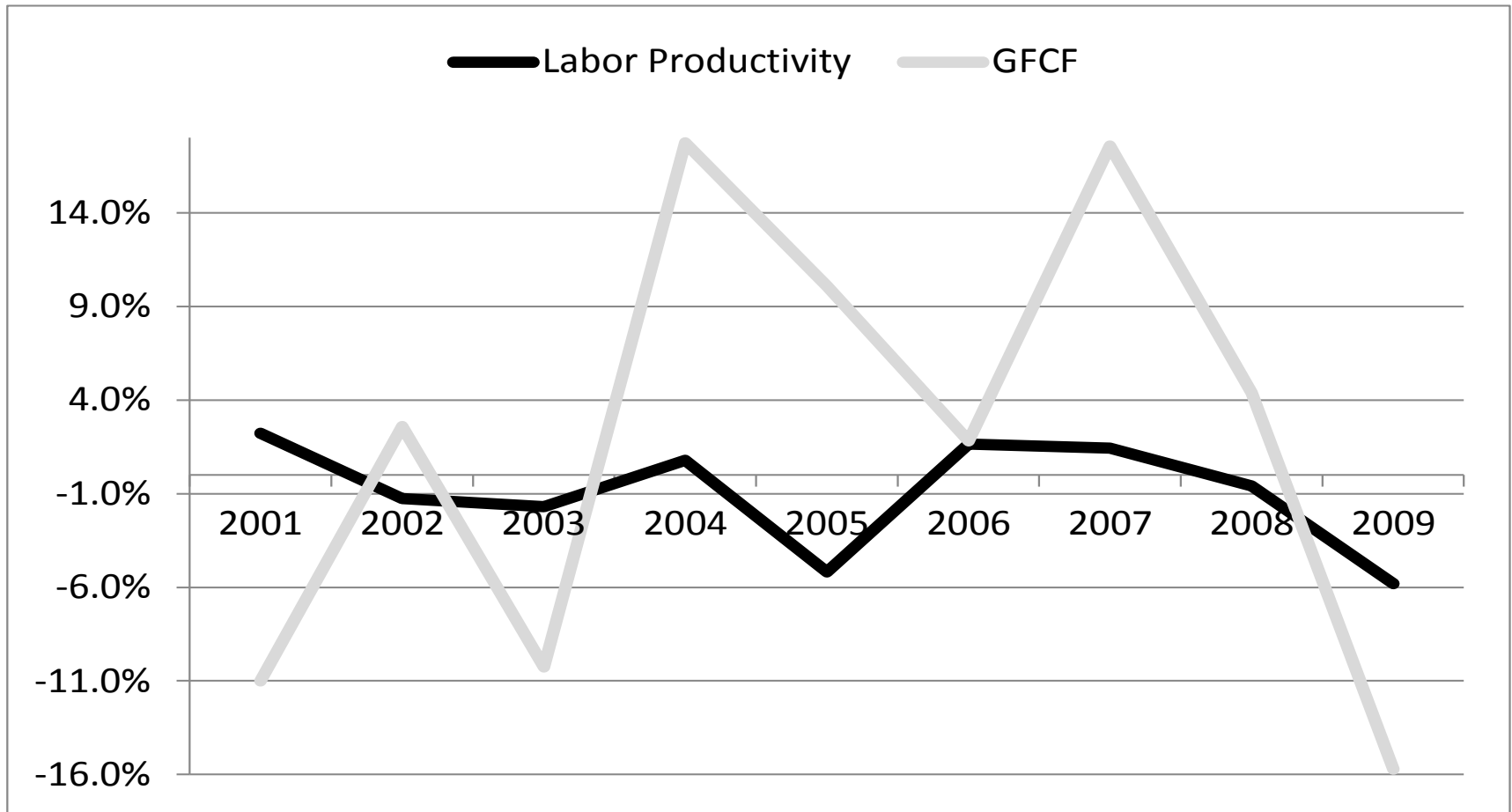
Annual Growth Rates of Labor Productivity and GFCF

- There seems to be a positive, but not very strong, relationship between the trend rate of real GFCF growth and the trend rate of growth of labor productivity in the Brazilian economy during the period considered
- Our hypothesis is that the weakness of the above relationship is due to the pattern of investment observed in the Brazilian economy in the 2000s:
 - Lack of investment in new plants (greenfield investment)
 - Prevalence of investment in acquisition of new equipment and machinery to maintain productive capacity in line with markets expansion

Assets share of total GFCF



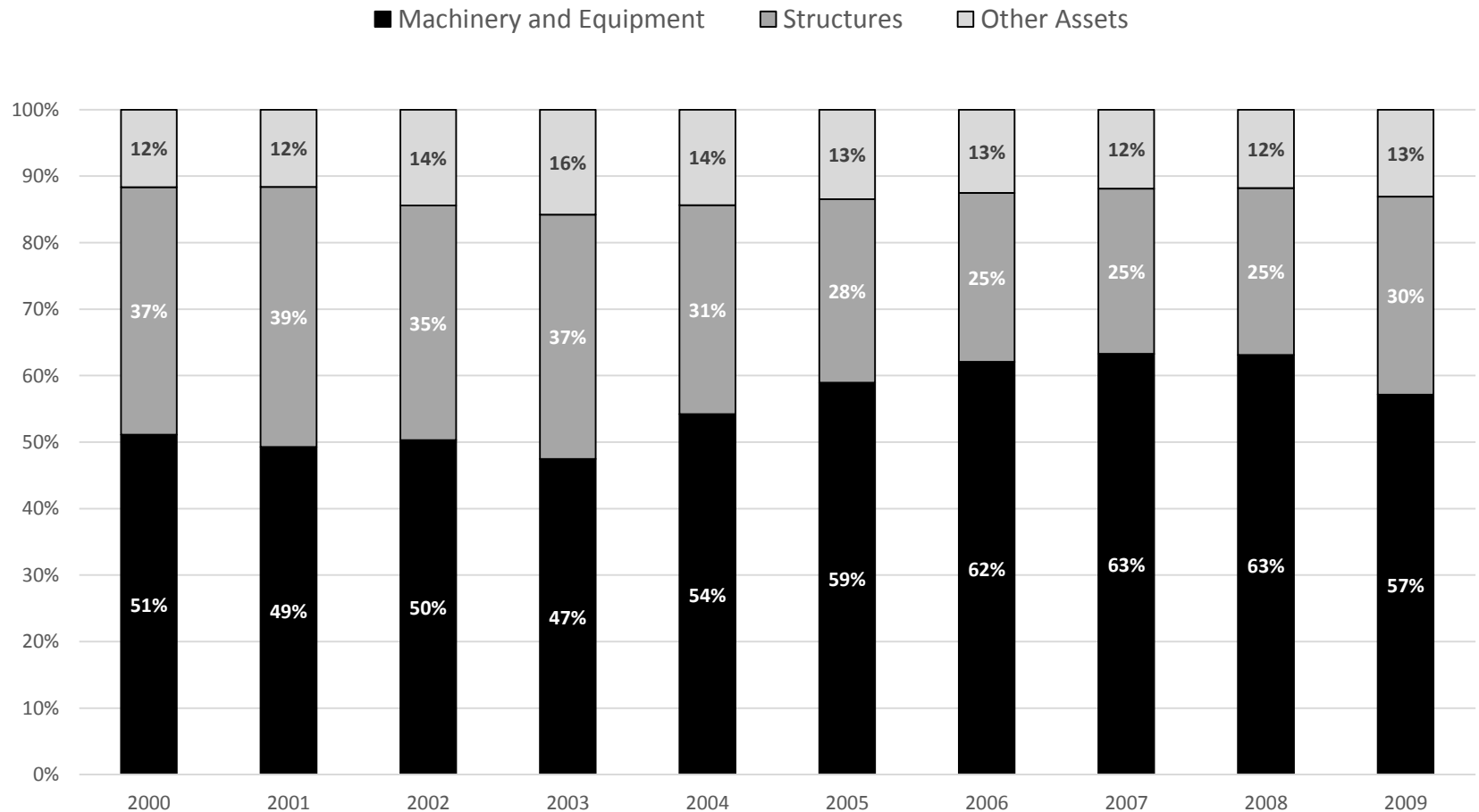
Total Manufacturing: Annual Growth Rates of Labor Productivity and GFCF



Total Manufacturing: Annual Growth Rates of Labor Productivity and GFCF

- The relationship discussed before is even more weak in the case of Total Manufacturing industry
- The pattern of investment with the prevalence of acquisition of equipment and machinery over new plants is stronger in the Total Manufacturing industry
- As result the poor labor productive performance of Total Manufacturing in the 2000s can be related to:
 - The low trend rate of growth of GFCF in the Total Manufacturing in the period;
 - The kind of investment realized that reduced the productivity gains associated with the introduction of new vintages of fixed capital assets.

Assets share of Total Manufacturing GFCF



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